UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
RESEARCH AND DEVELOPMENT

September 13, 2017

MEMORANDUM

SUBJECT: Laboratory PFAS Results for NC DEQ Chemours Test Well Samples

FROM: Timothy J. Buckley, Directo Personal Matters / Ex. 6
Exposure Methods and Measurements Division

THRU: Jennifer Orme-Zavaleta, Dire Personal Matters / Ex. 6
National Exposure Research I

TO: Julie S. Woosley, Chief
Hazardous Waste Section
North Carolina Department of Environmental Quality

Per your email request of July 21, 2017, attached please find our laboratory analysis report of PFAS concentration results for sampling on or near the Chemours-Fayetteville, NC facility. These results are a part of a larger effort in support of NC DEQ that has included 4 previous reports providing PFAS results from sampling along the Cape Fear River upstream and downstream of Chemours.

Thank you for inviting us to be a part of this effort that addresses a very important public health concern in North Carolina. These results represent the effort of many within our lab, but I would especially like to acknowledge Drs. Mark Strynar, Andy Lindstrom, James McCord, Johnsie Lang, and Seth Newton in conducting the laboratory analyses, Dr. Myriam Medina-Vera who provided invaluable support and coordination, and Ms. Sania Tong Argao who supported and oversaw quality assurance.

If you have any questions or concerns, do not hesitate to contact me at (919) 541-2454 or email buckley.timothy@epa.gov. I look forward to our continued work together.

Enclosure

CC: Linda Culpepper, NC DEQ Deputy Director
Becky B. Allenbach, USEPA Region 4
Jeff Morris, USEPA OPPT
Betsy Behl, USEPA, OW
Peter Grevatt, USEPA, OW
Kathleen Raffaele, OLEM

Summary of Results

PFAS water concentration results are reported for 19 sites on or near the Chemours Fayetteville, NC facility. We understand that these samples were collected by Chemours staff under the observation of your staff during the week of July 31, 2017. Samples were delivered to our laboratory on August 3rd and 4th. For these samples, we did not provide sample containers nor did we provide field blanks or spikes, so our assessment of quality control is limited. We report the concentration of 16 analytes using two methods, i.e., targeted and non-targeted analysis. For the targeted analysis, we report concentrations for 11 analytes (Table 1). For these targeted analytes, concentrations and chemical identity were determined with high certainty based on reference standards and a calibration curve.

Table 1. PFAS Measured Using Targeted Analysis

Short Name	Chemical Name	Formula	CAS #	Monoisotopic Mass (Da)
GenX	Perfluoro(2-methyl-3-oxahexanoic) acid	$C_6HF_{11}O_3$	13252-13-6	329.9750
PFBA	Perfluorobutyric acid	$C_4HF_7O_2$	375-22-4	213.9865
PFPeA	Perfluoropentanoic acid	$C_5HF_9O_2$	2706-90-3	263.9833
PFHxA	Perfluorohexanoic acid	$C_6HF_{11}O_2$	307-24-4	313.9801
PFHpA	Perfluoroheptanoic acid	$C_7HF_{13}O_2$	375-85-9	363.9769
PFOA	Perfluorooctanoic acid	$C_8HF_{15}O_2$	335-67-1	413.9737
PFNA	Perfluorononanoic acid	$C_9HF_{17}O_2$	375-95-1	463.9705
PFDA	Perfluorodecanoic acid	$C_{10}HF_{19}O_2$	83-89-6	513.9673
PFBS	Perfluorobutanesulfonic acid	$C_4HF_9SO_3$	206-793-1	299.9503
PFHxS	Perfluorohexanesulfonic acid	$C_6HF_{13}SO_3$	355-46-4	399.9439
PFOS	Perfluorooctanesulfonic acid	$C_8HF_{17}SO_3$	1763-23-1	499.9375

Non-targeted results are reported for 5 analytes (Table 2). For these non-targeted analytes, standards are not available. Therefore, the concentration of these analytes is estimated assuming that the mass spectrometer is responding to the non-targeted analyte as it responds to GenX (see Equation 1). Accordingly, the concentration estimates of the non-targeted analytes are considered semi-quantitative. For non-targeted analytes, the actual instrument response may be weaker or stronger resulting in an under- or over-estimation of their concentration. Based on experience with this class of analytes, we conservatively suggest a ~10-fold uncertainty around these estimated concentrations.

Table 2. PFAS Measured Using Non-Targeted Analysis

Short Name	Chemical Name	Formula	CAS #	Monoisotopic Mass (Da)
PFMOAA	2,2-difluoro-2-(trifluoromethoxy)acetic acid	$C_3HF_5O_3$	674-13-5	179.9846
PFO2HxA	perfluoro-3,5-dioxahexanoic acid	$C_4HF_7O_4$	39492-88-1	245.9763
PFO3OA	perfluoro-3,5,7-trioxaoctanoic acid	$C_5HF_9O_5$	39492-89-2	311.9680
PFESA Byproduct 1	Perfluoro-3,6-dioxa-4-methyl-7-octene-1-sulfonic acid	$C_7HF_{13}SO_5$	29311-67-9	443.9337
PFESA Byproduct 2	Ethanesulfonic acid, 2-[1-[difluoro(1,2,2,2-tetrafluoroethoxy) methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-	$C_7H_2F_{14}SO_5$	749836-20-2	463.9399

Equation 1: $$[NTA] = [GenX] * \frac{NTA_{PA}}{GenX_{PA}}$$

Where: [NTA] is the concentration of the non-targeted analyte (ng/L)
[GenX] is the concentration of GenX (ng/L)
NTA_{PA} is the integrated peak area for the non-targeted analyte
$GenX_{PA}$ is the integrated peak area for GenX

Results from both the targeted and non-targeted analysis are provided in Table 3. For 15 of the 19 sampling sites, dilutions of 25X to 100X were required in order to yield concentrations within the range of the calibration curve. Results have been flagged accordingly. Although necessary for quantification, diluting the samples introduces additional uncertainty in the measurement. In some cases, even with dilution, concentrations exceeded the calibration curve. These results are flagged accordingly.

Considerable range in PFAS concentrations was observed across analytes and sampling sites. In general, lower concentrations were observed for the legacy PFAS, from below detection to as high as 2,100 ng/L (Table 3). The shorter chain, new generation PFAS, GenX, was observed at concentrations approximately an order of magnitude higher than the legacy compounds. Estimated concentrations of non-targeted analytes including PFMOAA, PFO2HxA, and PFO3OA ranged even more so, from non-detect to as high as 738,000 ng/L (Table 3).

Although we did not have field duplicates or spikes, method performance was assessed with laboratory blanks (n=6). We did not detect any of the targeted analytes in any of the blanks. GenX was detected in three blanks at concentrations slightly above our detection limit of 10 ng/L, i.e. 12.9, 23.4, and 19.3 ng/L. The laboratory methods for the results reported here are described in Sun *et al.*, 2016[1] and Strynar *et al.*, 2015[2].

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[1] Sun M; Arevalo E; Strynar M; Lindstrom A; Richardson M; Kearns B; Pickett A; Smith C; Knappe DRU: Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina. Environmental Science & Technology Letters. 2016

[2] Strynar M, Dagnino S, McMahen R, Liang S, Lindstrom A, Andersen E, McMillan L, Thurman M, Ferrer I, Ball C. Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS). Environ Sci Technol. 2015

Table 3. PFAS Concentrations (ng/L)

Location	Quantified Using Targeted Analysis												Quantified Using Non-Targeted Analysis					Flag
	GenX	Legacy PFAS																
		PFBA	PFPeA	PFHxA	PFHpA	PFOA	PFNA	PFDA	PFBS	PFHxS	PFOS		PFMOAA	PFO2HxA	PFO3OA	PFESA BP1	PFESA BP2	
GW0817 Intake	-	-	21.7	18.4	10.9	-	-	-	-	-	-		34.1	307.0	-	-	-	
GW0817 Outfall	81.7	30.0	30.0	22.5	14.1	9.6	-	-	-	-	-		574	57.8	31.6	-	3,640	
Insitu-1	307*	-	-	-	-	-	-	-	-	-	-		327	78.6	10.6	-	68.0	
LTW-01	19,100	162	224	19.5	36.7	60.9	-	-	-	-	-		23,500	5,090	1,630	-	6,060	3
LTW-01 D	17,100	161	251	18.8	39.7	63.3	-	-	-	-	-		26,500	4,680	1,440	-	5,270	3
LTW-01 MS	26,700*	161	251	18.8	39.7	63.3	-	-	-	-	-		24,900	5,210	1,300	-	8,080	3
LTW-01 MSD	21,500	165	247	21.3	38.1	59.2	-	-	-	-	-		26,900	5,750	1,500	-	6,440	3
LTW-02	5,990	56.8	232	-	-	-	-	-	-	-	-		44,300	3,250	1,190	-	281	3
LTW-03	6,130	130	601*	-	11.5	-	-	-	-	-	-		108,000	5,420	1,380	-	168	3
LTW-04	9,720	328*	1,030	22.6	43.0	-	-	-	-	-	-		83,000	5,550	1,320	14.1	1,590	3
LTW-05	41,000*	385*	1,860	85.7	407*	-	-	-	-	-	-		285,000	21,200	13,500	-	3,810	3
MW-IS	6,540	105	239	14.3	33.8	70.7	19.7	-	-	-	-		24,400	1,680	590	-	6,860	3
SMW01	1,520	11.1	20.3	-	-	10.5	-	-	-	-	-		1,500	242	119	-	635	1
SMW-05P	13,700	59.7	226	74.3	126	1,960	-	-	-	-	-		93,600	4,660	1,590	78.5	1,510	3
SMW-06B	22,700	447*	1,400	96.6	186	2,100	-	-	-	-	-		738,000	38,600	13,300	20,600	12,300	3
SMW-09	12,800	419*	273*	62.2	39.2	38.8	-	-	-	-	-		12,600	-	399	24,500	2,460	3
SMW-10	10.7	-	-	-	-	-	-	-	-	-	-		283	-	-	-	-	
SMW-11	2,580	24.8	26.0	-	-	23.9	-	-	-	-	-		5,650	330	-	-	389	2
SMW-12	767	16.4	20.8	-	-	-	-	-	-	-	-		3,670	206	-	-	-	1

Flag Codes:

dash "-" = concentration below limit of detection of 10 ng/L
1 = Samples Diluted 25X
2 = Samples Diluted 50X
3 = Samples Diluted 100X
* = analyte outside range of calibration curve after dilution

ED_002003J_00095822-00005

To: Fransen, Tom[tom.fransen@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Cox, Heidi[heidi.cox@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]
From: Allen, Trent
Sent: Thur 8/31/2017 8:28:37 PM
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Dr. Strynar,

The lat-long for the lock and dam #3 is 34°37' 31.16" N 78° 34' 28.46" W.

I did not take this sample, and the lat-long is at the boat ramp. Hope this helps.

Trent

From: Fransen, Tom
Sent: Thursday, August 31, 2017 2:05 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Trent,
This is the email we discussed on the phone. I appreciate you getting the lat-long information since I haven't been involved with the sampling.
Tom

From: Culpepper, Linda
Sent: Thursday, August 31, 2017 1:41 PM
To: Fransen, Tom <tom.fransen@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Tom – can you or Melanie send Dr. Strynar the GPS coordinate for the boat ramp at lock & dam #3 on the Cape Fear?

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Johnson, Chris
Sent: Thursday, August 31, 2017 1:14 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

The only information was passed verbally by phone. I believe I heard them say that the sample was collected at the Huske Dam, no exact position provided.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 11:59 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Wow where did that sample come from? Do you have GPS coordinates. The August results of the outfall 002 weeks 6-7 and week8 (which have not yet been reported) do not show anything near that high.

Could it have been the old Chemours discharge creek?

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, August 31, 2017 11:00 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: FW: Brunswick Regional H2GO results from 8/14/17

Mark – sharing results we heard about yesterday on a call with the local water utilities and health directors.
Interesting results on page 9 of 12,600 ppt.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

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Phone: 919-707-9014

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From: Cox, Heidi
Sent: Thursday, August 31, 2017 10:55 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Bob Walker said he collected it from the river at the boat ramp at the O'Huske Lock and Dam, which I believe is Lock & Dam #3.
Heidi

From: Culpepper, Linda
Sent: Wednesday, August 30, 2017 10:38 PM
To: Cox, Heidi <heidi.cox@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Heidi – please follow up with them to see where the sample on page 9 with the GenX test result of 12,600 ppt was taken.
Not sure what O'Huske L&D represents. Thank you.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Cox, Heidi
Sent: Wednesday, August 30, 2017 12:11 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>
Subject: Brunswick Regional H2GO results from 8/14/17

Attached are the results from Brunswick Regional H2GO that were brought up by Bob Walker during the call this morning.
Heidi

Heidi Lane Cox
Regional Engineering Supervisor
Wilmington and Fayetteville Regional Offices
Public Water Supply Section
Department of Environmental Quality

(910) 796-7368 office
Personal Phone / Ex. 6
Heidi.cox@ncdenr.gov

127 Cardinal Drive Ext.
Wilmington, NC 28405

Nothing Compares

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To: beth.eckert@cfpua.org[beth.eckert@cfpua.org]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Gregson, Jim[jim.gregson@ncdenr.gov]
From: Culpepper, Linda
Sent: Thur 7/27/2017 1:23:04 PM
Subject: FW: Other standards we discussed
New NCSU PFECAs for water work.pptx

Good morning Beth – connecting you with Dr. Strynar at the EPA lab.
See his email below.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, July 27, 2017 9:19 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Other standards we discussed

We already have both of these and a handful of others we method validated with what we are doing for GenX in the NCDEQ samples.

However I would be glad to chat with them.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, July 27, 2017 9:11 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: FW: Other standards we discussed

Mark – I am not sure these are the compounds discussed.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Gregson, Jim
Sent: Wednesday, July 26, 2017 8:51 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: FW: Other standards we discussed

Jim Gregson
Regional Supervisor

Water Quality Regional Operations Section
Division of Water Resources
Department of Environmental Quality

910.796.7215 Reception Desk
910.796.7386 Direct
910.350.2004 Fax
Jim.gregson@ncdenr.gov

Wilmington Regional Office
127 Cardinal Drive Ext
Wilmington, NC 28405

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

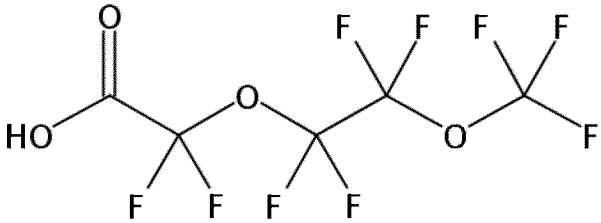
From: Beth Eckert [mailto:Beth.Eckert@cfpua.org]
Sent: Tuesday, July 25, 2017 7:37 PM
To: Gregson, Jim <jim.gregson@ncdenr.gov>
Cc: Beth Eckert <Beth.Eckert@cfpua.org>
Subject: Other standards we discussed

Jim,
In our discussion you mentioned EPA had not found standards for the other compounds in Dr. Knappe's study. Below are two standards that Eurofins has found, ordered, and received in house as of Monday. They have begun some quality control, method development, type activities and anticipate adding these compounds to their GenX method once they work through their process. Once that happens they will have results for these compounds any time they run the method which they anticipate will begin in 1 – 2 weeks. In case they would like to talk to someone at Eurofins to find out where they obtained the standards, I am also including our contacts information. Any thoughts on EPAs perspective of the analysis or data since they have not obtained these standards yet?

- Perfluoro-3-methoxypropanoic acid (PFMOPrA), CAS# 377-73-1
- Perfluoro-4-methoxybutanoic acid (PFMOBA), CAS# 863090-89-5

Our Eurofins contact:
Joseph M. Mattheis
Mobile: 919-376-7978
Email: JosephMattheis@EurofinsUS.com

Thanks,
Beth Eckert

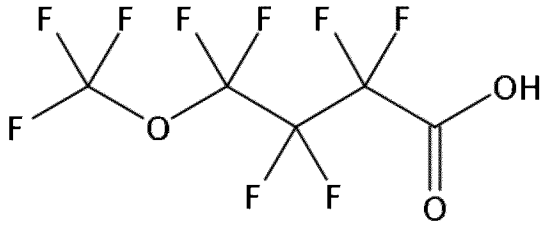


CAS Registry Number 151772-58-6

C5 H F9 O4

Acetic acid, 2,2-difluoro-2-[1,1,2,2-tetrafluoro-2-(trifluoromethoxy)ethoxy]-
Molecular Weight 296.04
Boiling Point (Predicted)Value: 185.8±35.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.765±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.20±0.10 | Condition: Most Acidic Temp: 25 °C

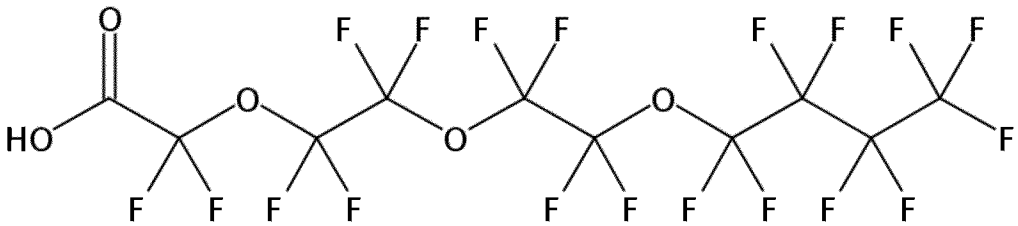
Other Names
Acetic acid, difluoro[1,1,2,2-tetrafluoro-2-(trifluoromethoxy)ethoxy]- (9CI)
Perfluoro-3,6-dioxaheptanoic acid



CAS Registry Number 863090-89-5

C5 H F9 O3

Butanoic acid, 2,2,3,3,4,4-hexafluoro-4-(trifluoromethoxy)-
Molecular Weight 280.05
Boiling Point (Predicted)Value: 149.7±40.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.736±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.51±0.10 | Condition: Most Acidic Temp: 25 °C

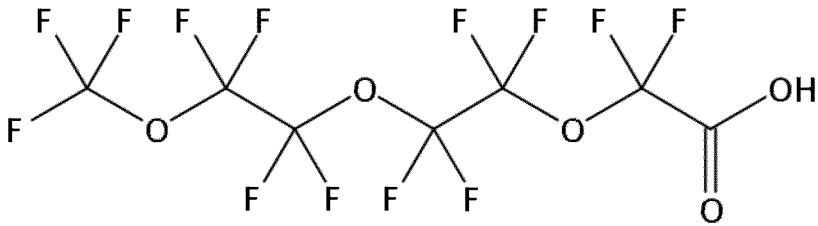


CAS Registry Number 330562-41-9

C10 H F19 O5

Acetic acid, 2,2-difluoro-2-[1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(1,1,2,2,3,3,4,4,4-nonafluorobutoxy)ethoxy]ethoxy]-
Molecular Weight 562.08
Boiling Point (Predicted)Value: 292.7±40.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.805±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.21±0.10 | Condition: Most Acidic Temp: 25 °C

Other Names
Acetic acid, difluoro[1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(nonafluorobutoxy)ethoxy]ethoxy]- (9CI)

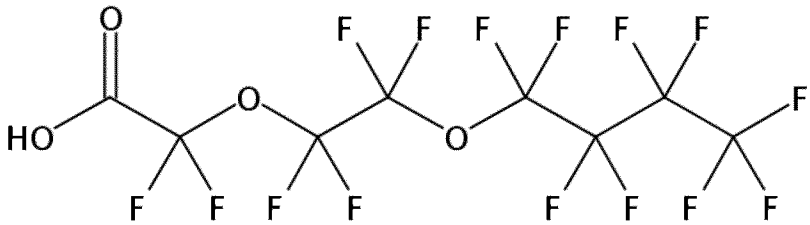


CAS Registry Number 151772-59-7

C7 H F13 O5

Acetic acid, 2,2-difluoro-2-[1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(trifluoromethoxy)ethoxy]ethoxy]-
Molecular Weight 412.06
Boiling Point (Predicted)Value: 247.8±35.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.800±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.21±0.10 | Condition: Most Acidic Temp: 25 °C

Other Names
Acetic acid, difluoro[1,1,2,2-tetrafluoro-2-[1,1,2,2-tetrafluoro-2-(trifluoromethoxy)ethoxy]ethoxy]- (9CI)

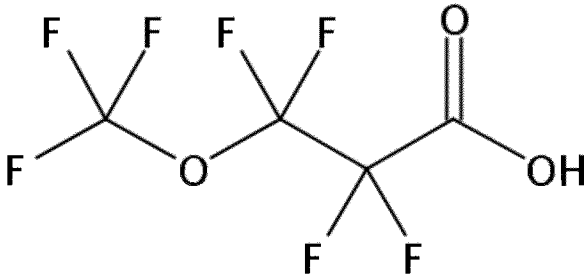


CAS Registry Number 137780-69-9

C8 H F15 O4

Acetic acid, 2,2-difluoro-2-[1,1,2,2-tetrafluoro-2-(1,1,2,2,3,3,4,4,4-nonafluorobutoxy)ethoxy]-
Molecular Weight 446.07
Boiling Point (Predicted)Value: 236.1±40.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.784±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.21±0.10 | Condition: Most Acidic Temp: 25 °C

Other Names
Acetic acid, difluoro[1,1,2,2-tetrafluoro-2-(nonafluorobutoxy)ethoxy]- (9CI)



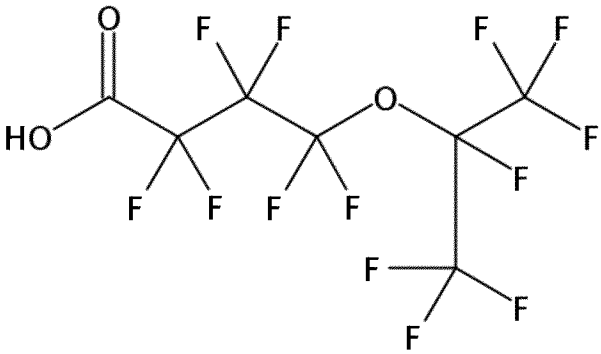
CAS Registry Number 377-73-1

C4 H F7 O3

Propanoic acid, 2,2,3,3-tetrafluoro-3-(trifluoromethoxy)-

Molecular Weight 230.04
Boiling Point (Experimental)Value: 126 °C
Density (Predicted)Value: 1.718±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.52±0.10 | Condition: Most Acidic Temp: 25 °C

Other Names
Propionic acid, tetrafluoro-3-(trifluoromethoxy)- (8CI)



CAS Registry Number 801212-59-9
C7 H F13 O3

Butanoic acid, 2,2,3,3,4,4-hexafluoro-4-[1,2,2,2-tetrafluoro-1-(trifluoromethyl)ethoxy]-
Molecular Weight 380.06
Boiling Point (Predicted)Value: 207.6±40.0 °C | Condition: Press: 760 Torr
Density (Predicted)Value: 1.758±0.06 g/cm3 | Condition: Temp: 20 °C Press: 760 Torr
pKa (Predicted)Value: 0.51±0.10 | Condition: Most Acidic Temp: 25 °C

Other Names
Butyric acid, hexafluoro-4-[tetrafluoro-1-(trifluoromethyl)ethoxy]- (8CI)

To: Strynar, Mark[Strynar.Mark@epa.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]
Cc: Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Tong-Argao, Sania
Sent: Tue 8/22/2017 6:09:56 PM
Subject: RE: QAPP
PHCB-013-QAPP-01_QAPP_The Analysis of Surface Water_NC DEQ_FinalSigned.pdf

Hi Mark (and Chris),

The QAPP is attached for reference.

Thanks,
Sania

From: Strynar, Mark
Sent: Tuesday, August 22, 2017 2:08 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: RE: QAPP

Sania or Myriam,

What is the answer to this question from Chris?

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, August 22, 2017 9:45 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: QAPP

Mark, has the GenX QAPP been finalized? If so, could we get a copy? Thanks!

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

The Analysis of Surface Water, Waste Water, Drinking Water and Well Water Samples for Selected Perfluorethercarboxylic Acids (PFECAs) for North Carolina Department of Environmental Quality (NCDEQ)

Quality Assurance Project Plan

National Exposure Research Laboratory

Research Triangle Park, NC

July 12, 2017

Mark J. Strynar — 7/12/17 Date

EPA NERL/EMMD Principle Investigator

Myriam Medina-Vera — 07/12/2017 Date

EPA NERL/EMMD/PHCB Branch Chief

Sania Tong-Argao — 7/12/2017 Date

EPA NERL/EMMD QA Manager

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A3. Distribution List

Name	Title	Organization	E-Mail
Mark Strynar	Principal Investigator (PI)	EPA/ORD/NERL/EMMD/PHCB	strynar.mark@epa.gov
Myriam Medina-Vera	PHCB Branch Chief	EPA/ORD/NERL/EMMD/PHCB	medina-vera.myriam@epa.gov
Timothy Buckley	EMMD Director	EPA/ORD/NERL/EMMD	buckley.timothy@epa.gov
Sania Tong Argao	EMMD QA Manager	EPA/ORD/NERL/EMMD	tong-argao.sania@epa.gov
Becky Allenbach	Acting Deputy Director Water Protection Division	EPA/Region 4	allenbach.becky@epa.gov
Linda Culpeper	Deputy Director	Division of Water Resources North Carolina Department of Environmental Quality	linda.culpepper@ncdenr.gov
Chris Johnson	Environmental Program Supervisor	Water Sciences Section / Organic Chemistry Branch/NC DEQ	chris.johnson@ncdenr.gov

A4. Project Organization

Project Personnel	Role	Responsibility
Mark Strynar	Principal Investigator	Sample Analysis and data reporting
Chris Johnson	Project Coordinator	Sample collection and delivery
Myriam Medina-Vera	EPA project supervision	EPA Project oversight and approval
Sania Tong Argao	QA Supervision	QA oversight and QAPP/SOP approval
Timothy Buckley	EMMD Coordinator	Coordinate project discussions between EMMD, R4 and NCDEQ
Becky Allenbach	Regional supervision	Supervision of R4 roles
Linda Culpeper	NCDEQ supervision	Supervision of NCDEQ roles

A5. Problem Definition and Background

The N.C. Department of Environmental Quality (NCDEQ) through EPA Region 4 requested the assistance of Dr. Mark Strynar (EPA/ORD/NERL/EMMD/PHCB) to conduct an independent laboratory analysis of water samples being collected by NCDEQ at 13 locations in the Cape Fear River Watershed for a total of six weeks. The NCDEQ needs to know the current concentrations for GenX and related constituents (perfluorethercarboxylic acids – PFECAs) in the Cape Fear River Basin.

Dr. Mark Strynar has expertise in the analyses of polyflouroalkyl substances (PFAS) including PFECAS. He is considered an expert in the field. The NCDEQ was aware of the publication he co-authored titled "Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina," and published on November 2016 (Environ. Sci. Technol. Lett. 2016, 3, 415−419: http://pubs.acs.org/doi/abs/10.1021/acs.estlett.6b00398). The publication investigated whether PFAS can be removed from impacted water sources through waste water treatment. The researchers were able to detect several fluorinated compounds including GenX in Wilmington finished drinking water. Based on the expertise of EPA scientist, they are assisting NCDEQ in the analysis of wastewater, surface water, ground water, and treated drinking water samples to determine the presence and concentration of the chemical "Gen X" in the samples. The EPA scientists are also analyzing the samples to determine the presence of perfluoro-2-methoxyacetic acid and perfluoro-3,5-dioxahexanoic acid, which are related perfluoroalkyl substances (PFAS).

The NC Department of Health and Human Services will use the data provided on the level of GenX and other PFECAs in the river basin and drinking water systems downstream to evaluate human exposure in regard to health screening level(s) for public consumption. Information on additional PFECAs will be used to compare past levels with current concentrations as health studies continue to be evaluated.

A6. Project/Task Description

North Carolina Division of Water Resources staff in the Fayetteville and Wilmington Regional Offices will conduct water sampling in accordance with QAPP at locations in the Cape Fear River basin at: Chemours outfall 002; Bladen Bluff - water intake, finished water, and well; Lower Cape Fear Water and Sewer Authority intake; International Paper intake; International Paper finished water; Cape Fear Public Utility Authority finished water; Pender County public utility finished water; Brunswick County public utility finished water; Cape Fear Public Utility Aquifer Storage and Recovery well; and Wrightsville Beach water supply well.

Two grab samples will be collection on Mondays at each of the Fayetteville locations and on Thursdays at each the Wilmington locations during each of the three weeks beginning June 19, June 26 and July 3, 2017 to determine current concentrations of GenX and related ether chemicals in the River basin. **Note:** after several discussions, NCDEQ added several weeks to the effort- samples will be collected the week of July 10, July 17 and July 24, 2017 using the

same protocols. One set of samples will be shipped to Test America in Colorado for GenX analysis, and one set of samples will be delivered to the EPA ORD lab in RTP, NC for GenX and related compounds analysis to replicate analysis conducted in the Sun et al. report which included Dr. Knappe and Mark Strynar. Data will be used by the Department of Health and Human Services to evaluate human exposure in comparison to health screening level(s) for GenX and other related compounds as health study information is available. EPA ORD will follow their own protocols and QA plans.

A7. Quality Objectives and Criteria for Measurement Data

The quality objectives of this project plan are to analyze 100% of the water samples received from the NCDEQ sampling event and report back the concentrations of GenX in the samples. Additionally, the estimation of additional PFECAs that are not able to be quantitated due to lack of commercially available standards are to be semi-quantitatively estimated by best effort. Specifically, replicate analysis precision should be within +/- 20%. Percent accuracy of any spiked trip QA samples need to be within 20% of the theoretical concentrations. Also back prediction of calibration curve points should be within +/- 30% for the lowest calibration curve point and +/- 20% for all other calibration curve points. Finally, blank samples (trip blanks, method blanks and solvent blank) should be free of analytes to demonstrate control of laboratory contamination that may exist.

A8. Special Training/Certifications

No specific training is required as for this QAPP, but the analysts shall have completed all site specific health and safety training requirements that are applicable. Records of this training are kept in Branch and SHEM offices. This document assumes laboratory personnel will have a thorough working knowledge of basic laboratory skills, reagents, and instrumentation. This document is designed to guide a competent laboratory worker in the analysis of PFC compounds and it is not intended to instruct individuals on the basic aspects of analytical chemistry.

A9. Documents and Records

Planning Documents

This QAPP is the planning document for this study. Additional documentation will be maintained in laboratory record notebooks, chain of custody (CoC) forms, and the study file.

Tracking Documents

Dr. Mark Strynar will retain copies of the sampling data logs, the field sample tracking forms, and the laboratory records describing the preparation and deployment of field QC samples.

CoC forms will accompany the samples shipped to the PFAS analysis laboratory by NCDEQ, and these forms will be retained after analysis. This information will be maintained in a

dedicated bound EPA laboratory notebook specific for this project. The PFAS analyst will maintain sample preparation records, and LC-MS/MS analysis logs. The study file will also contain the records of QA issues, amendments to plans and SOPs, and corrective action reports. QA records, such as audit reports, corrective action reports, etc., will be maintained by the Principal Investigator. Finally, Mark Strynar will maintain the study file documentation including the final database of results, together with all associated final reports. All records will be maintained as per EPA specifications.

The Shipping Records maintain documentation of when specific samples were shipped from NCDEQ to the RTP PFAS lab. This is a batch type record.

The Laboratory Record Notebooks (LRBs) are the records of the extraction and preparation of samples for analysis, the preparation of sampling containers, and the preparation of standard solutions for spiking and calibration. Methods and reagents used are recorded.

The Sample Analyses records are the instrument logs that document the analyses of samples, and contain records of specific instrument conditions, and date and time of sample data acquisition.

The Data files are the hard copy print-out of instrument analysis results and the electronic versions of these data. The electronic version of data is imported into the study database. Raw data (including electronic data on individual PC hard drives and group shared drives) will be kept as paper records. All data generated will be maintained Dr. Mark J. Strynar until completion of the project. Upon completion, data will be stored in accordance with EPA's record management policy. All instrument data will be backed up to network drives daily and will be archived along with other supporting data and relative correspondence at the completion of the study. Printed data will be referenced, signed and dated in accordance with the Office of Research & Development's Policy and Procedure Manual Section 13.02 on Paper Laboratory Records. The laboratory notebook will be the record for any procedure conducted in the laboratory and will provide the objective, procedure details, data references and discussion for project development. These entries will give a full and complete statement of the situation being examined, a specific hypothesis relating to the situation, and a brief experimental protocol designed to answer the questions posed in the hypothesis. Data will be recorded from these experiments and a discussion of the results will be presented with conclusions drawn. Any standard, solution, or sample made during these investigations will be marked with a reference number, traceable to a specific entry in the lab notebook. The laboratory notebooks are the property of the EPA and will be stored in accordance with EPA's record management policy.

B. DATA GENERATION AND ACQUISITION

B1. Experimental Design

NC DEQ has designed a set of samples to be collected to investigate the occurrence of PFECAs including GenX in various water samples that are important to their study. EPA RTP PFAS members were not involved in the experimental design. However, various QA elements were added to the original sample design per EPA RTP request after the project began. Elements such as QA samples to assess background contamination, spiked compound recovery and selection of sites that are not expected to contain the analytes of interest. These elements were added to the study design after the study began.

B2. Sampling Methods

The NC DEQ developed the sampling protocol used to collect the samples. The North Carolina Division of Water Resources staff in the Fayetteville and Wilmington Regional Offices will conduct the water sampling in accordance their QAPP at locations in the Cape Fear River basin. The proposed locations are Chemours outfall 002; Bladen Bluff - water intake, finished water, and well; Lower Cape Fear Water and Sewer Authority intake; International Paper intake; International Paper finished water; Cape Fear Public Utility Authority finished water; Pender County public utility finished water; Brunswick County public utility finished water; Cape Fear Public Utility Aquifer Storage and Recovery well; and Wrightsville Beach water supply well. EPA requested that samples were collected in 1L bottles. The initial protocol had two 500 mL bottles collected at the different sites. Blanks and QA/QC samples are included in the protocol. EPA will analyzed samples received through the chain of custody.

B3. Sample Handling and Chain of Custody

The samples collected by NC DEQ for EPA analysis will contain 35% nitric acid to preserve the sample. The NC DEQ will provide their chain of custody (CoC) form when delivering samples to EPA. The EPA researcher will sign the chain of custody and keep a copy for record. The CoC form is the standard form used by the NC DEQ Surface Water Section titled Chain of Custody (COC) Record. It includes the NC DENR/DWR laboratory performing the collection, the purpose of the investigation, the sample collector, the station number, station location, date and time sampled, number of containers and the signature chain when samples are relinquish to the next person and the date.

B4. Analytical Methods

The analytical procedures used for this project are detailed in the D-EMMD-PHCB-062-SOP-01 "*Method for Extraction and Analysis of Perfluoroethercarboxylic acids (PFECAs) from Surface*

Water, Well Water and Waste Water by Ultra-High Performance Liquid Chromatography (UPLC)-Tandem Mass Spectrometry (MS/MS)"

B5. Quality Control

The EPA team requested that QC filed spikes were added to the protocol in an effort to assess performance of the analytical methods. The Limit of Quantitation (LOQ) of the method is 10.0 ng/L (10 ppt). However, lower LOQs are achievable with this method through modification of the concentration step which will be documented if necessary. The verified calibration range of the method used is 10-250 ng/L. Results will be reported with the appropriate flags when the original sample concentration is beyond the method calibration range.

B6/B7. Instrument/Equipment Calibration, Testing, Inspection, Maintenance

The LC-MS/MS system is tuned by the manufacturer annually during regularly scheduled preventive maintenance service, or more frequently if conditions warrant. The system is manually tuned by the service technician to insure ion intensities, relative ion abundances, mass resolution, and ion peak shape are within manufacturer's specifications. Data on tune performance parameters is available in the instrument log file. The calibration of the LC-MS/MS response for individual compounds is based on the calibration curve solutions that are analyzed with each batch that is analyzed. In general, at a minimum, a 7-point calibration curve that spans the linear instrument detection range is analyzed at the beginning and end of each batch of samples analyzed. In this way, the calibration curve of standards reflects the condition of the instrument while samples are being analyzed.

After the batch has been analyzed the calibration curves are generated. The correlation coefficient should be be > 0.98 for the calibration to be accepted. If the correlation coefficient is not > 0.98, appropriate maintenance and troubleshooting is conducted until the problem is found. Curves with outlier points in the middle ranges suggest that the entire batch was out of control, invalidating this batch and making it necessary to rerun the entire batch from any raw material that remains from the original sample bottle that has been preserved in the lab. Curves with outlier points at the low or high end may exclude these outliers if adequate justification can be made (e.g, concentrations obviously below or above the linear response point of the instrument). Any samples with concentrations of an analyte more than 10% above the top calibration point require appropriate dilution of the primary sample (preserved in the lab) and complete reprocessing and reanalysis of that sample for that particular compound.

B8. Inspection/Acceptance of Supplies and Consumables

All supplies and consumable materials, such as solvents, reagents, labware, extraction cartridges, and other materials use in this analysis have been subjected to continuous testing as part of this laboratory's research for the past 5 years. Only materials that have been found to be reliably free from PFAS contamination will be used. To ensure that these materials remain free of potential contaminants, solvent blanks, matrix blanks, and field blanks will be analyzed with every analytical batch run in this evaluation. Results from these analyses must show that all analytes are <LOQ. If any of these analyses yield target analyte concentrations that are >LOQ, the results of the entire batch will be flagged and a systematic evaluation of the materials used in the entire process will be conducted until the source of the contamination is found. Once the contaminated material has been identified, it will be replaced with a new batch or lot that has been tested to be free from contamination and the entire batch will be rerun.

B9. Non-direct Measurements

Not applicable

B10. Data Management

When shipping samples from NCDEQ to the RTP PFAS laboratory, NCDEQ will include the CoC sheets for each sample contained within the shipment.

Upon receipt at the laboratory, the sample custodian will check the contents of each shipping container for sample container breakage, and will verify that contents match the shipping lists. After logging in each sample, and signing CoC forms, the samples will be transferred to the proper storage facility.

In the laboratory, the data will be verified and checked at several levels. The instrument operator will generate the calibration curves, apply the curves to detected analytes, and complete a first pass assessment of accuracy of identification of analytes in samples. This will be done on-screen using an automated procedure where the system pages through the data for identification of each analyte in each sample. If adjustments are needed in the integration area, baseline, or peak identification, this will be done manually by the analyst. Hard copy output will include a copy of the method, a copy of each calibration curve with equation and fit printed, run list, and a summary of the quantitation for each analyte.

The technical reviewer will review data for accuracy in identification and quantification. This reviewer will monitor retention time, mass transition, and qualifier ion ratios.

The LC-MS/MS analytical data for samples are preprocessed and initially reviewed using spreadsheet software; this is a three-step process and is described as follows:

1) The LC-MS/MS summary data are electronically transferred into an Excel spreadsheet template. This consists of the analysis date, the sample identification number and classification (e.g., blank, QC, calibration, unknown), target analyte names, analyte and IS peak area counts, analyte/IS peak area ratios, quantitation ion/qualifier ion ratio, and concentration of analyte in ng/L. The first reviewer assures that this electronic transfer has been made accurately and completely.

2) The reviewer hand-enters into the spreadsheet template any ancillary analytical data required for the database to calculate final concentrations, e.g., dilution factors, calibration standard concentration adjustments. (Any hand-entered data will be checked by a second analyst.) The templates functions as a user friendly interface for data entry and they also impose uniformity on the reported data by requesting data values in specific units that have a uniform accuracy, i.e., number of significant digits. The straight-forward design of the spreadsheet template also permits all the data from any given analytical run to be reviewed by the task leaders without requiring them to invest time learning new software.

The final analyte concentrations are reported in ng/L using validated equations that take into account dilution factors, standard purity and salt concentration if needed, and volume of unknown sample used in the analysis.

The QA Manager or appropriate designee will review subset of all laboratory data for accuracy in reporting, transcription, and calculations.

C. ASSESSMENTS AND OVERSIGHT

C1. Assessments and Response Actions

Data audits will be a random check of electronic and hand-entered data conducted by the EPA EMMD QA Manager or appropriate designee. These audits will focus on review of data transcription, calculation, and reporting. The EMMD QAM or designee will report to the researcher any findings requiring corrective action. Any findings and corrective measures will be noted in the file and discussed in the final report.

Internal quality control measures described in this QAPP, implemented by the technical staff and monitored by the PI, will give information on data quality on a day-to-day basis. Dr. Andrew Lindstrom NERL/EMMD will serve as a secondary reviewer to conduct a QA audit of data quality prior to EMMD/QAM data audits. The responsibility for interpreting the results of these checks and resolving any potential problems is shared between the technical staff and the PI. In addition, the NC DEQ field and technical staff will report any problems that could potentially affect the data quality. The EPA staff will also be responsible for identifying problems that could affect data quality or the ability to use the data upon receipt of the samples and during the analyses. Any problems that are identified will be reported to the PI, who will document the

problem and any loss of samples. Action will be taken by EPA staff to control the problem, identify a solution to the problem, and ameliorate losses and correct data, where possible.

Ideally, the quality control measures regulating the operation of each work area will be sufficient to maintain acceptable performance and data quality. However, in the event that a study component is not operating within the limits of acceptability, as determined by a QA assessment, a formal account of the matter must be documented by the PI as part of the project records. The report should contain the following information:

- Description and duration of problem
- Probable cause and resolution of problem
- Statement describing data affected by problem
- Feasibility of repeating work activity and/or generating new data.

No further work may be performed until the problem has been satisfactorily resolved, and the PI has acknowledged approval to continue work.

C2. Reports to Management

The NCDEQ, EPA R4 and EMMD staff will meet weekly, unless deemed unnecessary, to discuss the progress of the project. The EMMD Division Director will be responsible of transmitting data results thru R4 to the NC DEQ. These reports will be provided on a timeline agreed upon by all parties.

Results of the QA audits will be reported as part of the final report. This section will define any errors, deficiencies, or deviations from the QAPP.

D. DATA VALIDATION AND USABILITY

D1/D2. Data Review, Verification, and Validation/Verification and Validation Methods

The data will undergo QA review by a secondary reviewer that would check for completeness and transcriptions errors before delivering the data to NC DEQ. The data will be reported with appropriate flags and explanations.

D3. Analysis and Reconciliation with User Requirements

Field Sample Data Review

Not applicable.

Data Reduction

The instrument software reports results in peak area counts; the transition from area counts to ng/L is done in the Excel Spreadsheet database using validated equations that take into account dilution factors, purity of standards and salt content, and volume of initial sample used. The study database will contain all analytical data required to meet the QA objectives, including target analyte concentrations expressed as ng/L, MDLs, comments, and field and laboratory QC results. All analytical data will be linked to the Sample ID number.

Data Validation

The goal of data validation is to ensure that complete and accurate analytical information is available for all samples analyzed by the laboratory. Data validation begins during and after the period of analysis, and data entry into the database. The key personnel of the analytical team will perform the first level of review, ensuring that all data have been validated. The mechanisms used for all data transcriptions and transmissions will be reviewed, and a random subset of all transcriptions checked. For data requiring calculation of results, a random subset (approx. 5%) of the raw data will be recalculated.

Once the chemical measurement data have been imported into the database, the following QA/QC checks to validate the data will be carried out:

- Sample ID checks to verify that all Sample IDs with reported data are valid Sample IDs, i.e., they were logged in as received from NC DEQ,

- Missing data checks to verify that all Sample IDs received from the field either had a full set of analytical data reported or were disqualified, as documented in the CoC data,

- Duplicate data checks, to verify that the same analytical data were not imported into the database twice for a given sample,

- Out-of-range checks, to verify that all data for data fields limited to a code set did not violate that code set,

- Calculation verification; for any calculations performed within the database a random subset (approximately 5%) of the raw data are calculated using an independent calculation source (Excel spreadsheet) for validation.

Data flags will be assigned to each chemical measurement record to identify the quality and usability of the record. Data quality flags will be assigned as follows:

Flag = 0 = Usable sample/data, no problems
Flag = 1 = Some uncertainty in the quality of the sample/data
Flag = 2 = Unusable sample/data

The criteria used to define a detected analyte at the Flag = 0 level include: correct retention (± 0.5 min from RT of analyte in the bracketing standard runs, or with adjustment for RT shifts due to co-chromatography, as determined from RT of IS); co-maximizing peak shape for both the quantification and qualifier ions (except if an interference can be clearly detected on the front or back side of a peak); correct ion ratio for quantitation ion to qualifier ion (± 2 SD, with exception for clearly identifiable interferences). At levels near the LOD, the qualifier ion may not be detectable, but the quantification ion must be clearly present at the correct RT without interference. Samples with a direct interference to the qualifier ion will still have integration of the quantification ion performed and will designated with a Flag 1. The Flag 2 will be used for IS values where the IS either was not spiked, was not recovered, or had recovery <30%. For analytes that are detected below the LOQ, but >LOD, the calculated results will not be reported. Senior staff (QA Manger) will specify study database edits performed, and will review them after completion. The resulting edit report will document the current data values and verify that the records have passed all edit tests

Verification and Validation Methods

The data will be verified by checking the equations that are used to calculate the final concentration values. The equation that will be used to calculate the concentration of a target analytes in water is:

Analyte conc. in ng/L = (area counts – b) / a

Where a = slope from the calibration curve, b = intercept

The validation of the data will be encompassed in the results of the QC samples in each shipment of unknowns. Since these QC samples will be generated in the lab prior to shipment to the field, these samples will reflect all the sample preparation, shipping, storage, and handling of actual field samples. For laboratory and field blanks, if the background level for a given target analyte is unacceptably high, the target analyte results for all samples affected by this background will be flagged. The recoveries of analytes in these field samples will be an accurate reflection of recovery of analytes throughout the entire process. In addition, the recovery of the IS compounds will demonstrate the method performance on a sample by sample basis. Since the ISs are the labeled version of the "average" analyte of each class, the IS recoveries can be used to effectively account for losses during analytical procedures on a sample by sample basis.

Reconciliation With User Requirements

The EPA RTP PFAS lab will summarize the chemical analyses of the water samples in a final report that will provide information to determine data quality and the range of target analyte levels found in the water samples.

E. References

Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina
Mei Sun, Elisa Arevalo, Mark Strynar, Andrew Lindstrom, Michael Richardson, Ben Kearns, Adam Pickett, Chris Smith, and Detlef R. U. Knappe
Environmental Science & Technology Letters 2016 3 (12), 415-419
DOI: 10.1021/acs.estlett.6b00398

Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS)
Mark Strynar, Sonia Dagnino, Rebecca McMahen, Shuang Liang, Andrew Lindstrom, Erik Andersen, Larry McMillan, Michael Thurman, Imma Ferrer, and Carol Ball
Environmental Science & Technology 2015 49 (19), 11622-11630
DOI: 10.1021/acs.est.5b01215

To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Tue 11/7/2017 9:28:59 PM
Subject: Updated SGS results
SGS results.xlsx

Latest spreadsheet update is attached.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources
4405 Reedy Creek Road
Raleigh, NC 27607

Office: 919-733-3908

Email correspondence with this address is subject to North Carolina public record regulations and may be disclosed to third parties.

Result (ppt)

		8/14/2017	8/15/2017	8/18/2017	8/19/2017	8/20/2017	8/21/2017	8/22/2017	8/23/2017	8/25/2017	8/26/2017	8/27/2017	8/28/2017	8/29/2017	10/2/2017	10/3/2017	10/4/2017	Date	Date	Date	Date
Chemours Outfall 002	PFBA	8.29	7.90	9.30	8.35	10.1	9.73	11.2	12.4	13.3	12.2	12.8	11.8	16.0	15.8	14.3					
	PFPeA	39.8	41.3	39.1	37.1	35.6	40.2	42.8	45.1	44.1	45.9	45.4	44.7	50.8	50.5	48.0					
	PFHxA	52.8	58.0	55.5	41.7	43.9	49.0	52.7	59.8	55.2	57.2	58.1	58.8	60.0	58.5	56.1					
	PFHpA	30.5	19.7	22.7	27.4	26.2	31.4	33.7	34.1	36.2	37.3	34.7	36.3	38.0	38.1	36.8					
	PFOA	18.2	12.2	15.2	19.8	17.9	18.6	19.8	21.0	22.2	22.7	20.0	20.9	24.2	23.8	23.0					
	PFNA	5.15	3.22	3.78	3.88	4.10	4.25	4.40	5.45	5.82	5.98	5.49	5.38	5.90	5.78	5.84					
	PFDA	2.12	1.87	2.36	2.59	2.54	2.54	2.60	3.42	4.00	4.07	3.75	3.92	4.75	4.64	5.35					
	PFBS	5.99	4.19	4.90	5.21	4.72	4.65	5.37	4.67	5.18	5.06	5.20	5.32	4.36	4.51	4.50					
	PFHxS	6.75	6.22	8.00	9.47	8.62	7.09	8.44	7.07	8.27	8.08	8.05	7.64	6.69	6.88	6.58					
	PFOS	10.8	9.80	14.4	16.3	14.3	14.3	15.6	16.5	17.0	15.1	16.1	8.0	1.29	1.23	1.73					
	GenX	69.3	90.7	46.5	59.1	40.8	85.4	68.4	20.8	39.4	50.0	41.8	48.6	35.0	3.28	3.29					
	PFOA+PFOS	24.8	22	29.6	33.1	32.2	30.8	32.4	37.5	39.2	37.8	36.1	20.9	37.1	36.1	36.3	0	0	0	0	

Result (ppt)

		8/18/2017	8/25/2017	10/2/2017	Date	Date	Date
Bladen Bluffs MW	PFBA	0.845 (J)	1.07 (J)	0.963 (J)			
	PFPeA	1.92 (J)	2.06	2.04 (J)			
	PFHxA	1.45 (J)	1.99	2.32			
	PFHpA	0.947 (J)	1.25 (J)	1.48 (J)			
	PFOA	0.708 (J)	0.808 (J)	3.09			
	PFNA	ND	ND	0.215 (J)			
	PFDA	ND	ND	ND			
	PFBS	0.218 (J)	0.217 (J)	ND			
	PFHxS	0.243 (J)	0.260 (J)	0.270 (J)			
	PFOS	0.420 (J)	0.482 (J)	0.351 (J)			
	GenX	ND	ND	ND			
	PFOA+PFOS	1.25 (J)	1.338 (J)	3.441 (J)			

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Int'l Paper	PFBA	10.2	9.22	8.87	9.72		
	PFPeA	16.4	15.8	16.7	16.3		
	PFHxA	16.1	13.0	15.2	16.7		
	PFHpA	7.70	6.16	7.35	8.38		
	PFOA	3.65	2.97	3.74	5.50		
	PFNA	0.591 (J)	0.525 (J)	0.551 (J)	0.556 (J)		
	PFDA	0.225 (J)	0.228 (J)	0.248 (J)	0.267 (J)		
	PFBS	1.88 (J)	1.73 (J)	2.04	1.58 (J)		
	PFHxS	1.73 (J)	1.39 (J)	1.82 (J)	1.48 (J)		
	PFOS	1.44 (J)	1.31 (J)	1.40 (J)	1.13 (J)		
	GenX	50.2	38.6	39.3	50.6		
	PFOA+PFOS	5.26 (J)	4.18 (J)	5.14 (J)	6.63 (J)		

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
CFPUA	PFBA	12.8	8.38	7.77	14.1		
	PFPeA	38.1	38.8	39.4	37.7		
	PFHxA	39.3	38.1	24.7	37.9		
	PFHpA	23.8	16.4	16.4	26.2		
	PFOA	15.1	10.1	12.1	17.1		
	PFNA	4.27	3.55	3.86	4.28		
	PFDA	3.00	2.59	2.68	3.52		
	PFBS	5.57	4.54	4.90	4.54		
	PFHxS	7.91	6.28	7.27	7.30		
	PFOS	17.2	17.2	16.5	14.3		
	GenX	55.2	59.1	28.9	47.7		
	PFOA+PFOS	32.3	27.4	26.6	31.4	0	0

Result (ppt)

		8/18/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Fender County	PFBA	12.2	10.8	10.1	11.5		
	PFPeA	25.0	21.2	21.7	29.3		
	PFHxA	19.8	16.1	15.3	18.7		
	PFHpA	8.49	6.52	8.50	8.77		
	PFOA	3.82	2.74	3.87	5.88		
	PFNA	0.422 (J)	0.391 (J)	0.381 (J)	0.474 (J)		
	PFDA	ND	ND	ND	ND		
	PFBS	2.27	1.87 (J)	2.04	1.78 (J)		
	PFHxS	1.62 (J)	1.24 (J)	1.53 (J)	1.37 (J)		
	PFOS	0.944 (J)	1.02 (J)	0.977 (J)	0.898 (J)		
	GenX	60.6	81.0	42.4	85.2		
	PFOA+PFOS	4.36 (J)	3.76 (J)	3.85 (J)	6.58 (J)		

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Brunswick County MW	PFBA	8.98	7.55	5.60	10.6		
	PFPeA	32.1	25.7	19.6	33.1		
	PFHxA	38.1	29.8	22.1	39.7		
	PFHpA	20.0	14.7	13.5	24.6		
	PFOA	13.0	7.96	8.16	16.7		
	PFNA	2.87	1.97 (J)	1.85 (J)	2.97		
	PFDA	1.48 (J)	0.987 (J)	1.50 (J)	2.15		
	PFBS	3.25	3.18	3.17	3.09		
	PFHxS	4.51	4.14	4.69	4.79		
	PFOS	7.78	5.98	7.78	9.38		
	GenX	33.1	25.0	24.3	32.7		
	PFOA+PFOS	20.8	13.9	15.9	26.1	0.0	0.0

Batch Specific Analytical Comments:

Sample Specific QC Comments are noted in the "Validation Results" tab below

I - Estimated (below RL) / ND - Not Detected

Sample comments 8/14/17 - 8/23/17

PFOA recovered below LOQ in Method Blank

PFBA recovered below acceptance level in Matrix Spike

PFOS, 8:2 FTS recovered above acceptance level in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Sample Duplicate

GenX surrogate recovered below acceptance levels in Sample Duplicate

Sample comments 8/25/17 - 8/28/17

PFBA recovered below acceptance level in Matrix Spike

GenX surrogate recovered below acceptance levels in Blank Spike

GenX surrogate recovered below acceptance levels in Method Blank

Sample comments 8/28/17 - 8/29/17 (GenX batch)

GenX surrogate recovered below acceptance levels in Blank Spike

Sample comments 9/28/17 - 9/29/17 (FF-only batch)

PFuNA, PFDoA, PFTeA recovered above acceptance level in LCS

PFBS recovered below acceptance level in LCS

1 of 3 surrogates recovered below acceptance levels in LCS

Sample comments 10/2/17 - 10/5/17

PFuNA, PFDoA, PFTeA recovered above acceptance level in LCS

PFBS recovered below acceptance level in LCS

1 of 3 surrogates recovered below acceptance levels in LCS

GenX surrogate recovered below acceptance levels in LCS and MS

GenX RPD above acceptance levels in Sample Duplicate

Result (ppt)

		9/14/2017	9/15/2017	9/18/2017	9/19/2017	9/20/2017	9/21/2017	
Chemours Outfall 002	PFuNA	0.346 (J)	0.233 (J)	0.425 (J)	0.419 (J)	0.386 (J)	0.201 (J)	**Sample Specific**
	PFDoA	ND	ND	ND	ND	ND	ND	9/18/2017: 1 of 3
	PFTriA	ND	ND	ND	ND	ND	ND	9/19/2017: 1 of 3
	PFTreA	ND	ND	ND	ND	ND	ND	9/20/2017: 1 of 3
	PFHpS	0.313 (J)	0.228 (J)	0.395 (J)	0.540 (J)	0.352 (J)	0.365 (J)	9/21/2017: 2 of 3
	PFDS	ND	ND	ND	ND	ND	ND	9/21/2017: 2 of 3
	NMeFOSAA	ND	ND	ND	ND	ND	ND	
	NetFOSAA	ND	ND	ND	ND	ND	ND	
	6:2 FTS	1.78 (J)	1.61 (J)	2.60	2.33	1.77 (J)	1.33 (J)	
	8:2 FTS	ND	ND	ND	ND	ND	ND	

Result (ppt)

		9/22/2017	9/25/2017	9/26/2017	9/27/2017	9/28/2017	9/29/2017	
Chemours Outfall 002	PFuNA	0.264 (J)	0.256 (J)	0.402 (J)	0.478 (J)	0.590 (J)	0.517 (J)	**Sample Specific**
	PFDoA	ND	ND	ND	ND	ND	ND	9/22/2017: 1 of 3
	PFTriA	ND	ND	ND	ND	ND	ND	9/25/2017: 1 of 3
	PFTreA	ND	ND	ND	ND	ND	ND	9/26/2017: 1 of 3
	PFHpS	0.340 (J)	0.382 (J)	0.491 (J)	0.467 (J)	0.364 (J)	0.331 (J)	9/27/2017: 1 of 3
	PFDS	ND	ND	ND	ND	ND	ND	9/28/2017: 1 of 3
	NMeFOSAA	ND	ND	ND	ND	ND	ND	9/29/2017: 1 of 3
	NetFOSAA	ND	ND	ND	ND	ND	ND	
	6:2 FTS	1.52 (J)	0.990 (J)	1.70 (J)	1.31 (J)	0.703 (J)	0.965 (J)	
	8:2 FTS	ND	ND	ND	ND	ND	ND	

Result (ppt)

		10/2/2017	10/3/2017	10/4/2017	Date	Date	Date	
Chemours Outfall 002	PFuNA	0.606 (J)	0.643 (J)	0.698 (J)				**Sample Specific**
	PFDoA	ND	ND	ND				10/3/2017: 1 of 3
	PFTriA	ND	ND	ND				
	PFTreA	ND	ND	ND				
	PFHpS	0.297 (J)	0.328 (J)	0.267 (J)				
	PFDS	ND	ND	ND				
	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	1.29 (J)	1.24 (J)	1.02 (J)				
	8:2 FTS	ND	ND	ND				

Result (ppt)

		9/18/2017	9/25/2017	10/2/2017	Date	Date	Date	
Bladen Bluffs FW	PFuNA	ND	ND	ND				**Sample Specific**
	PFDoA	ND	ND	ND				9/18/2017: 1 of 3
	PFTriA	ND	ND	ND				9/25/2017: GenX
	PFTreA	ND	ND	ND				10/2/2017: GenX
	PFHpS	ND	ND	ND				
	PFDS	ND	ND	ND				

	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	ND	ND	0.682 (J)				
	8:2 FTS	ND	ND	ND				

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
Int'l Paper	PFuNA	ND	ND	ND	ND			**Sample Specific**
	PFDoA	ND	ND	ND	ND			9/21/2017: 2 of 3
	PFTriA	ND	ND	ND	ND			10/5/2017: GenX
	PFTreA	ND	0.812 (J)	ND	ND			
	PFHpS	ND	ND	ND	ND			
	PFDS	ND	ND	ND	ND			
	NMeFOSAA	ND	ND	ND	ND			
	NetFOSAA	ND	ND	ND	ND			
	6:2 FTS	ND	ND	ND	0.622 (J)			
	8:2 FTS	ND	ND	ND	ND			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
CFPUA	PFuNA	0.538 (J)	0.627 (J)	0.567 (J)	0.829 (J)			**Sample Specific**
	PFDoA	ND	ND	ND	ND			9/21/2017: 1 of 3
	PFTriA	ND	ND	ND	ND			10/5/2017: GenX
	PFTreA	ND	ND	ND	ND			
	PFHpS	0.375 (J)	0.440 (J)	0.410 (J)	0.379 (J)			
	PFDS	ND	ND	ND	ND			
	NMeFOSAA	ND	ND	ND	ND			
	NetFOSAA	ND	ND	ND	ND			
	6:2 FTS	0.842 (J)	1.00 (J)	1.10 (J)	1.39 (J)			
	8:2 FTS	ND	ND	ND	ND			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
Pender County	PFuNA	ND	ND	ND	ND			**Sample Specific**
	PFDoA	ND	ND	ND	ND			9/21/2017: 2 of 3
	PFTriA	ND	ND	ND	ND			
	PFTreA	ND	ND	ND	ND			
	PFHpS	ND	ND	ND	ND			
	PFDS	ND	ND	ND	ND			
	NMeFOSAA	ND	ND	ND	ND			
	NetFOSAA	ND	ND	ND	ND			
	6:2 FTS	0.798 (J)	ND	ND	0.796 (J)			
	8:2 FTS	ND	ND	ND	ND			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
Brunswick	PFuNA	ND	ND	0.217 (J)	0.354 (J)			**Sample Specific**

	PFDoA	ND	ND	ND	ND		
Brunswick County NW	PFTriA	ND	ND	ND	ND		
	PFTreA	ND	ND	ND	ND		
	PFHpS	ND	ND	ND	ND		
	PFDS	ND	ND	ND	ND		
	NMeFOSAA	ND	ND	ND	ND		
	NetFOSAA	ND	ND	ND	ND		
	6:2 FTS	0.578 (J)	ND	0.959 (J)	1.16 (J)		
	8:2 FTS	ND	ND	ND	ND		

Batch Specific Analytical Comments:

J : Estimated (below RL) / ND : Not Detected

Sample comments 9/14/17 - 9/22/17

PFOA recovered below LOQ in Method Blank
PFBA recovered below acceptance level in Matrix Spike
PFDS, 6:2 FTS recovered above acceptance level in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Sample Duplicate
GenX surrogate recovered below acceptance levels in Sample Duplicate

Sample comments 9/25/17 - 9/28/17

PFBA recovered below acceptance level in Matrix Spike
GenX surrogate recovered below acceptance levels in Blank Spike
GenX surrogate recovered below acceptance levels in Method Blank

Sample comments 9/28/17 - 9/29/17

GenX surrogate recovered below acceptance levels in Blank Spike

Sample comments 10/2/17 - 10/5/17

PFuNA, PFTriA, PFTreA recovered above acceptance level in LCS
PFBS recovered below acceptance level in LCS
1 of 3 surrogates recovered below acceptance levels in LCS
GenX surrogate recovered below acceptance levels in LCS and MS
GenX RPD above acceptance levels in Sample Duplicate

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 2 of 3 surrogates recovered below acceptance levels
: 2 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: GenX surrogate recovered below acceptance levels
: GenX surrogate recovered below acceptance levels

cific Analytical Comments:

: 2 of 3 surrogates recovered below acceptance levels

: GenX surrogate recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered above acceptance levels

: GenX surrogate recovered below acceptance levels

cific Analytical Comments:

: 2 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels

SGS Result (ppt)

		8/16/2017	8/17/2017	8/18/2017	8/21/2017	8/22/2017	8/23/2017	8/24/2017
Chemours Outfall 002	PFBA	10.8	10.2	10.7	5.78	5.62	10.1	9.00
	PFPeA	26.9	21.4	20.4	20.6	20.0	24.6	24.9
	PFHxA	25.3	19.7	21.4	25.9	24.6	30.6	29.8
	PFHpA	16.2	11.6	12.4	16.9	15.7	19.5	20.1
	PFOA	12.4	11.1	11.9	14.0	12.1	14.7	16.8
	PFNA	2.69	2.32	2.58	3.02	3.18	3.33	3.98
	PFDA	2.05	1.64 (J)	1.73 (J)	2.23	2.36	2.11	2.75
	PFBS	3.87	4.61	4.38	4.29	3.88	4.35	4.48
	PFHxS	6.72	12.7	12.6	8.47	7.45	7.88	9.00
	PFOS	13.6	25.4	24.7	17.7	15.3	ND	ND
	GenX	109	89.9	125	39.8	67.1	91.0	154
	PFOA+PFOS	26	36.5	36.6	31.7	27.4	14.7	16.8

Result (ppt)

		8/18/2017	8/21/2017	8/28/2017	9/5/2017	9/11/2017	
Bladen Bluffs FW	PFBA	4.42	5.49	12.2	pending	pending	
	PFPeA	13.7	17.3	27.0	pending	pending	
	PFHxA	12.4	21.0	33.6	pending	pending	
	PFHpA	6.89	12.8	22.1	pending	pending	
	PFOA	5.30	9.03	15.3	pending	pending	
	PFNA	1.29 (J)	2.01	3.32	pending	pending	
	PFDA	1.04 (J)	1.56 (J)	2.57	pending	pending	
	PFBS	2.56	3.11	4.22	pending	pending	
	PFHxS	5.66	5.92	5.48	pending	pending	
	PFOS	11.7	14.0	ND	pending	pending	
	GenX	19.2	23.8	46.7	ND	ND	
	PFOA+PFOS	17.0	23.0	15.3			

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Int'l Paper	PFBA	5.85	6.80	8.22	pending		
	PFPeA	8.67	12.0	10.4	pending		
	PFHxA	5.70	14.6	8.57	pending		
	PFHpA	2.23	4.43	3.86	pending		
	PFOA	0.988 (J)	1.92 (J)	2.07	pending		
	PFNA	ND	0.305 (J)	0.276 (J)	pending		
	PFDA	ND	ND	ND	pending		
	PFBS	0.803 (J)	1.49 (J)	1.43 (J)	pending		
	PFHxS	0.363 (J)	0.827 (J)	1.15 (J)	pending		
	PFOS	0.221 (J)	0.438 (J)	0.953 (J)	pending		
	GenX	24.4	32.1	29.1	37.9		
	PFOA+PFOS	1.21 (J)	2.36 (J)	3.02 (J)			

Result (ppt)

8/17/2017	8/24/2017	8/31/2017	9/7/2017

CFPUA	PFBA	7.67	8.20	8.28	pending		
	PFPeA	25.8	28.0	20.0	pending		
	PFHxA	24.7	26.4	20.8	pending		
	PFHpA	15.6	18.3	13.6	pending		
	PFOA	11.4	13.3	13.0	pending		
	PFNA	2.86	4.44	4.67	pending		
	PFDA	1.70 (J)	3.44	4.13	pending		
	PFBS	5.00	5.17	5.05	pending		
	PFHxS	7.6	7.8	12.0	pending		
	PFOS	16.0	21.7	ND	pending		
	GenX	64.6	36.1	38.2	44.0		
	PFOA+PFOS	27.4	35.0	13.0	#VALUE!		

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Pender County	PFBA	8.63	9.51	12.0	pending		
	PFPeA	15.8	19.0	18.3	pending		
	PFHxA	10.7	12.9	13.0	pending		
	PFHpA	4.79	5.38	4.98	pending		
	PFOA	2.32	2.28	2.39	pending		
	PFNA	0.288 (J)	0.268 (J)	0.317 (J)	pending		
	PFDA	ND	ND	ND	pending		
	PFBS	1.95 (J)	1.80 (J)	2.40	pending		
	PFHxS	1.35 (J)	0.793 (J)	1.70	pending		
	PFOS	0.883 (J)	0.559 (J)	1.04 (J)	pending		
	GenX	50.6	48.0	39.4	50.5		
	PFOA+PFOS	3.20 (J)	2.84 (J)	3.43 (J)			

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Brunswick County NW	PFBA	6.59	6.12	8.34	pending		
	PFPeA	24.1	15.3	16.3	pending		
	PFHxA	24.9	18.6	19.7	pending		
	PFHpA	14.5	11.9	12.1	pending		
	PFOA	9.32	7.85	7.93	pending		
	PFNA	1.96 (J)	1.69 (J)	1.71 (J)	pending		
	PFDA	1.37 (J)	1.19 (J)	1.03 (J)	pending		
	PFBS	3.62	2.82	3.40	pending		
	PFHxS	3.63	3.82	4.63	pending		
	PFOS	8.66	7.34	ND	pending		
	GenX	28.7	21.2	24.0	34.1		
	PFOA+PFOS	18.0	15.2	7.9	#VALUE!		

Batch Specific Analytical Comments:

Sample Specific QC Comments are noted in the "Additional Results" tab below

J : Estimated (below RL) / ND : Not Detected

Sample comments 8/16/17 - 8/24/17

PFBA recovered below acceptance levels in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Matrix Spike
GenX surrogate recovered below acceptance levels in Method Blank
GenX surrogate recovered below acceptance levels in Blank Spike
GenX surrogates recovered below acceptance levels in Sample Duplicates

Sample comments 8/23/17 - 8/31/17 (GenX)

GenX surrogate recovered below acceptance levels in LCS

Sample comments 8/23/17 - 8/31/17 (PF cpds)

1 of 3 surrogates recovered below acceptance levels in Blank Spike
PFuNA, PFTriA, PFTreA, PFDS recovered above acceptance levels in Blank Spike
PFBA, PFPeA recovered below acceptance levels in Matrix Spike
6:2 FTS, 8:2 FTS recovered above acceptance levels in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Matrix Spike

Sample comments 9/1/17 - 9/13/17 (GenX)

GenX surrogate recovered below acceptance levels in Method Blank
GenX surrogate RPD above acceptance levels in Sample Duplicate

8/25/2017	8/28/2017	8/29/2017	8/30/2017	8/31/2017	9/1/2017	9/5/2017	9/6/2017	9/7/2017	9/8/2017
8.69	10.9	10.4	12.0	11.0	pending	pending	pending	pending	pending
25.8	30.0	28.7	29.5	32.5	pending	pending	pending	pending	pending
31.1	39.6	39.0	38.9	42.2	pending	pending	pending	pending	pending
20.3	26.3	25.9	24.7	27.2	pending	pending	pending	pending	pending
16.0	22.0	21.1	21.9	20.3	pending	pending	pending	pending	pending
3.49	4.35	3.99	4.09	4.02	pending	pending	pending	pending	pending
2.51	2.97	2.86	2.87	2.33	pending	pending	pending	pending	pending
4.70	4.96	4.81	4.23	5.02	pending	pending	pending	pending	pending
9.91	8.41	8.15	6.45	9.41	pending	pending	pending	pending	pending
ND	ND	ND	ND	ND	pending	pending	pending	pending	pending
108	64.7	71.8	66.2	51.7	163	63.1	179	102	55.8
16.0	22.0	21.1	21.9	20.3	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

8/29/2017

Cross Creek WWTP Effluent	PFBA	16.8	
	PFPeA	48.4	
	PFHxA	67.8	
	PFHpA	32.7	
	PFOA	36.3	
	PFNA	5.62	
	PFDA	8.28	
	PFBS	17.6	
	PFHxS	22.7	
	PFOS	ND	
	GenX	ND	
PFOA + PFOS		36.3	

8/29/2017

DAK Americas WWTP Effluent	PFBA	25.8	
	PFPeA	34.3	
	PFHxA	74.1	
	PFHpA	34.5	
	PFOA	30.2	
	PFNA	3.76	
	PFDA	0.993 (J)	
	PFBS	10.6	
	PFHxS	18.8	
	PFOS	ND	
	GenX	23.4	
PFOA + PFOS		30.2	

8/29/2017

Rockfish WWTP Effluent	PFBA	10.3	
	PFPeA	51.8	
	PFHxA	50.5	
	PFHpA	22.8	
	PFOA	24.9	
	PFNA	2.86	
	PFDA	2.73	
	PFBS	8.53	
	PFHxS	10.3	
	PFOS	ND	
	GenX	ND	

PFOA + PFOS 24.9

9/6/2017

Huske L&D	PFBA	pending	
	PFPeA	pending	
	PFHxA	pending	
	PFHpA	pending	
	PFOA	pending	
	PFNA	pending	
	PFDA	pending	
	PFBS	pending	
	PFHxS	pending	
	PFOS	pending	
	GenX	ND	

PFOA + PFOS

9/11/2017	9/12/2017	9/13/2017	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
pending	pending	pending	
47.8	310	72.5	
#VALUE!	#VALUE!	#VALUE!	

Result (ppt)

		8/16/2017	8/17/2017	8/18/2017	8/21/2017	8/22/2017	8/23/2017	8/24/2017	8/25/2017
Chemours Outfall 002	PFuNA	0.401 (J)	0.482 (J)	0.442 (J)	0.369 (J)	0.787 (J)	0.414 (J)	0.724 (J)	0.515 (J)
	PFDoA	ND	ND	ND	ND	0.279 (J)	ND	0.248 (J)	ND
	PFTriA	ND	ND	ND	ND	ND	ND	0.322 (J)	ND
	PFTreA	ND	ND	ND	ND	ND	ND	0.227 (J)	ND
	PFHpS	0.344 (J)	0.535 (J)	0.651 (J)	0.374 (J)	0.415 (J)	0.209 (J)	0.463 (J)	0.370 (J)
	PFDS	ND	ND	ND	ND	ND	ND	ND	ND
	NMeFOSAA	ND	ND	ND	ND	ND	ND	ND	ND
	NetFOSAA	ND	ND	ND	ND	ND	ND	ND	ND
	6:2 FTS	1.44 (J)	2.07	1.85 (J)	1.36 (J)	1.10 (J)	1.85	2.03	2.39
	8:2 FTS	ND	ND	ND	ND	ND	ND	ND	ND

Result (ppt)

		8/28/2017	8/29/2017	8/30/2017	8/31/2017	9/1/2017	Sample Specific Analytical
Chemours Outfall 002	PFuNA	0.606 (J)	0.551 (J)	0.641 (J)	0.279 (J)	pending	8/28/2017: 1 of 3 surrogates
	PFDoA	ND	ND	ND	ND	pending	8/29/2017: 1 of 3 surrogates
	PFTriA	ND	ND	ND	ND	pending	8/30/2017: 1 of 3 surrogates
	PFTreA	ND	ND	ND	0.883 (J)	pending	8/31/2017: GenX surrogate
	PFHpS	0.355 (J)	0.305 (J)	0.394 (J)	0.385 (J)	pending	8/31/2017: 1 of 3 surrogates
	PFDS	ND	ND	ND	ND	pending	9/1/2017: GenX surrogate
	NMeFOSAA	ND	ND	ND	ND	pending	
	NetFOSAA	ND	ND	ND	ND	pending	
	6:2 FTS	3.37	3.35	3.38	2.99	pending	
	8:2 FTS	ND	ND	ND	ND	pending	

Result (ppt)

		9/5/2017	9/6/2017	9/7/2017	9/8/2017	9/11/2017	9/12/2017	9/13/2017	Sample
Chemours Outfall 002	PFuNA	pending	pending	pending	pending	pending	pending	pending	9/5/2017: 9/13/2017
	PFDoA	pending	pending	pending	pending	pending	pending	pending	
	PFTriA	pending	pending	pending	pending	pending	pending	pending	
	PFTreA	pending	pending	pending	pending	pending	pending	pending	
	PFHpS	pending	pending	pending	pending	pending	pending	pending	
	PFDS	pending	pending	pending	pending	pending	pending	pending	
	NMeFOSAA	pending	pending	pending	pending	pending	pending	pending	
	NetFOSAA	pending	pending	pending	pending	pending	pending	pending	
	6:2 FTS	pending	pending	pending	pending	pending	pending	pending	
	8:2 FTS	pending	pending	pending	pending	pending	pending	pending	

Result (ppt)

		8/18/2017	8/21/2017	8/28/2017	9/5/2017	9/11/2017	Sample Specific Analytical
Bladen Bluffs FW	PFuNA	0.275 (J)	0.247 (J)	0.444 (J)	pending	pending	8/18/2017: 1 of 3 surrogates
	PFDoA	ND	ND	ND	pending	pending	8/28/2017: 1 of 3 surrogates
	PFTriA	1.52 (J)	ND	ND	pending	pending	
	PFTreA	11.9	ND	1.03 (J)	pending	pending	
	PFHpS	0.356 (J)	0.304 (J)	0.341 (J)	pending	pending	
	PFDS	ND	ND	ND	pending	pending	

	NMeFOSAA	ND	ND	ND	pending	pending	
	NetFOSAA	ND	ND	ND	pending	pending	
	6:2 FTS	0.698 (J)	0.876 (J)	1.72 (J)	pending	pending	
	8:2 FTS	ND	ND	ND	pending	pending	

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Int'l Paper	PFuNA	ND	ND	ND	pending		**Sample Specific Analytical**
	PFDoA	ND	ND	ND	pending		8/24/2017: GenX surrogate
	PFTriA	ND	3.57	ND	pending		8/31/2017: 1 of 3 surrogates
	PFTreA	ND	23.4	ND	pending		
	PFHpS	ND	ND	ND	pending		
	PFDS	ND	ND	ND	pending		
	NMeFOSAA	ND	ND	ND	pending		
	NetFOSAA	ND	ND	ND	pending		
	6:2 FTS	ND	ND	ND	pending		
	8:2 FTS	ND	ND	ND	pending		

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
CFPUA	PFuNA	ND	0.483 (J)	0.956 (J)	pending		**Sample Specific Analytical**
	PFDoA	ND	ND	ND	pending		8/17/2017: GenX surrogate
	PFTriA	ND	ND	ND	pending		8/31/2017: GenX surrogate
	PFTreA	ND	ND	ND	pending		8/31/2017: 1 of 3 surrogates
	PFHpS	0.433 (J)	0.509 (J)	0.524 (J)	pending		
	PFDS	ND	ND	ND	pending		
	NMeFOSAA	ND	ND	ND	pending		
	NetFOSAA	ND	ND	ND	pending		
	6:2 FTS	1.36 (J)	1.29 (J)	1.41 (J)	pending		
	8:2 FTS	ND	ND	ND	pending		

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Pender County	PFuNA	ND	ND	ND	pending		**Sample Specific Analytical**
	PFDoA	ND	ND	ND	pending		8/17/2017: 1 of 3 surrogates
	PFTriA	ND	ND	ND	pending		8/31/2017: 1 of 3 surrogates
	PFTreA	ND	ND	0.419 (J)	pending		
	PFHpS	ND	ND	ND	pending		
	PFDS	ND	ND	ND	pending		
	NMeFOSAA	ND	ND	ND	pending		
	NetFOSAA	ND	ND	ND	pending		
	6:2 FTS	ND	ND	ND	pending		
	8:2 FTS	ND	ND	ND	pending		

Result (ppt)

		8/17/2017	8/24/2017	8/31/2017	9/7/2017		
Brunswick	PFuNA	0.248 (J)	0.211 (J)	0.213 (J)	pending		**Sample Specific Analytical**

	PFDoA	ND	ND	ND	pending		8/17/2017: GenX surrogate
Brunswick County NW	PFTriA	ND	0.199 (J)	ND	pending		8/31/2017: GenX surrogate
	PFTreA	ND	1.28 (J)	0.489 (J)	pending		
	PFHpS	ND	ND	0.296 (J)	pending		
	PFDS	ND	ND	ND	pending		
	NMeFOSAA	ND	ND	ND	pending		
	NetFOSAA	ND	ND	ND	pending		
	6:2 FTS	0.595 (J)	ND	0.535 (J)	pending		
	8:2 FTS	ND	ND	ND	pending		

Batch Specific Analytical Comments:

J : Estimated (below RL) / ND : Not Detected

Sample comments 8/16/17 - 8/24/17

PFBA recovered below acceptance levels in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Matrix Spike

GenX surrogate recovered below acceptance levels in Method Blank

GenX surrogate recovered below acceptance levels in Blank Spike

GenX surrogates recovered below acceptance levels in Sample Duplicates

Sample comments 8/23/17 - 8/31/17 (GenX)

GenX surrogate recovered below acceptance levels in LCS

Sample comments 8/23/17 - 8/31/17 (PF cpds)

1 of 3 surrogates recovered below acceptance levels in Blank Spike

PFuNA, PFTriA, PFTreA, PFDS recovered above acceptance levels in Blank Spike

PFBA, PFPeA recovered below acceptance levels in Matrix Spike

6:2 FTS, 8:2 FTS recovered above acceptance levels in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Matrix Spike

Sample comments 9/1/17 - 9/13/17 (GenX)

GenX surrogate recovered below acceptance levels in Method Blank

GenX surrogate RPD above acceptance levels in Sample Duplicate

Sample Specific Analytical Comments:
8/17/2017: 1 of 3 surrogates recovered below acceptance levels
8/18/2017: 1 of 3 surrogates recovered below acceptance levels
8/21/2017: 1 of 3 surrogates recovered below acceptance levels
8/22/2017: 1 of 3 surrogates recovered below acceptance levels
8/23/2017: 1 of 3 surrogates recovered below acceptance levels
8/24/2017: GenX surrogate recovered below acceptance levels
8/24/2017: 1 of 3 surrogates recovered below acceptance levels
8/25/2017: GenX surrogate recovered below acceptance levels

ical Comments:
ogates recovered below acceptance levels
ogates recovered below acceptance levels
ogates recovered below acceptance levels
ogate recovered below acceptance levels
ogates recovered below acceptance levels
gate recovered below acceptance levels

Sample Specific Analytical Comments:
9/5/2017: GenX surrogate recovered below acceptance levels
9/13/2017: GenX surrogate recovered below acceptance levels

ical Comments:
ogates recovered below acceptance levels
ogates recovered below acceptance levels

9/6/2017

Huske L&D	PFuNA	pending	**Sample Specific Analytical Comm**
	PFDoA	pending	9/6/2017: GenX surrogate recov
	PFTriA	pending	
	PFTreA	pending	
	PFHpS		
	PFDS	pending	

	NMeFOSAA	pending	
	NetFOSAA	pending	
	6:2 FTS	pending	
	8:2 FTS	pending	

ical Comments:
ogate recovered below acceptance levels
ogates recovered below acceptance levels

8/29/2017

Cross Creek WWTP Effluent	PFuNA	0.971 (J)	Sample Specific Analytical Comm
	PFDoA	ND	8/29/2017: 1 of 3 surrogates rec
	PFTriA	ND	
	PFTreA	ND	
	PFHpS	0.650 (J)	
	PFDS	ND	
	NMeFOSAA	1.30 (J)	
	NetFOSAA	ND	
	6:2 FTS	20.7	
	8:2 FTS	0.957 (J)	

ical Comments:
ogate recovered below acceptance levels
ogate recovered below acceptance levels
ogates recovered below acceptance levels

8/29/2017

DAK Americas WWTP Effluent	PFuNA	ND	Sample Specific Analytical Comm
	PFDoA	ND	8/29/2017: 1 of 3 surrogates rec
	PFTriA	ND	8/29/2017: GenX surrogate reco
	PFTreA	ND	
	PFHpS	0.271 (J)	
	PFDS	ND	
	NMeFOSAA	ND	
	NetFOSAA	ND	
	6:2 FTS	6.56	
	8:2 FTS	ND	

ical Comments:
ogates recovered below acceptance levels
ogates recovered below acceptance levels

8/29/2017

Rockfish WWTP Effluent	PFuNA	ND	Sample Specific Analytical Comm
	PFDoA	ND	8/29/2017: 1 of 3 surrogates rec
	PFTriA	ND	
	PFTreA	ND	
	PFHpS	0.345 (J)	
	PFDS	ND	
	NMeFOSAA	ND	
	NetFOSAA	ND	
	6:2 FTS	4.56	
	8:2 FTS	ND	

ical Comments:

ogate recovered above acceptance levels
ogate recovered below acceptance levels

tical Comments:

ogate recovered below acceptance level

tical Comments:

rogates recovered below acceptance levels

tical Comments:

rogates recovered below acceptance levels

ogate recovered above acceptance levels

tical Comments:

rogates recovered below acceptance levels

To: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; McCord, James[mccord.james@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Thur 7/20/2017 8:28:56 PM
Subject: RE: EPA PFAS contact

I have confirmed that we have enough sample bottles and acid for next week. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Johnson, Chris
Sent: Thursday, July 20, 2017 11:49 AM
To: 'Lindstrom, Andrew' <Lindstrom.Andrew@epa.gov>; McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

I don't think we will need any additional sample bottles or HNO3. I picked up what I thought would finish out weeks 5 and 6 last week. If that changes, I will let you know today. We do, however, need any QC materials you want to accompany the samples. And, we need the unpreserved set of QC materials for the contract laboratory.

I hope to be able to deliver this week's samples before noon tomorrow. Wilmington is sampling today and we usually get their samples on Friday morning.

Will there be another contact for sample delivery tomorrow or should I call you, Andy?

Thanks!

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Thursday, July 20, 2017 11:34 AM
To: McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: FW: EPA PFAS contact

James,

Chris Johnson will be coming tomorrow to drop off samples and pick up materials for the next round of sampling.

If you could help make sure we are ready to give him the materials he needs to complete this week's sampling it would be extremely helpful.

I think we will be needed empty bottles (24) and a set of QC spikes and blanks similar to last week.

James' phone number is 919-541-2137.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]

Sent: Wednesday, July 19, 2017 3:40 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Understood. Thanks for letting us know, Andy.

I will be heading over there on Friday with this week's samples if all goes to plan. Talk to you again soon.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, July 19, 2017 3:08 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Chris and Dana,

I spoke with Sandy this morning about her interest in obtaining assistance with the analysis of groundwater samples for GenX.

I asked that she make this request directly to our Laboratory Director, Dr. Jennifer Orme-Zavaleta.

Please let me know if I can help in any way.

Thank you,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, July 19, 2017 3:02 PM
To: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

My contact person at the ORD lab is Mark Strynar. I've copied him on this email, but he is out of the office right now. The other contact I have there is Andy Lindstrom, who is also copied on the email.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Satterwhite, Dana
Sent: Wednesday, July 19, 2017 2:44 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>
Subject: EPA PFAS contact

Hi Chris,
Sandy Mort (copied on this email) has requested a contact person with EPA ORD for PFAS testing. Will you share that information with her?
Thank you,
Dana

Dana Satterwhite
Environmental Program Supervisor III
WW/GW Laboratory Certification Branch
North Carolina Department of Environmental Quality/Division of Water Resources

919 733 3908 ext. 202 office
dana.satterwhite@ncdenr.gov

Water Sciences Section
1623 Mail Service Center
Raleigh, NC 27699-1623

Nothing Compares

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Have you signed up to receive automatic email notices of changes to policies, regulations and resources pertaining to the NC Wastewater/Groundwater Laboratory Certification program that could have an impact on your day-to-day operations? If not, send a blank email to the following address:
DENR.DWQ.Lab_Cert-join@lists.ncmail.net

To: Strynar, Mark[Strynar.Mark@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Allen, Trent[trent.allen@ncdenr.gov]
Cc: Cox, Heidi[heidi.cox@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]
From: Fransen, Tom
Sent: Thur 8/31/2017 8:06:30 PM
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Trent,
Looks like there is more to the issue than Lat-Long for L&D3. See the latest email.
Tom

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 3:47 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Fransen, Tom <tom.fransen@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

If that sample was taken at L&D3 boat ramp I know exactly where that is. However, the weekly sampling was of the Chemours outfall 002 and the first sample below the L&D3 was Bladen Bluffs and nothing was shown above 102 ng/L (Chemours outfall 002 7-24-17). How do you get 12,600 at L&D3 unless it is from diffuse source rather than direct discharge?

Week#8 data has not been released but is very similar to week#6,7.

Mark

The week 6 & 7 GenX results are much more straightforward, so I will discuss this first. These samples were received by our lab on July 28, August 1, and 4, 2017, respectively. Results show that GenX concentrations throughout the river basin continue their decline starting with the Chemours outfall (week 7 maximum of 67.9 ng/L) and extending downstream to finished drinking water (maximum at Pender Co. finished water week 7 of 43.4 ng/L). Our QA/QC samples for these results are within expected tolerances (i.e. undetected in blanks and spiked samples within 20% of expected concentrations) with one exception: a high-level spike (200 ng/L) measured at 149 ng/L in week 6 which was outside our ±20 percent range. The GenX results are provided in Attachment B.

		Conc.	Flag
Week	**Location / Sample Identifier**	**(ng/L)**	
6	DWR #1- PO Hoffer WTP Raw Water	<10	1
6	DWR #2 - Bladen Bluffs Raw water (avg. 2 reps)	30.4	
6	DWR #3 - Bladen Bluffs Finished water	34.2	
6	DWR #4 - Smithfield Field Well	<10	1
6	NCDEQ 1 - LCFWSA Raw	35.1	
6	NCDEQ 2 - Sweeney Treated	69.5	
6	NCDEQ 3 - ASR Well	53.6	
6	NCDEQ 4 - WB Well 11	19.2	
6	NCDEQ 5 - IP-Raw	36.3	

6	NCDEQ 6 - IP-Finished	22.2	
6	NCDEQ 7 - NW Brunswick WTP - Finished	31.2	
6	NCDEQ 8 - Pender 421 WTP Finished	65.4	
6	NCDEQ 9 - WB Well 6	<10	1
6	NCDEQ 10 - CB Well 8	<10	1
6	NCDEQ 11 - CB Well 13	<10	1
6	Chemours Outfall 002 7-24-17	102	
6	Chemours Outfall 002 7-25-17 (avg. 2 reps)	74.6	
6	Chemours Outfall 002 7-26-17	71.3	
6	Chemours Outfall 002 7-27-17	77.1	
6	Chemours Outfall 002 7-28-17	63.4	
7	(2) Sweeney WTP finished	38.3	
7	(6) IP WTP Finished	12.7	
7	(7) NW Brunswick Finished	21.6	
7	(8) Pender 421 WTP Finished	39.2	
7	Pender Co. Finished water 7-31-17	43.4	
7	Chemours outfall 002 7-31-17	67.9	
7	Bladen Bluffs WTP Finished	36.2	
7	Chemours outfall 002 8-1-17	35.1	
7	Chemours outfall 002 8-2-17	41.9	
7	Chemours outfall 002 8-3-17	61.8	
7	Chemours outfall 002 8-4-17	44.0	
Flag			
1	Below Limit of Quantitation		

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, August 31, 2017 1:41 PM
To: Fransen, Tom <tom.fransen@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Tom – can you or Melanie send Dr. Strynar the GPS coordinate for the boat ramp at lock & dam #3 on the Cape Fear?

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

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Phone: 919-707-9014

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From: Johnson, Chris
Sent: Thursday, August 31, 2017 1:14 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

The only information was passed verbally by phone. I believe I heard them say that the sample was collected at the Huske Dam, no exact position provided.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 11:59 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Wow where did that sample come from? Do you have GPS coordinates. The August results of the outfall 002 weeks 6-7 and week8 (which have not yet been reported) do not show anything near that high.

Could it have been the old Chemours discharge creek?

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, August 31, 2017 11:00 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: FW: Brunswick Regional H2GO results from 8/14/17

Mark – sharing results we heard about yesterday on a call with the local water utilities and health directors.
Interesting results on page 9 of 12,600 ppt.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Cox, Heidi
Sent: Thursday, August 31, 2017 10:55 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Bob Walker said he collected it from the river at the boat ramp at the O'Huske Lock and Dam, which I believe is Lock & Dam #3.
Heidi

From: Culpepper, Linda
Sent: Wednesday, August 30, 2017 10:38 PM
To: Cox, Heidi <heidi.cox@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Heidi – please follow up with them to see where the sample on page 9 with the GenX test result of 12,600 ppt was taken. Not sure what O'Huske L&D represents. Thank you.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Cox, Heidi
Sent: Wednesday, August 30, 2017 12:11 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>
Subject: Brunswick Regional H2GO results from 8/14/17

Attached are the results from Brunswick Regional H2GO that were brought up by Bob Walker during the call this morning.
Heidi

Heidi Lane Cox
Regional Engineering Supervisor
Wilmington and Fayetteville Regional Offices
Public Water Supply Section
Department of Environmental Quality

(910) 796-7368 office
Personal Phone / Ex. 6
Heidi.cox@ncdenr.gov

127 Cardinal Drive Ext.
Wilmington, NC 28405

Nothing Compares

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To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Culpepper, Linda
Sent: Thur 7/27/2017 1:20:00 PM
Subject: RE: flow information for the Chemours outfall samples

What date range is needed?

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, July 27, 2017 9:02 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: flow information for the Chemours outfall samples

Great thanks Linda.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, July 27, 2017 8:58 AM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: flow information for the Chemours outfall samples

Julie is leading an inspection team at the plant site today. I'll send her a text as well to see if they can record the historical data while on site.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, July 26, 2017 11:07 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: flow information for the Chemours outfall samples

Linda,

Would it be possible to get flow information for the Chemours outfall samples that are being collected?

We are measuring the concentration, but unless we also have flow information we won't be able to calculate the total mass of GenX (or any other compound) emitted into the river. This is a very important parameter for determining mass flows and calculated concentrations at the drinking water intakes.

The NPDES permit application indicates that the average WWTP flow at the site is 1.2 million gallons a day but this may have changed as a result of the new controls on the GenX process stream.

Thank you,

Andy

To: Strynar, Mark[Strynar.Mark@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
Cc: Karoly, Cyndi[cyndi.karoly@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Brantley, Mark[mark.brantley@ncdenr.gov]; West, Steve[steve.west@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 6/22/2017 6:26:52 PM
Subject: RE: Discussion for sampling and analysis in Wilmington

My cell phone number is 919 770 3805 if needed. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:24 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Okay. My cell is Personal Phone / Ex. 6 if you have any issues. I get in at 7 AM. Can we shoot for 9 AM in case I do not get finished prepping today.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 9:21 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I would like to come as early as possible in order to get the kits to Fayetteville. Perhaps before lunch if possible.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:16 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

I am working to get this done today. Let me know when you will be available to come and get sample container tomorrow.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 8:25 AM

To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Thanks for the reply, Mark.

I received word from the Wilmington RO and it looks like they will need 16 bottles to finish out their projected sampling. I haven't heard from the Fayetteville office, but based on what we've received from then for the first sampling event, I would think they need approximately 12 bottles to finish up. This is all based on the sampling being done this week.

Given the tight time frame for next week's sampling, we will probably need to drive the sample kits down to Fayetteville tomorrow afternoon if possible. I would also like to deliver the first set to you if we receive Wilmington's set in time. Either way, if there is any way we can have the sample kits ready tomorrow I would have time to get them to the samplers.

Thanks once again for your help on this project.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 6:50 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

One change Chris. I had wishful thinking. I am actually working on Friday and am not off. I will be here.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 4:39 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I will find out the number. Let me contact the regional folks. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 4:09 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I am off Friday but we could have them prepared for your visit to pick up. How many sample bottles do you need? We typically replicate sample 10% of the samples and have a trip blank and a high and low trip spike as well.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]

Sent: Wednesday, June 21, 2017 1:53 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

It may be better if you could supply this material. Based on our conversation, the 1L bottles are preferable and we don't carry that size. Can we pick them up when we bring the first delivery? We may be able to get over there on Friday if that works with your schedules.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 1:50 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

We could provide sample bottles if they are needed. In addition we have always included trip blanks and spikes with our assays for QA/QC purposes. We should strongly consider doing so in any future sampling efforts.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 11:45 AM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Good morning. Wondering if you could clarify a question from the conference call yesterday. Will your laboratory be providing sample bottles and preservative for future sampling events? Also, I see from your 2009 SOP that blanks and spikes were mandated for the coolers. If you require those, will they be provided? We aren't able to make the spikes since they can't be confirmed by analysis.

Thanks for your help.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, June 21, 2017 8:04 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

Great.

Please let me know if I can help in any way as we proceed with this project.

We're very grateful for your help with coordinating this effort.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, June 20, 2017 3:39 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Received. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Tuesday, June 20, 2017 2:57 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Jones, Nick <nick.jones@ncdenr.gov>; Perez, Helen I <helen.perez@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

All,

I've attached a copy of the field collection protocol that we have been using for PFAS compounds including GenX.

The shipping address and storage conditions are specified on page 6.

Please let us know if you have any questions.

Thank you very much,

Andy

-----Original Appointment-----
From: Buckley, Timothy
Sent: Tuesday, June 20, 2017 1:20 PM
To: chris.johnson@ncdenr.gov; Allenbach, Becky; Strynar, Mark; Medina-Vera, Myriam; cyndi.karoly@ncdenr.gov; linda.culpepper@ncdenr.gov
Cc: Lindstrom, Andrew; Jones, Nick; Perez, Helen I; Satterwhite, Dana
Subject: Discussion for sampling and analysis in Wilmington
When: Tuesday, June 20, 2017 2:00 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Teleconference: Call in **Personal Phone / Ex. 6**

Thank you all for making time for this discussion. I know that there is a lot of pressure to move quickly on this project. ORD/NERL is happy to provide analytical support. To guide our involvement/effort, I am hoping that collectively we can provide answers to the following questions.

1. What question are we attempting to address with this sampling effort?
2. What is the sampling design?
3. What is the status and timeline of the QAPP?
4. Given split sample analysis (contract lab and NERL lab), how will differences in reported concentrations be managed?
5. What is the plan for communicating results and who has the lead?
6. What is the project timeline?
7. Do we need on-going coordination meetings?

To: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; McCord, James[mccord.james@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Thur 7/20/2017 8:06:52 PM
Subject: RE: EPA PFAS contact

Will do. Thanks, Andy.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Thursday, July 20, 2017 3:44 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Chris,

Please call Mark or James.

James' phone number is 919-541-2137.

Thank you,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, July 20, 2017 11:49 AM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

I don't think we will need any additional sample bottles or HNO3. I picked up what I thought would finish out weeks 5 and 6 last week. If that changes, I will let you know today. We do, however, need any QC materials you want to accompany the samples. And, we need the unpreserved set of QC materials for the contract laboratory.

I hope to be able to deliver this week's samples before noon tomorrow. Wilmington is sampling today and we usually get their samples on Friday morning.

Will there be another contact for sample delivery tomorrow or should I call you, Andy?

Thanks!

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Thursday, July 20, 2017 11:34 AM
To: McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: FW: EPA PFAS contact

James,

Chris Johnson will be coming tomorrow to drop off samples and pick up materials for the next round of sampling.

If you could help make sure we are ready to give him the materials he needs to complete this week's sampling it would be extremely helpful.

I think we will be needed empty bottles (24) and a set of QC spikes and blanks similar to last week.

James' phone number is 919-541-2137.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, July 19, 2017 3:40 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Understood. Thanks for letting us know, Andy.

I will be heading over there on Friday with this week's samples if all goes to plan. Talk to you again soon.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, July 19, 2017 3:08 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Chris and Dana,

I spoke with Sandy this morning about her interest in obtaining assistance with the analysis of groundwater samples for GenX.

I asked that she make this request directly to our Laboratory Director, Dr. Jennifer Orme-Zavaleta.

Please let me know if I can help in any way.

Thank you,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, July 19, 2017 3:02 PM
To: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

My contact person at the ORD lab is Mark Strynar. I've copied him on this email, but he is out of the office right now. The other contact I have there is Andy Lindstrom, who is also copied on the email.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Satterwhite, Dana
Sent: Wednesday, July 19, 2017 2:44 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>
Subject: EPA PFAS contact

Hi Chris,
Sandy Mort (copied on this email) has requested a contact person with EPA ORD for PFAS testing. Will you share that information with her?
Thank you,
Dana

Dana Satterwhite
Environmental Program Supervisor III
WW/GW Laboratory Certification Branch
North Carolina Department of Environmental Quality/Division of Water Resources

919 733 3908 ext. 202 office
dana.satterwhite@ncdenr.gov

Water Sciences Section
1623 Mail Service Center
Raleigh, NC 27699-1623

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Have you signed up to receive automatic email notices of changes to policies, regulations and resources pertaining to the NC Wastewater/Groundwater Laboratory Certification program that could have an impact on your day-to-day operations? If not, send a blank email to the following address:
DENR.DWQ.Lab_Cert-join@lists.ncmail.net

To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Fri 4/13/2018 9:13:38 PM
Subject: FW: [External] Additional Site Investigation Report
Chemours Fayetteville Additional Site Investigation Report - NCD047368642-R1.pdf

Mark, this is the information I received when asking about the Fayetteville Observer article. Hopefully this will address the compounds in question. I haven't had a chance to review the report. Use this for your information only and if you wanted to disseminate, let me get the OK JIC from the permitting branch beforehand. Have a great weekend.

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908

Correspondence with this email address is subject to North Carolina public record regulations and may be disclosed to third parties.

From: Grzyb, Julie
Sent: Friday, April 13, 2018 3:06 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Brower, Connie <connie.brower@ncdenr.gov>
Subject: FW: [External] Additional Site Investigation Report
Importance: High

Chris,
Michael Scott sent me this report to review regarding the 25 compounds discussed in the news article.
Hoping this addresses it,
Julie

From: Scott, Michael
Sent: Friday, April 13, 2018 2:47 PM
To: Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: FW: [External] Additional Site Investigation Report
Importance: High

Julie,

This should be the report you asked about.

Michael

Michael E. Scott
Director
Division of Waste Management
North Carolina Department of Environmental Quality

919-707-8246 office
Michael.scott@ncdenr.gov

217 West Jones Street
1646 Mail Service Center
Raleigh, NC 27699

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From: Garon, Kevin P [mailto:Kevin.Garon@chemours.com]
Sent: Wednesday, January 31, 2018 5:06 PM
To: Ghiold, Joe <joe.ghiold@ncdenr.gov>
Cc: Mccarty, Bud <bud.mccarty@ncdenr.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Shoemaker, Stephen H <STEPHEN.H.SHOEMAKER@chemours.com>; eric.rey@apks.com
Subject: [External] Additional Site Investigation Report
Importance: High

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to report.spam@nc.gov.

Dr. Ghiold,
Attached please find a cover letter and a PDF version of the *Additional Site Investigation Report* for the Chemours Fayetteville Works. This version of the report contains the text, tables and figures. Due to the size of the laboratory reports, they are being sent to you on CD with two additional hard copies of this report.

Please know that we are continuing to gather more information and data on the site and as we do, we will share that information with NCDEQ and continue to work collaboratively. As we continue to move through the investigation, corrective measures review and finally remedy selection process, we are also working in parallel to identify any interim responses that could be quickly implemented, with special attention toward those which could potentially have positive impact on the continued reductions of PFAS concentrations at outfall 002.

Please call or e-mail me with any questions or comments.

Respectfully submitted,
Kevin

Kevin P. Garon
Principal Project Director
Chemours Corporate Remediation Group
704-560-6435
Kevin.Garon@Chemours.com
The Chemours Company

LinkedIn | Twitter | Chemours.com

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https://www.chemours.com/Chemours_Home/en_US/email_disclaimer.html

January 31, 2018

Mr. Joe Ghiold, Project Manager
Facility Management Branch
Hazardous Waste Section
Division of Waste Management
NC Department of Environmental Quality
1646 Mail Service Center
Raleigh, NC 27699-1646

Re: Additional Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina
EPA ID No. NCD 047 368 642

Dear Mr. Ghiold:

Enclosed, please find a PDF copy of the *Additional Site Investigation Report* for the Chemours Fayetteville Works. This document reports the results of the *Additional Investigation Work Plan* submitted to your office on October 31, 2017. This work was performed in response to a notice of violation issued to The Chemours Company FC, LLC, on September 6, 2017, by the North Carolina Department of Environmental Quality (NCDEQ). In addition to this electronic submittal of the report (text, tables and figures), two hard copies of the full report that include a CD containing the full lab reports are being shipped to your office.

Chemours is pleased to provide this report on the results of the investigation and the initial conclusions drawn to date from these additional data. We want to emphasize that as we collect and analyze these and additional information and data, we recognize that our understanding will evolve and there may be additional findings, assessments and conclusions to share. Chemours will timely communicate new learnings and interpretations to DEQ and will continue to work to address these issues collaboratively with the agency.

As we continue to move through the investigation, corrective measures review and finally remedy selection process, we are working in parallel to identify any interim responses that could be quickly implemented, with special attention toward those which could potentially have positive impact on outfall 002.

If you have any questions or need additional information, please feel free to contact me at 704-560-6435.

Respectfully submitted,

Kevin Garon
Project Director
Chemours Corporate Remediation Group

cc: Christel Compton – Chemours Fayetteville Works
File

Enclosures

PARSONS

ADDITIONAL SITE INVESTIGATION REPORT

CHEMOURS FAYETTEVILLE WORKS SITE
RCRA PERMIT NO. NCD047368642-R1

Prepared for:

The Chemours Company FC, LLC
Corporate Remediation Group
22828 NC Highway 87 W
Fayetteville, NC 28306-7332

Prepared by:

PARSONS
4701 Hedgemore Drive
Charlotte, NC 28209

January 31, 2018

Chemours PN 504639
Parsons PN 449338

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PROFESSIONAL SIGNATURES AND SEALS

Professional Geologist

Professional Geologist	Geologist License number	Expiration date
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ACRONYMS

Acronym	Definition / Description
ADQM	Analytical Data Quality Management
AOC	Area of concern
APFO	Ammonium Perfluorooctanoate
bgs	Below ground surface
Chemours	The Chemours Company FC, LLC
CMS	Corrective Measures Study
COC	Constituent of concern
DuPont	E. I. du Pont de Nemours and Company
DVM	Data Verification Module
FEP	Fluorinated ethylene propylene
ft/d	Foot/feet per day
gpm	Gallons per minute
HFPO-DA	Hexafluoropropylene oxide dimer acid
HH&E	Human health and the environment
MDL	Method detection limit
MSL	Mean sea level
MS/MSD	Matrix spike/ Matrix spike duplicate
NCAC	North Carolina Administrative Code
NCDENR	North Carolina Department of Environmental and Natural Resources
NCDEQ	North Carolina Department of Environmental Quality
NCDHHS	North Carolina Department of Health & Human Services
NCGS	North Carolina Geological Survey
ng/kg	Nanogram(s) per kilogram
ng/L	Nanogram(s) per liter
NPDES	National Pollutant Discharge Elimination System
PFAS	Poly- and perfluoroalkyl substances
PMDF	Polymer Manufacturing Development Facility
PPA	Polymer Processing Aid (also polyphthalamide)
PVC	Polyvinyl chloride
PVF	Polyvinyl fluoride
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RL	Reporting Limit
RPD	Relative percent difference
SCM	Site conceptual model
Site	Fayetteville Works Facility

Acronym	Definition / Description
SOP	Standard operating procedure
SPLP	Synthetic Precipitation Leaching Procedure
SWMU	Solid waste management unit
USEPA	U. S. Environmental Protection Agency
WWTP	Wastewater treatment plant

EXECUTIVE SUMMARY

Parsons has prepared this Additional Site Investigation Report on behalf of The Chemours Company FC, LLC (Chemours) for the Fayetteville Works facility located near Duart Township in Bladen County, North Carolina (the Site).

On June 21, 2017, the North Carolina Department of Environmental Quality (NCDEQ) requested Chemours perform supplemental sampling of monitoring wells at the Site. Based on the analytical results of this sampling, NCDEQ issued Chemours a notice of violation (Notice) on September 6, 2017. The Notice required Chemours to meet the requirements of Title 15A of the North Carolina Administrative Code, Subchapter 02L, Section .0106 (15A NCAC 02L.0106), which specifies corrective action for groundwater. In response to subsequent discussions with NCDEQ, Chemours submitted a work plan for additional site assessment under 15A NCAC 02L.0106(g) on October 31, 2017. This investigation was conducted during November and December 2017, and supplements the Resource Conservation and Recovery Act Facility Investigation (RFI) that was previously conducted at the Site.

The additional information collected during this investigation will assist in making decisions in support of the overall Site corrective action goals and will support an eventual corrective measures study (CMS). The constituents of concern (COCs) investigated were the 16 poly- and perfluoroalkyl substances (PFAS) listed in Table 1 (hereafter referred to as List 1-PFASs) and the 10 PFASs listed in Table 2 (hereafter referred to as List 2-PFASs) (collectively, List 1-PFASs and List 2-PFAS are referred to as “Target PFAS”). Initial data on Target PFAS presence in soil, groundwater, and surface water were obtained through execution of investigation work plans performed between July and September 2017. Completion of the current site assessment was accomplished by collecting site-specific data to better define the nature and extent of Target PFAS distribution in environmental media (due to releases from industrial processes, regulated units, solid waste management units, or other sources). Hydrogeologic data were also collected that can be used to predict the fate and transport of the PFAS in the environment.

Investigations results indicate that Target PFAS releases to environmental media from primary sources (e.g., wastewater conveyances, industrial process activities) have resulted in secondary sources present in environmental media. These secondary sources are present in on-site soil and groundwater (Perched Zone water, Surficial Aquifer groundwater, and Black Creek Aquifer groundwater) and off-site Surficial Aquifer groundwater. The distribution of detected Target PFAS in soil would appear to suggest air deposition is the primary source (in areas away from ditches). Although leaching of Target PFASs could lead to some of the detected groundwater concentrations, the higher groundwater concentrations are likely the result of leakage from stormwater and wastewater conveyance ditches. The observed distribution in the aquifers appears to result from Target PFAS migration with natural groundwater flow. Detection of Target PFAS in the surface water of Willis Creek, Georgia Branch, and the Cape Fear River suggests probable migration of these groundwater secondary sources to these surface waters. However, sampling has suggested there are upstream sources in the Cape Fear River for some of the Target PFASs. A conceptual level water balance-based mass flux estimate indicates that HFPO-DA in groundwater discharging to the river would not alone result in river water HFPO-DA concentrations at or above 140 nanograms per liter (ng/L).

Lithologic logging of newly installed wells (including deeper Black Creek Aquifer wells), along with hydrogeologic testing of the saturated portion of the Perched Zone and the Surficial Aquifer, allowed for refinement of the Site Conceptual Model (SCM). This, in turn, will facilitate

more accurate prediction of Target PFAS fate and transport in the environment during development of corrective action alternatives, including the feasibility study to be provided to NCDEQ by February 28, 2018 and the remedial plan to be provided March 31, 2018. In addition, the SCM will be updated to include, as appropriate, data from the ongoing stormwater investigation, and the results of Chemours' ongoing evaluation of interim control measures.

The path forward for corrective action at the Site is next to perform a feasibility study addressing remedial alternatives for on-site Target PFAS secondary sources. Chemours is evaluating how these secondary sources may be contributing to exposure or pathways of concern and will propose remedial alternatives to address those sources of concern in the forthcoming Feasibility Report. Chemours has already undertaken (or committed to undertake) numerous actions to identify, evaluate, remove, treat, mitigate, or control various on-site primary Target PFAS sources (as documented in the January 15, 2018, letter to NCDEQ).

1.0 INTRODUCTION

Parsons has prepared this Additional Site Investigation Report on behalf of The Chemours Company FC, LLC (Chemours) for the Fayetteville Works facility located near Duart Township in Bladen County, North Carolina (the Site).

On June 21, 2017, the North Carolina Department of Environmental Quality (NCDEQ) requested Chemours perform supplemental sampling of monitoring wells at the Site. Based on the analytical results of this sampling, NCDEQ issued Chemours a notice of violation (Notice) on September 6, 2017. The Notice required Chemours to meet the requirements of Title 15A of the North Carolina Administrative Code, Subchapter 02L, Section .0106 (15A NCAC 02L.0106), which specifies corrective action for groundwater. In response to subsequent discussions with NCDEQ, Chemours submitted a work plan for additional site assessment under 15A NCAC 02L.0106(g) on October 31, 2017. This investigation was conducted during November and December 2017 and supplements the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) that was previously conducted at the Site.

This report is organized into six sections, including this Introduction, which presents site background information and corrective action approach. Section 2.0 presents the groundwater and soil investigation results from the additional site investigation, while Section 3.0 presents the hydrogeologic investigation results. Section 4.0 presents an update to the Site Conceptual Model (SCM) and discusses contaminant sources and distribution in environmental media. Section 5.0 presents the conclusions and path forward. Section 6.0 lists the references cited in the text.

1.1 Site Background

The Site is located on NC Highway 87, 15 miles southeast of the City of Fayetteville, and south of the Bladen-Cumberland county line. The Site encompasses 2,177 acres of relatively flat undeveloped open land and woodland bounded on the east by the Cape Fear River, on the west by NC Highway 87, and on the north and south by farmland (Figure 1).

E.I. du Pont de Nemours and Company (DuPont) purchased the property in parcels from several families in 1970. The Site's first manufacturing area was constructed in the early 1970s. Currently, the Site manufactures plastic sheeting, fluorochemicals, and intermediates for plastics manufacturing. A former manufacturing area, which was sold in 1992, produced nylon strapping and elastomeric tape.

DuPont sold its Butacite® and SentryGlas® manufacturing units to Kuraray America Inc. in June 2014. In July 2015, DuPont separated its specialty chemicals business into a new publicly-traded company named The Chemours Company FC, LLC, as of July 1, 2015. With this separation, Chemours became the owner of the entire 2,177 acres of the Fayetteville Works along with the Fluoromonomers, Nafion® membranes, and PPA[1] manufacturing units. The polyvinyl fluoride (PVF) resin manufacturing unit remained with DuPont.

In addition to the manufacturing operations, Chemours operates two natural gas-fired boilers and a wastewater treatment plant (WWTP) for the treatment of process and sanitary wastewaters from Chemours, Kuraray, and DuPont. Hazardous wastes generated from the Chemours' manufacturing processes and laboratories are currently

[1] PPA – Polymer Processing Aid

managed at the permitted Hazardous Waste Container Storage Area, in four permitted hazardous waste tanks, and at the 90-day ignitable waste accumulation area prior to being shipped offsite for treatment, disposal, or recycling.

1.1.1 Plant Site Operations

Figure 1 depicts the location of the Chemours Fayetteville Works facility on an excerpt of the United States Geological Survey topographic map of the area. The site layout is depicted on Figure 2. The Site consists of five main manufacturing areas, one former manufacturing area, and two support areas as summarized in the table below:

Area	Description
Main Manufacturing Areas	
Chemours Fluoromonomers and Nafion® Membrane	Manufactures Nafion® fluoropolymer membrane for electronic cells and various fluorochemicals used for Nafion® membrane, Teflon® fluoropolymer, Viton® elastomers, and other fluorinated products.
Chemours Polymer Processing Aid (PPA)	Manufactures a fluorochemical that is used as a processing aid for off-site fluoropolymer manufacturing. This area formerly manufactured ammonium perfluorooctanoate (APFO). (Note: The last date of APFO production at the Site was April 28, 2013. Although APFO was manufactured in this area, it was never used in any of the other manufacturing facilities at the Site.)
Kuraray Butacite®	Manufactures Butacite® polyvinyl butyral sheeting and polyvinyl butyral resin for automotive and architectural safety glass.
Kuraray SentryGlas®	Manufactures SentryGlas® structural interlayer for automotive and architectural safety glass (previous location of now defunct Dymetrol® nylon strapping).
DuPont Company PVF	Manufactures PVF resin used to produce Tedlar® film.
Former Manufacturing Area	
Polymer Manufacturing Development Facility (PMDF)	Manufactured Teflon® fluorinated ethylene propylene (FEP) for electrical wiring insulation and other applications. (Note: this Teflon® unit did not use APFO in its process.) The PMDF unit was permanently shut down in June 2009; it no longer manufactures DuPont Teflon®.
Support Areas	
Power	Generates steam via natural gas and fuel oil-fired boilers for the facility's manufacturing areas as well as comfort heating for employees. Produces process water and demineralized water from raw river water.
Wastewater Treatment Plant	The WWTP treats process wastewater and sanitary wastewater prior to discharge to the Cape Fear River.

1.1.2 Regulatory History

The Fayetteville Works facility received its initial RCRA Permit (NCD047368642) to operate a hazardous waste container storage area and tanks in February 1983, while under DuPont ownership. DuPont submitted an amended Part A application in 1991 to document upgrades to its fluorocarbon waste treatment and tank system. The RCRA

Part B permit application submitted in August 1993 identified 71,750 gallons of container storage capacity at the container storage area. Stored waste included characteristic wastes (D001, D002, D003, D007, D009, and D029) and listed wastes (F002, F003, and F005).

In January 1998, the Site's RCRA Permit was reissued and was to remain in effect for 10 years. Part V of the permit required DuPont to investigate potential releases of hazardous substances into the environment. In June 2007, DuPont submitted an application for renewal of the Site's RCRA Permit. The North Carolina Department of Environment and Natural Resources (NCDENR; now NCDEQ) reissued the permit on September 28, 2012.

Since 1996, several stages of investigation have been conducted at the Site under NCDENR/NCDEQ oversight to meet the conditions of the permit. The Phase III (Final) RFI report was submitted in August 2014 (DuPont CRG). In addition, the Site voluntarily agreed to the NCDENR request to investigate potential APFO releases as part the ongoing RFI. The findings of the APFO investigation activities (conducted during the Phase II RFI) were included in Appendix A of the Phase II RFI Report (DuPont CRG 2006). The Corrective Measures Study (CMS) Work Plan was submitted on December 2, 2016 (Chemours CRG) and approved on February 8, 2017. The Site is currently in the CMS phase of the Corrective Action Program.

1.2 Corrective Action

Corrective action refers to all activities related to the investigation, characterization, and cleanup of a release of hazardous wastes or hazardous waste constituents from solid waste management units (SWMUs) and/or areas of concern (AOCs) at the Site. Chemours has established several overall goals for the corrective action activities at the Site.

- Ensure the protection of human health and the environment (HH&E) through the development and use of an SCM, based on a satisfactory understanding of site constituents, release pathways, and exposure potential;
- Cost-effectively manage/minimize long-term liabilities associated with potential contaminant releases using a risk-based prioritization process;
- Appropriately comply with all regulatory requirements; and
- Coordinate RCRA corrective action activities with other business activities at the Site to minimize disruption to plant operations, maximize benefits and synergies with other, overlapping environmental initiatives, and ensure field efforts are conducted in a safe and efficient manner.

1.3 Approach, Goals, and Objectives of Additional Site Investigation

The purpose of this investigation was to gather additional information to perform a site assessment under 15A NCAC 02L.0106(g). Results of the investigation will facilitate remedial decisions in support of the overall Site corrective action goals and an eventual CMS. To accomplish this, site-specific data were collected to determine the nature and extent of Target PFAS releases (e.g., from regulated units, SWMUs, or other source areas) to environmental media at the Site. The goal of this investigation was to collect additional data on Target PFAS distribution in soil, groundwater, and surface water and

hydrogeologic data that can be used to predict fate and transport of Target PFAS in the environment.

Based on a review of historical Site data and the current SCM, the following specific objectives were developed:

1. Determine distribution of Target PFASs (target lists) in Perched Zone water, Surficial Aquifer groundwater, and Black Creek Aquifer groundwater
2. Determine distribution of leachable and “total” Target PFASs in surface soil and the vertical distribution of Target PFASs above the perched water
3. Further characterize Site hydrogeologic conditions

The specific tasks that were completed to meet these objectives and investigation results are described in the following sections.

2.0 GROUNDWATER AND SOIL INVESTIGATION RESULTS

The specific objectives for groundwater and soil sampling during this investigation were to identify and delineate Target PFASs in site-wide groundwater and surficial soil and to determine the leachability of Target PFASs from soils to groundwater. Vertical profiling of Target PFASs in soil above the perched water also was performed to confirm whether leached Target PFASs contribute to the observed groundwater concentrations. No deviations from the field investigation methodologies presented in the work plan were noted during the recent investigation.

2.1 Data Verification and Validation

During this investigation, of groundwater and soil samples were analyzed for the 16 PFASs listed in Table 1 (hereafter referred to as List 1-PFASs) and the 10 PFASs listed in Table 2 (hereafter referred to as List 2-PFASs) (collectively, List 1-PFASs and List 2-PFAS are referred to as "Target PFAS"). List 1-PFASs were analyzed by a North Carolina-certified laboratory using an approved United States Environmental Protection Agency (USEPA) method. Chemours could not identify any commercial laboratories that could analyze for the List 2-PFASs; therefore, List 2-PFASs were analyzed at the Chemours Fayetteville Works on-site laboratory, following site-specific methodology.

Analytical data produced during this investigation were verified/validated according to the process presented in the work plan. The laboratory provided all data to the Chemours data validation contractor, AECOM's in-house Analytical Data Quality Management (ADQM) group, in a data package. Laboratory analytical reports are included in Appendix A. The data package contained raw data that was reviewed by ADQM for compliance with the laboratory standard operating procedures (SOPs) and usability. The laboratory also delivered the analytical data electronically for upload to the Chemours Locus EIM™ database.

All data were reviewed using the Data Verification Module (DVM). The DVM is an internal review process used to assist with the determination of data usability. The electronic data deliverables received from the laboratory were loaded into the Locus EIM™ database and processed through a series of data quality checks, which are a combination of software (the DVM) and manual reviewer evaluations. The data are evaluated against the following data usability checks:

- Field and laboratory blank contamination
- USEPA hold time criteria
- Missing quality control (QC) samples
- Matrix spike/matrix spike duplicate (MS/MSD) recoveries and the relative percent differences (RPDs) between these spikes
- Laboratory control sample(LCS)/control sample duplicate (LCSD) recoveries and the RPD between these spikes
- Surrogate spike recoveries for organic analyses
- RPD between field duplicate sample pairs
- RPD between laboratory replicates for inorganic analyses
- Difference / percent difference between total and dissolved sample pairs, if any.

The DVM applies the following data evaluation qualifiers to analysis results, as warranted:

Qualifier	Definition
R	Unusable result. Analyte may or may not be present in the sample.
B	Not detected substantially above the level reported in the laboratory or field blanks.
J	Analyte present. Reported value may not be accurate or precise.
UJ	Not detected. Reporting limit may not be accurate or precise.

The individual DVM narrative report for each lot entered into the EIM database summarized which samples were qualified (if any), the specific reasons for the qualification, and the potential bias in reported results. In addition, laboratory results greater than the method detection limit (MDL) but less than the reporting limit (RL) were qualified "J" and should be considered estimated values.

The DVM review process described above was performed on 100% of the data generated for the sampling events. The DVM review process was supplemented by a manual review of the instrument-related QC results for calibration standards, blanks, and recoveries to evaluate the overall review process to be consistent with Stage 2b of the USEPA Guidance for Labelling Externally Validated Laboratory Analytical Data for Superfund Use (EPA-540-R-08-005 2009).

2.2 Site-Wide Groundwater Monitoring

The main focus of this groundwater investigation was to further delineate Target PFAS concentrations in site-wide groundwater. Perched Zone water, Surficial Aquifer groundwater, and Black Creek Aquifer groundwater was gauged and sampled. Gauged groundwater levels from 84 wells are listed in Table 3. Figures 3, 5, and 6 depict potentiometric surfaces for the Perched Zone, Surficial Aquifer, and Black Creek Aquifer (respectively), developed using gauged groundwater levels. Figure 4 also depicts contours of the Perched Zone water thickness. As shown, Perched Zone water is thickest at the River Water Solids Settling Basins and flows radially away from the basins (as observed in the current SCM). Groundwater in both the Surficial and Black Creek Aquifers generally flows toward the Cape Fear River. Deflections in the direction of flow toward Willis Creek are present in the vicinity of the creek.

During this site investigation, groundwater from 28 Perched Zone wells, 27 Surficial Aquifer wells, and four Black Creek Aquifer wells was sampled and analyzed for the 16 List 1-PFASs and the additional 10 List 2-PFASs. Hexafluoropropylene oxide dimer acid (HFPO-DA) is included in List 1-PFASs. List 1-PFASs are summarized in Table 4a for Perched Zone water samples, Table 5a for Surficial Aquifer groundwater samples, and Table 6a for Black Creek Aquifer groundwater samples.

Perched Zone water HFPO-DA concentrations ranged from 440 nanograms per liter (ng/L) to 640,000 ng/L (as shown on Figure 7). The highest Perched Zone water HFPO-DA concentrations were detected in the eastern portion of the Nafion® Unit, near the Nafion® Area ditch. The second highest Perched Zone water HFPO-DA concentration was detected in piezometer PZ-18, on the west side of the facility, near the Wood-lined ditch. Surficial Aquifer groundwater HFPO-DA concentrations ranged from <10 ng/L to 45,000 ng/L (as shown on Figure 8). There was no discernable distribution pattern to the concentrations; however, low concentrations were generally present along the Site access road, and higher concentrations were detected in the LTW

wells near the Cape Fear River. Black Creek Aquifer groundwater HFPO-DA concentrations ranged from <130 ng/L to 9,900 ng/L (as shown on Figure 9). Although there was no discernable distribution pattern to the concentrations, the non-detect result was in the hydraulically upgradient portion of the Site.

Analytical detections of List 1-PFASs (other than HFPO-DA) in Perched Zone water are posted on Figure 10, while detections in Surficial Aquifer groundwater are posted on Figure 11, and detections in Black Creek Aquifer groundwater are posted on Figure 12. Between four and 11 of the List 1-PFASs (not including HFPO-DA) were detected in Perched Zone water. The same group of nine PFASs that previously were detected in Cape Fear River surface water (PFBS, PFDA, PFHpA, PFHxS, PFHxA, PFNA, PFOS, PFOA, PFPeA) were also detected in many of the Perched Zone wells at similar concentrations. This is likely because most of the Perched Zone water originates as leakage from the Sediment Basins (which settle out river water solids) and infiltration of non-contact cooling water (i.e., river water) from the Nafion® Area ditch. Although there is no discernable general distribution of Target PFASs in the Perched Zone water, five of the List 1-PFASs are present at relatively higher concentrations in Nafion® Area wells (PFHpA, PFHxA, PFNA, PFOA, and PFPeA), suggesting a potential on-site source other than leakage from the Sediment Basins or of non-contact cooling water.

Fewer and lower concentrations of List 1-PFASs were detected in Surficial Aquifer groundwater, except for higher detected PFOA concentrations in PPA Area wells. List 1-PFASs were detected in groundwater from three of the four Black Creek Aquifer wells at relatively lower concentrations than those detected in the Surficial Aquifer. Only PFPeA was detected at concentrations above 100 ng/L.

Six State monitoring wells were sampled in addition to on-site wells. This set of six wells is known as the "DWR DuPont Station" series of wells (well installation specifications can be viewed on the internet at https://www.ncwater.org). These wells monitor the upper and lower portions of the Surficial Aquifer, the upper and lower portions of the Black Creek Aquifer, the Upper Cape Fear Confining Unit, and the Upper Cape Fear Aquifer. Table 7a summarizes the List 1-PFAS results. As shown, HFPO-DA was only detected (at 970 ng/L) in the well that monitors the upper portion of the Surficial Aquifer. Another four List 1-PFASs were detected in the upper portion of the Surficial Aquifer, at concentrations not exceeding 22 ng/L. PFOA was the only List 1-PFAS detected in three of the other five wells (two wells did not have any detection of a List 1-PFAS).

Tables 4b through 7b summarize analytical results for List 2-PFASs. As indicated, List 2-PFASs ranged in concentration from non-detect to over 8,000,000 ng/L (i.e., 8 parts per million). The highest List 2-PFAS concentrations were generally associated with the highest List 1-PFAS concentrations. The List 2-PFAS PFMOAA was detected at the highest concentrations. As with the List 1-PFASs, there was no discernable distribution pattern.

2.3 Site-wide Soil Sampling

The main focus of the soil sampling was to further delineate Target PFASs in soil and determine their leachability. This objective was accomplished by collecting soil samples at 32 locations over the interval 0.0 to 0.5 feet below ground surface (bgs) and running the synthetic precipitation leaching procedure (SPLP) preparation method on the samples prior to analysis for Target PFASs. The sampling locations (shown on Figure 13) were unbiased (e.g., with regard to manufacturing unit, prevailing northeast

wind direction, ground cover foliage) and covered an area that included the Main Manufacturing Area and the surrounding forested property.

Table 8a summarizes the analytical results for List 1-PFASs in soil leachate, including HFPO-DA. List 1-PFAS detections are posted on Figure 13. As shown, HFPO-DA was detected in all but one 0.0 to 0.5 bgs sample at leachable concentrations ranging from 11 ng/L to 1700 ng/L. There was no discernable distribution to the leachable HFPO-DA concentrations, although concentrations above 100 ng/L were mainly detected in the eastern portion of the Site. Some of the remaining List 1-PFASs also were detected in 0.0 to 0.5 bgs samples, but at lower concentrations (most at less than 10 ng/L, and none exceeding 100 ng/L). List 2-PFAS results from the Chemours on-site laboratory were not yet available for inclusion in this report, and will be submitted in a forthcoming revision.

In addition to the 0.0 to 0.5 bgs samples, soil was collected at two deeper depths (4.5 to 5.0 bgs and 9.5 to 10.0 bgs) at three locations to determine vertical profiles for List 1-PFASs in the soil overlying perched water (these leachable List 1-PFAS results are included in Table 8a). HFPO-DA results range from non-detect (<10 ng/L) to 130 ng/L and were detected at all depth intervals. The vertical profiles were collected near Perched Zone water wells where groundwater samples were collected. The highest leachable HFPO-DA soil concentration currently detected in each profile did not correlate well with the detected groundwater HFPO-DA concentration, suggesting that the perched water concentrations may result from an HFPO-DA source other than leaching of air deposited HFPO-DA (e.g., leakage from on-site stormwater conveyance ditches or non-process water ditches). For instance, the highest leachable HFPO-DA concentration in soil boring SB-01 equaled 26 ng/L, while the groundwater concentration in nearby piezometer PZ-16 equaled 63,000 ng/L. Likewise, at soil boring SB-09, the highest leachable HFPO-DA concentration equaled 130 ng/L, while the groundwater concentration in nearby well SMW-02 equaled 15,000 ng/L. At soil boring SB-32, the highest leachable HFPO-DA concentration equaled 30 ng/L, while the groundwater concentration in nearby piezometer PZ-20 equaled 780 ng/L. Few List 1-PFASs were detected in the soil leachate at the deeper depths, and all concentrations were less than 10 ng/L. List 2-PFAS results from the Chemours on-site laboratory were not yet available for inclusion in this report, and will be submitted in a forthcoming revision.

Analysis of “total” soil concentration was performed on a sub-set of the soil samples to determine how “total” concentrations compare against “leachable” concentrations. Only List 1-PFASs were analyzed because there does not appear to be a method for conducting “total” soil analysis for the List 2-PFAS compounds. Table 9 summarizes the analytical results for “total” List 1-PFASs, including HFPO-DA. Comparing “total” to “leachable” List 1-PFAS detections indicates that not all List 1-PFASs detected in the “total” analyses were detected in the “leachable” samples. Likewise, not all detected “leachable” List 1-PFASs were detected in the “total” analyses. Furthermore, there was no consistency in the discrepancy in detected List 1-PFASs. Comparing “total” to “leachable” concentrations of HFPO-DA in the 0.0 to 0.5 bgs samples indicates ratios between 16 and 53 (i.e., the “total” nanogram per kilogram [ng/kg] concentration was 16 to 53 times the “leachable” ng/L concentration). The SPLP method should result in a dilution ratio of 20; therefore, ratios greater than 20 indicate that not all of the compound is leachable. Although the visual lithology of the soil noted during sampling of the upper six inches was generally consistent, there may have been small-scale differences that lead to the variation in List 1-PFAS leachability.

3.0 HYDROGEOLOGIC INVESTIGATION RESULTS

The main focus of this part of the investigation was to refine the SCM by collecting additional hydrogeologic data (e.g., lithology, and hydrogeologic unit delineation). To meet this objective, the lithology beneath the Site was further refined through advancement of soil borings and determining hydraulic conductivities of the saturated units through in-situ testing. No deviations from the field investigation methodologies presented in the work plan were noted during this investigation.

Off-site access could not be obtained in time to install piezometers near Willis and Georgia Branch Creeks; therefore, off-site groundwater interaction with these surface waters could not be confirmed. However, based on ground surface topography in the vicinity of these two creeks, Surficial Aquifer groundwater should flow toward the creeks from both sides.

3.1 Hydrogeologic Unit Delineation

Most hydrogeologic investigations to date have focused on the Perched Zone groundwater, the associated clay lens, and the uppermost portion of the Surficial Aquifer. Regional hydrogeology in the vicinity of the Site consists of the following:

Hydrogeologic Unit Elevation (feet MSL)	Hydrogeologic Unit Name/ Description
+150 to +100	Unsaturated silty-sand/medium-grained sand (with clay stringers; Note: the clay lens and Perched Zone water beneath the Manufacturing Area is in this interval)
+100 to +84	Surficial Aquifer (silty-sand/medium-grained sand with clay stringers)
+84 to +65	Black Creek Confining Unit (clay)
+65 to -53	Black Creek Aquifer (sand)
-53 to -173	Upper Cape Fear Confining Unit (clay)
-173 to -237	Upper Cape Fear Aquifer (sand)
-237	Basement Rock

MSL = mean sea level

Lithology beneath the Site was further refined by installing eight monitoring wells and continuously logging for lithology during the recent investigation. Four wells were installed in the Surficial Aquifer (MW-18D through MW-21D), and four were installed in the deeper Black Creek Aquifer (BCA-01 through BCA-04). Boring Logs (with well completion details) are included in Appendix B. In addition to the eight new monitoring wells, damaged well MW-15D was replaced, and a larger diameter well MW-22D was installed in the Surficial Aquifer for use during the aquifer pump test described below. All eight new monitoring wells (and the replacement well) were completed with 10 feet of 0.01-inch factory-slotted, 2-inch-diameter, polyvinyl chloride (PVC) screen connected to flush joint PVC casing. Pump test well MW-22D was completed with 20 feet of 0.03-inch, wire-wrapped, 6-inch-diameter PVC and stainless-steel screen connected to flush-joint PVC casing. All newly installed wells were accurately surveyed for horizontal location and ground surface and top-of-casing elevations.

Two of the Black Creek Aquifer borings (BCA -03 and BCA-04) were advanced through the entire sand thickness of the aquifer and into the underlying clay of the Upper Cape

Fear Confining Unit so that the entire saturated thickness of the Black Creek Aquifer could be determined. Locations of the four new Surficial Aquifer wells are shown on Figure 5, while the new Black Creek Aquifer wells are shown on Figure 6.

The new lithologic data were used to refine the hydrogeologic cross sections for the Site. Figure 14 shows the locations for two generalized cross-sections through the Site (Figure 15 and Figure 16) that depict the complex physical aspects of the Site (e.g., topography, lithology, hydrogeology, and potential interactions with surface water features). Updates to the cross sections from the previous version include refinement to the presence and depth intervals of the Black Creek Confining Unit, the Black Creek Aquifer, and the Upper Cape Fear Confining Unit. Interpretation of the hydrogeology suggests that water from the Perched Zone and groundwater from both the Surficial and the Black Creek Aquifers discharge or contribute flow to the Cape Fear River. As shown in Figures 5 and 6, the hydraulic gradients in the Surficial Aquifer and Black Creek Aquifer are low, except for a predicted increase in the Black Creek Aquifer hydraulic gradient in the immediate vicinity of the bluff adjacent to the Cape Fear River.

3.2 Hydrogeologic Testing

Two types of hydrogeologic tests were performed on saturated groundwater zones during this investigation: slug test and pump test. Slug tests were performed on wells FTA-01, NAF-01, and NAF-02 (see Figure 3 for locations) that monitor the shallow perched water zone. Slug tests were performed because the sustainable well yield was low (less than 2 gallons per minute [gpm]), and there was a limited volume of perched water. Slug tests are limited to estimating the hydraulic conductivity of the saturated zone material in the immediate vicinity of the tested well (i.e., the radius of influence is very small), and were performed to verify that the hydraulic conductivity fell within the range typical for the observed sandy material grain size. A pump test was performed on the Surficial Aquifer using newly installed well MW-22D as the pumped well and nearby well MW-16D as an observation well (see Figure 5 for locations).

The slug tests were performed by measuring the static water level (head) in the well (with a downhole pressure transducer), then introducing a near instantaneous change in water level by either removing or adding a PVC-pipe “slug,” then measuring the change in water level over time until it returned to near the original static level. In this manner, one slug test was performed on well FTA-01 (falling head), two on well NAF-01 (rising head and falling head), and two on well NAF-02 (rising head and falling head). Slug test data were analyzed using Aquifer Test 2015 software (Waterloo Hydrogeologic 2015). Results indicate that the hydraulic conductivity of the Perched Zone sand ranges from 1.61 to 10.2 feet per day (ft/d), which is in the general range for medium-grained sand (Domenico 1990). Slug test analysis reports are included in Appendix C.

A pump test on the Surficial Aquifer was performed on newly installed well MW-22D to determine the hydraulic conductivity of the unconfined aquifer. A constant-rate test was performed by pumping MW-22D at a constant rate (gpm) for a period of time and measuring the rate of water level change in both the pumped well and nearby observation well MW-16D (both well locations are shown on Figure 5). Based on a step-test performed on MW-22D the day before the pump test, a discharge rate of 33.5 gpm was chosen as the optimal rate that would produce the maximum drawdown in MW-22D without desaturating the screened interval of the well. During the pump test, the discharge rate varied from 32.0 to 33.6 gpm, with an average rate of 33.35 gpm. It took approximately 90 minutes for the drawdown to stabilize at 0.75 feet in observational well MW-16D, which is located 47.5 feet away from pumping well MW-22D. The pump test

analysis report is included in Appendix C. The data were analyzed using Aquifer Test 2015 software (Waterloo Hydrogeologic). Results indicate that the hydraulic conductivity of the Surficial Aquifer sand equaled 72.3 ft/d, which is in the range for medium-grained sand (Domenico 1990). The return of water levels to the static level in MW-22D was recorded after the pump turned off. Analysis of these “recovery test” data indicated a lower hydraulic conductivity equal to 3.77 ft/d. This lower value is likely due to the amount of open screen area limiting the recharge capacity. The analysis report for this test are also included in Appendix C.

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4.0 UPDATED SITE CONCEPTUAL MODEL

Chemours uses the SCM to develop a representation of the chemical and physical characteristics of a site to focus investigation efforts and remedial decision making. The SCM also assists in the identification of areas for additional collection of potentially relevant data that can be addressed during future investigations.

The SCM was based on an analysis of potential exposure pathways, constituents of concern (COCs), and environmental fate and transport mechanisms. An accurate understanding of the geology and hydrogeology at the Site is also essential in developing the SCM.

The current SCM, presented below, was developed based on a review of historical data and the results of the activities and investigations conducted at the Site.

4.1 Physical Setting

4.1.1 Regional Physical Setting

Regional Climate

Relatively mild winters, hot summers and abundant rainfall characterize the climate in Bladen County. Temperatures range from an average monthly high of 91°F in July to an average monthly low of 33°F in January. Average rainfall ranges from a monthly high of 5.59 inches in July to a monthly low of 2.97 inches in November.

Regional Topography

The region surrounding the Site is generally level to gently sloping. However, surface topography steepens when approaching the Cape Fear River and its tributaries.

Regional Geology/Hydrogeology

The facility is in the northwestern portion of Bladen County. Bladen County is situated within the Coastal Plain Physiographic Province, which consists of a seaward thickening wedge of sedimentary deposits ranging in age from Cretaceous to Recent. Paleozoic; metamorphic and igneous rocks underlie these deposits. In the northern portion of Bladen County these “basement” rocks are approximately 400 feet bgs. A detailed description of the Coastal Plain sediments is presented in the RCRA Confirmatory Sampling Report (DuPont CRG 1999). Based on the Geologic Map of North Carolina (North Carolina Geological Survey [NCGS] 1985), the Site is underlain by the Black Creek Formation. The Black Creek Formation is characterized by lignitic clay, gray to black, and contains thin beds and laminae of fine-grained micaceous sand as well as thick lenses of cross-bedded sand. The upper portion of the formation may also contain glauconitic, fossiliferous clayey sand lenses. The Black Creek Formation and surficial deposits are the principal potable water aquifers in the region.

4.1.2 Local Physical Setting

Figure 14 shows the locations for two updated generalized cross-sections through the Site (Figure 15 and Figure 16) that depict the complex physical aspects of the Site (e.g., topography, lithology and hydrogeology). The following subsections discuss the local geology and hydrogeology in more detail.

Site Topography and Drainage

The facility topography is relatively flat within the developed portion of the Site; surface topography then decreases towards the Cape Fear River to the east and Willis Creek to the north of the facility. Topographic relief from the main manufacturing area down to the top of the riverbank is approximately 100 feet and approximately 40 feet from the main manufacturing area to Willis Creek. Surface topography generally remains flat to the west; however, there is a gentle increase of about five feet to a topographic divide near Highway 87. In the far southwestern portion of the property, surface topography again decreases by 15 to 25 feet where the Georgia Branch Creek channel runs along the property line. The Georgia Branch Creek confluence with the Cape Fear River is approximately 1.3 miles south of the dam (0.75 miles southeast of the property).

The Cape Fear River is located along the eastern property boundary of the plant, approximately 1,850 feet from the eastern portion of the manufacturing area. Willis Creek, a tributary of the Cape Fear River is in the northern portion of the Site, approximately 3,000 feet from the manufacturing area. Process wastewater is either sent off-site for proper disposal or treated on-site and piped to the National Pollutant Discharge Elimination System (NPDES) permitted outfall at the Cape Fear River (permit number NC003573).[2] Portions of the Georgia Branch, another tributary to the Cape Fear River, flow along part of the southern boundary of the Site. The plant facilities are located on a plateau at an approximate elevation of 145 feet above MSL. The plant is situated approximately 70 feet above the 100- and 500-year Cape Fear River floodplains and at least 1,000 feet from the 100-year floodplain's nearest approach.

Site Geology

The soil on the Site falls within the Norfolk-Goldsboro-Raines general classification (Leab 1990). These soils are located on old, high stream terraces in the northern part of Bladen County and are generally poorly drained soils that have a sandy or loamy surface layer and loamy subsoil.

Based on the lithology logged during on-site investigations, the Site is underlain by a fine- to medium-grained sand unit with thin discontinuous interbedded silt/clay lenses. The sand extends to a depth of approximately 65 feet bgs (elevation of +80 feet MSL). The saturated portion of this unit has been identified as the Surficial Aquifer. Beneath this unit is a 7- to 15-foot-thick, laterally-continuous dense clay that has been identified as the Black Creek Confining Unit. The elevation of this unit (approximately +65 to +77 feet MSL) indicates that it, too, should outcrop along the bluff face adjacent to the Cape Fear River, and potentially along the embankment near Willis Creek. Beneath this confining unit is the Black Creek Aquifer, which is approximately 8 to 20 feet thick and is encountered at depth between 80 and 100 feet bgs (elevation of approximately +45 to +65 feet MSL). Beneath this aquifer is a massive dense clay (with minor sand stringers) that has been identified as the Upper Cape Fear Confining Unit. This unit was not fully penetrated; however, it extended to at least 200 feet bgs (elevation of -55 feet MSL; see boring log for well BCA-03 in Appendix B)).

Within the manufacturing area, the uppermost sand unit is locally bisected by an aerially extensive stiff clay/clayey silt lens (clay lens). This clay lens is limited in lateral extent to the east, north and south by local topography and pinches out (terminates) to the west of the manufacturing area.

[2] As of November 29, 2017 and per NCDEQ's order, process wastewater from the Nafion area of the facility is collected and sent offsite for disposal.

The depth to the top of the clay lens is approximately 15 to 18 feet bgs. The clay lens becomes thinner moving west across the manufacturing area. It ranging from approximately one foot to approximately 19 feet thick. A visual inspection for the clay lens was conducted along the drainage channel beside the bluff leading to the Cape Fear River. The clay lens was observed in the drainage channel bottom and was approximately 10 to 12 feet thick in the channel banks. The area of the channel where the clay lens was observed also coincided with an area of the channel where seepage faces were observed. Based on the elevation of the clay lens, it should outcrop on the bluff adjacent to the Cape Fear River.

Site Hydrogeology

A shallow unconfined aquifer (Surficial Aquifer) is encountered at approximately 50 feet bgs. Groundwater elevations range from approximately 100 to 107 feet above MSL in the western areas of the Site to approximately 93 feet MSL in the eastern areas of the Site, indicating that groundwater flow is generally toward the Cape Fear River (see Figure 5; gauged water levels are presented in Table 3).

The Cape Fear River stage was recently measured to be 29.18 feet MSL, which is lower than the base elevation of the Surficial Aquifer, indicating that the Cape Fear River is a discharge boundary for the Surficial Aquifer. Based on groundwater elevations near Willis Creek, portions of the creek are “gaining” (groundwater discharges to the creek) and portions are “losing” (surface water infiltrates to the underlying groundwater). Georgia Branch Creek also appears to be a gaining stream near where State Road 1303 crosses Highway 87.

The Black Creek Aquifer is under confined conditions at the Site and is separated from the overlying Surficial Aquifer by a clay confining unit. The Black Creek Aquifer is the uppermost identified regional “state-wide” hydrogeologic unit. The measured groundwater potentiometric surface for the aquifer is presented in Figure 6, which shows flow is toward the Cape Fear River. The Cape Fear River stage is also lower than the base of the Black Creek Aquifer, indicating that the Cape Fear River is also a discharge boundary for the Black Creek Aquifer.

A series of incised erosional channels were observed in the Cape Fear River floodplain located east of the manufacturing area. These channels can contain a steady flow of water where they intersect groundwater.

An aerially limited perched water zone exists on top of the clay lens that underlies most of the manufacturing area. This Perched Zone appears mainly to result from seepage of surface water through the bottom of the North/South Sediment Basins that are used to settle out solids from Cape Fear River water (which is used on-site as non-contact cooling water) and infiltration of non-contact cooling water from the Nafion® Area ditch. The Perched Zone may also be recharged to a lesser extent by direct infiltration of rainfall and leakage from other on-site stormwater and non-process water conveyance ditches. Perched Zone water flows in a radial pattern away from a potentiometric high in the vicinity of the basins and the Nafion® Area ditch (see Figure 3). Where perched water is present, it is encountered from approximately six feet bgs at the basins to a depth of approximately 20 feet bgs along the edges of the Perched Zone west of the basins. Figure 4 shows the thickness of the perched water.

The lateral extent of the Perched Zone appears to be controlled by the topography and lateral limits of the clay lens. Perched water flows away from the potentiometric high along the top of the clay lens until either reaching the perimeter of the lens (where it

would flow off the edge), reaching a seepage face (such as the one observed along the bluff adjacent to the river), or until there is insufficient hydraulic head. Flora at the Site (especially the heavily forested areas) consume the perched water through transpiration processes.

4.2 PFAS Sources and Distribution in Environmental Media

Prior to completion of this recent investigation, Chemours submitted and executed work plans for:

- On-site groundwater sampling of 14 select wells, the Site Outfall, and the Site River Water Intake (with results presented in Supplemental Groundwater Sampling Technical Memorandum, dated November 3, 2017)
- On-site shallow soil sampling and surface water sampling of Willis Creek (with results presented in Additional Supplemental Soil and Surface Water Sampling Technical Memorandum, dated November 3, 2017)
- Surface water sampling of the Cape Fear River, Willis Creek, Georgia Branch creek, and the Site's current wastewater outfall (with results presented in Cape Fear River Surface Water Sampling Technical Memorandum, dated November 3, 2017)

Results of the above investigations, along with the recent investigation, indicate that Target PFAS releases to environmental media from primary sources (e.g., wastewater conveyances, industrial process activities) have resulted in secondary sources present in environmental media. The current understanding of the Target PFAS distribution in environmental media (i.e., nature and extent) is discussed below.

4.2.1 PFAS Distribution in Soil

Chemours initially investigated soil under the Additional Supplemental Soil and Surface Water Sampling Plan (Parsons 2017b). The initial sampling effort was conducted to collect Site surface soil from several locations to determine if air deposition was a viable release pathway for on-site groundwater concentrations of HFPO-DA. Eleven surface soil samples were collected from 0 to 2 feet bgs around the main manufacturing area of the Site, and two samples were collected from presumed background locations west of the main manufacturing area. These were analyzed for HFPO-DA.

Results of the initial investigation indicated that HFPO-DA soil concentrations in the manufacturing area ranged from non-detect (<1300 ng/kg) to 18,000 ng/kg, with no discernable distribution pattern. The HFPO-DA soil concentration at the Borrow Pit, north of the manufacturing area, equaled 1900 ng/kg, while the soil concentration near the Cape Fear riverbank ranged from 4400 ng/kg to 24,000 ng/kg (with no discernable distribution pattern). HFPO-DA was not detected in soil collected from the background locations.

The recent investigation was more comprehensive and determined the distribution and leachability of Target PFASs present in surficial soil (from 0.0 to 0.5 feet bgs), as well as vertically profiling leachable Target PFASs throughout the soil column. A sub-set was also analyzed for "total" List 1-PFASs. Results indicated that the same PFASs were not always detected in the same soil sample analyzed by the two different methods. There was no discernable distribution to the leachable Target PFAS concentrations, although the highest concentrations were mainly detected in the eastern portion of the Site, which generally coincides with the prevailing wind direction. This would appear to suggest that

Target PFAS detected in soil results from air deposition and subsequent leaching (in areas away from ditches). The highest leachable Target PFAS soil concentrations currently detected in each vertical soil profile did not correlate well with the detected groundwater Target PFAS concentrations, suggesting that the perched water concentrations may result from sources other than leaching of air deposited Target PFAS (e.g., migration of surface water leakage from stormwater or wastewater conveyance ditches).

4.2.2 PFAS Distribution in On-Site Groundwater

During the initial groundwater monitoring event, HFPO-DA was detected in all but one groundwater sample (SMW-10), ranging in concentration from <10 ng/L to 50,000 ng/L. HFPO-DA also was detected in the river water intake at 11 ng/L and the Site's outfall at 110 ng/L. HFPO-DA groundwater concentrations in the Surficial Aquifer were lower by one to two orders of magnitude near Willis Creek and Georgia Branch than in the central portion of the Manufacturing Area. Concentrations detected in the LTW wells near the river were similar to those detected in the Surficial Aquifer beneath central portion of the manufacturing area. There was variability in the number of List 1-PFASs detected; however, nine List 1-PFASs were detected at similar concentrations in the river water intake and the Site's outfall. These are the same nine List 1-PFASs detected in many of the Perched Zone water samples (at similar concentrations).

The recent investigation was more comprehensive and delineated Target PFASs in Perched Zone water, Surficial Aquifer groundwater, and Black Creek Aquifer groundwater. Highest Target PFAS concentrations were detected in the Perched Zone water beneath the Nafion® Area; however, Target PFASs were detected in all but one Black Creek Aquifer well. The distribution suggests that air deposition with subsequent leaching is a potential source, as well as recharge from conveyance channels and ditches (including those that receive stormwater runoff). The same nine List 1-PFASs detected in river water were again detected in many groundwater samples (particularly Perched Zone water samples) at similar concentrations as are present in the river water. This is likely because most of the Perched Zone water originates as leakage from the Sediment Basins (which settle out river water solids) and infiltration of non-contact cooling water (i.e., river water) from the Nafion® Area ditch.

4.2.3 PFAS Distribution in Surface Water

Chemours initially investigated surface water under the Cape Fear River Surface Water Sampling Plan (Parsons 2017d) and the Additional Supplemental Soil and Surface Water Sampling Plan (Parsons 2017b). The purpose of the initial sampling efforts was to determine whether PFASs were present in either the Cape Fear River or the two tributaries adjacent to the Site (Willis Creek and Georgia Branch).

Multiple river water samples were collected adjacent to the Site, 5 and 10 miles upstream of the Site, and at locations downstream of the Site. HFPO-DA was not detected in upstream river water samples; however, a set of nine List 1-PFASs were detected in all upstream river water samples. HFPO-DA was detected in river water adjacent to the manufacturing area (at 12 ng/L to 160 ng/L) and in all downstream river water samples (ranging in concentration from 24 ng/L to 54 ng/L). The same nine PFASs that were detected in upstream river water samples were detected in all river water samples collected adjacent to and downstream of the Site.

HFPO-DA also was detected in Willis Creek (at 230 ng/L to 450 ng/L) and Georgia Branch (at 690 ng/L and 540 ng/L). Five to seven other List 1-PFASs were detected in Willis Creek and Georgia Branch at relatively low concentrations. These detections are likely the result of Surficial Aquifer groundwater discharging to the creeks.

The Surficial Aquifer and Black Creek Aquifer provide more potential groundwater discharge (although at lower Target PFAS concentrations) to the Cape Fear River than the perched water, which has a limited volume. The current SCM suggests that Perched Zone water with elevated Target PFAS concentrations (mainly HFPO-DA) is a source for on-site Surficial Aquifer and Black Creek Aquifer detected Target PFAS. A conceptual level water balance-based mass flux estimate indicates that HFPO-DA in groundwater discharging to the river would not alone result in river water HFPO-DA concentrations at or above 140 ng/L. The actual discharge of groundwater to the river will be limited by the lower hydraulic conductivity of the riverbank sediments, which would act to impede flow. The volume of flow to the river varies annually, but has averaged about 3870 cubic feet per second from 2010 through 2016 [3]. PFAS mass in groundwater discharging to the river would mix with this large volume of flow, significantly decreasing the concentration from that detected in the groundwater. Chemours is currently working on incorporating these additional data into the SCM.

[3] On-line at:
https://nwis.waterdata.usgs.gov/nc/nwis/uv/?site_no=02105500&agency_cd=USGS&

5.0 CONCLUSIONS AND PATH FORWARD

The purpose of the recent investigation was to gather additional information to complete a site assessment under 15A NCAC 02L.0106(g), to assist in making remedial decisions in support of the overall Site corrective action goals, and to support an eventual CMS. Initial data on PFAS presence in soil, groundwater, and surface water were obtained through execution of investigation work plans between July and September 2017. Completion of the current site assessment was accomplished by collecting site-specific data to better define the nature and extent of Target PFAS distribution in environmental media (due to releases from industrial processes, regulated units, SWMUs, or other sources). Hydrogeologic data were also gathered that can be used to predict fate and transport of the PFAS in the environment.

Results of the investigations indicate that Target PFAS releases to environmental media from primary sources (e.g., wastewater conveyances, industrial process activities) have resulted in secondary sources present in environmental media. These secondary sources are present in on-site soil and groundwater (Perched Zone water, Surficial Aquifer groundwater, and Black Creek Aquifer groundwater) and off-site Surficial Aquifer groundwater. The distribution of detected Target PFAS in soil would appear to suggest air deposition is the primary source (in areas away from ditches). Although leaching of Target PFASs could lead to some of the detected groundwater concentrations, the higher groundwater concentrations are likely the result of leakage from stormwater and wastewater conveyance ditches. The observed distribution in the aquifers appears to result from Target PFAS migration with natural groundwater flow. Detection of PFAS in the surface water of Willis Creek, Georgia Branch, and the Cape Fear River, suggests probable migration of these groundwater secondary sources to these surface waters. However, sampling has suggested there are upstream sources in the Cape Fear River for some of the Target PFASs. A conceptual level water balance-based mass flux estimate indicates that HFPO-DA in groundwater discharging to the river would not alone result in river water HFPO-DA concentrations at or above 140 ng/L.

Lithologic logging of newly installed wells (including deeper Black Creek Aquifer wells), along with hydrogeologic testing of the saturated portion of the Perched Zone and the Surficial Aquifer, allowed for refinement of the SCM. This, in turn, will facilitate more accurate prediction of Target PFAS fate and transport in the environment during development of corrective action alternatives, including the feasibility study to be provided to NCDEQ by February 28, 2018, and the remedial plan to be provided by March 31, 2018. In addition, the SCM will be updated to include, as appropriate, data from the ongoing stormwater investigation, and the results of Chemours' ongoing evaluation of interim control measures.

The path forward for corrective action at the Site is next to perform a feasibility study for addressing remedial alternatives for on-site Target PFAS secondary sources. Chemours is evaluating how these secondary sources may be contributing to exposure or pathways of concern and will propose remedial alternatives to address those sources of concern in the forthcoming Feasibility Report. Chemours has already undertaken (or committed to undertake) numerous actions to identify, evaluate, remove, treat, mitigate, or control various on-site primary PFAS sources (as documented in the January 15, 2018, letter to NCDEQ).

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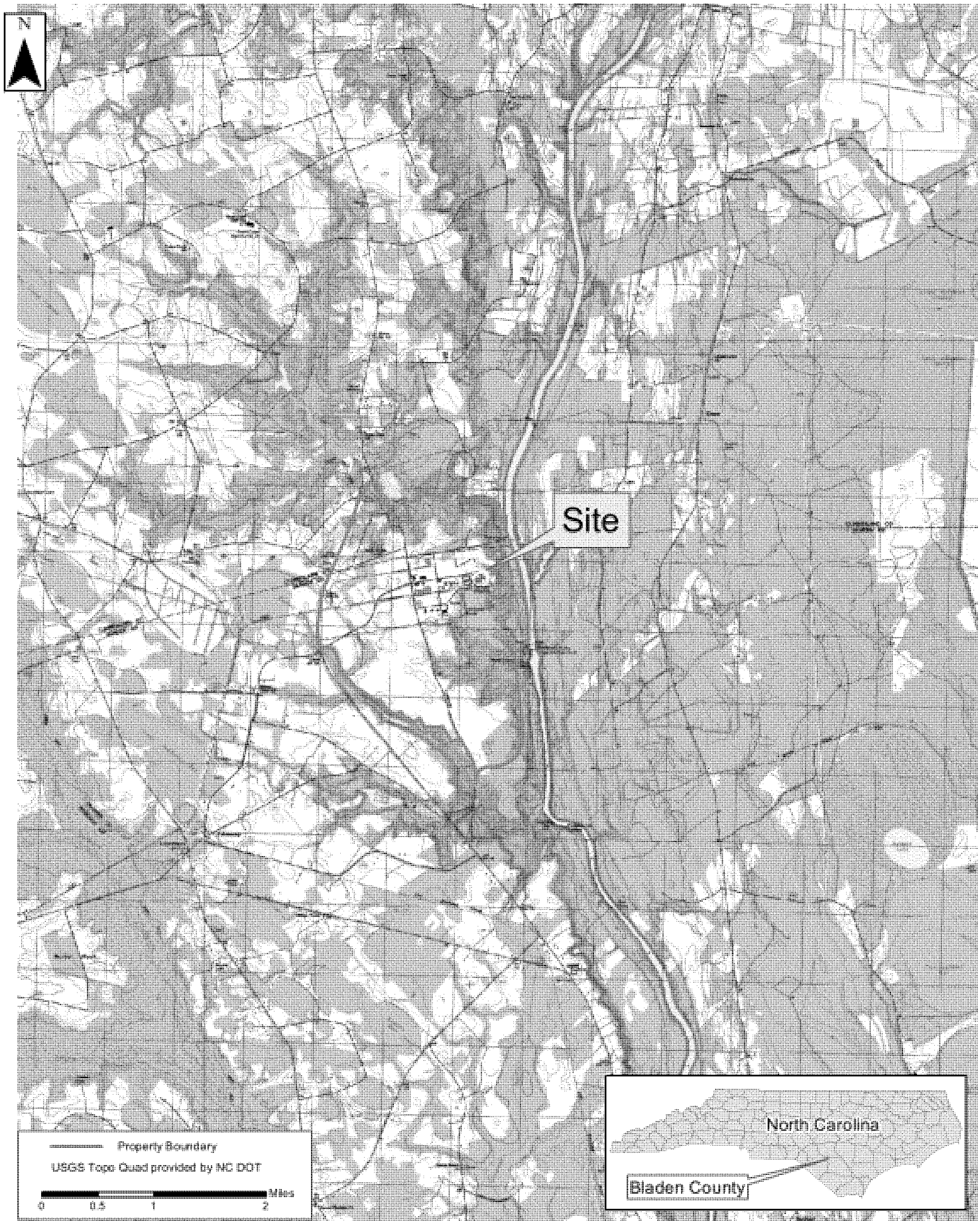
FIGURES



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PE&I
4701 Hedgemore Dr.
Charlotte, NC 28209

Site Location Map
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Drawn:	Date:	File Project Number:
C. Oneal	1/29/2018	449338.01050

Revision: 1

Figure Number: 1

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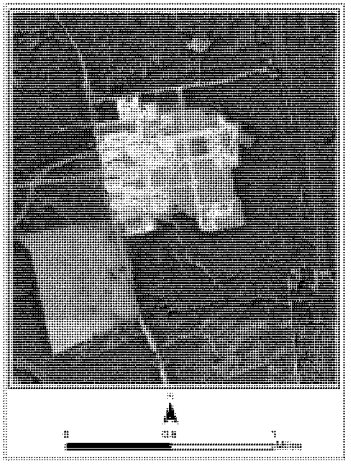

Pavement/Curb
Plant Border
Drainage Channel
River
Site Structure
SWMU

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Charlotte, NC 28209

Site Layout Map
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

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Date: 1/29/2018
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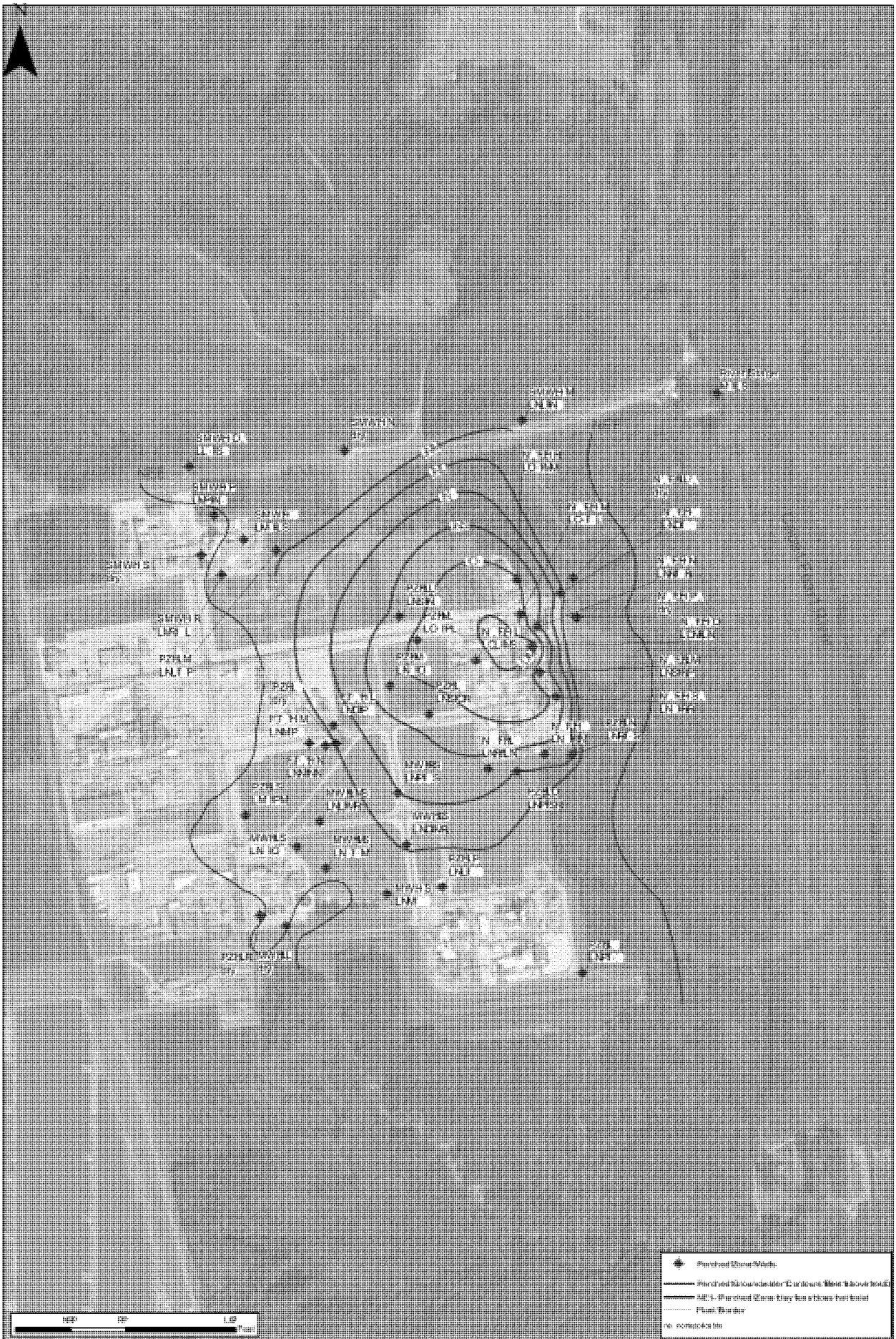

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Perched Water Zone Potentiometric Map
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Chemours Fayetteville Works 1
Fayetteville North Carolina

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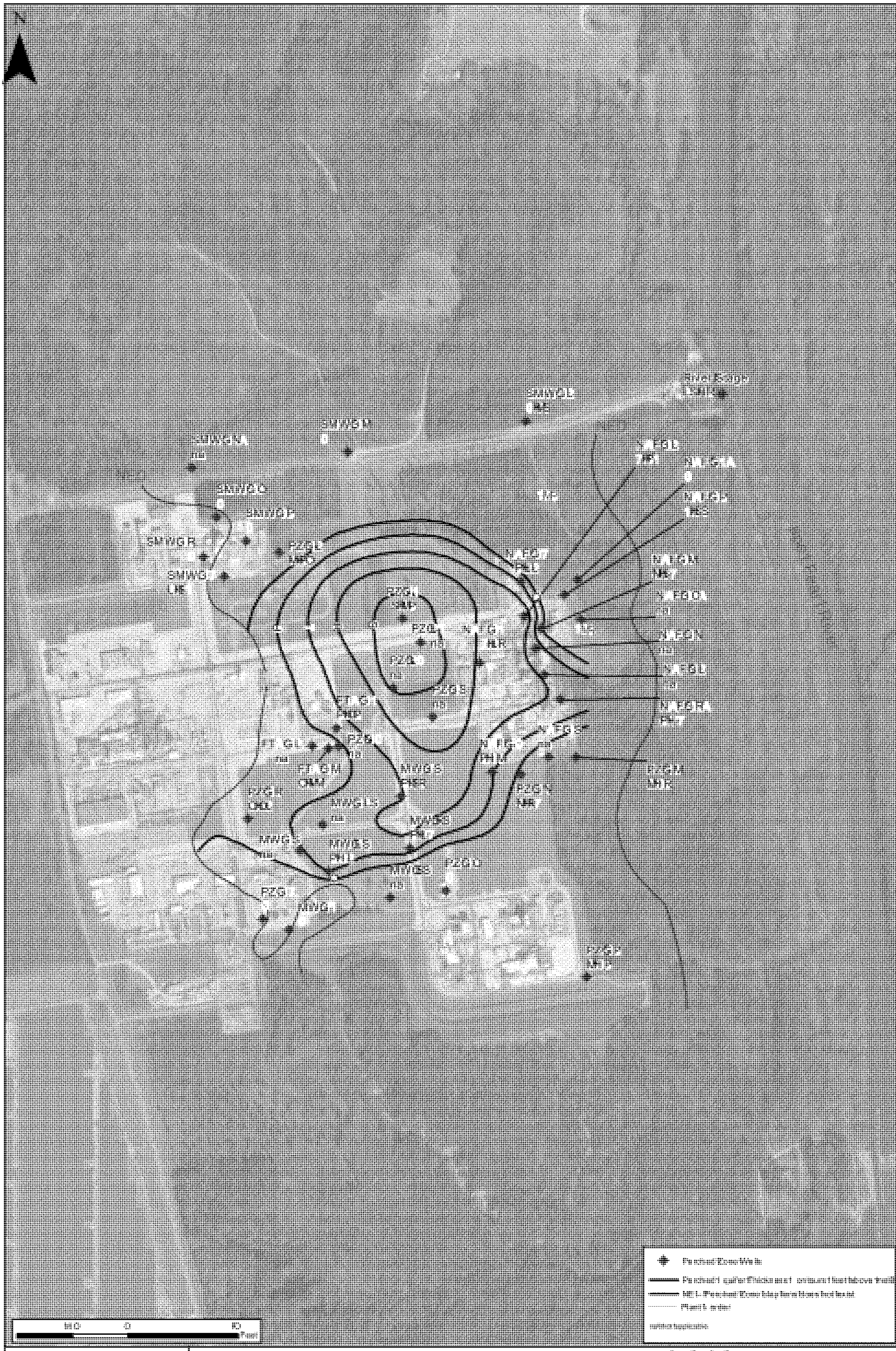

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Perched Water Thickness Map
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Fayetteville North arolina

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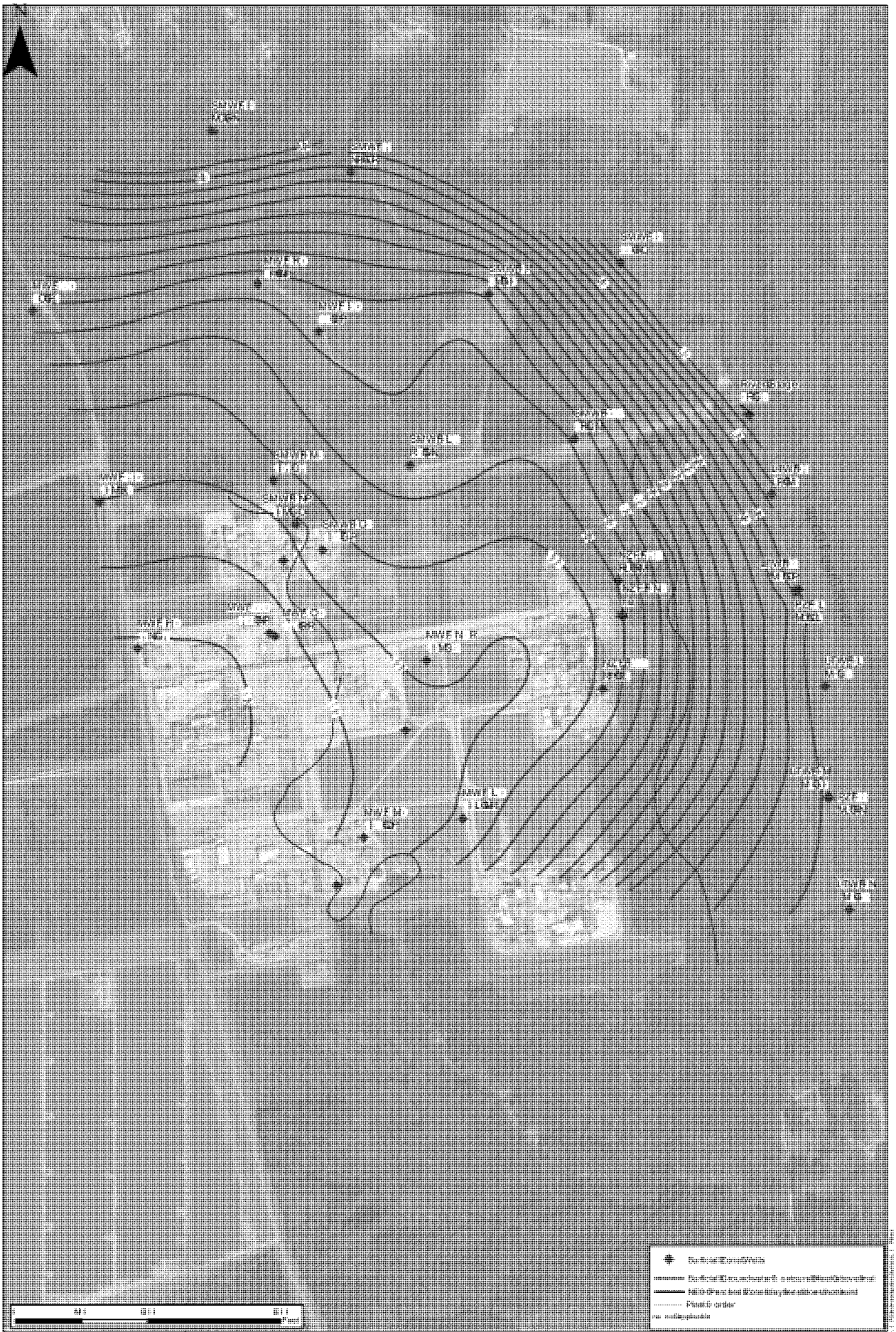

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Surficial Aquifer Potentiometric Map
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number 3N

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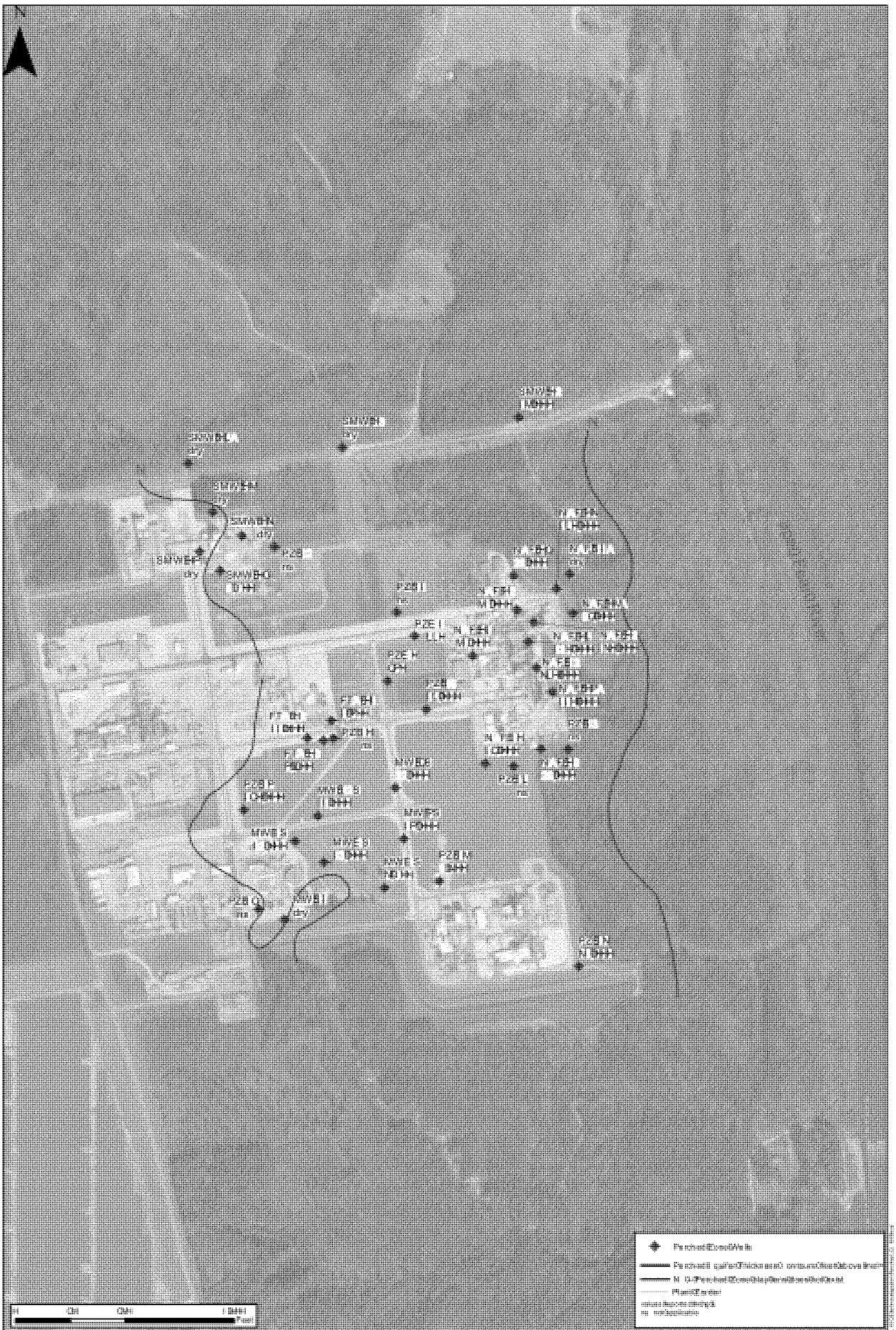
Jack Creek Aquifer Potentiometric Map
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number 1



PARSONS

Perched Water Zone HFPOE Concentrations
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number 10

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Figure2Number

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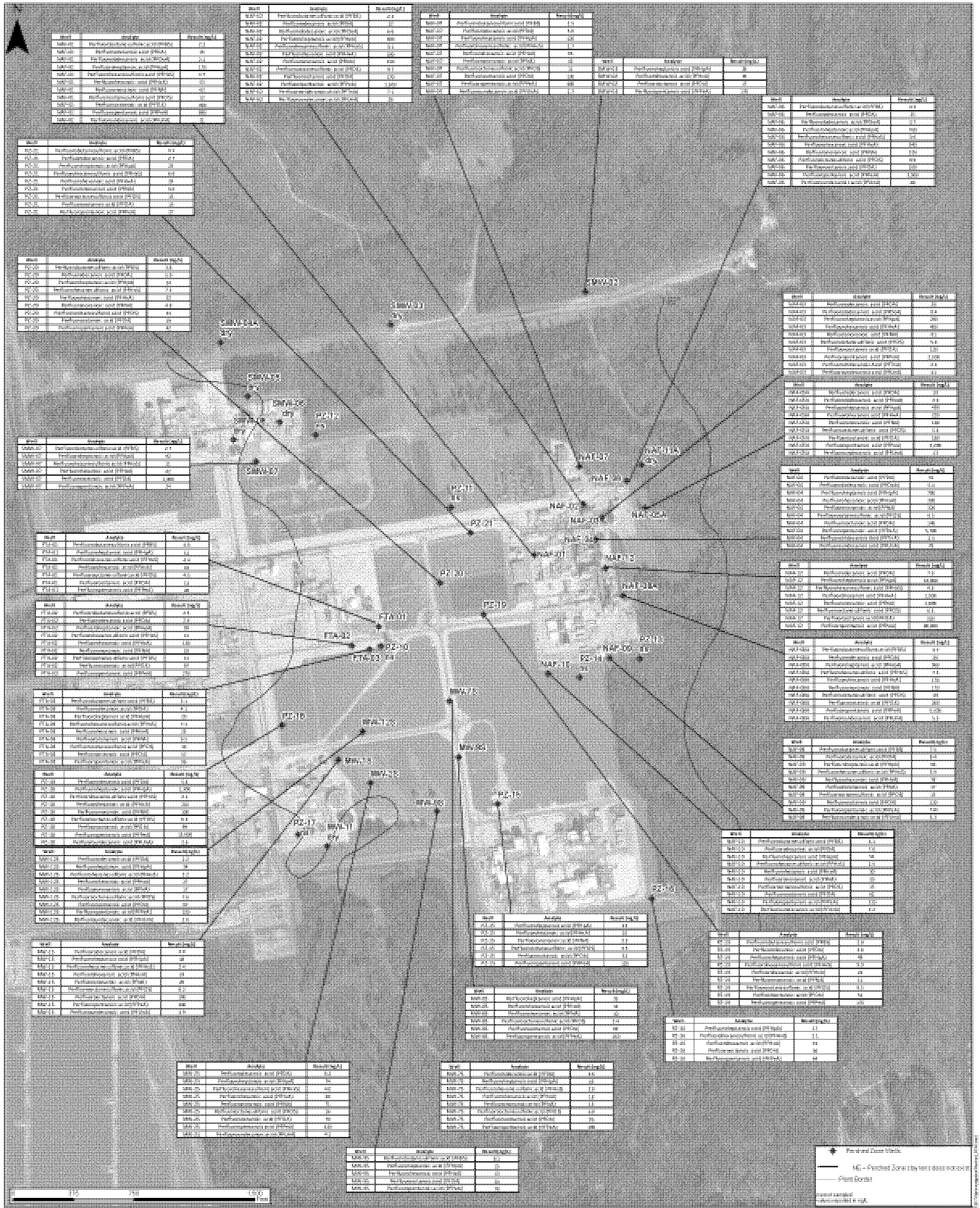

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Perched Water Zone PFAS Detected Concentrations
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number: 10

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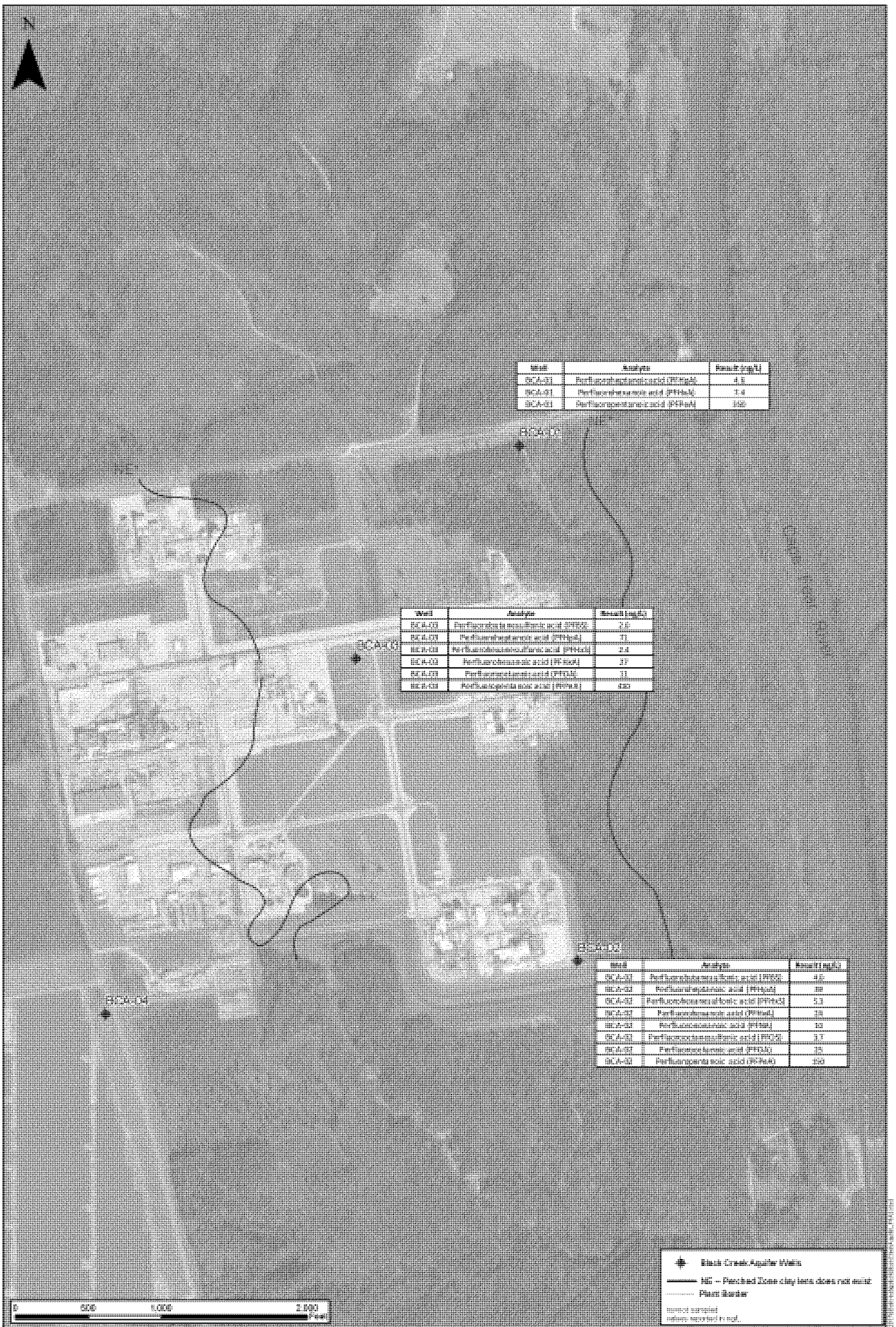
Surficial Aquifer PFAS Detected Concentrations
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number: 11



Well	Analyte	Result (ug/L)
BCA-01	Perfluorobutanesulfonic acid (PFBS)	4.8
BCA-01	Perfluorohexanoic acid (PFHxA)	1.4
BCA-01	Perfluorooctanoic acid (PFOA)	160

Well	Analyte	Result (ug/L)
BCA-02	Perfluorobutanesulfonic acid (PFBS)	2.6
BCA-02	Perfluorohexanoic acid (PFHxA)	21
BCA-02	Perfluoroheptanoic acid (PFHpA)	2.4
BCA-02	Perfluorooctanoic acid (PFOA)	37
BCA-02	Perfluorooctanesulfonic acid (PFOS)	11
BCA-02	Perfluorooctanoic acid (PFOA)	420

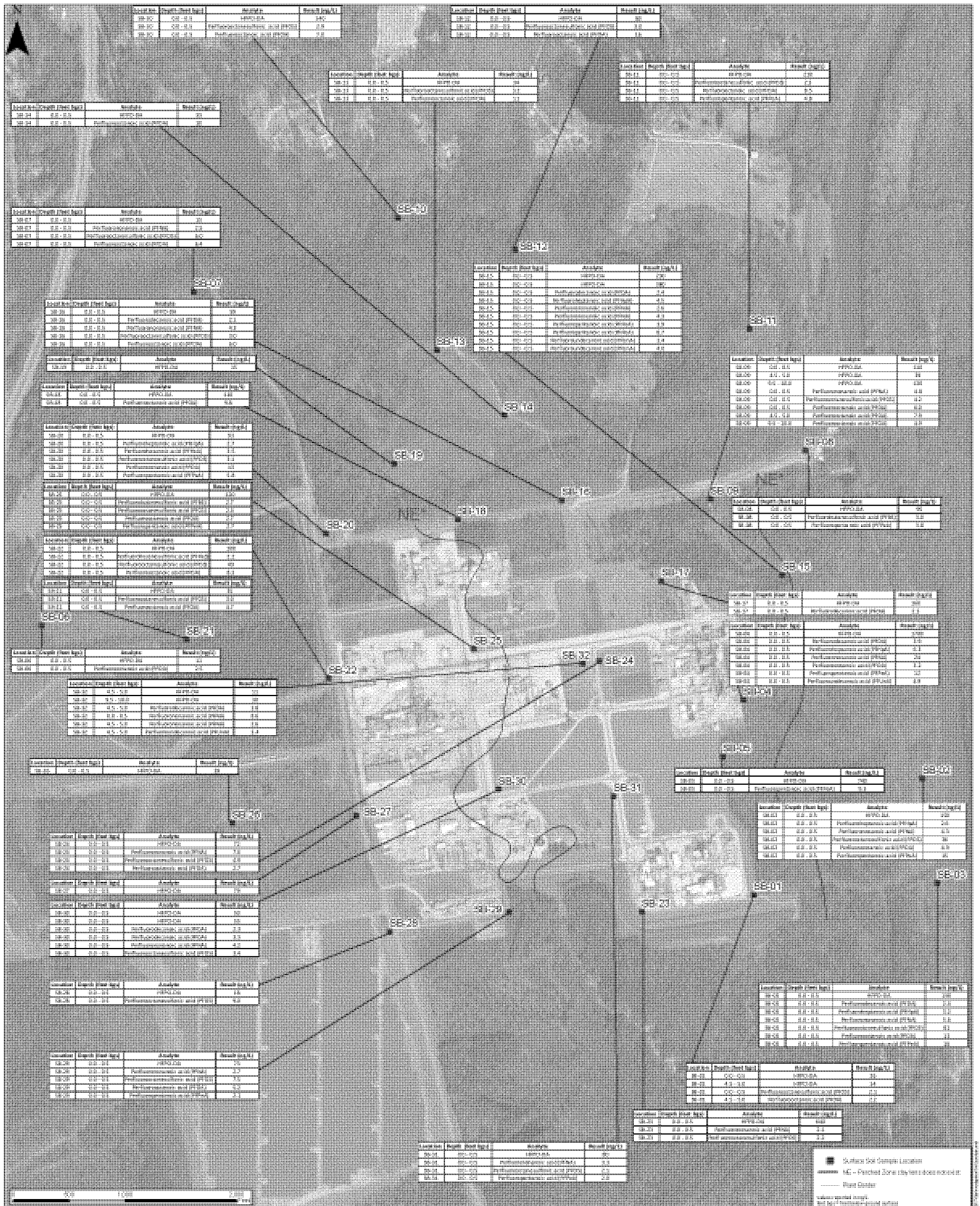
Well	Analyte	Result (ug/L)
BCA-03	Perfluorobutanesulfonic acid (PFBS)	4.6
BCA-03	Perfluoroheptanoic acid (PFHpA)	88
BCA-03	Perfluorohexanesulfonic acid (PFHxS)	5.3
BCA-03	Perfluorohexanoic acid (PFHxA)	18
BCA-03	Perfluorooctanoic acid (PFOA)	63
BCA-03	Perfluorooctanesulfonic acid (PFOS)	3.1
BCA-03	Perfluorononanoic acid (PFNA)	35
BCA-03	Perfluoroundecanoic acid (PFUnA)	263

PARSONS

PCSJ
5731 Heightsville Dr
Charlotte, NC 28208

Black Creek Aquifer PFAS Detected Concentrations
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

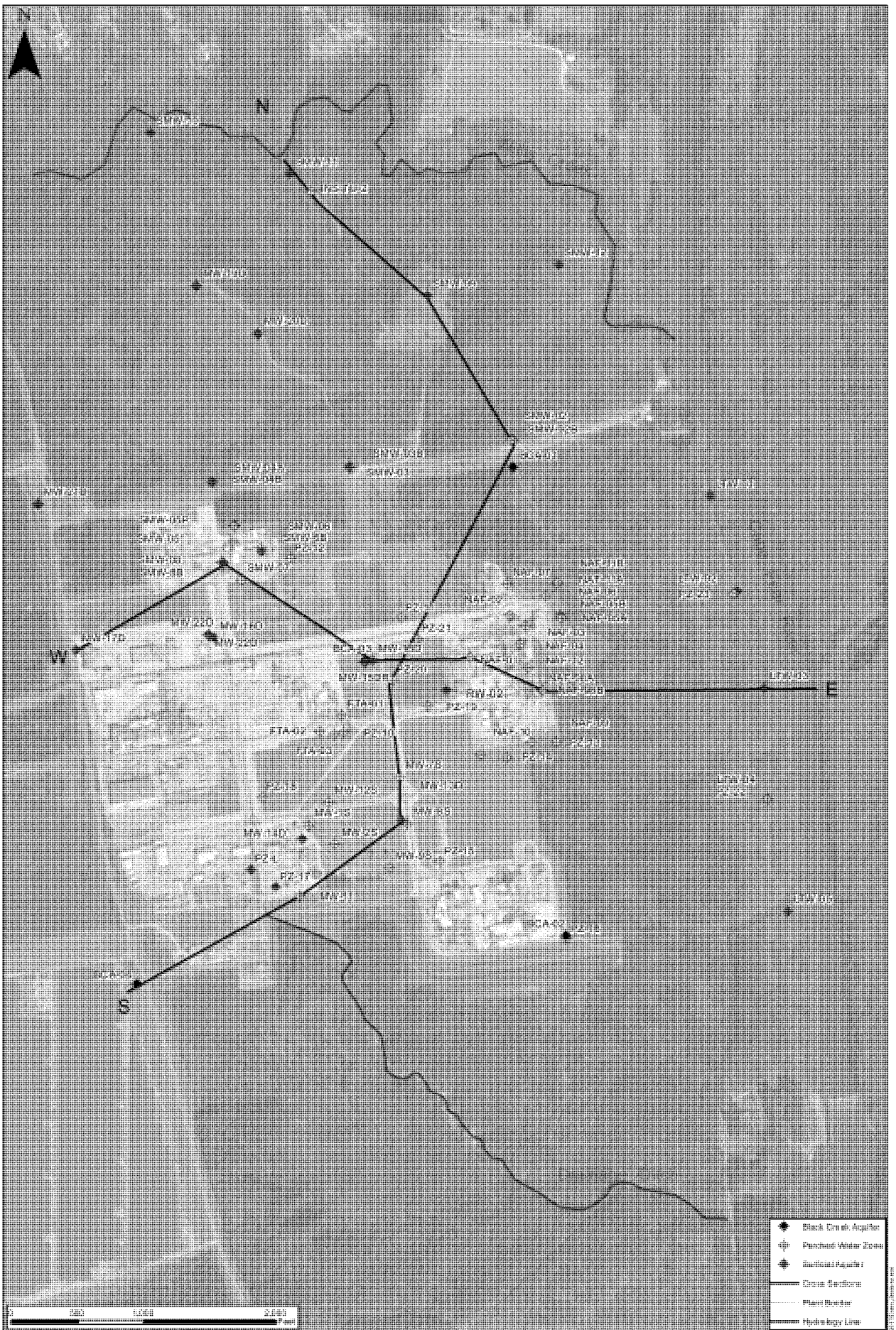
Drawn: C. Dowd
Date: 1/8/2019
File Project Number: 449008.01.000
Revision: 1
Figure Number: 12
Name: Black Creek Aquifer_PFAS



PARSONS

Leachable HFPO-DA and PFAS Detected Concentrations in Surface Soil
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

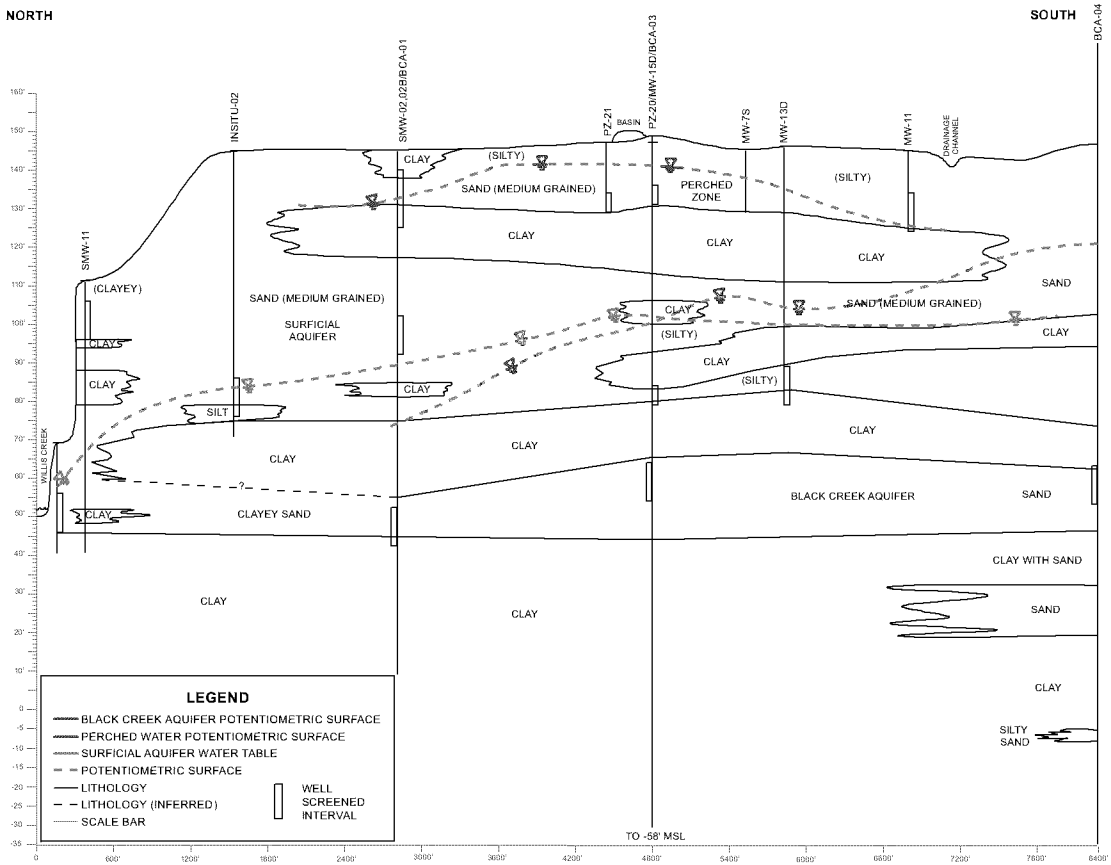
Figure Number: 13



PARSONS

Cross Section Location Map
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Figure Number: 14



PARSONS

4701 Hedgemore Drive
Charlotte, NC 28209

Title:
North-South Cross Section Map (A-A')
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Drawn/Approved: RAH	File Project Number: 449338.01050
Date: 1/29/2018	Figure Number: 15
Revised:	
File Name: North South Cross Section 01032018	

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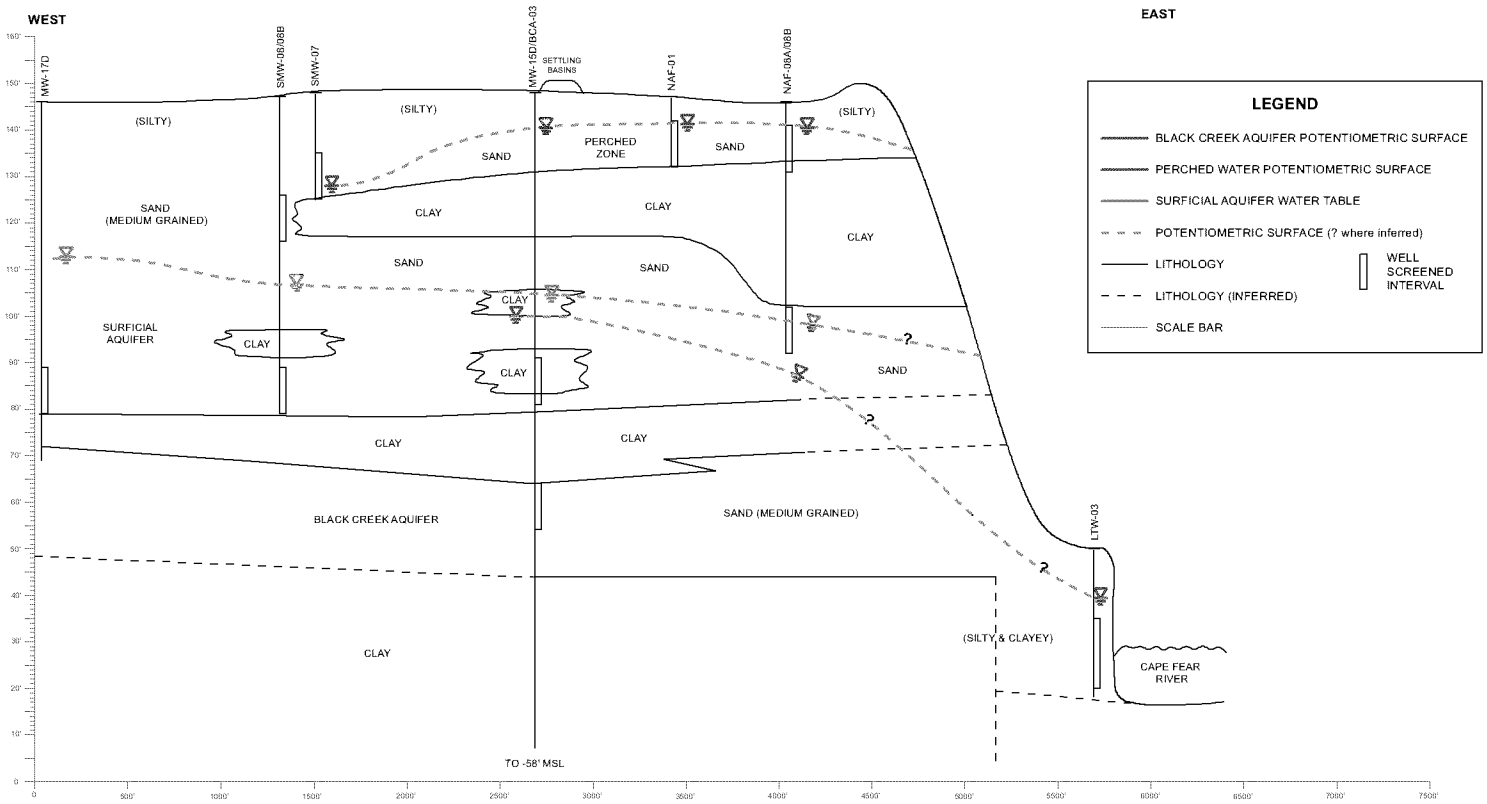

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PARSONS

4701 Hedgemore Drive
Charlotte, NC 28209

Title:
West-East Cross Section Map (B-B')
Additional Site Investigation
Chemours Fayetteville Works
Fayetteville, North Carolina

Drawn/Approved: RAH	File Project Number: 449338.01050
Date: 1/30/2018	Figure Number: 16
Revised:	
File Name: West East Cross Section 01032018	

ED_002003J_00095845-00052

TABLES

TABLE 1

Target Compounds - List 1

Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Analyte	Abbreviation	CAS Number
N-ethyl perfluorooctane sulfonamidoacetic acid	NEtFOSAA	2991-50-6
N-methyl perfluorooctane sulfonamidoacetic acid	NMeFOSAA	2355-31-9
Perfluorobutanesulfonic acid (PFBS)	PFBS	375-73-5
Perfluorodecanoic acid (PFDA)	PFDA	335-76-2
Perfluorododecanoic acid (PFDoA)	PFDoA	307-55-1
Perfluoroheptanoic acid (PFHpA)	PFHpA	375-85-9
Perfluorohexanesulfonic acid (PFHxS)	PFHxS	355-46-4
Perfluorohexanoic acid (PFHxA)	PFHxA	307-24-4
Perfluorononanoic acid (PFNA)	PFNA	375-95-1
Perfluorooctanesulfonic acid (PFOS)	PFOS	1763-23-1
Perfluorooctanoic acid (PFOA)	PFOA	335-67-1
Perfluorotetradecanoic acid (PFTeA)	PFTA	376-06-7
Perfluorotridecanoic Acid (PFTriA)	PFTrDA	72629-94-8
Perfluoroundecanoic acid (PFUnA)	PFUnA	2058-94-8
Perfluoropentanoic acid (PFPeA)	PFPeA	2706-90-3
Hexafluoropropylene oxide dimer acid	HFPO-DA	13252-13-6

TABLE 2

Target Compounds - List 2

Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Compound Group	Analyte	Abbreviation	CAS Number
Monoether PFECAs	C3HF5O3	PFMOAA	674-13-5
	C5HF9O3	PFECA-A	863090-89-5
	C7HF13O3	PFECA-G	174767-10-3
	C4HF7O3	PFECA-F	377-73-1
Polyether PFECAs	C4HF7O4	PFO2HxA	39492-88-1
	C5HF9O5	PFO3OA	39492-89-2
	C6HF11O6	PFO4DA	39492-90-5
	C7HF13O7	PFO5DA	39492-91-6
PFESAs	C7H2F14O5S	PFESA Byproduct 2	749836-20-2
	C7HF13O5S	PFESA Byproduct 1	66796-30-3

TABLE 3

Monitoring Well Gauging Results

Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Well ID	Date Measured	Measuring Point Elevation (ft MSL)	Depth to Water from Top of Casing (feet)	Groundwater Elevation (ft MSL)	Screened Interval (ft bgs)	Hydrogeologic Unit
BCA-01	12/14/2017	146.297	59.57	86.73	91 - 101	Black Creek Aquifer
BCA-02	12/14/2017	148.421	74.67	73.75	92 - 102	Black Creek Aquifer
BCA-03	12/14/2017	150.579	49.51	101.07	93 - 103	Black Creek Aquifer
BCA-04	12/14/2017	150.241	30.05	120.19	94 - 104	Black Creek Aquifer
DMS-42V1	12/4/2017	154.36	23.73	130.63	115 - 125	Black Creek Aquifer
DMS-42V2	12/4/2017	154.03	19.52	134.51	20 - 30	Surficial Aquifer
DMS-42V3	12/4/2017	154.24	23.68	130.56	182 - 192	Black Creek Aquifer
DMS-42V4	12/4/2017	154.16	178.7	-24.54	253 - 263	Upper Cape Fear Confining Unit
DMS-42V5	12/4/2017	153.86	205.01	-51.15	310 - 320	Upper Cape Fear
DMS-42V6	12/4/2017	153.73	19.56	134.17	80 - 90	Surficial Aquifer
FTA-01	12/14/2017	150.63	16.07	134.56	12 - 22	Perched Zone
FTA-02	12/14/2017	150.28	17.72	132.56	11.5 - 21.5	Perched Zone
FTA-03	12/14/2017	151.08	17.75	133.33	12 - 22	Perched Zone
INSITU-1	12/14/2017	118.20	9.41	108.79	7 - 17	Surficial Aquifer
INSITU-2	12/14/2017	113.12	dry	< 92.88	7 - 17	Surficial Aquifer
LTW-01	12/14/2017	53.83	16.41	37.42	11 - 26	Surficial Aquifer
LTW-02	12/14/2017	52.48	9.81	42.67	28 - 38	Surficial Aquifer
LTW-03	12/14/2017	52.91	12.73	40.18	15 - 30	Surficial Aquifer
LTW-04	12/14/2017	51.86	9.86	42.00	12 - 27	Surficial Aquifer
LTW-05	12/14/2017	52.01	9.99	42.02	29 - 44	Surficial Aquifer
MW-11	12/14/2017	148.53	dry	dry	11.5 - 21.5	Perched Zone
MW-12S	12/14/2017	152.06	20.79	131.27	17.5 - 22.5	Perched Zone
MW-13D	12/14/2017	148.65	45.06	103.59	57 - 67	Surficial Aquifer
MW-14D	12/14/2017	149.73	41.06	108.67	62 - 72	Surficial Aquifer
MW-15DR	12/14/2017	150.361	46.14	104.22	47 - 57	Surficial Aquifer

TABLE 3
Monitoring Well Gauging Results
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Well ID	Date Measured	Measuring Point Elevation (ft MSL)	Depth to Water from Top of Casing (feet)	Groundwater Elevation (ft MSL)	Screened Interval (ft bgs)	Hydrogeologic Unit
MW-16D	12/14/2017	148.41	36.62	111.79	72 - 82	Surficial Aquifer
MW-17D	12/14/2017	146.12	30.31	115.81	57 - 67	Surficial Aquifer
MW-18D	12/14/2017	107.574	20.86	86.71	50 - 60	Surficial Aquifer
MW-19D	12/14/2017	139.55	51.98	87.57	46 - 56	Surficial Aquifer
MW-1S	12/14/2017	149.93	19.47	130.46	21 - 24	Perched Zone
MW-20D	12/14/2017	137.182	48.41	88.77	65 - 75	Surficial Aquifer
MW-21D	12/14/2017	151.384	46.40	104.98	72 - 82	Surficial Aquifer
MW-22D	12/14/2017	149.063	36.49	112.57	52 - 72	Surficial Aquifer
MW-2S	12/14/2017	149.91	19.89	130.02	19 - 23	Perched Zone
MW-7S	12/14/2017	147.47	11.49	135.98	---	Perched Zone
MW-8S	12/14/2017	146.48	12.21	134.27	---	Perched Zone
MW-9S	12/14/2017	154.39	21.43	132.96	17.5 - 22.5	Perched Zone
NAF-01	12/14/2017	149.66	8.38	141.28	5 - 15	Perched Zone
NAF-02	12/14/2017	150.31	9.70	140.61	5 - 15	Perched Zone
NAF-03	12/14/2017	148.10	10.13	137.97	5 - 15	Perched Zone
NAF-04	12/14/2017	150.44	7.31	143.13	5 - 15	Perched Zone
NAF-05A	12/14/2017	146.64	nm	na	---	Perched Zone
NAF-05B	12/14/2017	146.43	nm	na	---	Surficial Aquifer
NAF-06	12/14/2017	146.43	11.44	134.99	2.75 - 12.75	Perched Zone
NAF-07	12/14/2017	149.69	9.47	140.22	5.5 - 15.5	Perched Zone
NAF-08A	12/14/2017	148.82	9.05	139.77	5 - 15	Perched Zone
NAF-08B	12/14/2017	148.86	50.88	97.98	43.5 - 53.5	Surficial Aquifer
NAF-09	12/14/2017	149.29	12.56	136.73	7 - 17	Perched Zone
NAF-10	12/14/2017	150.00	12.87	137.13	8.25 - 18.25	Perched Zone
NAF-11A	12/14/2017	140.59	dry	dry	2.5 - 7.5	Perched Zone
NAF-11B	12/14/2017	140.74	46.80	93.94	33.5 - 43.5	Surficial Aquifer

TABLE 3
Monitoring Well Gauging Results
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Well ID	Date Measured	Measuring Point Elevation (ft MSL)	Depth to Water from Top of Casing (feet)	Groundwater Elevation (ft MSL)	Screened Interval (ft bgs)	Hydrogeologic Unit
NAF-12	12/14/2017	145.79	7.04	138.75	18 - 23	Perched Zone
PZ-10	damaged	148.66	nm	na	15 - 20	Perched Zone
PZ-11	12/14/2047	151.03	12.67	138.36	15 - 20	Perched Zone
PZ-12	12/14/2047	150.91	19.26	131.65	15.1 - 20.1	Perched Zone
PZ-13	12/14/2047	149.20	12.12	137.08	7.1 - 12.1	Perched Zone
PZ-14	12/14/2047	148.38	12.51	135.87	9 - 14	Perched Zone
PZ-15	12/14/2047	148.79	17.10	131.69	10.2 - 15.2	Perched Zone
PZ-16	12/14/2047	149.11	14.05	135.06	9.2 - 14.2	Perched Zone
PZ-17	12/14/2047	150.08	dry	dry	21.1 - 26.1	Perched Zone
PZ-18	12/14/2047	150.83	21.31	129.52	19.1 - 24.1	Perched Zone
PZ-19	12/14/2047	150.62	12.15	138.47	11 - 16	Perched Zone
PZ-20	12/14/2047	152.03	12.57	139.46	13 - 18	Perched Zone
PZ-21	12/14/2047	149.21	8.70	140.51	13 - 18	Perched Zone
PZ-22	12/14/2047	51.81	7.86	43.95	36 - 46	Surficial Aquifer
PZ-23	12/14/2047	53.66	7.03	46.63	47 - 52	Surficial Aquifer
SMW-01	12/14/2047	---	13.41		5 - 15	Surficial Aquifer
SMW-02	12/14/2047	147.93	16.54	131.39	5 - 20	Perched Zone
SMW-02B	12/14/2047	145.21	dry	< 89.14	43 - 53	Surficial Aquifer
SMW-03	12/14/2047	151.09	dry	dry	10 - 20	Perched Zone
SMW-03B	12/14/2047	150.43	57.98	92.45	72 - 82	Surficial Aquifer
SMW-04A	12/14/2047	148.09	dry	< 110.86	19.5 - 34.5	Perched Zone
SMW-04B	12/14/2047	148.37	46.56	101.81	43 - 53	Surficial Aquifer
SMW-05	12/14/2047	148.10	dry	< 125.36	10 - 20	Perched Zone
SMW-05P	12/14/2047	149.32	45.16	104.16	45 - 60	Surficial Aquifer
SMW-06	12/14/2047	150.97	dry	< 126.18	12 - 22	Perched Zone
SMW-06B	12/14/2047	150.32	48.05	102.27	58 - 68	Surficial Aquifer

TABLE 3
Monitoring Well Gauging Results
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Well ID	Date Measured	Measuring Point Elevation (ft MSL)	Depth to Water from Top of Casing (feet)	Groundwater Elevation (ft MSL)	Screened Interval (ft bgs)	Hydrogeologic Unit
SMW-07	12/14/2047	147.64	19.73	127.91	13 - 23	Perched Zone
SMW-08	12/14/2047	151.02	dry	dry	21 - 31	Perched Zone
SMW-08B	12/14/2047	148.81	41.63	107.18	58 - 68	Surficial Aquifer
SMW-09	12/14/2047	141.43	57.43	84.00	52 - 62	Surficial Aquifer
SMW-10	12/14/2047	76.26	29.51	46.75	39 - 49	Surficial Aquifer
SMW-11	12/14/2047	71.95	14.26	57.69	13 - 23	Surficial Aquifer
SMW-12	12/14/2047	118.22	95.26	22.96	88 - 98	Surficial Aquifer

Notes:
ft MSL = feet Mean Sea Level
ft bgs = feet below ground surface
dry = well was dry
< = well was dry, groundwater elevation is less than the indicated value
nm = not measured
na = not applicable
"---" = unknown

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
FTA-01	FAY-GWASI-FTA-01	11/30/2017	HFPO Dimer Acid	1800 J
FTA-01	FAY-GWASI-FTA-01	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
FTA-01	FAY-GWASI-FTA-01	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorobutane Sulfonic Acid	3.8
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorodecanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorododecanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluoroheptanoic Acid	11
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorohexane Sulfonic Acid	4.4
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorohexanoic Acid	17
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorononanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluoropentanoic Acid	26
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorotetradecanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluorotridecanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	Perfluoroundecanoic Acid	<2.0
FTA-01	FAY-GWASI-FTA-01	11/30/2017	PFOA	13
FTA-01	FAY-GWASI-FTA-01	11/30/2017	PFOS	5
FTA-02	FAY-GWASI-FTA-02	11/30/2017	HFPO Dimer Acid	11,000 J
FTA-02	FAY-GWASI-FTA-02	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
FTA-02	FAY-GWASI-FTA-02	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorobutane Sulfonic Acid	2.5
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorodecanoic Acid	2.6
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorododecanoic Acid	<2.0
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluoroheptanoic Acid	99
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorohexane Sulfonic Acid	11
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorohexanoic Acid	130
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorononanoic Acid	18
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluoropentanoic Acid	270
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorotetradecanoic Acid	<2.0
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluorotridecanoic Acid	<2.0
FTA-02	FAY-GWASI-FTA-02	11/30/2017	Perfluoroundecanoic Acid	<2.0
FTA-02	FAY-GWASI-FTA-02	11/30/2017	PFOA	97
FTA-02	FAY-GWASI-FTA-02	11/30/2017	PFOS	11
FTA-03	FAY-GWASI-FTA-03	11/30/2017	HFPO Dimer Acid	8700 J
FTA-03	FAY-GWASI-FTA-03	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
FTA-03	FAY-GWASI-FTA-03	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorobutane Sulfonic Acid	3.1
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorodecanoic Acid	4.1
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorododecanoic Acid	<2.0
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluoroheptanoic Acid	29
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorohexane Sulfonic Acid	7.1
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorohexanoic Acid	23
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorononanoic Acid	9.5
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluoropentanoic Acid	96
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorotetradecanoic Acid	<2.0
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluorotridecanoic Acid	<2.0
FTA-03	FAY-GWASI-FTA-03	11/30/2017	Perfluoroundecanoic Acid	<2.0
FTA-03	FAY-GWASI-FTA-03	11/30/2017	PFOA	57
FTA-03	FAY-GWASI-FTA-03	11/30/2017	PFOS	16
MW-12S	FAY-GWASI-MW-12S	11/22/2017	HFPO Dimer Acid	11,000
MW-12S	FAY-GWASI-MW-12S	11/22/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-12S	FAY-GWASI-MW-12S	11/22/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorodecanoic Acid	2.2

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorododecanoic Acid	<2.0
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluoroheptanoic Acid	34
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorohexane Sulfonic Acid	3.2
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorohexanoic Acid	27
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorononanoic Acid	17
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluoropentanoic Acid	130
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorotetradecanoic Acid	<2.0
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluorotridecanoic Acid	<2.0
MW-12S	FAY-GWASI-MW-12S	11/22/2017	Perfluoroundecanoic Acid	2
MW-12S	FAY-GWASI-MW-12S	11/22/2017	PFOA	97
MW-12S	FAY-GWASI-MW-12S	11/22/2017	PFOS	7.6
MW-1S	FAY-GWASI-MW-1S	11/22/2017	HFPO Dimer Acid	12,000
MW-1S	FAY-GWASI-MW-1S	11/22/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-1S	FAY-GWASI-MW-1S	11/22/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorodecanoic Acid	3.9
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorododecanoic Acid	<2.0
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluoroheptanoic Acid	48
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorohexane Sulfonic Acid	2.4
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorohexanoic Acid	24
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorononanoic Acid	20
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluoropentanoic Acid	240
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorotetradecanoic Acid	<2.0
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluorotridecanoic Acid	<2.0
MW-1S	FAY-GWASI-MW-1S	11/22/2017	Perfluoroundecanoic Acid	3.9
MW-1S	FAY-GWASI-MW-1S	11/22/2017	PFOA	100
MW-1S	FAY-GWASI-MW-1S	11/22/2017	PFOS	8.2
MW-2S	FAY-GWASI-MW-2S	11/22/2017	HFPO Dimer Acid	13,000
MW-2S	FAY-GWASI-MW-2S	11/22/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-2S	FAY-GWASI-MW-2S	11/22/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorodecanoic Acid	8.2
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorododecanoic Acid	<2.0
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluoroheptanoic Acid	74
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorohexane Sulfonic Acid	4
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorohexanoic Acid	40
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorononanoic Acid	71
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluoropentanoic Acid	420
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorotetradecanoic Acid	<2.0
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluorotridecanoic Acid	<2.0
MW-2S	FAY-GWASI-MW-2S	11/22/2017	Perfluoroundecanoic Acid	4.1
MW-2S	FAY-GWASI-MW-2S	11/22/2017	PFOA	79
MW-2S	FAY-GWASI-MW-2S	11/22/2017	PFOS	16
MW-7S	FAY-GWASI-MW-7S	11/29/2017	HFPO Dimer Acid	22,000
MW-7S	FAY-GWASI-MW-7S	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-7S	FAY-GWASI-MW-7S	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorodecanoic Acid	2.6
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorododecanoic Acid	<2.0
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluoroheptanoic Acid	43
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorohexane Sulfonic Acid	2.8
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorohexanoic Acid	18
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorononanoic Acid	13

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluoropentanoic Acid	190
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorotetradecanoic Acid	<2.0
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluorotridecanoic Acid	<2.0
MW-7S	FAY-GWASI-MW-7S	11/29/2017	Perfluoroundecanoic Acid	<2.0
MW-7S	FAY-GWASI-MW-7S	11/29/2017	PFOA	99
MW-7S	FAY-GWASI-MW-7S	11/29/2017	PFOS	6.9
MW-8S	FAY-GWASI-MW-8S	11/29/2017	HFPO Dimer Acid	18,000
MW-8S	FAY-GWASI-MW-8S	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-8S	FAY-GWASI-MW-8S	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorodecanoic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorododecanoic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluoroheptanoic Acid	33
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorohexanoic Acid	12
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorononanoic Acid	10
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluoropentanoic Acid	160
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorotetradecanoic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluorotridecanoic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	Perfluoroundecanoic Acid	<2.0
MW-8S	FAY-GWASI-MW-8S	11/29/2017	PFOA	83
MW-8S	FAY-GWASI-MW-8S	11/29/2017	PFOS	5.4
MW-9S	FAY-GWASI-MW-9S	11/29/2017	HFPO Dimer Acid	6300
MW-9S	FAY-GWASI-MW-9S	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-9S	FAY-GWASI-MW-9S	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorobutane Sulfonic Acid	8.1
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorodecanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorododecanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluoroheptanoic Acid	15
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorohexanoic Acid	13
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorononanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluoropentanoic Acid	78
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorotetradecanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluorotridecanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	Perfluoroundecanoic Acid	<2.0
MW-9S	FAY-GWASI-MW-9S	11/29/2017	PFOA	24
MW-9S	FAY-GWASI-MW-9S	11/29/2017	PFOS	<2.0
NAF-01	FAY-GWASI-NAF-01	11/15/2017	HFPO Dimer Acid	51,000
NAF-01	FAY-GWASI-NAF-01	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-01	FAY-GWASI-NAF-01	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorobutane Sulfonic Acid	2.2
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorodecanoic Acid	16
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorododecanoic Acid	2.1
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluoroheptanoic Acid	170
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorohexane Sulfonic Acid	3.7
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorohexanoic Acid	53
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorononanoic Acid	63
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluoropentanoic Acid	890
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluorotridecanoic Acid	<2.0
NAF-01	FAY-GWASI-NAF-01	11/15/2017	Perfluoroundecanoic Acid	21
NAF-01	FAY-GWASI-NAF-01	11/15/2017	PFOA	450

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-01	FAY-GWASI-NAF-01	11/15/2017	PFOS	12
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	HFPO Dimer Acid	51,000
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorobutane Sulfonic Acid	2.2
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorodecanoic Acid	16
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorododecanoic Acid	2.6
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluoroheptanoic Acid	170
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorohexane Sulfonic Acid	4.1
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorohexanoic Acid	52
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorononanoic Acid	66
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluoropentanoic Acid	970
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluorotridecanoic Acid	<2.0
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	Perfluoroundecanoic Acid	18
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	PFOA	430
NAF-01	FAY-GWASI-NAF-01-D	11/15/2017	PFOS	12
NAF-02	FAY-GWASI-NAF-02	11/15/2017	HFPO Dimer Acid	59,000
NAF-02	FAY-GWASI-NAF-02	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-02	FAY-GWASI-NAF-02	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorobutane Sulfonic Acid	2.2
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorodecanoic Acid	12
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorododecanoic Acid	6.6
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluoroheptanoic Acid	300
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorohexane Sulfonic Acid	3.1
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorohexanoic Acid	180
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorononanoic Acid	310
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluoropentanoic Acid	1500
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluorotridecanoic Acid	7.1
NAF-02	FAY-GWASI-NAF-02	11/15/2017	Perfluoroundecanoic Acid	28
NAF-02	FAY-GWASI-NAF-02	11/15/2017	PFOA	170
NAF-02	FAY-GWASI-NAF-02	11/15/2017	PFOS	9.7
NAF-03	FAY-GWASI-NAF-03	11/15/2017	HFPO Dimer Acid	160,000
NAF-03	FAY-GWASI-NAF-03	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-03	FAY-GWASI-NAF-03	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorobutane Sulfonic Acid	<2.0
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorodecanoic Acid	20
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorododecanoic Acid	8.4
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluoroheptanoic Acid	290
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorohexane Sulfonic Acid	<2.0
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorohexanoic Acid	400
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorononanoic Acid	81
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluoropentanoic Acid	2000
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluorotridecanoic Acid	2.2
NAF-03	FAY-GWASI-NAF-03	11/15/2017	Perfluoroundecanoic Acid	41
NAF-03	FAY-GWASI-NAF-03	11/15/2017	PFOA	120
NAF-03	FAY-GWASI-NAF-03	11/15/2017	PFOS	5.3
NAF-04	FAY-GWASI-NAF-04	11/15/2017	HFPO Dimer Acid	130,000
NAF-04	FAY-GWASI-NAF-04	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-04	FAY-GWASI-NAF-04	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorobutane Sulfonic Acid	<2.0

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorodecanoic Acid	31
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorododecanoic Acid	5.4
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluoroheptanoic Acid	780
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorohexane Sulfonic Acid	<2.0
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorohexanoic Acid	300
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorononanoic Acid	320
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluoropentanoic Acid	5700
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluorotridecanoic Acid	2.3
NAF-04	FAY-GWASI-NAF-04	11/15/2017	Perfluoroundecanoic Acid	78
NAF-04	FAY-GWASI-NAF-04	11/15/2017	PFOA	140
NAF-04	FAY-GWASI-NAF-04	11/15/2017	PFOS	6.5
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	HFPO Dimer Acid	97,000 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorobutane Sulfonic Acid	<2.0
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorodecanoic Acid	18 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorododecanoic Acid	2.2 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluoroheptanoic Acid	430 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorohexane Sulfonic Acid	<2.0
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorohexanoic Acid	220 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorononanoic Acid	130 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluoropentanoic Acid	3200
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorotetradecanoic Acid	<2.0
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluorotridecanoic Acid	<2.0
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	Perfluoroundecanoic Acid	13 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	PFOA	180 J
NAF-05A	FAY-GWASI-NAF-05A	11/08/2017	PFOS	5.4 J
NAF-06	FAY-GWASI-NAF-06	11/14/2017	HFPO Dimer Acid	140,000 J
NAF-06	FAY-GWASI-NAF-06	11/14/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-06	FAY-GWASI-NAF-06	11/14/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorobutane Sulfonic Acid	4.3
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorodecanoic Acid	25
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorododecanoic Acid	3.7
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluoroheptanoic Acid	760
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorohexane Sulfonic Acid	3.6
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorohexanoic Acid	540
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorononanoic Acid	320
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluoropentanoic Acid	3500
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorotetradecanoic Acid	<2.0
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluorotridecanoic Acid	<2.0
NAF-06	FAY-GWASI-NAF-06	11/14/2017	Perfluoroundecanoic Acid	48
NAF-06	FAY-GWASI-NAF-06	11/14/2017	PFOA	260
NAF-06	FAY-GWASI-NAF-06	11/14/2017	PFOS	9.9
NAF-07	FAY-GWASI-NAF-07	11/15/2017	HFPO Dimer Acid	29,000
NAF-07	FAY-GWASI-NAF-07	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-07	FAY-GWASI-NAF-07	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorobutane Sulfonic Acid	2.5
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorodecanoic Acid	5.6
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorododecanoic Acid	<2.0
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluoroheptanoic Acid	120
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorohexane Sulfonic Acid	2.7
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorohexanoic Acid	65

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorononanoic Acid	42
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluoropentanoic Acid	480
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluorotridecanoic Acid	<2.0
NAF-07	FAY-GWASI-NAF-07	11/15/2017	Perfluoroundecanoic Acid	2.7
NAF-07	FAY-GWASI-NAF-07	11/15/2017	PFOA	130
NAF-07	FAY-GWASI-NAF-07	11/15/2017	PFOS	11
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	HFPO Dimer Acid	110,000
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorobutane Sulfonic Acid	3.7
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorodecanoic Acid	26
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorododecanoic Acid	<2.0
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluoroheptanoic Acid	960
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorohexane Sulfonic Acid	7.3
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorohexanoic Acid	170
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorononanoic Acid	170
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluoropentanoic Acid	5300
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorotetradecanoic Acid	<2.0
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluorotridecanoic Acid	<2.0
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	Perfluoroundecanoic Acid	5.5
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	PFOA	200
NAF-08A	FAY-GWASI-NAF-08A	11/15/2017	PFOS	18
NAF-09	FAY-GWASI-NAF-09	11/16/2017	HFPO Dimer Acid	29,000 J
NAF-09	FAY-GWASI-NAF-09	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-09	FAY-GWASI-NAF-09	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorobutane Sulfonic Acid	7.5
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorodecanoic Acid	8.4
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorododecanoic Acid	<2.0
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluoroheptanoic Acid	96
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorohexane Sulfonic Acid	3.9
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorohexanoic Acid	78
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorononanoic Acid	17
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluoropentanoic Acid	710
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorotetradecanoic Acid	<2.0
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluorotridecanoic Acid	<2.0
NAF-09	FAY-GWASI-NAF-09	11/16/2017	Perfluoroundecanoic Acid	3.3
NAF-09	FAY-GWASI-NAF-09	11/16/2017	PFOA	120
NAF-09	FAY-GWASI-NAF-09	11/16/2017	PFOS	13
NAF-10	FAY-GWASI-NAF-10	11/14/2017	HFPO Dimer Acid	17,000 J
NAF-10	FAY-GWASI-NAF-10	11/14/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-10	FAY-GWASI-NAF-10	11/14/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorobutane Sulfonic Acid	4.2
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorodecanoic Acid	7.9
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorododecanoic Acid	<2.0
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluoroheptanoic Acid	55
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorohexane Sulfonic Acid	2.5
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorohexanoic Acid	30
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorononanoic Acid	20
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluoropentanoic Acid	310
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorotetradecanoic Acid	<2.0
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluorotridecanoic Acid	<2.0
NAF-10	FAY-GWASI-NAF-10	11/14/2017	Perfluoroundecanoic Acid	3.1

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-10	FAY-GWASI-NAF-10	11/14/2017	PFOA	61
NAF-10	FAY-GWASI-NAF-10	11/14/2017	PFOS	15
NAF-12	FAY-GWASI-NAF-12	11/16/2017	HFPO Dimer Acid	640,000 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorodecanoic Acid	7.9 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorododecanoic Acid	<2.0 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluoroheptanoic Acid	16,000
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorohexane Sulfonic Acid	4.6 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorohexanoic Acid	1000
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorononanoic Acid	1800
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluoropentanoic Acid	80,000
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorotetradecanoic Acid	<2.0 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluorotridecanoic Acid	<2.0 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	Perfluoroundecanoic Acid	<2.0 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	PFOA	310 J
NAF-12	FAY-GWASI-NAF-12	11/16/2017	PFOS	6.3 J
PZ-15	FAY-GWASI-PZ-15	11/29/2017	HFPO Dimer Acid	9600
PZ-15	FAY-GWASI-PZ-15	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-15	FAY-GWASI-PZ-15	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorodecanoic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorododecanoic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluoroheptanoic Acid	23
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorohexanoic Acid	10
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorononanoic Acid	3.3
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluoropentanoic Acid	120
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorotetradecanoic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluorotridecanoic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	Perfluoroundecanoic Acid	<2.0
PZ-15	FAY-GWASI-PZ-15	11/29/2017	PFOA	32
PZ-15	FAY-GWASI-PZ-15	11/29/2017	PFOS	3.5
PZ-16	FAY-GWASI-PZ-16	11/29/2017	HFPO Dimer Acid	63,000
PZ-16	FAY-GWASI-PZ-16	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-16	FAY-GWASI-PZ-16	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorodecanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorododecanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluoroheptanoic Acid	17
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorohexane Sulfonic Acid	2.1
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorohexanoic Acid	19
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorononanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluoropentanoic Acid	64
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorotetradecanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluorotridecanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	Perfluoroundecanoic Acid	<2.0
PZ-16	FAY-GWASI-PZ-16	11/29/2017	PFOA	36
PZ-16	FAY-GWASI-PZ-16	11/29/2017	PFOS	<2.0
PZ-18	FAY-GWASI-PZ-18	11/17/2017	HFPO Dimer Acid	170,000
PZ-18	FAY-GWASI-PZ-18	11/17/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-18	FAY-GWASI-PZ-18	11/17/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorobutane Sulfonic Acid	<2.0
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorodecanoic Acid	5.4
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorododecanoic Acid	<2.0
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluoroheptanoic Acid	1300
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorohexane Sulfonic Acid	2.1
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorohexanoic Acid	210
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorononanoic Acid	100
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluoropentanoic Acid	13,000
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorotetradecanoic Acid	<2.0
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluorotridecanoic Acid	<2.0
PZ-18	FAY-GWASI-PZ-18	11/17/2017	Perfluoroundecanoic Acid	2.6
PZ-18	FAY-GWASI-PZ-18	11/17/2017	PFOA	99
PZ-18	FAY-GWASI-PZ-18	11/17/2017	PFOS	6.2
PZ-19	FAY-GWASI-PZ-19	11/16/2017	HFPO Dimer Acid	14,000
PZ-19	FAY-GWASI-PZ-19	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-19	FAY-GWASI-PZ-19	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorobutane Sulfonic Acid	2.8
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorodecanoic Acid	3
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorododecanoic Acid	<2.0
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluoroheptanoic Acid	48
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorohexane Sulfonic Acid	9.9
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorohexanoic Acid	22
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorononanoic Acid	11
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluoropentanoic Acid	170
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorotetradecanoic Acid	<2.0
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluorotridecanoic Acid	<2.0
PZ-19	FAY-GWASI-PZ-19	11/16/2017	Perfluoroundecanoic Acid	<2.0
PZ-19	FAY-GWASI-PZ-19	11/16/2017	PFOA	51
PZ-19	FAY-GWASI-PZ-19	11/16/2017	PFOS	9.5
PZ-20	FAY-GWASI-PZ-20	11/16/2017	HFPO Dimer Acid	780
PZ-20	FAY-GWASI-PZ-20	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-20	FAY-GWASI-PZ-20	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorobutane Sulfonic Acid	3.8
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorodecanoic Acid	5.9
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorododecanoic Acid	<2.0
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluoroheptanoic Acid	24
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorohexane Sulfonic Acid	7.5
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorohexanoic Acid	32
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorononanoic Acid	4.8
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluoropentanoic Acid	42
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorotetradecanoic Acid	<2.0
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluorotridecanoic Acid	<2.0
PZ-20	FAY-GWASI-PZ-20	11/16/2017	Perfluoroundecanoic Acid	<2.0
PZ-20	FAY-GWASI-PZ-20	11/16/2017	PFOA	19
PZ-20	FAY-GWASI-PZ-20	11/16/2017	PFOS	21
PZ-21	FAY-GWASI-PZ-21	11/16/2017	HFPO Dimer Acid	440
PZ-21	FAY-GWASI-PZ-21	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
PZ-21	FAY-GWASI-PZ-21	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorobutane Sulfonic Acid	3.1
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorodecanoic Acid	2.7
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorododecanoic Acid	<2.0
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluoroheptanoic Acid	23
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorohexane Sulfonic Acid	6.6

TABLE 4a
Perched Zone Water PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorohexanoic Acid	24
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorononanoic Acid	3.6
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluoropentanoic Acid	27
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorotetradecanoic Acid	<2.0
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluorotridecanoic Acid	<2.0
PZ-21	FAY-GWASI-PZ-21	11/16/2017	Perfluoroundecanoic Acid	<2.0
PZ-21	FAY-GWASI-PZ-21	11/16/2017	PFOA	15
PZ-21	FAY-GWASI-PZ-21	11/16/2017	PFOS	13
SMW-02	FAY-GWASI-SMW-02	11/21/2017	HFPO Dimer Acid	15,000 J
SMW-02	FAY-GWASI-SMW-02	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-02	FAY-GWASI-SMW-02	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluoroheptanoic Acid	28
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorohexanoic Acid	16
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorononanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluoropentanoic Acid	170
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-02	FAY-GWASI-SMW-02	11/21/2017	PFOA	17
SMW-02	FAY-GWASI-SMW-02	11/21/2017	PFOS	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	HFPO Dimer Acid	9300
SMW-07	FAY-GWASI-SMW-07	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-07	FAY-GWASI-SMW-07	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorobutane Sulfonic Acid	2.7
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluoroheptanoic Acid	92
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorohexane Sulfonic Acid	11
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorohexanoic Acid	42
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorononanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluoropentanoic Acid	24
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-07	FAY-GWASI-SMW-07	11/21/2017	PFOA	1400
SMW-07	FAY-GWASI-SMW-07	11/21/2017	PFOS	<2.0

Notes: ng/L = nanograms per liter
J = estimated value
< = less than indicated reporting limit
detections are highlighted

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFECA-A	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFECA-F	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFECA-G	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFESA_BP1	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFESA_BP2	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFMOAA	386
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFO2HxA	1,922
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFO3OA	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFO4DA	<200
FTA-01	FAY-GWASI-FTA-01-1	11/30/2017	PFO5DA	<200
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFECA-A	<200
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFECA-F	<200
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFECA-G	<200
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFESA_BP1	5,827
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFESA_BP2	1,189
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFMOAA	6,969
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFO2HxA	7,632
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFO3OA	1,681
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFO4DA	1,146
FTA-02	FAY-GWASI-FTA-02-1	11/30/2017	PFO5DA	1,939
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFECA-A	<200
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFECA-F	<200
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFECA-G	<200
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFESA_BP1	<200
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFESA_BP2	589
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFMOAA	9,152
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFO2HxA	8,008
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFO3OA	1,184
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFO4DA	782
FTA-03	FAY-GWASI-FTA-03-1	11/30/2017	PFO5DA	703
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFECA-A	<200
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFECA-F	<200
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFECA-G	<200
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFESA_BP1	<200
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFESA_BP2	471
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFMOAA	5,001
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFO2HxA	7,391
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFO3OA	1,385
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFO4DA	1,421
MW-12S	FAY-GWASI-MW-12S-1	11/22/2017	PFO5DA	705
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFECA-A	<200
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFECA-F	<200
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFECA-G	<200
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFESA_BP1	<200
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFESA_BP2	544
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFMOAA	5,332

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFO2HxA	7,911
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFO3OA	1,485
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFO4DA	1,376
MW-12S	FAY-GWASI-MW-12S-2	11/22/2017	PFO5DA	841
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFECA-A	<200
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFECA-F	<200
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFECA-G	<200
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFESA_BP1	<200
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFESA_BP2	546
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFMOAA	14,111
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFO2HxA	9,876
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFO3OA	2,018
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFO4DA	1,815
MW-1S	FAY-GWASI-MW-1S-1	11/22/2017	PFO5DA	910
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFECA-A	<200
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFECA-F	<200
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFECA-G	<200
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFESA_BP1	<200
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFESA_BP2	553
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFMOAA	14,097
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFO2HxA	9,725
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFO3OA	1,952
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFO4DA	1,755
MW-1S	FAY-GWASI-MW-1S-2	11/22/2017	PFO5DA	914
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFECA-A	<200
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFECA-F	<200
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFECA-G	<200
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFESA_BP1	<200
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFESA_BP2	1,299
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFMOAA	22,042
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFO2HxA	13,709
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFO3OA	2,876
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFO4DA	1,761
MW-2S	FAY-GWASI-MW-2S-1	11/22/2017	PFO5DA	1,958
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFECA-A	<200
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFECA-F	<200
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFECA-G	<200
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFESA_BP1	<200
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFESA_BP2	1,321
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFMOAA	22,408
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFO2HxA	14,161
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFO3OA	2,951
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFO4DA	2,233
MW-2S	FAY-GWASI-MW-2S-2	11/22/2017	PFO5DA	2,145
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFECA-A	<200
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFECA-F	<200

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFECA-G	<200
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFESA_BP1	<200
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFESA_BP2	571
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFMOAA	6,140
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFO2HxA	14,879
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFO3OA	2,339
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFO4DA	2,100
MW-7S	FAY-GWASI-MW-7S-1	11/29/2017	PFO5DA	1,541
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFECA-A	<200
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFECA-F	<200
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFECA-G	<200
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFESA_BP1	<200
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFESA_BP2	446
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFMOAA	4,844
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFO2HxA	13,152
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFO3OA	1,791
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFO4DA	1,433
MW-8S	FAY-GWASI-MW-8S-1	11/29/2017	PFO5DA	1,484
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFECA-A	<200
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFECA-F	<200
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFECA-G	<200
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFESA_BP1	<200
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFESA_BP2	<200
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFMOAA	1,231
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFO2HxA	4,022
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFO3OA	839
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFO4DA	611
MW-9S	FAY-GWASI-MW-9S-1	11/27/2017	PFO5DA	<200
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFECA-A	<200
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFECA-F	<200
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFECA-G	<200
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFESA_BP1	3,073
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFESA_BP2	15,633
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFMOAA	42,218
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFO2HxA	47,621
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFO3OA	19,925
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFO4DA	18,151
NAF-01	FAY-GWASI-NAF-01-1	11/15/2017	PFO5DA	11,597
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFECA-A	<200
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFECA-F	<200
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFECA-G	<200
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFESA_BP1	2,821
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFESA_BP2	15,667
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFMOAA	43,669
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFO2HxA	46,213
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFO3OA	19,861

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFO4DA	17,866
NAF-01	FAY-GWASI-NAF-01-2	11/15/2017	PFO5DA	12,068
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFECA-A	<200
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFECA-F	<200
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFECA-G	<200
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFESA_BP1	2,897
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFESA_BP2	16,313
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFMOAA	43,425
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFO2HxA	47,314
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFO3OA	20,312
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFO4DA	18,873
NAF-01	FAY-GWASI-NAF-01-D-1	11/15/2017	PFO5DA	12,803
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFECA-A	<200
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFECA-F	<200
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFECA-G	<200
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFESA_BP1	2,836
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFESA_BP2	16,189
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFMOAA	43,298
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFO2HxA	46,459
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFO3OA	20,373
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFO4DA	18,510
NAF-01	FAY-GWASI-NAF-01-D-2	11/15/2017	PFO5DA	12,007
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFECA-A	<200
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFECA-F	418
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFECA-G	<200
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFESA_BP1	3,735
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFESA_BP2	10,462
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFMOAA	391,570
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFO2HxA	19,005
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFO3OA	60,619
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFO4DA	45,716
NAF-02	FAY-GWASI-NAF-02-1	11/15/2017	PFO5DA	26,845
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFECA-A	<200
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFECA-F	450
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFECA-G	<200
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFESA_BP1	3,557
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFESA_BP2	7,192
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFMOAA	406,380
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFO2HxA	189,005
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFO3OA	60,531
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFO4DA	48,581
NAF-02	FAY-GWASI-NAF-02-2	11/15/2017	PFO5DA	28,073
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFECA-A	<200
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFECA-F	307
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFECA-G	<200
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFESA_BP1	16,331

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFESA_BP2	7,621
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFMOAA	468,045
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFO2HxA	249,170
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFO3OA	85,625
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFO4DA	46,319
NAF-03	FAY-GWASI-NAF-03-1	11/15/2017	PFO5DA	31,354
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFECA-A	<200
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFECA-F	240
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFECA-G	<200
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFESA_BP1	16,508
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFESA_BP2	8,171
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFMOAA	538,490
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFO2HxA	300,720
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFO3OA	96,220
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFO4DA	52,725
NAF-03	FAY-GWASI-NAF-03-2	11/15/2017	PFO5DA	33,102
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFECA-A	<200
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFECA-F	1,248
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFECA-G	<200
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFESA_BP1	63,491
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFESA_BP2	17,923
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFMOAA	1,726,095
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFO2HxA	912,105
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFO3OA	262,395
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFO4DA	110,665
NAF-04	FAY-GWASI-NAF-04-1	11/15/2017	PFO5DA	47,780
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFECA-A	<200
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFECA-F	923
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFECA-G	<200
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFESA_BP1	66,947
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFESA_BP2	18,105
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFMOAA	1,715,830
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFO2HxA	898,740
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFO3OA	247,065
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFO4DA	106,730
NAF-04	FAY-GWASI-NAF-04-2	11/15/2017	PFO5DA	48,463
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFECA-A	<200
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFECA-F	381
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFECA-G	<200
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFESA_BP1	260,295
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFESA_BP2	15,264
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFMOAA	599,340
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFO2HxA	578,045
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFO3OA	281,605
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFO4DA	209,810
NAF-05A	FAY-GWASI-NAF-05A-1	11/08/2017	PFO5DA	136,855

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFECA-A	<200
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFECA-F	1,235
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFECA-G	<200
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFESA_BP1	47,420
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFESA_BP2	22,374
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFMOAA	966,000
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFO2HxA	508,965
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFO3OA	192,945
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFO4DA	105,270
NAF-06	FAY-GWASI-NAF-06-1	11/14/2017	PFO5DA	68,677
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFECA-A	<200
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFECA-F	937
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFECA-G	<200
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFESA_BP1	47,148
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFESA_BP2	22,743
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFMOAA	985,555
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFO2HxA	502,285
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFO3OA	184,855
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFO4DA	98,745
NAF-06	FAY-GWASI-NAF-06-2	11/14/2017	PFO5DA	68,898
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFECA-A	<200
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFECA-F	397
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFECA-G	<200
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFESA_BP1	<200
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFESA_BP2	<200
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFMOAA	360
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFO2HxA	14,400
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFO3OA	575
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFO4DA	3,580
NAF-06	FAY-GWNEW-NAF-06-121317-1	12/13/2017	PFO5DA	<200
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFECA-A	<200
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFECA-F	227
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFECA-G	<200
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFESA_BP1	<200
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFESA_BP2	<200
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFMOAA	1,635
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFO2HxA	17,040
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFO3OA	1,510
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFO4DA	2,805
NAF-06	FAY-GWNEW-NAF-06-121317-2	12/13/2017	PFO5DA	<200
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFECA-A	<200
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFECA-F	<200
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFECA-G	<200
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFESA_BP1	392
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFESA_BP2	1,562
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFMOAA	115,273

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFO2HxA	66,135
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFO3OA	21,250
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFO4DA	9,176
NAF-07	FAY-GWASI-NAF-07-1	11/15/2017	PFO5DA	5,246
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFECA-A	<200
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFECA-F	<200
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFECA-G	<200
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFESA_BP1	282
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFESA_BP2	1,582
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFMOAA	112,916
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFO2HxA	62,286
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFO3OA	21,068
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFO4DA	8,959
NAF-07	FAY-GWASI-NAF-07-2	11/15/2017	PFO5DA	5,080
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFECA-A	<200
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFECA-F	<200
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFECA-G	<200
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFESA_BP1	61,245
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFESA_BP2	10,074
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFMOAA	15,910
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFO2HxA	43,173
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFO3OA	18,382
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFO4DA	10,416
NAF-08A	FAY-GWASI-NAF-08A-1	11/15/2017	PFO5DA	5,888
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFECA-A	<200
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFECA-F	<200
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFECA-G	<200
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFESA_BP1	71,915
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFESA_BP2	9,685
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFMOAA	15,234
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFO2HxA	41,289
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFO3OA	17,348
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFO4DA	9,997
NAF-08A	FAY-GWASI-NAF-08A-2	11/15/2017	PFO5DA	5,363
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFECA-A	<200
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFECA-F	311
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFECA-G	<200
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFESA_BP1	2,697
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFESA_BP2	851
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFMOAA	4,691
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFO2HxA	21,127
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFO3OA	11,429
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFO4DA	9,663
NAF-09	FAY-GWASI-NAF-09-1	11/16/2017	PFO5DA	1,693
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFECA-A	<200
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFECA-F	373

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFECA-G	<200
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFESA_BP1	2,435
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFESA_BP2	791
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFMOAA	4,751
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFO2HxA	21,533
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFO3OA	11,804
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFO4DA	9,692
NAF-09	FAY-GWASI-NAF-09-2	11/16/2017	PFO5DA	1,685
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFECA-A	<200
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFECA-F	<200
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFECA-G	<200
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFESA_BP1	<200
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFESA_BP2	891
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFMOAA	4,789
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFO2HxA	17,088
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFO3OA	4,104
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFO4DA	2,503
NAF-10	FAY-GWASI-NAF-10-1	11/14/2017	PFO5DA	2,017
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFECA-A	<200
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFECA-F	<200
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFECA-G	<200
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFESA_BP1	<200
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFESA_BP2	818
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFMOAA	4,627
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFO2HxA	16,539
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFO3OA	4,539
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFO4DA	2,239
NAF-10	FAY-GWASI-NAF-10-2	11/14/2017	PFO5DA	1,802
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFECA-A	<200
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFECA-F	797
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFECA-G	<200
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFESA_BP1	129,815
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFESA_BP2	76,125
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFMOAA	68,690
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFO2HxA	283,775
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFO3OA	105,980
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFO4DA	61,459
NAF-12	FAY-GWASI-NAF-12-1	11/16/2017	PFO5DA	27,878
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFECA-A	<200
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFECA-F	916
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFECA-G	<200
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFESA_BP1	144,625
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFESA_BP2	76,230
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFMOAA	69,075
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFO2HxA	296,180
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFO3OA	112,570

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFO4DA	61,219
NAF-12	FAY-GWASI-NAF-12-2	11/16/2017	PFO5DA	27,840
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFECA-A	<200
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFECA-F	<200
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFECA-G	<200
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFESA_BP1	<200
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFESA_BP2	227
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFMOAA	2,187
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFO2HxA	7,868
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFO3OA	1,761
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFO4DA	1,360
PZ-15	FAY-GWASI-PZ-15-1	11/29/2017	PFO5DA	505
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFECA-A	<200
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFECA-F	<200
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFECA-G	<200
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFESA_BP1	<200
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFESA_BP2	233
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFMOAA	870
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFO2HxA	2,778
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFO3OA	562
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFO4DA	505
PZ-16	FAY-GWNEW-PZ-16-121317-1	12/13/2017	PFO5DA	<200
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFECA-A	<200
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFECA-F	<200
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFECA-G	<200
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFESA_BP1	<200
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFESA_BP2	242
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFMOAA	824
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFO2HxA	2,665
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFO3OA	512
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFO4DA	468
PZ-16	FAY-GWNEW-PZ-16-121317-2	12/13/2017	PFO5DA	<200
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFECA-A	<200
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFECA-F	950
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFECA-G	<200
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFESA_BP1	11,092
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFESA_BP2	5,474
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFMOAA	6,662,860
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFO2HxA	1,610,185
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFO3OA	399,610
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFO4DA	79,740
PZ-18	FAY-GWASI-PZ-18-110717	11/07/2017	PFO5DA	15,098
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFECA-A	<200
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFECA-F	1,085
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFECA-G	<200
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFESA_BP1	13,781

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFESA_BP2	5,827
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFMOAA	8,174,250
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFO2HxA	1,935,440
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFO3OA	488,640
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFO4DA	99,015
PZ-18	FAY-GWASI-PZ-18-112717	11/27/2017	PFO5DA	17,612
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFECA-A	<200
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFECA-F	<200
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFECA-G	<200
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFESA_BP1	<200
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFESA_BP2	494
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFMOAA	11,011
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFO2HxA	16,547
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFO3OA	2,343
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFO4DA	2,430
PZ-19	FAY-GWASI-PZ-19-1	11/16/2017	PFO5DA	806
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFECA-A	<200
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFECA-F	<200
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFECA-G	<200
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFESA_BP1	<200
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFESA_BP2	518
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFMOAA	11,084
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFO2HxA	16,678
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFO3OA	2,428
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFO4DA	2,317
PZ-19	FAY-GWASI-PZ-19-2	11/16/2017	PFO5DA	919
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFECA-A	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFECA-F	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFECA-G	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFESA_BP1	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFESA_BP2	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFMOAA	419
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFO2HxA	1,034
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFO3OA	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFO4DA	<200
PZ-20	FAY-GWASI-PZ-20-1	11/16/2017	PFO5DA	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFECA-A	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFECA-F	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFECA-G	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFESA_BP1	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFESA_BP2	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFMOAA	425
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFO2HxA	1,057
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFO3OA	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFO4DA	<200
PZ-20	FAY-GWASI-PZ-20-2	11/16/2017	PFO5DA	<200

TABLE 4b
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFECA-A	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFECA-F	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFECA-G	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFESA_BP1	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFESA_BP2	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFMOAA	697
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFO2HxA	707
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFO3OA	<200
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFO4DA	844
PZ-21	FAY-GWASI-PZ-21-1	11/16/2017	PFO5DA	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFECA-A	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFECA-F	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFECA-G	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFESA_BP1	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFESA_BP2	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFMOAA	776
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFO2HxA	818
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFO3OA	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFO4DA	<200
PZ-21	FAY-GWASI-PZ-21-2	11/16/2017	PFO5DA	<200
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFECA-A	<200
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFECA-F	<200
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFECA-G	<200
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFESA_BP1	<200
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFESA_BP2	226
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFMOAA	1,588
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFO2HxA	17,792
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFO3OA	4,613
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFO4DA	2,451
SMW-02	FAY-GWASI-SMW-02-1	11/21/2017	PFO5DA	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFECA-A	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFECA-F	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFECA-G	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFESA_BP1	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFESA_BP2	<200
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFMOAA	1,112
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFO2HxA	13,379
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFO3OA	3,647
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFO4DA	1,580
SMW-02	FAY-GWASI-SMW-02-2	11/21/2017	PFO5DA	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFECA-A	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFECA-F	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFECA-G	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFESA_BP1	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFESA_BP2	<200
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFMOAA	820

TABLE 4b
Perched Zone Water PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFO2HxA	1,104
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFO3OA	327
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFO4DA	333
SMW-07	FAY-GWASI-SMW-07-1	11/21/2017	PFO5DA	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFECA-A	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFECA-F	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFECA-G	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFESA_BP1	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFESA_BP2	<200
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFMOAA	722
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFO2HxA	1,906
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFO3OA	220
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFO4DA	338
SMW-07	FAY-GWASI-SMW-07-2	11/21/2017	PFO5DA	<200

Notes: ng/L = nanograms per liter
< = less than indicated reporting limit
-D = duplicate sample
-1 & -2 = replicate samples analyzed
detections are highlighted

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	HFPO Dimer Acid	400
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorodecanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorododecanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluoroheptanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorohexanoic Acid	2.3
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorononanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluoropentanoic Acid	9.8
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorotetradecanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluorotridecanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	Perfluoroundecanoic Acid	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	PFOA	<2.0
INSITU-1	FAY-GWASI-INSITU-1	11/28/2017	PFOS	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	HFPO Dimer Acid	25,000
LTW-01	FAY-GWASI-LTW-01	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-01	FAY-GWASI-LTW-01	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorobutane Sulfonic Acid	3.7
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorodecanoic Acid	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorododecanoic Acid	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluoroheptanoic Acid	55
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorohexane Sulfonic Acid	11
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorohexanoic Acid	31
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorononanoic Acid	3.2
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluoropentanoic Acid	370
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorotetradecanoic Acid	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluorotridecanoic Acid	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	Perfluoroundecanoic Acid	<2.0
LTW-01	FAY-GWASI-LTW-01	11/16/2017	PFOA	83
LTW-01	FAY-GWASI-LTW-01	11/16/2017	PFOS	26
LTW-02	FAY-GWASI-LTW-02	11/16/2017	HFPO Dimer Acid	6800
LTW-02	FAY-GWASI-LTW-02	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-02	FAY-GWASI-LTW-02	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorodecanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorododecanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluoroheptanoic Acid	10
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorohexanoic Acid	8.1
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorononanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluoropentanoic Acid	240
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorotetradecanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluorotridecanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	Perfluoroundecanoic Acid	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	PFOA	<2.0
LTW-02	FAY-GWASI-LTW-02	11/16/2017	PFOS	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	HFPO Dimer Acid	9400 J
LTW-03	FAY-GWASI-LTW-03	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-03	FAY-GWASI-LTW-03	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorodecanoic Acid	<2.0

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorododecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluoroheptanoic Acid	18
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorohexanoic Acid	15
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorononanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluoropentanoic Acid	610
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorotetradecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluorotridecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	Perfluoroundecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	PFOA	<2.0
LTW-03	FAY-GWASI-LTW-03	11/30/2017	PFOS	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	HFPO Dimer Acid	8900 J
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorodecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorododecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluoroheptanoic Acid	18
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorohexanoic Acid	14
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorononanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluoropentanoic Acid	610
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorotetradecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluorotridecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	Perfluoroundecanoic Acid	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	PFOA	<2.0
LTW-03	FAY-GWASI-LTW-03-D	11/30/2017	PFOS	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	HFPO Dimer Acid	17,000
LTW-04	FAY-GWASI-LTW-04	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-04	FAY-GWASI-LTW-04	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorodecanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorododecanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluoroheptanoic Acid	82
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorohexanoic Acid	43
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorononanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluoropentanoic Acid	1800
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorotetradecanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluorotridecanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	Perfluoroundecanoic Acid	<2.0
LTW-04	FAY-GWASI-LTW-04	11/16/2017	PFOA	7.2
LTW-04	FAY-GWASI-LTW-04	11/16/2017	PFOS	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	HFPO Dimer Acid	45,000
LTW-05	FAY-GWASI-LTW-05	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
LTW-05	FAY-GWASI-LTW-05	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorodecanoic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorododecanoic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluoroheptanoic Acid	550
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorohexanoic Acid	170
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorononanoic Acid	<2.0

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluoropentanoic Acid	3900
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorotetradecanoic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluorotridecanoic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	Perfluoroundecanoic Acid	<2.0
LTW-05	FAY-GWASI-LTW-05	11/16/2017	PFOA	3
LTW-05	FAY-GWASI-LTW-05	11/16/2017	PFOS	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	HFPO Dimer Acid	45,000
MW-13D	FAY-GWASI-MW-13D	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-13D	FAY-GWASI-MW-13D	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorodecanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorododecanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluoroheptanoic Acid	43
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorohexanoic Acid	77
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorononanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluoropentanoic Acid	4700
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorotetradecanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluorotridecanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	Perfluoroundecanoic Acid	<2.0
MW-13D	FAY-GWASI-MW-13D	11/16/2017	PFOA	2.5
MW-13D	FAY-GWASI-MW-13D	11/16/2017	PFOS	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	HFPO Dimer Acid	8300
MW-14D	FAY-GWASI-MW-14D	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-14D	FAY-GWASI-MW-14D	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorobutane Sulfonic Acid	2.2
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorodecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorododecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluoroheptanoic Acid	100
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorohexane Sulfonic Acid	4.7
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorohexanoic Acid	78
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorononanoic Acid	11
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluoropentanoic Acid	380
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorotetradecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluorotridecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	Perfluoroundecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D	11/30/2017	PFOA	620
MW-14D	FAY-GWASI-MW-14D	11/30/2017	PFOS	7.7
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	HFPO Dimer Acid	8300
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorobutane Sulfonic Acid	2.3
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorodecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorododecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluoroheptanoic Acid	110
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorohexane Sulfonic Acid	5
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorohexanoic Acid	78
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorononanoic Acid	11
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluoropentanoic Acid	370
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorotetradecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluorotridecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	Perfluoroundecanoic Acid	<2.0
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	PFOA	620

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-14D	FAY-GWASI-MW-14D-D	11/30/2017	PFOS	7.7
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	HFPO Dimer Acid	3600
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorobutane Sulfonic Acid	3.6
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorodecanoic Acid	2.8
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorododecanoic Acid	<2.0
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluoroheptanoic Acid	35
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorohexane Sulfonic Acid	5.7
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorohexanoic Acid	42
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorononanoic Acid	17
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluoropentanoic Acid	110
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorotetradecanoic Acid	<2.0
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluorotridecanoic Acid	<2.0
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	Perfluoroundecanoic Acid	<2.0
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	PFOA	47
MW-15DR	FAY-GWNEW-MW-15DR	12/11/2017	PFOS	11
MW-16D	FAY-GWASI-MW-16D	11/16/2017	HFPO Dimer Acid	720
MW-16D	FAY-GWASI-MW-16D	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-16D	FAY-GWASI-MW-16D	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorodecanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorododecanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluoroheptanoic Acid	3.4
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorohexanoic Acid	3.7
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorononanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluoropentanoic Acid	17
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorotetradecanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluorotridecanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	Perfluoroundecanoic Acid	<2.0
MW-16D	FAY-GWASI-MW-16D	11/16/2017	PFOA	12
MW-16D	FAY-GWASI-MW-16D	11/16/2017	PFOS	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	HFPO Dimer Acid	610
MW-17D	FAY-GWASI-MW-17D	11/17/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-17D	FAY-GWASI-MW-17D	11/17/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorodecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorododecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluoroheptanoic Acid	3.5
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorohexanoic Acid	4.3
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorononanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluoropentanoic Acid	17
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorotetradecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluorotridecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	Perfluoroundecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D	11/17/2017	PFOA	3.4
MW-17D	FAY-GWASI-MW-17D	11/17/2017	PFOS	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	HFPO Dimer Acid	610
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorobutane Sulfonic Acid	<2.0

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorodecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorododecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluoroheptanoic Acid	3.3
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorohexanoic Acid	4.1
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorononanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluoropentanoic Acid	17
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorotetradecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluorotridecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	Perfluoroundecanoic Acid	<2.0
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	PFOA	3.2
MW-17D	FAY-GWASI-MW-17D-D	11/17/2017	PFOS	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	HFPO Dimer Acid	170 J
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorodecanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorododecanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluoroheptanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorohexanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorononanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluoropentanoic Acid	3.2
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorotetradecanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluorotridecanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	Perfluoroundecanoic Acid	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	PFOA	<2.0
MW-18D	FAY-GWNEW-MW-18D	12/06/2017	PFOS	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	HFPO Dimer Acid	840 J
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorodecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorododecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluoroheptanoic Acid	4.8
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorohexanoic Acid	5.6
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorononanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluoropentanoic Acid	24
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorotetradecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluorotridecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	Perfluoroundecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	PFOA	7.1
MW-19D	FAY-GWNEW-MW-19D	12/06/2017	PFOS	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	HFPO Dimer Acid	840 J
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorodecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorododecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluoroheptanoic Acid	4.5
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorohexanoic Acid	5.8

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorononanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluoropentanoic Acid	23
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorotetradecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluorotridecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	Perfluoroundecanoic Acid	<2.0
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	PFOA	7.2
MW-19D	FAY-GWNEW-MW-19D-D	12/06/2017	PFOS	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	HFPO Dimer Acid	1400
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorodecanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorododecanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluoroheptanoic Acid	9.4
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorohexanoic Acid	11
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorononanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluoropentanoic Acid	46
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorotetradecanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluorotridecanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	Perfluoroundecanoic Acid	<2.0
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	PFOA	35
MW-20D	FAY-GWNEW-MW-20D	12/07/2017	PFOS	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	HFPO Dimer Acid	390 J
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorodecanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorododecanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluoroheptanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorohexanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorononanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluoropentanoic Acid	9.5
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorotetradecanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluorotridecanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	Perfluoroundecanoic Acid	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	PFOA	<2.0
MW-21D	FAY-GWNEW-MW-21D	12/06/2017	PFOS	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	HFPO Dimer Acid	990
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorobutane Sulfonic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorodecanoic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorododecanoic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluoroheptanoic Acid	3.7
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorohexane Sulfonic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorohexanoic Acid	4.6
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorononanoic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluoropentanoic Acid	15
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorotetradecanoic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluorotridecanoic Acid	<2.0
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	Perfluoroundecanoic Acid	<2.0

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
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Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	PFOA	10
MW-22D	FAY-GWNEW-MW-22D	12/08/2017	PFOS	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	HFPO Dimer Acid	6600 J
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorobutane Sulfonic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorodecanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorododecanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluoroheptanoic Acid	23
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorohexane Sulfonic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorohexanoic Acid	16
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorononanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluoropentanoic Acid	530
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorotetradecanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluorotridecanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	Perfluoroundecanoic Acid	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	PFOA	<2.0
NAF-08B	FAY-GWASI-NAF-08B	11/16/2017	PFOS	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	HFPO Dimer Acid	2100 J
SMW-01	FAY-GWASI-SMW-01	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-01	FAY-GWASI-SMW-01	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorobutane Sulfonic Acid	2.4
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluoroheptanoic Acid	12
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorohexanoic Acid	8.9
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorononanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluoropentanoic Acid	25
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01	11/21/2017	PFOA	15
SMW-01	FAY-GWASI-SMW-01	11/21/2017	PFOS	2.5
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	HFPO Dimer Acid	2100 J
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorobutane Sulfonic Acid	2.5
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluoroheptanoic Acid	12
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorohexanoic Acid	8.7
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorononanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluoropentanoic Acid	26
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	PFOA	14
SMW-01	FAY-GWASI-SMW-01-D	11/21/2017	PFOS	2.3
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	HFPO Dimer Acid	8900 J
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
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Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluoroheptanoic Acid	41
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorohexanoic Acid	38
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorononanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluoropentanoic Acid	480
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	PFOA	130
SMW-03B	FAY-GWASI-SMW-03B	11/21/2017	PFOS	<2.0
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	HFPO Dimer Acid	4500
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<33
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorobutane Sulfonic Acid	2.3
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorodecanoic Acid	<3.3
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorododecanoic Acid	<5.9
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluoroheptanoic Acid	51
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorohexane Sulfonic Acid	2.4
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorohexanoic Acid	41
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorononanoic Acid	<2.9
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluoropentanoic Acid	86
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorotetradecanoic Acid	<3.1
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluorotridecanoic Acid	<14
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	Perfluoroundecanoic Acid	<12
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	PFOA	23,000
SMW-04B	FAY-GWASI-SMW-04B	11/21/2017	PFOS	<5.7
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	HFPO Dimer Acid	7700 J
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorobutane Sulfonic Acid	7.7
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorodecanoic Acid	<2.0
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorododecanoic Acid	<2.0
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluoroheptanoic Acid	63
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorohexane Sulfonic Acid	10
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorohexanoic Acid	42
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorononanoic Acid	2.8
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluoropentanoic Acid	280
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorotetradecanoic Acid	<2.0
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluorotridecanoic Acid	<2.0
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	Perfluoroundecanoic Acid	<2.0
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	PFOA	510
SMW-05P	FAY-GWASI-SMW-05P	11/15/2017	PFOS	3.2
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	HFPO Dimer Acid	42,000
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluoroheptanoic Acid	230 J
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorohexane Sulfonic Acid	2 J

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorohexanoic Acid	110 J
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorononanoic Acid	2.5 J
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluoropentanoic Acid	3200
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	PFOA	3500
SMW-06B	FAY-GWASI-SMW-06B	11/21/2017	PFOS	2.9 J
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	HFPO Dimer Acid	15,000
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorobutane Sulfonic Acid	4.1
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorodecanoic Acid	<2.0
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorododecanoic Acid	<2.0
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluoroheptanoic Acid	130
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorohexane Sulfonic Acid	6
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorohexanoic Acid	45
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorononanoic Acid	5.1
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluoropentanoic Acid	1100
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorotetradecanoic Acid	<2.0
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluorotridecanoic Acid	<2.0
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	Perfluoroundecanoic Acid	<2.0
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	PFOA	450
SMW-08B	FAY-GWASI-SMW-08B	11/21/2017	PFOS	5.7
SMW-09	FAY-GWASI-SMW-09	11/15/2017	HFPO Dimer Acid	16,000 J
SMW-09	FAY-GWASI-SMW-09	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-09	FAY-GWASI-SMW-09	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorobutane Sulfonic Acid	3
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorodecanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorododecanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluoroheptanoic Acid	63
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorohexane Sulfonic Acid	13
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorohexanoic Acid	88
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorononanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluoropentanoic Acid	290
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorotetradecanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluorotridecanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	Perfluoroundecanoic Acid	<2.0
SMW-09	FAY-GWASI-SMW-09	11/15/2017	PFOA	53
SMW-09	FAY-GWASI-SMW-09	11/15/2017	PFOS	39
SMW-10	FAY-GWASI-SMW-10	11/15/2017	HFPO Dimer Acid	<10 J
SMW-10	FAY-GWASI-SMW-10	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-10	FAY-GWASI-SMW-10	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorodecanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorododecanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluoroheptanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorohexanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorononanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluoropentanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorotetradecanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluorotridecanoic Acid	<2.0

TABLE 5a
Surficial Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-10	FAY-GWASI-SMW-10	11/15/2017	Perfluoroundecanoic Acid	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	PFOA	<2.0
SMW-10	FAY-GWASI-SMW-10	11/15/2017	PFOS	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	HFPO Dimer Acid	4400 J
SMW-11	FAY-GWASI-SMW-11	11/15/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-11	FAY-GWASI-SMW-11	11/15/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorodecanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorododecanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluoroheptanoic Acid	11
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorohexanoic Acid	10
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorononanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluoropentanoic Acid	48
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorotetradecanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluorotridecanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	Perfluoroundecanoic Acid	<2.0
SMW-11	FAY-GWASI-SMW-11	11/15/2017	PFOA	34
SMW-11	FAY-GWASI-SMW-11	11/15/2017	PFOS	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	HFPO Dimer Acid	1400 J
SMW-12	FAY-GWASI-SMW-12	11/14/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SMW-12	FAY-GWASI-SMW-12	11/14/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorobutane Sulfonic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorodecanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorododecanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluoroheptanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorohexane Sulfonic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorohexanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorononanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluoropentanoic Acid	33
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorotetradecanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluorotridecanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	Perfluoroundecanoic Acid	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	PFOA	<2.0
SMW-12	FAY-GWASI-SMW-12	11/14/2017	PFOS	<2.0

Notes: ng/L = nanograms per liter
J = estimated value
< = less than indicated reporting limit
detections are highlighted

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFECA-A	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFECA-F	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFECA-G	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFESA_BP1	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFESA_BP2	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFMOAA	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFO2HxA	366
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFO3OA	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFO4DA	<200
INSITU-1	FAY-GWASI-INSITU1	11/28/2017	PFO5DA	<200
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFECA-A	<200
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFECA-F	<200
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFECA-G	<200
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFESA_BP1	<200
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFESA_BP2	434
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFMOAA	29,061
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFO2HxA	34,888
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFO3OA	7,178
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFO4DA	1,948
LTW-01	FAY-GWASI-LTW-01-1	11/16/2017	PFO5DA	506
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFECA-A	<200
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFECA-F	<200
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFECA-G	<200
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFESA_BP1	<200
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFESA_BP2	429
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFMOAA	29,496
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFO2HxA	35,359
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFO3OA	7,291
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFO4DA	1,852
LTW-01	FAY-GWASI-LTW-01-2	11/16/2017	PFO5DA	409
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFECA-A	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFECA-F	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFECA-G	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFESA_BP1	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFESA_BP2	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFMOAA	31,056
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFO2HxA	15,118
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFO3OA	2,972
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFO4DA	<200
LTW-02	FAY-GWASI-LTW-02-1	11/16/2017	PFO5DA	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFECA-A	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFECA-F	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFECA-G	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFESA_BP1	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFESA_BP2	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFMOAA	31,848
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFO2HxA	16,450
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFO3OA	3,102
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFO4DA	<200
LTW-02	FAY-GWASI-LTW-02-2	11/16/2017	PFO5DA	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFECA-A	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFECA-F	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFECA-G	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFESA_BP1	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFESA_BP2	<200
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFMOAA	140,376
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFO2HxA	39,673
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFO3OA	5,727
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFO4DA	258
LTW-03	FAY-GWASI-LTW-03-1	11/30/2017	PFO5DA	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFECA-A	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFECA-F	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFECA-G	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFESA_BP1	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFESA_BP2	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFMOAA	140,305
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFO2HxA	40,664
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFO3OA	5,836
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFO4DA	<200
LTW-03	FAY-GWASI-LTW-03-D-1	11/30/2017	PFO5DA	<200
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFECA-A	<200
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFECA-F	<200
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFECA-G	<200
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFESA_BP1	<200
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFESA_BP2	327
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFMOAA	100,673
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFO2HxA	41,484
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFO3OA	7,032
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFO4DA	725
LTW-04	FAY-GWASI-LTW-04-1	11/16/2017	PFO5DA	<200
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFECA-A	<200
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFECA-F	280
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFECA-G	<200
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFESA_BP1	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFESA_BP2	296
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFMOAA	99,126
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFO2HxA	42,012
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFO3OA	7,004
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFO4DA	786
LTW-04	FAY-GWASI-LTW-04-2	11/16/2017	PFO5DA	<200
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFECA-A	<200
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFECA-F	263
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFECA-G	<200
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFESA_BP1	<200
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFESA_BP2	387
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFMOAA	257,405
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFO2HxA	138,065
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFO3OA	42,265
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFO4DA	4,162
LTW-05	FAY-GWASI-LTW-05-1	11/16/2017	PFO5DA	<200
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFECA-A	<200
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFECA-F	213
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFECA-G	<200
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFESA_BP1	<200
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFESA_BP2	431
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFMOAA	256,730
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFO2HxA	129,860
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFO3OA	43,142
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFO4DA	3,928
LTW-05	FAY-GWASI-LTW-05-2	11/16/2017	PFO5DA	<200
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFECA-A	<200
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFECA-F	<200
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFECA-G	<200
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFESA_BP1	<200
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFESA_BP2	213
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFMOAA	323,340
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFO2HxA	131,950
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFO3OA	11,658
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFO4DA	805
MW-13D	FAY-GWASI-MW-13D-1	11/16/2017	PFO5DA	<200
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFECA-A	<200
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFECA-F	301
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFECA-G	<200
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFESA_BP1	<200
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFESA_BP2	207
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFMOAA	312,555

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFO2HxA	132,200
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFO3OA	11,250
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFO4DA	535
MW-13D	FAY-GWASI-MW-13D-2	11/16/2017	PFO5DA	<200
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFECA-A	<200
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFECA-F	<200
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFECA-G	<200
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFESA_BP1	249
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFESA_BP2	360
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFMOAA	93,163
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFO2HxA	26,473
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFO3OA	7,627
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFO4DA	2,764
MW-14D	FAY-GWASI-MW-14D-1	11/30/2017	PFO5DA	595
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFECA-A	<200
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFECA-F	<200
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFECA-G	<200
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFESA_BP1	<200
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFESA_BP2	363
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFMOAA	95,836
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFO2HxA	26,807
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFO3OA	7,941
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFO4DA	2,828
MW-14D	FAY-GWASI-MW-14D-D-1	11/30/2017	PFO5DA	584
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFECA-A	<200
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFECA-F	<200
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFECA-G	<200
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFESA_BP1	12,431
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFESA_BP2	1,714
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFMOAA	39,674
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFO2HxA	11,991
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFO3OA	3,095
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFO4DA	1,098
MW-15DR	FAY-GWNEW-MW-15DR-1	12/11/2017	PFO5DA	693
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFECA-A	<200
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFECA-F	<200
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFECA-G	<200
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFESA_BP1	11,779
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFESA_BP2	1,690
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFMOAA	38,851
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFO2HxA	11,958
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFO3OA	2,686

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFO4DA	1,259
MW-15DR	FAY-GWNEW-MW-15DR-2	12/11/2017	PFO5DA	652
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFECA-A	<200
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFECA-F	<200
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFECA-G	<200
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFESA_BP1	<200
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFESA_BP2	242
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFMOAA	2,358
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFO2HxA	879
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFO3OA	225
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFO4DA	<200
MW-16D	FAY-GWASI-MW-16D-1	11/16/2017	PFO5DA	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFECA-A	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFECA-F	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFECA-G	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFESA_BP1	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFESA_BP2	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFMOAA	2,383
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFO2HxA	1,101
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFO3OA	205
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFO4DA	<200
MW-16D	FAY-GWASI-MW-16D-2	11/16/2017	PFO5DA	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFECA-A	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFECA-F	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFECA-G	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFESA_BP1	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFESA_BP2	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFMOAA	215
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFO2HxA	508
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFO3OA	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFO4DA	<200
MW-17D	FAY-GWASI-MW-17D-1	11/17/2017	PFO5DA	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFECA-A	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFECA-F	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFECA-G	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFESA_BP1	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFESA_BP2	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFMOAA	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFO2HxA	593
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFO3OA	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFO4DA	<200
MW-17D	FAY-GWASI-MW-17D-2	11/17/2017	PFO5DA	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFECA-A	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFECA-F	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFECA-G	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFESA_BP1	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFESA_BP2	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFMOAA	222
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFO2HxA	502
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFO3OA	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFO4DA	<200
MW-17D	FAY-GWASI-MW-17D-D-1	11/17/2017	PFO5DA	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFECA-A	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFECA-F	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFECA-G	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFESA_BP1	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFESA_BP2	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFMOAA	227
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFO2HxA	565
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFO3OA	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFO4DA	<200
MW-17D	FAY-GWASI-MW-17D-D-2	11/17/2017	PFO5DA	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFECA-A	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFECA-F	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFECA-G	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFESA_BP1	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFESA_BP2	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFMOAA	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFO2HxA	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFO3OA	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFO4DA	<200
MW-18D	FAY-GWNEW-MW-18D-1	12/06/2017	PFO5DA	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFECA-A	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFECA-F	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFECA-G	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFESA_BP1	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFESA_BP2	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFMOAA	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFO2HxA	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFO3OA	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFO4DA	<200
MW-18D	FAY-GWNEW-MW-18D-2	12/06/2017	PFO5DA	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFECA-A	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFECA-F	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFECA-G	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFESA_BP1	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFESA_BP2	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFMOAA	658
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFO2HxA	1,149
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFO3OA	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFO4DA	<200
MW-19D	FAY-GWNEW-MW-19D-1	12/06/2017	PFO5DA	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFECA-A	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFECA-F	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFECA-G	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFESA_BP1	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFESA_BP2	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFMOAA	474
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFO2HxA	971
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFO3OA	214
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFO4DA	<200
MW-19D	FAY-GWNEW-MW-19D-2	12/06/2017	PFO5DA	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFECA-A	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFECA-F	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFECA-G	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFESA_BP1	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFESA_BP2	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFMOAA	518
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFO2HxA	1,081
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFO3OA	261
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFO4DA	<200
MW-19D	FAY-GWNEW-MW-19D-D-1	12/06/2017	PFO5DA	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFECA-A	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFECA-F	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFECA-G	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFESA_BP1	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFESA_BP2	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFMOAA	582
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFO2HxA	1,089
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFO3OA	200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFO4DA	<200
MW-19D	FAY-GWNEW-MW-19D-D-2	12/06/2017	PFO5DA	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFECA-A	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFECA-F	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFECA-G	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFESA_BP1	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFESA_BP2	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFMOAA	6,627
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFO2HxA	2,720
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFO3OA	548
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFO4DA	<200
MW-20D	FAY-GWNEW-MW-20D-1	12/06/2017	PFO5DA	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFECA-A	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFECA-F	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFECA-G	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFESA_BP1	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFESA_BP2	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFMOAA	6,690
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFO2HxA	2,715
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFO3OA	557
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFO4DA	<200
MW-20D	FAY-GWNEW-MW-20D-2	12/06/2017	PFO5DA	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFECA-A	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFECA-F	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFECA-G	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFESA_BP1	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFESA_BP2	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFMOAA	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFO2HxA	268
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFO3OA	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFO4DA	<200
MW-21D	FAY-GWNEW-MW-21D-1	12/06/2017	PFO5DA	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFECA-A	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFECA-F	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFECA-G	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFESA_BP1	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFESA_BP2	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFMOAA	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFO2HxA	233
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFO3OA	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFO4DA	<200
MW-21D	FAY-GWNEW-MW-21D-2	12/06/2017	PFO5DA	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFECA-A	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFECA-F	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFECA-G	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFESA_BP1	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFESA_BP2	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFMOAA	343

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFO2HxA	490
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFO3OA	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFO4DA	<200
MW-22D	FAY-GWNEW-MW-22D-1	12/08/2017	PFO5DA	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFECA-A	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFECA-F	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFECA-G	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFESA_BP1	296
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFESA_BP2	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFMOAA	267
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFO2HxA	445
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFO3OA	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFO4DA	<200
MW-22D	FAY-GWNEW-MW-22D-2	12/08/2017	PFO5DA	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFECA-A	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFECA-F	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFECA-G	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFESA_BP1	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFESA_BP2	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFMOAA	24,422
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFO2HxA	8,498
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFO3OA	938
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFO4DA	<200
NAF-08B	FAY-GWASI-NAF-08B-1	11/16/2017	PFO5DA	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFECA-A	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFECA-F	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFECA-G	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFESA_BP1	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFESA_BP2	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFMOAA	288
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFO2HxA	1,246
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFO3OA	298
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFO4DA	<200
SMW-01	FAY-GWASI-SMW-01-1	11/21/2017	PFO5DA	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFECA-A	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFECA-F	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFECA-G	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFESA_BP1	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFESA_BP2	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFMOAA	274
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFO2HxA	1,202
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFO3OA	326

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFO4DA	<200
SMW-01	FAY-GWASI-SMW-01-2	11/21/2017	PFO5DA	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFECA-A	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFECA-F	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFECA-G	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFESA_BP1	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFESA_BP2	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFMOAA	263
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFO2HxA	1,271
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFO3OA	378
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFO4DA	<200
SMW-01	FAY-GWASI-SMW-01-D-1	11/21/2017	PFO5DA	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFECA-A	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFECA-F	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFECA-G	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFESA_BP1	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFESA_BP2	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFMOAA	376
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFO2HxA	1,227
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFO3OA	392
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFO4DA	<200
SMW-01	FAY-GWASI-SMW-01-D-2	11/21/2017	PFO5DA	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFECA-A	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFECA-F	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFECA-G	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFESA_BP1	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFESA_BP2	<200
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFMOAA	286,045
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFO2HxA	93,605
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFO3OA	14,469
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFO4DA	872
SMW-03B	FAY-GWASI-SMW-03B-1	11/20/2017	PFO5DA	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFECA-A	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFECA-F	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFECA-G	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFESA_BP1	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFESA_BP2	<200
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFMOAA	285,790
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFO2HxA	103,740
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFO3OA	14,213
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFO4DA	890
SMW-03B	FAY-GWASI-SMW-03B-2	11/20/2017	PFO5DA	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFECA-A	<200
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFECA-F	<200
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFECA-G	<200
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFESA_BP1	<200
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFESA_BP2	<200
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFMOAA	21,440
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFO2HxA	6,080
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFO3OA	1,372
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFO4DA	341
SMW-04B	FAY-GWASI-SMW-04B-1	11/20/2017	PFO5DA	<200
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFECA-A	<200
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFECA-F	<200
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFECA-G	<200
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFESA_BP1	342
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFESA_BP2	<200
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFMOAA	22,410
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFO2HxA	6,052
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFO3OA	1,406
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFO4DA	293
SMW-04B	FAY-GWASI-SMW-04B-2	11/20/2017	PFO5DA	<200
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFECA-A	<200
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFECA-F	<200
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFECA-G	<200
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFESA_BP1	275
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFESA_BP2	<200
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFMOAA	67,468
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFO2HxA	17,878
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFO3OA	5,220
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFO4DA	2,174
SMW-05P	FAY-GWASI-SMW-05P-1	11/15/2017	PFO5DA	375
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFECA-A	<200
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFECA-F	<200
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFECA-G	<200
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFESA_BP1	<200
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFESA_BP2	<200
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFMOAA	67,372
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFO2HxA	17,772
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFO3OA	5,065
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFO4DA	1,817
SMW-05P	FAY-GWASI-SMW-05P-2	11/15/2017	PFO5DA	353
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFECA-A	<200
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFECA-F	<200

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFECA-G	<200
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFESA_BP1	2,990
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFESA_BP2	1,922
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFMOAA	1,330,715
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFO2HxA	340,070
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFO3OA	67,385
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFO4DA	9,500
SMW-06B	FAY-GWASI-SMW-06B-1	11/21/2017	PFO5DA	522
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFECA-A	<200
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFECA-F	274
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFECA-G	<200
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFESA_BP1	3,880
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFESA_BP2	1,989
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFMOAA	1,357,825
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFO2HxA	345,835
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFO3OA	64,100
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFO4DA	9,309
SMW-06B	FAY-GWASI-SMW-06B-2	11/21/2017	PFO5DA	523
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFECA-A	<200
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFECA-F	<200
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFECA-G	<200
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFESA_BP1	1,509
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFESA_BP2	298
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFMOAA	394,635
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFO2HxA	111,610
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFO3OA	22,903
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFO4DA	5,427
SMW-08B	FAY-GWASI-SMW-08B-1	11/21/2017	PFO5DA	807
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFECA-A	<200
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFECA-F	<200
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFECA-G	<200
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFESA_BP1	1,451
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFESA_BP2	341
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFMOAA	367,955
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFO2HxA	98,395
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFO3OA	23,085
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFO4DA	5,305
SMW-08B	FAY-GWASI-SMW-08B-2	11/21/2017	PFO5DA	915
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFECA-A	<200
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFECA-F	<200
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFECA-G	<200
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFESA_BP1	8,936

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFESA_BP2	280
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFMOAA	3,095
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFO2HxA	4,078
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFO3OA	1,342
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFO4DA	847
SMW-09	FAY-GWASI-SMW-09-1	11/15/2017	PFO5DA	<200
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFECA-A	<200
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFECA-F	<200
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFECA-G	<200
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFESA_BP1	9,015
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFESA_BP2	227
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFMOAA	2,817
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFO2HxA	4,118
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFO3OA	1,181
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFO4DA	897
SMW-09	FAY-GWASI-SMW-09-2	11/15/2017	PFO5DA	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFECA-A	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFECA-F	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFECA-G	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFESA_BP1	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFESA_BP2	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFMOAA	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFO2HxA	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFO3OA	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFO4DA	<200
SMW-10	FAY-GWASI-SMW-10-1	11/15/2017	PFO5DA	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFECA-A	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFECA-F	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFECA-G	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFESA_BP1	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFESA_BP2	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFMOAA	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFO2HxA	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFO3OA	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFO4DA	<200
SMW-10	FAY-GWASI-SMW-10-2	11/15/2017	PFO5DA	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFECA-A	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFECA-F	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFECA-G	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFESA_BP1	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFESA_BP2	<200
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFMOAA	2,289

TABLE 5b
Surficial Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFO2HxA	3,482
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFO3OA	668
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFO4DA	305
SMW-11	FAY-GWASI-SMW-11-1	11/15/2017	PFO5DA	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFECA-A	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFECA-F	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFECA-G	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFESA_BP1	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFESA_BP2	<200
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFMOAA	3,277
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFO2HxA	3,951
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFO3OA	818
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFO4DA	299
SMW-11	FAY-GWASI-SMW-11-2	11/15/2017	PFO5DA	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFECA-A	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFECA-F	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFECA-G	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFESA_BP1	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFESA_BP2	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFMOAA	1,991
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFO2HxA	1,342
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFO3OA	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFO4DA	<200
SMW-12	FAY-GWASI-SMW-12-1	11/14/2017	PFO5DA	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFECA-A	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFECA-F	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFECA-G	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFESA_BP1	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFESA_BP2	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFMOAA	2,014
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFO2HxA	1,132
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFO3OA	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFO4DA	<200
SMW-12	FAY-GWASI-SMW-12-2	11/14/2017	PFO5DA	<200

Notes: ng/L = nanograms per liter
< = less than indicated reporting limit
-D = duplicate sample
-1 & -2 = replicate samples analyzed
detections are highlighted

TABLE 6a
Black Creek Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	HFPO Dimer Acid	9900 J
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorobutane Sulfonic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorodecanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorododecanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluoroheptanoic Acid	4.6
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorohexane Sulfonic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorohexanoic Acid	7.4
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorononanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluoropentanoic Acid	350
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorotetradecanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluorotridecanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	Perfluoroundecanoic Acid	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	PFOA	<2.0
BCA-01	FAY-GWNEW-BCA-01	12/07/2017	PFOS	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	HFPO Dimer Acid	9900
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorobutane Sulfonic Acid	4
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorodecanoic Acid	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorododecanoic Acid	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluoroheptanoic Acid	39
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorohexane Sulfonic Acid	5.3
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorohexanoic Acid	24
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorononanoic Acid	10
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluoropentanoic Acid	150
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorotetradecanoic Acid	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluorotridecanoic Acid	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	Perfluoroundecanoic Acid	<2.0
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	PFOA	25
BCA-02	FAY-GWNEW-BCA-02	12/11/2017	PFOS	3.7
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	HFPO Dimer Acid	9700
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorobutane Sulfonic Acid	2
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorodecanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorododecanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluoroheptanoic Acid	71
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorohexane Sulfonic Acid	2.4
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorohexanoic Acid	27
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorononanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluoropentanoic Acid	410
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorotetradecanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluorotridecanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	Perfluoroundecanoic Acid	<2.0
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	PFOA	11
BCA-03	FAY-GWNEW-BCA-03	12/11/2017	PFOS	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	HFPO Dimer Acid	<130
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorobutane Sulfonic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorodecanoic Acid	<2.0

TABLE 6a
Black Creek Aquifer PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorododecanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluoroheptanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorohexane Sulfonic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorohexanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorononanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluoropentanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorotetradecanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluorotridecanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	Perfluoroundecanoic Acid	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	PFOA	<2.0
BCA-04	FAY-GWNEW-BCA-04	12/07/2017	PFOS	<2.0

Notes: ng/L = nanograms per liter
J = estimated value
< = less than indicated reporting limit
detections are highlighted

TABLE 6b
Black Creek Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFECA-A	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFECA-F	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFECA-G	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFESA_BP1	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFESA_BP2	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFMOAA	57,690
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFO2HxA	17,953
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFO3OA	2,151
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFO4DA	<200
BCA-01	FAY-GWNEW-BCA-01-1	12/07/2017	PFO5DA	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFECA-A	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFECA-F	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFECA-G	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFESA_BP1	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFESA_BP2	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFMOAA	57,926
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFO2HxA	18,410
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFO3OA	2,076
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFO4DA	<200
BCA-01	FAY-GWNEW-BCA-01-2	12/07/2017	PFO5DA	<200
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFECA-A	<200
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFECA-F	<200
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFECA-G	<200
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFESA_BP1	<200
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFESA_BP2	341
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFMOAA	116,720
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFO2HxA	33,345
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFO3OA	9,156
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFO4DA	3,116
BCA-02	FAY-GWNEW-BCA-02-1	12/11/2017	PFO5DA	794
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFECA-A	<200
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFECA-F	<200
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFECA-G	<200
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFESA_BP1	<200
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFESA_BP2	399
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFMOAA	116,184
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFO2HxA	33,288
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFO3OA	9,919
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFO4DA	3,322
BCA-02	FAY-GWNEW-BCA-02-2	12/11/2017	PFO5DA	736
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFECA-A	<200
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFECA-F	<200
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFECA-G	<200
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFESA_BP1	<200

TABLE 6b
Black Creek Aquifer PFAS - List 2 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFESA_BP2	<200
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFMOAA	217,775
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFO2HxA	77,665
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFO3OA	17,715
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFO4DA	2,934
BCA-03	FAY-GWNEW-BCA-03-1	12/11/2017	PFO5DA	<200
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFECA-A	<200
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFECA-F	<200
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFECA-G	<200
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFESA_BP1	<200
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFESA_BP2	217
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFMOAA	193,420
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFO2HxA	73,870
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFO3OA	17,104
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFO4DA	2,816
BCA-03	FAY-GWNEW-BCA-03-2	12/11/2017	PFO5DA	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFECA-A	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFECA-F	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFECA-G	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFESA_BP1	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFESA_BP2	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFMOAA	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFO2HxA	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFO3OA	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFO4DA	<200
BCA-04	FAY-GWNEW-BCA-04-1	12/07/2017	PFO5DA	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFECA-A	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFECA-F	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFECA-G	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFESA_BP1	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFESA_BP2	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFMOAA	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFO2HxA	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFO3OA	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFO4DA	<200
BCA-04	FAY-GWNEW-BCA-04-2	12/07/2017	PFO5DA	<200

Notes: ng/L = nanograms per liter
< = less than indicated reporting limit
-D = duplicate sample
-1 & -2 = replicate samples analyzed
detections are highlighted

TABLE 7a
State Wells PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Screened Hydrogeologic Unit
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	HFPO Dimer Acid	<10	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorodecanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorododecanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluoroheptanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorohexanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorononanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluoropentanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorotetradecanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluorotridecanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	Perfluoroundecanoic Acid	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	PFOA	<2.0	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1	11/27/2017	PFOS	<2.0	Black Creek Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	HFPO Dimer Acid	970	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorodecanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorododecanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluoroheptanoic Acid	5.9	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorohexanoic Acid	8.8	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorononanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluoropentanoic Acid	22	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorotetradecanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluorotridecanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	Perfluoroundecanoic Acid	<2.0	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	PFOA	6.3	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2	11/27/2017	PFOS	<2.0	Surficial Aquifer (shallow)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	HFPO Dimer Acid	<10	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Black Creek Aquifer (deep)

TABLE 7a
State Wells PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Screened Hydrogeologic Unit
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorodecanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorododecanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluoroheptanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorohexanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorononanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluoropentanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorotetradecanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluorotridecanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	Perfluoroundecanoic Acid	<2.0	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	PFOA	2.3	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3	11/27/2017	PFOS	<2.0	Black Creek Aquifer (deep)
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	HFPO Dimer Acid	<10	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorodecanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorododecanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluoroheptanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorohexanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorononanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluoropentanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorotetradecanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluorotridecanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	Perfluoroundecanoic Acid	<2.0	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	PFOA	12	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4	11/29/2017	PFOS	<2.0	Upper Cape Fear Confining Unit
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	HFPO Dimer Acid	<10	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorodecanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorododecanoic Acid	<2.0	Upper Cape Fear Aquifer

TABLE 7a
State Wells PFAS - List 1 Concentrations
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Screened Hydrogeologic Unit
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluoroheptanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorohexanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorononanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluoropentanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorotetradecanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluorotridecanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	Perfluoroundecanoic Acid	<2.0	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	PFOA	29	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5	11/28/2017	PFOS	<2.0	Upper Cape Fear Aquifer
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	HFPO Dimer Acid	<10	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorodecanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorododecanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluoroheptanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorohexanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorononanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluoropentanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorotetradecanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluorotridecanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	Perfluoroundecanoic Acid	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	PFOA	<2.0	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6	11/27/2017	PFOS	<2.0	Surficial Aquifer (deep)

Notes: ng/L = nanograms per liter
J = estimated value
< = less than indicated reporting limit
detections are highlighted

TABLE 7b

State Wells PFAS - List 2 Concentrations

Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Aquifer
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFECA-G	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFECA-F	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFO2HxA	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFO3OA	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFO4DA	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFO5DA	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFESA_BP1	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFMOAA	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFESA_BP2	<200	Black Creek Aquifer (shallow)
DMS-42V1	FAY-GWNEW-DMS-42V1-1	11/27/2017	PFECA-A	<200	Black Creek Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFECA-G	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFECA-F	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFO3OA	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFO4DA	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFO5DA	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFESA_BP1	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFESA_BP2	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFECA-A	<200	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFO2HxA	850	Surficial Aquifer (shallow)
DMS-42V2	FAY-GWNEW-DMS-42V2-1	11/27/2017	PFMOAA	312	Surficial Aquifer (shallow)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFECA-G	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFECA-F	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFO2HxA	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFO3OA	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFO4DA	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFO5DA	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFESA_BP1	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFMOAA	<200	Black Creek Aquifer (deep)
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFESA_BP2	<200	Black Creek Aquifer (deep)

TABLE 7b
State Wells PFAS - List 2 Concentrations
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Chemours Fayetteville Works
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Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Aquifer
DMS-42V3	FAY-GWNEW-DMS-42V3-1	11/27/2017	PFECA-A	<200	Black Creek Aquifer (deep)
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFECA-G	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFECA-F	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFO2HxA	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFO3OA	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFO4DA	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFO5DA	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFESA_BP1	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFMOAA	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFESA_BP2	<200	Upper Cape Fear Confining Unit
DMS-42V4	FAY-GWNEW-DMS-42V4-1	11/29/2017	PFECA-A	<200	Upper Cape Fear Confining Unit
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFECA-G	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFECA-F	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFO2HxA	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFO3OA	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFO4DA	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFO5DA	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFESA_BP1	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFMOAA	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFESA_BP2	<200	Upper Cape Fear Aquifer
DMS-42V5	FAY-GWNEW-DMS-42V5-1	11/28/2017	PFECA-A	<200	Upper Cape Fear Aquifer
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFECA-G	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFECA-F	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFO2HxA	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFO3OA	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFO4DA	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFO5DA	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFESA_BP1	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFMOAA	<200	Surficial Aquifer (deep)

TABLE 7b

State Wells PFAS - List 2 Concentrations

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Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Date	Parameter Name	Result (ng/L)	Aquifer
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFESA_BP2	<200	Surficial Aquifer (deep)
DMS-42V6	FAY-GWNEW-DMS-42V6-1	11/27/2017	PFECA-A	<200	Surficial Aquifer (deep)

Notes: ng/L = nanograms per liter
< = less than indicated reporting limit
-D = duplicate sample
-1 & -2 = replicate samples analyzed
detections are highlighted

TABLE 8a
Soil Leachate PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	26
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	PFOA	<2.0
SB-01	FAY-SSASI-SB-01(0-.5)	0.0 - 0.5	11/27/2017	PFOS	2.1
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	HFPO Dimer Acid	14
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorodecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorododecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroheptanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorononanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoropentanoic Acid	<2.0

TABLE 8a
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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotetradecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotridecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroundecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	PFOA	2.2
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	PFOS	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	HFPO Dimer Acid	<10
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorodecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorododecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroheptanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorononanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoropentanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotetradecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotridecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroundecanoic Acid	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	PFOA	<2.0
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	PFOS	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	150
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<2.0

TABLE 8a
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SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	2.6
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	4.3
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	15
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	<2.0
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	PFOA	4.9
SB-02	FAY-SSASI-SB-02	0.0 - 0.5	11/27/2017	PFOS	36
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	150
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	2.4
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	3.2
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	5.6
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	16
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	<2.0
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	PFOA	13
SB-03	FAY-SSASI-SB-03	0.0 - 0.5	11/27/2017	PFOS	81
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	1700

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	3.9
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	6.3
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	24
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	12
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<2.0
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	4.9
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	PFOA	3.2
SB-04	FAY-SSASI-SB-04	0.0 - 0.5	11/27/2017	PFOS	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	740
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	9.3
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	PFOA	<2.0
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	PFOS	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	11
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	PFOA	2.5
SB-06	FAY-SSASI-SB-06	0.0 - 0.5	11/28/2017	PFOS	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	15
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	2.5
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	PFOA	6.4
SB-07	FAY-SSASI-SB-07	0.0 - 0.5	11/28/2017	PFOS	6.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	95
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	3.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	3.8
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	PFOA	<2.0
SB-08	FAY-SSASI-SB-08	0.0 - 0.5	11/28/2017	PFOS	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	110
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	4.8
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	PFOA	6.0
SB-09	FAY-SSASI-SB-09(0-.5)	0.0 - 0.5	11/28/2017	PFOS	4.2
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	HFPO Dimer Acid	39
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorodecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorododecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoroheptanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorohexanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorononanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoropentanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorotetradecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorotridecanoic Acid	<2.0

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SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoroundecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	PFOA	7.9
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	PFOS	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	HFPO Dimer Acid	130
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorodecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorododecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoroheptanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorohexanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorononanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoropentanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorotetradecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorotridecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoroundecanoic Acid	<2.0
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	PFOA	4.9
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	PFOS	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	140
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0

TABLE 8a
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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	PFOA	7.0
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	PFOS	2.9
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	210
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	4.8
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	PFOA	8.5
SB-11	FAY-SSASI-SB-11	0.0 - 0.5	11/28/2017	PFOS	2.3
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	80
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	PFOA	16
SB-12	FAY-SSASI-SB-12	0.0 - 0.5	11/28/2017	PFOS	3.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	34
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	PFOA	11
SB-13	FAY-SSASI-SB-13	0.0 - 0.5	11/28/2017	PFOS	3.2
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	33
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<2.0
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	PFOA	10
SB-14	FAY-SSASI-SB-14	0.0 - 0.5	11/28/2017	PFOS	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	380
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	2.4
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	4.5
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	4.3
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	8.7 J
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	3.4
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	230
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	2.6
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	3.9 J
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	4.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	59
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	2.1
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	4.3
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	PFOA	6.0
SB-16	FAY-SSASI-SB-16	0.0 - 0.5	11/29/2017	PFOS	3.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	160
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	2.3
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	PFOA	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-17	FAY-SSASI-SB-17	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	110
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	PFOA	9.8
SB-18	FAY-SSASI-SB-18	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	15
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0

TABLE 8a
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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-19	FAY-SSASI-SB-19	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	93
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	2.7
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	3.5
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	5.8
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	PFOA	13
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	PFOS	3.1
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	35
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	PFOA	4.7
SB-21	FAY-SSASI-SB-21	0.0 - 0.5	11/29/2017	PFOS	3.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	100
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	2.2
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	PFOA	8.3
SB-22	FAY-SSASI-SB-22	0.0 - 0.5	11/29/2017	PFOS	49

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	640 J
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	2.1
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-23	FAY-SSASI-SB-23	0.0 - 0.5	11/29/2017	PFOS	2.2
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	72
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	7.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	PFOA	2.7
SB-24	FAY-SSASI-SB-24	0.0 - 0.5	11/29/2017	PFOS	4.9
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	120
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	2.7
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	2.7
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	PFOA	2.7
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	PFOS	2.4
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	39
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-26	FAY-SSASI-SB-26	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	79
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-27	FAY-SSASI-SB-27	0.0 - 0.5	11/29/2017	PFOS	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	18

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	PFOA	<2.0
SB-28	FAY-SSASI-SB-28	0.0 - 0.5	11/29/2017	PFOS	9.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	73
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	2.7
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	2.1
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<2.0

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Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<2.0
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	PFOA	5.2
SB-29	FAY-SSASI-SB-29	0.0 - 0.5	11/29/2017	PFOS	7.5
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	HFPO Dimer Acid	55
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorodecanoic Acid	3.3
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorododecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluoroheptanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorohexanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorononanoic Acid	4.2
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluoropentanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorotetradecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluorotridecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	Perfluoroundecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	PFOA	<2.0
SB-30	FAY-SSASI-SB-30	0.0 - 0.5	11/30/2017	PFOS	3.4
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	HFPO Dimer Acid	50
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorodecanoic Acid	2.3
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorododecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluoroheptanoic Acid	<2.0

TABLE 8a
Soil Leachate PFAS - List 1 Concentrations
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Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorohexanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorononanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluoropentanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorotetradecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluorotridecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	Perfluoroundecanoic Acid	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	PFOA	<2.0
SB-30	FAY-SSASI-SB-30-D	0.0 - 0.5	11/30/2017	PFOS	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	HFPO Dimer Acid	80
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorodecanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorododecanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluoroheptanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorohexanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorononanoic Acid	3.3
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluoropentanoic Acid	2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorotetradecanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluorotridecanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	Perfluoroundecanoic Acid	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	PFOA	<2.0
SB-31	FAY-SSASI-SB-31	0.0 - 0.5	11/30/2017	PFOS	2.1
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	HFPO Dimer Acid	<10
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20

TABLE 8a
Soil Leachate PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorodecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorododecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoroheptanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorohexanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorononanoic Acid	8.6
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoropentanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorotetradecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorotridecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoroundecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	PFOA	<2.0
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	PFOS	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	HFPO Dimer Acid	11
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorodecanoic Acid	3.8
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorododecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroheptanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorononanoic Acid	2.6
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoropentanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotetradecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotridecanoic Acid	<2.0

TABLE 8a
Soil Leachate PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/L)
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroundecanoic Acid	3.4
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	PFOA	<2.0
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	PFOS	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	HFPO Dimer Acid	30
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<20
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<20
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorobutane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorodecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorododecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroheptanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexane Sulfonic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorononanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoropentanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotetradecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotridecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroundecanoic Acid	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	PFOA	<2.0
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	PFOS	<2.0

Notes: bgs = below ground surface
ng/L = nanograms per liter
J = estimated value
< = less than indicated reporting limit
detections are highlighted

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	HFPO Dimer Acid	<1300
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorodecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorododecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroheptanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorononanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoropentanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotetradecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotridecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroundecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	PFOA	<200 J
SB-01	FAY-SSASI-Sb-01(4.5-5)	4.5 - 5.0	12/01/2017	PFOS	<230 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	HFPO Dimer Acid	<1300
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorodecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorododecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroheptanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorononanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoropentanoic Acid	<200 J

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotetradecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotridecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroundecanoic Acid	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	PFOA	<200 J
SB-01	FAY-SSASI-Sb-01(9.5-10)	9.5 - 10.0	12/01/2017	PFOS	<210 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	HFPO Dimer Acid	39,000 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorodecanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorododecanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoroheptanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorohexanoic Acid	310 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorononanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoropentanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorotetradecanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluorotridecanoic Acid	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	Perfluoroundecanoic Acid	420 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	PFOA	<200 J
SB-05	FAY-SSASI-SB-05	0.0 - 0.5	11/27/2017	PFOS	<220 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	HFPO Dimer Acid	<1300
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorodecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorododecanoic Acid	<200 J

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoroheptanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorohexanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorononanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoropentanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorotetradecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluorotridecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	Perfluoroundecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	PFOA	230 J
SB-09	FAY-SSASI-SB-09(4.5-5)	4.5 - 5.0	11/30/2017	PFOS	<250 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	HFPO Dimer Acid	28,000
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorodecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorododecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoroheptanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorohexanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorononanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoropentanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorotetradecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluorotridecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	Perfluoroundecanoic Acid	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	PFOA	<200 J
SB-09	FAY-SSASI-SB-09(9.5-10)	9.5 - 10.0	11/30/2017	PFOS	<220 J
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	HFPO Dimer Acid	5600

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorobutane Sulfonic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorodecanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorododecanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoroheptanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorohexane Sulfonic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorohexanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorononanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoropentanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorotetradecanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluorotridecanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	Perfluoroundecanoic Acid	<200
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	PFOA	520
SB-10	FAY-SSASI-SB-10	0.0 - 0.5	11/28/2017	PFOS	230
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	20,000
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	220
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	600
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<200

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	210
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	620
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	PFOA	<200
SB-15	FAY-SSASI-SB-15	0.0 - 0.5	11/29/2017	PFOS	<210
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	18,000
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	320
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	490
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	360
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	1000
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	PFOA	<200
SB-15	FAY-SSASI-SB-15-D	0.0 - 0.5	11/29/2017	PFOS	<210
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	1500
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Hfpo Dimer Acid (trial)	1500
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<200

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	800 J
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<200
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	PFOA	670 J
SB-20	FAY-SSASI-SB-20	0.0 - 0.5	11/29/2017	PFOS	390 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	HFPO Dimer Acid	3100
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorobutane Sulfonic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorodecanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorododecanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoroheptanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorohexane Sulfonic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorohexanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorononanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoropentanoic Acid	200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorotetradecanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluorotridecanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	Perfluoroundecanoic Acid	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	PFOA	<200 J
SB-25	FAY-SSASI-SB-25	0.0 - 0.5	11/29/2017	PFOS	<220 J
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	HFPO Dimer Acid	<1300

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorobutane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorodecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorododecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoroheptanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorohexane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorohexanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorononanoic Acid	230
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoropentanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorotetradecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluorotridecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	Perfluoroundecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	PFOA	<200
SB-32	FAY-SSASI-Sb-32(0.0-0.5)	0.0 - 0.5	12/01/2017	PFOS	<230
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	HFPO Dimer Acid	<1300
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorobutane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorodecanoic Acid	210 J
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorododecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroheptanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorohexanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorononanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoropentanoic Acid	200 J
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotetradecanoic Acid	<200

TABLE 9
Soil Total PFAS - List 1 Concentrations
Additional Site Investigation Report
Chemours Fayetteville Works
Fayetteville, North Carolina

Location ID	Field Sample ID	Sample Depth Interval (feet bgs)	Sample Date	Parameter Name	Result (ng/kg)
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluorotridecanoic Acid	260 J
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	Perfluoroundecanoic Acid	570 J
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	PFOA	<200
SB-32	FAY-SSASI-Sb-32(4.5-5)	4.5 - 5.0	12/01/2017	PFOS	230 J
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	HFPO Dimer Acid	<1300
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	N-ethyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	N-methyl perfluorooctane sulfonamidoacetic acid	<2000
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorobutane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorodecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorododecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroheptanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexane Sulfonic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorohexanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorononanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoropentanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotetradecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluorotridecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	Perfluoroundecanoic Acid	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	PFOA	<200
SB-32	FAY-SSASI-Sb-32(9.5-10)	9.5 - 10.0	12/01/2017	PFOS	<250

Notes: bgs = below ground surface
ng/kg = nanograms per kilogram
J = estimated value
< = less than indicated reporting limit
detections are highlighted

APPENDIX A
LABORATORY ANALYTICAL REPORTS
(PROVIDED ELECTRONICALLY ON ATTACHED CD)

APPENDIX B
BORING LOGS

APPENDIX C
HYDROGEOLOGIC TESTING ANALYSIS REPORTS

To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Thur 6/22/2017 1:47:23 PM
Subject: RE: Discussion for sampling and analysis in Wilmington

Mark, can you tell me about the requirement related to the QAPP? Is this something that needs to be "customized" for the particular project or is it a copy of our standard sampling procedure? Does EPA need a copy of the QAPP before testing begins? Etc...

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:24 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Okay. My cell is Personal Phone / Ex. 6 if you have any issues. I get in at 7 AM. Can we shoot for 9 AM in case I do not get finished prepping today.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 9:21 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I would like to come as early as possible in order to get the kits to Fayetteville. Perhaps before lunch if possible.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:16 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

I am working to get this done today. Let me know when you will be available to come and get sample container tomorrow.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 8:25 AM

To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Thanks for the reply, Mark.

I received word from the Wilmington RO and it looks like they will need 16 bottles to finish out their projected sampling. I haven't heard from the Fayetteville office, but based on what we've received from then for the first sampling event, I would think they need approximately 12 bottles to finish up. This is all based on the sampling being done this week.

Given the tight time frame for next week's sampling, we will probably need to drive the sample kits down to Fayetteville tomorrow afternoon if possible. I would also like to deliver the first set to you if we receive Wilmington's set in time. Either way, if there is any way we can have the sample kits ready tomorrow I would have time to get them to the samplers.

Thanks once again for your help on this project.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 6:50 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

One change Chris. I had wishful thinking. I am actually working on Friday and am not off. I will be here.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 4:39 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I will find out the number. Let me contact the regional folks. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 4:09 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I am off Friday but we could have them prepared for your visit to pick up. How many sample bottles do you need? We typically replicate sample 10% of the samples and have a trip blank and a high and low trip spike as well.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]

Sent: Wednesday, June 21, 2017 1:53 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

It may be better if you could supply this material. Based on our conversation, the 1L bottles are preferable and we don't carry that size. Can we pick them up when we bring the first delivery? We may be able to get over there on Friday if that works with your schedules.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 1:50 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

We could provide sample bottles if they are needed. In addition we have always included trip blanks and spikes with our assays for QA/QC purposes. We should strongly consider doing so in any future sampling efforts.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 11:45 AM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Good morning. Wondering if you could clarify a question from the conference call yesterday. Will your laboratory be providing sample bottles and preservative for future sampling events? Also, I see from your 2009 SOP that blanks and spikes were mandated for the coolers. If you require those, will they be provided? We aren't able to make the spikes since they can't be confirmed by analysis.

Thanks for your help.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, June 21, 2017 8:04 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

Great.

Please let me know if I can help in any way as we proceed with this project.

We're very grateful for your help with coordinating this effort.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, June 20, 2017 3:39 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Received. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Tuesday, June 20, 2017 2:57 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Jones, Nick <nick.jones@ncdenr.gov>; Perez, Helen I <helen.perez@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

All,

I've attached a copy of the field collection protocol that we have been using for PFAS compounds including GenX.

The shipping address and storage conditions are specified on page 6.

Please let us know if you have any questions.

Thank you very much,

Andy

-----Original Appointment-----
From: Buckley, Timothy
Sent: Tuesday, June 20, 2017 1:20 PM
To: chris.johnson@ncdenr.gov; Allenbach, Becky; Strynar, Mark; Medina-Vera, Myriam; cyndi.karoly@ncdenr.gov; linda.culpepper@ncdenr.gov
Cc: Lindstrom, Andrew; Jones, Nick; Perez, Helen I; Satterwhite, Dana
Subject: Discussion for sampling and analysis in Wilmington
When: Tuesday, June 20, 2017 2:00 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Teleconference: Call in: **Personal Phone / Ex. 6**

Thank you all for making time for this discussion. I know that there is a lot of pressure to move quickly on this project. ORD/NERL is happy to provide analytical support. To guide our involvement/effort, I am hoping that collectively we can provide answers to the following questions.

1. What question are we attempting to address with this sampling effort?
2. What is the sampling design?
3. What is the status and timeline of the QAPP?
4. Given split sample analysis (contract lab and NERL lab), how will differences in reported concentrations be managed?
5. What is the plan for communicating results and who has the lead?
6. What is the project timeline?
7. Do we need on-going coordination meetings?

To: Johnson, Chris[chris.johnson@ncdenr.gov]
Cc: bob.pullano@gel.com[bob.pullano@gel.com]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Mrkt@gel.com[Mrkt@gel.com]
From: Bob Pullano
Sent: Thur 8/31/2017 7:19:49 PM
Subject: Re: FW: QC Samples

Hello Chris,

I have passed on this information to our Marketing Group who will provide a quote for your review and approval. They should have it completed tomorrow morning.

We look forward to working with you!

Please don't hesitate to contact me with any questions.

-Bob

On 8/31/2017 12:02 PM, Johnson, Chris wrote:

Good afternoon, Bob. Thanks for talking to me about GEL and the GenX vetting samples. Attached and below, you will find the information that was provided to the other contract laboratories regarding this QC testing. I have the set of samples ready to ship once you confirm GEL's interest and shipping instructions. If you decide to proceed, we would also need details regarding sample pricing and turn-around times. Please let me know if you have additional questions.

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908 ext224

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Friday, August 18, 2017 6:24 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Here are the ten PFAS found in the Wellington PFAC MXA standard solution mixture.

Mark

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 17, 2017 3:18 PM
To: Johnson, Chris;
Cc: Culpepper, Linda; Huffman, Gregson, Jim
Subject: RE: QC Samples

Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

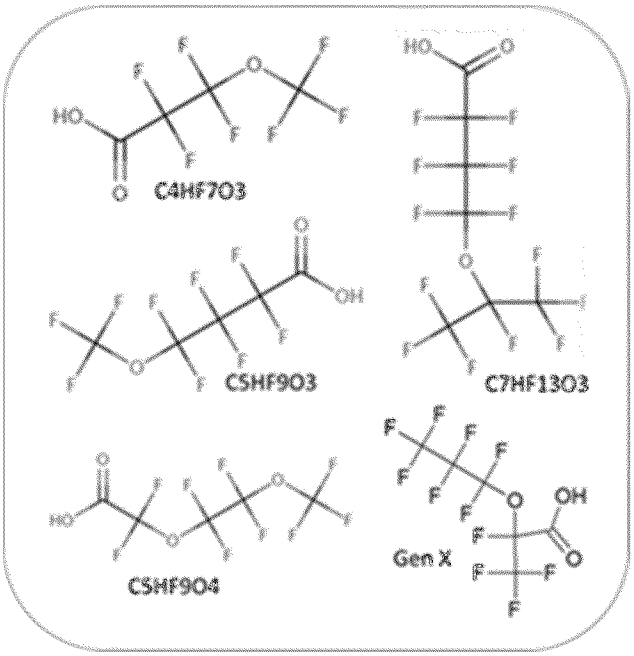
Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 3:01 PM

I provided a list of associated compounds below.

Here is the original list of what was being spiked into our earlier QC samples. The EPA laboratory has been extracting all these compounds by the same technique I believe. If not, Mark can correct me. These new samples should be similar:



Chris Johnson
NC DEQ-DWR
Water Sciences Section

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--

Bob Pullano
Director, Quality Systems
2040 Savage Road, Charleston, SC 29407 | PO Box 30712, Charleston, SC 29417
Office Main: 843.556.8171 Ext. 4429 | Fax: 843.766.1178
E-Mail: rlp@gel.com | Website: www.gel.com
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To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Tue 11/7/2017 3:18:04 PM
Subject: RE: [External] monofluoro-malonate
SGS results.xlsx

Most recently updated SGS spreadsheet is attached. The lab had some QC issues while processing the older samples. Mainly surrogate and spike recovery problems. They told me that their extraction process had been problematic, not related to the samples themselves.

I don't have access to any results around the time of the shutdown yet. If I run across any data I will pass to you. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Tuesday, November 07, 2017 10:11 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: [External] monofluoro-malonate

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I am happy to look at any data you get form SGS. I am still wondering if anyone else sees an uptick in the GenX in samples around the shutdown time also (Mid October). In particular Chemours 002 or the Brunswick County water.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, November 07, 2017 9:04 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: [External] monofluoro-malonate

This is very interesting. Thanks, Mark. I'm a little envious at your equipment and the detective work you get to do.

We have updated results from SGS for August and September samples. Are you interested in seeing those.

Thank you and your staff again for helping us keep the Cape Fear a little cleaner.

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Tuesday, November 07, 2017 8:29 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; McCord, James <mccord.james@epa.gov>; Detlef R. U. Knappe <knappe@ncsu.edu>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Lang, Johnsie <lang.johnsie@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: [External] monofluoro-malonate

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to report.spam@nc.gov.

All,

1)I took a very small set of samples to check for the presence of mono-fluoro malonate in the waters at or near Chemours. See the structure below:

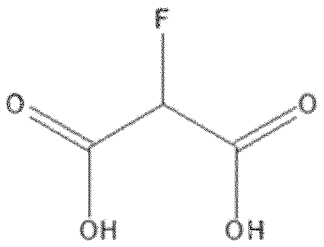
Samples used
Laboratory blank
NCDEQ Chemours outfall 002 Week#1 (around mid June)
NCDEQ Chemours outfall 002 pre shutdown (Around mid October)
Chemours onsite monitoring well LTW03

From my assessment I see NO evidence of the singly charged (m/z 120.9943) or doubly charged ion (m/z 59.9935) of the mono-fluoro malonate at all in these samples. I expect if it were a contaminant it should be in one of the three samples I have chosen. We usually do not go below 100 m/z as the mass accuracy becomes increasingly poor. Thus I reran these three extracts so I can look for the doubly charged ion and re-calibrated down to m/z 50.

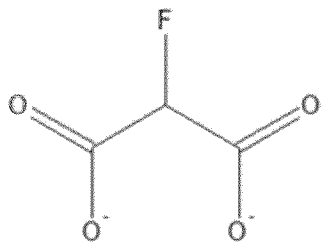
2) I then looked at every sample we have run on the TOFMS that was collected as part of the NCDEQ efforts and screened only for the singly charged ion (m/z 120.9943) as I cannot look at data below 100 m/z for the samples we have already run for the doubly charged ion. I again saw NO evidence in any sample of the mono-fluoro malonate presence.

My opinion would be this is a non-issue after this assessment.

Mark



Molecular Formula: $C_3H_3FO_4$
Monoisotopic Mass: 122.001537 Da
[M-H]-: m/z 120.99426 Da



Monoisotopic Mass: 119.986984 Da
M-2H]-2: m/z 59.9935

Dr. Mark J. Strynar
Physical Scientist
US EPA
National Exposure Research Laboratory
919-541-3706
Strynar.mark@epa.gov

SGS Results (ppt)

		8/14/2017	8/15/2017	8/18/2017	8/19/2017	8/20/2017	8/21/2017	8/22/2017	8/23/2017	8/25/2017	8/26/2017	8/27/2017	8/28/2017	8/29/2017	10/2/2017	10/5/2017	10/6/2017	Date	Date	Date	Date
Chemours Outfall 002	PFBA	8.29	7.90	9.30	8.35	10.1	9.23	11.2	12.4	13.3	12.2	pending	pending	16.0	15.8	14.3					
	PFPeA	29.9	41.3	39.1	37.1	35.6	40.2	42.8	45.1	44.1	40.9	pending	pending	50.8	50.5	48.0					
	PFHxA	22.8	28.0	35.5	41.7	43.9	49.0	52.7	59.8	55.2	57.2	pending	pending	60.0	58.5	56.1					
	PFHpA	20.5	19.7	22.7	27.4	26.2	31.4	33.7	34.1	36.2	37.7	pending	pending	38.0	38.1	36.8					
	PFOA	18.2	12.2	15.2	19.8	17.9	18.9	19.8	21.0	22.2	22.7	pending	pending	24.2	23.8	23.0					
	PFNA	5.15	3.22	3.78	3.88	4.10	4.25	4.40	5.46	5.82	5.98	pending	pending	5.90	5.78	5.84					
	PFDA	2.12	1.87	2.36	2.59	2.54	2.54	2.60	3.42	4.00	4.07	pending	pending	4.75	4.64	5.35					
	PFBS	5.99	4.19	4.90	5.21	4.72	4.85	5.37	4.67	5.18	5.06	pending	pending	4.36	4.51	4.50					
	PFHxS	6.75	6.22	8.00	9.47	8.62	7.98	8.44	7.07	8.27	8.08	pending	pending	9.69	9.88	9.58					
	PFOS	10.8	9.80	14.4	16.3	14.3	14.3	15.6	16.5	17.0	15.1	pending	pending	1.29	1.23	1.73					
	GenX	69.1	90.7	46.5	59.1	40.8	85.4	68.4	20.8	39.4	50.0	41.8	#VALUE!	35.0	3.28	3.29					
	PFOA+PFOS	24.8	22	29.6	33.1	32.2	30.8	32.4	37.5	39.2	37.8	#VALUE!	#VALUE!	37.1	36.1	36.3	0	0	0	0	

Result (ppt)

		8/18/2017	8/25/2017	10/2/2017	Date	Date	Date
Bladen Bluffs MW	PFBA	0.845 (J)	1.07 (J)	0.963 (J)			
	PFPeA	1.82 (J)	2.06	2.04 (J)			
	PFHxA	1.45 (J)	1.99	2.52			
	PFHpA	0.947 (J)	1.25 (J)	1.48 (J)			
	PFOA	0.708 (J)	0.808 (J)	3.09			
	PFNA	ND	ND	0.215 (J)			
	PFDA	ND	ND	ND			
	PFBS	0.218 (J)	0.217 (J)	ND			
	PFHxS	0.243 (J)	0.260 (J)	0.270 (J)			
	PFOS	0.420 (J)	0.482 (J)	0.351 (J)			
	GenX	ND	ND	ND			
	PFOA+PFOS	1.128 (J)	1.288 (J)	3.441 (J)			

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Int'l Paper	PFBA	10.2	9.22	8.87	9.72		
	PFPeA	16.4	15.8	16.7	19.3		
	PFHxA	18.1	13.0	15.2	16.7		
	PFHpA	7.70	6.16	7.35	8.38		
	PFOA	3.65	2.97	3.74	5.50		
	PFNA	0.591 (J)	0.528 (J)	0.551 (J)	0.556 (J)		
	PFDA	0.226 (J)	0.228 (J)	0.248 (J)	0.267 (J)		
	PFBS	1.88 (J)	1.73 (J)	2.04	1.58 (J)		
	PFHxS	1.73 (J)	1.39 (J)	1.82 (J)	1.48 (J)		
	PFOS	1.44 (J)	1.21 (J)	1.40 (J)	1.13 (J)		
	GenX	50.2	38.6	39.3	50.6		
	PFOA+PFOS	5.26 (J)	4.18 (J)	5.14 (J)	6.63 (J)		

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
CFPUA	PFBA	12.8	8.38	7.77	14.1		
	PFPeA	38.1	38.8	38.4	37.7		
	PFHxA	39.3	38.1	24.7	37.9		
	PFHpA	22.8	16.4	16.4	26.2		
	PFOA	15.1	10.1	12.1	17.1		
	PFNA	4.27	3.55	3.86	4.28		
	PFDA	3.00	2.59	2.68	3.52		
	PFBS	5.57	4.54	4.90	4.54		
	PFHxS	7.91	6.28	7.27	7.30		
	PFOS	17.2	17.2	14.5	14.3		
	GenX	55.2	59.1	28.9	47.7		
	PFOA+PFOS	32.3	27.4	26.6	31.4	0	0

Result (ppt)

		8/18/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Fender County	PFBA	12.2	10.8	10.1	11.5		
	PFPeA	25.0	21.2	21.7	29.3		
	PFHxA	19.8	16.1	15.3	18.7		
	PFHpA	8.49	6.52	8.50	8.77		
	PFOA	3.82	2.74	3.87	5.88		
	PFNA	0.422 (J)	0.391 (J)	0.381 (J)	0.474 (J)		
	PFDA	ND	ND	ND	ND		
	PFBS	2.27	1.87 (J)	2.04	1.78 (J)		
	PFHxS	1.82 (J)	1.24 (J)	1.53 (J)	1.37 (J)		
	PFOS	0.944 (J)	1.02 (J)	0.977 (J)	0.898 (J)		
	GenX	60.6	81.0	42.4	85.2		
	PFOA+PFOS	4.76 (J)	3.76 (J)	3.85 (J)	6.58 (J)		

Result (ppt)

		8/14/2017	8/21/2017	8/28/2017	10/5/2017	Date	Date
Brunswick County MW	PFBA	8.98	7.55	9.60	10.6		
	PFPeA	32.1	25.7	19.6	33.1		
	PFHxA	38.1	29.8	22.1	39.7		
	PFHpA	20.0	14.7	13.5	24.6		
	PFOA	13.0	7.96	8.16	16.7		
	PFNA	2.87	1.97 (J)	1.83 (J)	2.97		
	PFDA	1.48 (J)	0.987 (J)	1.50 (J)	2.15		
	PFBS	3.26	3.18	3.17	3.09		
	PFHxS	4.51	4.14	4.69	4.79		
	PFOS	7.78	5.98	7.78	9.38		
	GenX	33.1	25.0	24.3	32.7		
	PFOA+PFOS	20.8	13.9	15.9	26.1	0.0	0.0

Batch Specific Analytical Comments:

Sample Specific QC Comments are noted in the "Additional Results" tab below

I - Estimated (below RL) / ND - Not Detected

Sample comments 8/14/17 - 8/22/17

PFOA recovered below LOQ in Method Blank

PFBA recovered below acceptance level in Matrix Spike

PFOS, 8:2 FTS recovered above acceptance level in Matrix Spike

1 of 5 surrogates recovered below acceptance levels in Matrix Spike

1 of 5 surrogates recovered below acceptance levels in Sample Duplicate

GenX surrogate recovered below acceptance levels in Sample Duplicate

Sample comments 8/25/17 - 8/28/17

PFBA recovered below acceptance level in Matrix Spike

GenX surrogate recovered below acceptance levels in Blank Spike

GenX surrogate recovered below acceptance levels in Method Blank

Sample comments 8/28/17 - 9/28/17

GenX surrogate recovered below acceptance levels in Blank Spike

Sample comments 10/2/17 - 10/5/17

PFuHS, PFDoS, PFTeA recovered above acceptance level in LCS

PFBS recovered below acceptance level in LCS

1 of 5 surrogates recovered below acceptance levels in LCS

GenX surrogate recovered below acceptance levels in LCS and MS

GenX RPD above acceptance levels in Sample Duplicate

Result (ppt)

		9/14/2017	9/15/2017	9/18/2017	9/19/2017	9/20/2017	9/21/2017	
Chemours Outfall 002	PFuNA	0.346 (J)	0.233 (J)	0.425 (J)	0.419 (J)	0.386 (J)	0.201 (J)	**Sample Specific**
	PFDoA	ND	ND	ND	ND	ND	ND	9/18/2017: 1 of 3
	PFTriA	ND	ND	ND	ND	ND	ND	9/19/2017: 1 of 3
	PFTreA	ND	ND	ND	ND	ND	ND	9/20/2017: 1 of 3
	PFDS	ND	ND	ND	ND	ND	ND	9/21/2017: 2 of 3
	NMeFOSAA	ND	ND	ND	ND	ND	ND	
	NetFOSAA	ND	ND	ND	ND	ND	ND	
	6:2 FTS	1.78 (J)	1.61 (J)	2.60	2.33	1.77 (J)	1.33 (J)	
	8:2 FTS	ND	ND	ND	ND	ND	ND	

Result (ppt)

		9/22/2017	9/25/2017	9/26/2017	9/27/2017	9/28/2017	9/29/2017	
Chemours Outfall 002	PFuNA	0.264 (J)	0.256 (J)	0.402 (J)	0.478 (J)	pending	pending	**Sample Specific**
	PFDoA	ND	ND	ND	ND	pending	pending	9/22/2017: 1 of 3
	PFTriA	ND	ND	ND	ND	pending	pending	9/25/2017: 1 of 3
	PFTreA	ND	ND	ND	ND	pending	pending	9/26/2017: 1 of 3
	PFDS	ND	ND	ND	ND	pending	pending	9/27/2017: 1 of 3
	NMeFOSAA	ND	ND	ND	ND	pending	pending	
	NetFOSAA	ND	ND	ND	ND	pending	pending	
	6:2 FTS	1.52 (J)	0.990 (J)	1.70 (J)	1.31 (J)	pending	pending	
	8:2 FTS	ND	ND	ND	ND	pending	pending	

Result (ppt)

		10/2/2017	10/3/2017	10/4/2017	Date	Date	Date	
Chemours Outfall 002	PFuNA	0.606 (J)	0.643 (J)	0.698 (J)				**Sample Specific**
	PFDoA	ND	ND	ND				10/3/2017: 1 of 3
	PFTriA	ND	ND	ND				
	PFTreA	ND	ND	ND				
	PFDS	ND	ND	ND				
	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	1.29 (J)	1.24 (J)	1.02 (J)				
	8:2 FTS	ND	ND	ND				

Result (ppt)

		9/18/2017	9/25/2017	10/2/2017	Date	Date	Date	
Bladen Bluffs FW	PFuNA	ND	ND	ND				**Sample Specific**
	PFDoA	ND	ND	ND				9/18/2017: 1 of 3
	PFTriA	ND	ND	ND				9/25/2017: GenX
	PFTreA	ND	ND	ND				10/2/2017: GenX
	PFDS	ND	ND	ND				
	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	ND	ND	0.682 (J)				
	8:2 FTS	ND	ND	ND				

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
Int'l Paper	PFuNA	ND	ND	ND	ND			**Sample Specific**
	PFDoA	ND	ND	ND	ND			9/21/2017: 2 of 3
	PFTriA	ND	ND	ND	ND			10/5/2017: GenX
	PFTreA	ND	0.812 (J)	ND	ND			
	PFDS	ND	ND	ND	ND			
	NMeFOSAA	ND	ND	ND	ND			
	NetFOSAA	ND	ND	ND	ND			
	6:2 FTS	ND	ND	ND	0.622 (J)			
	8:2 FTS	ND	ND	ND	ND			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
CFPUA	PFuNA	0.538 (J)	0.627 (J)	0.567 (J)	0.829 (J)			**Sample Specific**
	PFDoA	ND	ND	ND	ND			9/21/2017: 1 of 3
	PFTriA	ND	ND	ND	ND			10/5/2017: GenX
	PFTreA	ND	ND	ND	ND			
	PFDS	ND	ND	ND	ND			
	NMeFOSAA	ND	ND	ND	ND			
	NetFOSAA	ND	ND	ND	ND			
	6:2 FTS	0.842 (J)	1.00 (J)	1.10 (J)	1.39 (J)			
	8:2 FTS	ND	ND	ND	ND			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	Date	Date	Date	
Pender County	PFuNA	ND	ND	ND				**Sample Specific**
	PFDoA	ND	ND	ND				9/21/2017: 2 of 3
	PFTriA	ND	ND	ND				
	PFTreA	ND	ND	ND				
	PFDS	ND	ND	ND				
	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	0.798 (J)	ND	ND				
	8:2 FTS	ND	ND	ND				

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date	
Brunswick County NW	PFuNA	ND	ND	0.217 (J)				**Sample Specific**
	PFDoA	ND	ND	ND				9/21/2017: 1 of 3
	PFTriA	ND	ND	ND				
	PFTreA	ND	ND	ND				
	PFDS	ND	ND	ND				
	NMeFOSAA	ND	ND	ND				
	NetFOSAA	ND	ND	ND				
	6:2 FTS	0.578 (J)	ND	0.959 (J)				

8:2 FTS	ND	ND	ND			

Batch Specific Analytical Comments:

J : Estimated (below RL) / ND : Not Detected

Sample comments 9/14/17 - 9/22/17

PFOA recovered below LOQ in Method Blank
PFBA recovered below acceptance level in Matrix Spike
PFDS, 6:2 FTS recovered above acceptance level in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Matrix Spike
1 of 3 surrogates recovered below acceptance levels in Sample Duplicate
GenX surrogate recovered below acceptance levels in Sample Duplicate

Sample comments 9/25/17 - 9/28/17

PFBA recovered below acceptance level in Matrix Spike
GenX surrogate recovered below acceptance levels in Blank Spike
GenX surrogate recovered below acceptance levels in Method Blank

Sample comments 9/28/17 - 9/29/17

GenX surrogate recovered below acceptance levels in Blank Spike

Sample comments 10/2/17 - 10/5/17

PFuNA, PFTriA, PFTreA recovered above acceptance level in LCS
PFBS recovered below acceptance level in LCS
1 of 3 surrogates recovered below acceptance levels in LCS
GenX surrogate recovered below acceptance levels in LCS and MS
GenX RPD above acceptance levels in Sample Duplicate

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 2 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels
: GenX surrogate recovered below acceptance levels
: GenX surrogate recovered below acceptance levels

ecific Analytical Comments:

: 2 of 3 surrogates recovered below acceptance levels

: GenX surrogate recovered below acceptance levels

ecific Analytical Comments:

: 1 of 3 surrogates recovered above acceptance levels

: GenX surrogate recovered below acceptance levels

ecific Analytical Comments:

: 2 of 3 surrogates recovered below acceptance levels

ecific Analytical Comments:

: 1 of 3 surrogates recovered below acceptance levels

SGS Result (ppt)

		8/23/2017	8/24/2017	8/25/2017	8/28/2017	8/29/2017	8/30/2017	8/31/2017
Chemours Outfall 002	PFBA	10.1	9.00	8.69	10.9	10.4	12.0	11.0
	PFPeA	24.6	24.9	25.8	30.0	28.7	29.5	32.5
	PFHxA	30.6	29.8	31.1	39.6	39.0	38.9	42.2
	PFHpA	19.5	20.1	20.3	26.3	25.9	24.7	27.2
	PFOA	14.7	16.8	16.0	22.0	21.1	21.9	20.3
	PFNA	3.33	3.98	3.49	4.35	3.99	4.09	4.02
	PFDA	2.11	2.75	2.51	2.97	2.86	2.87	2.33
	PFBS	4.35	4.48	4.70	4.96	4.81	4.23	5.02
	PFHxS	7.88	9.00	9.91	8.41	8.15	6.45	9.41
	PFOS	ND	ND	ND	ND	ND	ND	ND
	GenX	91.0	154	108	64.7	71.8	66.2	51.7
	PFOA+PFOS	14.7	16.8	16.0	22.0	21.1	21.9	20.3

Result (ppt)

		8/28/2017	9/5/2017	9/11/2017			
Bladen Bluffs FW	PFBA	12.2	pending	pending			
	PFPeA	27.0	pending	pending			
	PFHxA	33.6	pending	pending			
	PFHpA	22.1	pending	pending			
	PFOA	15.3	pending	pending			
	PFNA	3.32	pending	pending			
	PFDA	2.57	pending	pending			
	PFBS	4.22	pending	pending			
	PFHxS	5.48	pending	pending			
	PFOS	ND	pending	pending			
	GenX	46.7	ND	ND			
	PFOA+PFOS	15.3					

Result (ppt)

		8/31/2017	9/7/2017				
Int'l Paper	PFBA	8.22	pending				
	PFPeA	10.4	pending				
	PFHxA	8.57	pending				
	PFHpA	3.86	pending				
	PFOA	2.07	pending				
	PFNA	0.276 (J)	pending				
	PFDA	ND	pending				
	PFBS	1.43 (J)	pending				
	PFHxS	1.15 (J)	pending				
	PFOS	0.953 (J)	pending				
	GenX	29.1	37.9				
	PFOA+PFOS	3.02 (J)					

Result (ppt)

		8/31/2017	9/7/2017

CFPUA	PFBA	8.28	pending				
	PFPeA	20.0	pending				
	PFHxA	20.8	pending				
	PFHpA	13.6	pending				
	PFOA	13.0	pending				
	PFNA	4.67	pending				
	PFDA	4.13	pending				
	PFBS	5.05	pending				
	PFHxS	12.0	pending				
	PFOS	ND	pending				
	GenX	38.2	44.0				
	PFOA+PFOS	13.0	#VALUE!				

Result (ppt)

		8/31/2017	9/7/2017				
Pender County	PFBA	12.0	pending				
	PFPeA	18.3	pending				
	PFHxA	13.0	pending				
	PFHpA	4.98	pending				
	PFOA	2.39	pending				
	PFNA	0.317 (J)	pending				
	PFDA	ND	pending				
	PFBS	2.40	pending				
	PFHxS	1.70	pending				
	PFOS	1.04 (J)	pending				
	GenX	39.4	50.5				
	PFOA+PFOS	3.43 (J)					

Result (ppt)

		8/31/2017	9/7/2017				
Brunswick County NW	PFBA	8.34	pending				
	PFPeA	16.3	pending				
	PFHxA	19.7	pending				
	PFHpA	12.1	pending				
	PFOA	7.93	pending				
	PFNA	1.71 (J)	pending				
	PFDA	1.03 (J)	pending				
	PFBS	3.40	pending				
	PFHxS	4.63	pending				
	PFOS	ND	pending				
	GenX	24.0	34.1				
	PFOA+PFOS	7.9	#VALUE!				

Batch Specific Analytical Comments:

Sample Specific QC Comments are noted in the "Additional Results" tab below

J : Estimated (below RL) / ND : Not Detected

Sample comments 8/23/17 - 8/31/17 (GenX)

GenX surrogate recovered below acceptance levels in LCS

Sample comments 8/23/17 - 8/31/17 (PF cpds)

1 of 3 surrogates recovered below acceptance levels in Blank Spike

PFuNA, PFTriA, PFTreA, PFDS recovered above acceptance levels in Blank Spike

PFBA, PFPeA recovered below acceptance levels in Matrix Spike

6:2 FTS, 8:2 FTS recovered above acceptance levels in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Matrix Spike

Sample comments 9/1/17 - 9/13/17 (GenX)

GenX surrogate recovered below acceptance levels in Method Blank

GenX surrogate RPD above acceptance levels in Sample Duplicate

9/1/2017	9/5/2017	9/6/2017	9/7/2017	9/8/2017	9/11/2017	9/12/2017	9/13/2017	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
pending	pending	pending	pending	pending	pending	pending	pending	
163	63.1	179	102	55.8	47.8	310	72.5	
#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	

8/29/2017

Cross Creek WWTP Effluent	PFBA	16.8	
	PFPeA	48.4	
	PFHxA	67.8	
	PFHpA	32.7	
	PFOA	36.3	
	PFNA	5.62	
	PFDA	8.28	
	PFBS	17.6	
	PFHxS	22.7	
	PFOS	ND	
	GenX	ND	
PFOA + PFOS		36.3	

8/29/2017

DAK Americas WWTP Effluent	PFBA	25.8	
	PFPeA	34.3	
	PFHxA	74.1	
	PFHpA	34.5	
	PFOA	30.2	
	PFNA	3.76	
	PFDA	0.993 (J)	
	PFBS	10.6	
	PFHxS	18.8	
	PFOS	ND	
	GenX	23.4	
PFOA + PFOS		30.2	

8/29/2017

Rockfish WWTP Effluent	PFBA	10.3	
	PFPeA	51.8	
	PFHxA	50.5	
	PFHpA	22.8	
	PFOA	24.9	
	PFNA	2.86	
	PFDA	2.73	
	PFBS	8.53	
	PFHxS	10.3	
	PFOS	ND	
	GenX	ND	

PFOA + PFOS 24.9

9/6/2017

Huske L&D	PFBA	pending	
	PFPeA	pending	
	PFHxA	pending	
	PFHpA	pending	
	PFOA	pending	
	PFNA	pending	
	PFDA	pending	
	PFBS	pending	
	PFHxS	pending	
	PFOS	pending	
	GenX	ND	

PFOA + PFOS

Result (ppt)

		8/23/2017	8/24/2017	8/25/2017	8/28/2017	8/29/2017	8/30/2017	
Chemours Outfall 002	PFuNA	0.414 (J)	0.724 (J)	0.515 (J)	0.606 (J)	0.551 (J)	0.641 (J)	**Sample Specific**
	PFDoA	ND	0.248 (J)	ND	ND	ND	ND	8/23/2017: 1 of 3
	PFTriA	ND	0.322 (J)	ND	ND	ND	ND	8/24/2017: GenX
	PFTreA	ND	0.227 (J)	ND	ND	ND	ND	8/24/2017: 1 of 3
	PFDS	ND	ND	ND	ND	ND	ND	8/25/2017: GenX
	NMeFOSAA	ND	ND	ND	ND	ND	ND	8/28/2017: 1 of 3
	NetFOSAA	ND	ND	ND	ND	ND	ND	8/29/2017: 1 of 3
	6:2 FTS	1.85	2.03	2.39	3.37	3.35	3.38	8/30/2017: 1 of 3
	8:2 FTS	ND	ND	ND	ND	ND	ND	

Result (ppt)

		8/31/2017	9/1/2017	9/5/2017	9/6/2017	9/7/2017	9/8/2017	
Chemours Outfall 002	PFuNA	0.279 (J)	pending	pending	pending	pending	pending	**Sample Specific**
	PFDoA	ND	pending	pending	pending	pending	pending	8/31/2017: GenX
	PFTriA	ND	pending	pending	pending	pending	pending	8/31/2017: 1 of 3
	PFTreA	0.883 (J)	pending	pending	pending	pending	pending	9/1/2017: GenX
	PFDS	ND	pending	pending	pending	pending	pending	9/5/2017: GenX
	NMeFOSAA	ND	pending	pending	pending	pending	pending	
	NetFOSAA	ND	pending	pending	pending	pending	pending	
	6:2 FTS	2.99	pending	pending	pending	pending	pending	
	8:2 FTS	ND	pending	pending	pending	pending	pending	

Result (ppt)

		9/11/2017	9/12/2017	9/13/2017	
Chemours Outfall 002	PFuNA	pending	pending	pending	**Sample Specific Analytical Comments:**
	PFDoA	pending	pending	pending	9/13/2017: GenX surrogate recovered below acceptance
	PFTriA	pending	pending	pending	
	PFTreA	pending	pending	pending	
	PFDS	pending	pending	pending	
	NMeFOSAA	pending	pending	pending	
	NetFOSAA	pending	pending	pending	
	6:2 FTS	pending	pending	pending	
	8:2 FTS	pending	pending	pending	

Result (ppt)

		8/28/2017	9/5/2017	9/11/2017	
Bladen Bluffs FW	PFuNA	0.444 (J)	pending	pending	**Sample Specific Analytical Comments:**
	PFDoA	ND	pending	pending	8/28/2017: 1 of 3 surrogates recovered below
	PFTriA	ND	pending	pending	
	PFTreA	1.03 (J)	pending	pending	
	PFDS	ND	pending	pending	
	NMeFOSAA	ND	pending	pending	
	NetFOSAA	ND	pending	pending	
	6:2 FTS	1.72 (J)	pending	pending	
	8:2 FTS	ND	pending	pending	

Result (ppt)

		8/31/2017	9/7/2017		
Int'l Paper	PFuNA	ND	pending		**Sample Specific Analytical Comments:**
	PFDoA	ND	pending		8/31/2017: 1 of 3 surrogates recovered below
	PFTriA	ND	pending		
	PFTreA	ND	pending		
	PFDS	ND	pending		
	NMeFOSAA	ND	pending		
	NetFOSAA	ND	pending		
	6:2 FTS	ND	pending		
	8:2 FTS	ND	pending		

Result (ppt)

		8/31/2017	9/7/2017		
CFPUA	PFuNA	0.956 (J)	pending		**Sample Specific Analytical Comments:**
	PFDoA	ND	pending		8/31/2017: GenX surrogate recovered below acceptance
	PFTriA	ND	pending		8/31/2017: 1 of 3 surrogates recovered below
	PFTreA	ND	pending		
	PFDS	ND	pending		
	NMeFOSAA	ND	pending		
	NetFOSAA	ND	pending		
	6:2 FTS	1.41 (J)	pending		
	8:2 FTS	ND	pending		

Result (ppt)

		8/31/2017	9/7/2017		
Pender County	PFuNA	ND	pending		**Sample Specific Analytical Comments:**
	PFDoA	ND	pending		8/31/2017: 1 of 3 surrogates recovered below
	PFTriA	ND	pending		
	PFTreA	0.419 (J)	pending		
	PFDS	ND	pending		
	NMeFOSAA	ND	pending		
	NetFOSAA	ND	pending		
	6:2 FTS	ND	pending		
	8:2 FTS	ND	pending		

Result (ppt)

		8/31/2017	9/7/2017		
Brunswick County NW	PFuNA	0.213 (J)	pending		**Sample Specific Analytical Comments:**
	PFDoA	ND	pending		8/31/2017: GenX surrogate recovered below acceptance
	PFTriA	ND	pending		
	PFTreA	0.489 (J)	pending		
	PFDS	ND	pending		
	NMeFOSAA	ND	pending		
	NetFOSAA	ND	pending		
	6:2 FTS	0.535 (J)	pending		

8:2 FTS	ND	pending	

Batch Specific Analytical Comments:

J : Estimated (below RL) / ND : Not Detected

Sample comments 8/23/17 - 8/31/17 (GenX)

GenX surrogate recovered below acceptance levels in LCS

Sample comments 8/23/17 - 8/31/17 (PF cpds)

1 of 3 surrogates recovered below acceptance levels in Blank Spike

PFuNA, PFTriA, PFTreA, PFDS recovered above acceptance levels in Blank Spike

PFBA, PFPeA recovered below acceptance levels in Matrix Spike

6:2 FTS, 8:2 FTS recovered above acceptance levels in Matrix Spike

1 of 3 surrogates recovered below acceptance levels in Matrix Spike

Sample comments 9/1/17 - 9/13/17 (GenX)

GenX surrogate recovered below acceptance levels in Method Blank

GenX surrogate RPD above acceptance levels in Sample Duplicate

cific Analytical Comments:
: 1 of 3 surrogates recovered below acceptance levels
: GenX surrogate recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: GenX surrogate recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels

cific Analytical Comments:
: GenX surrogate recovered below acceptance levels
: 1 of 3 surrogates recovered below acceptance levels
GenX surrogate recovered below acceptance levels
GenX surrogate recovered below acceptance levels

9/6/2017

acceptance levels

Huske L&D	PFuNA	pending	**Sample Specific Analytical Comments:** 9/6/2017: GenX surrogate recovered below acceptance level
	PFDoA	pending	
	PFTriA	pending	
	PFTreA	pending	
	PFDS	pending	
	NMeFOSAA	pending	
	NetFOSAA	pending	
	6:2 FTS	pending	
	8:2 FTS	pending	

8/29/2017

acceptance levels

Cross Creek WWTP Effluent	PFuNA	0.971 (J)	**Sample Specific Analytical Comments:** 8/29/2017: 1 of 3 surrogates recovered below acceptance levels
	PFDoA	ND	
	PFTriA	ND	
	PFTreA	ND	
	PFDS	ND	
	NMeFOSAA	1.30 (J)	
	NetFOSAA	ND	
	6:2 FTS	20.7	
	8:2 FTS	0.957 (J)	

acceptance levels

8/29/2017

DAK Americas WWTP Effluent	PFuNA	ND	**Sample Specific Analytical Comments:**
	PFDoA	ND	8/29/2017: 1 of 3 surrogates recovered below acceptance levels
	PFTriA	ND	8/29/2017: GenX surrogate recovered above acceptance levels
	PFTreA	ND	
	PFDS	ND	
	NMeFOSAA	ND	
	NetFOSAA	ND	
	6:2 FTS	6.56	
	8:2 FTS	ND	

acceptance levels
acceptance levels

8/29/2017

Rockfish WWTP Effluent	PFuNA	ND	**Sample Specific Analytical Comments:**
	PFDoA	ND	8/29/2017: 1 of 3 surrogates recovered below acceptance levels
	PFTriA	ND	
	PFTreA	ND	
	PFDS	ND	
	NMeFOSAA	ND	
	NetFOSAA	ND	
	6:2 FTS	4.56	
	8:2 FTS	ND	

acceptance levels

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To: Cox, Heidi[heidi.cox@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Midgette, Robert[robert.midgette@ncdenr.gov]; Jessica Godreau[Jessica.godreau@ncdenr.gov]
Cc: Gregson, Jim[jim.gregson@ncdenr.gov]; Zimmerman, Jay[jay.zimmerman@ncdenr.gov]
From: Culpepper, Linda
Sent: Sun 8/20/2017 12:52:11 AM
Subject: FW: TestAmerica report and EDD files from 280-99322-1 HFPO-DA Testing - Deep Wells
J99322-1 UDS Level 2 Report Rev(1) Final Report.pdf
280-99322-1_Std_Tal.csv

Thank you, Heidi. Sharing with others.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Cox, Heidi
Sent: Friday, August 18, 2017 2:21 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: Fwd: TestAmerica report and EDD files from 280-99322-1 HFPO-DA Testing - Deep Wells

This is what I received from Kure Beach. I haven't had a chance to review it but wanted to go ahead and forward it to you. I'm not sure who might want to see this so will you forward it to the people who might be interested? Thanks!
Heidi

Heidi Lane Cox
Regional Engineering Supervisor
Wilmington and Fayetteville Regional Offices
Public Water Supply Section
(910)796-7368

From: Jim Mesimer <j.mesimer@townofkurebeach.org>
Sent: Friday, August 18, 2017 9:55 AM
Subject: FW: TestAmerica report and EDD files from 280-99322-1 HFPO-DA Testing - Deep Wells
To: Cox, Heidi <heidi.cox@ncdenr.gov>

Heidi,

Here is the information you requested.

Jimmy Mesimer
Town of Kure Beach

From: Rothmeyer, Stephanie [Rothmeyer, Stephanie [mailto:stephanie.rothmeyer@testamericainc.com]
Sent: Wednesday, August 2, 2017 6:35 PM
To: Jim Mesimer <j.mesimer@townofkurebeach.org>
Subject: TestAmerica report and EDD files from 280-99322-1 HFPO-DA Testing - Deep Wells

Hello,

Attached please find the report and EDD files for job 280-99322-1; HFPO-DA Testing - Deep Wells

Per request of Robin Robertson:

REVISION 1 CHANGES
Per client request, the report is revised to show results in ppt.

Please feel free to contact me if you have any questions.

Thank you.

Please let us know if we met your expectations by rating the service you received from TestAmerica on this project by visiting our website at:Project Feedback

STEPHANIE K ROTHMEYER
Project Manager

TestAmerica Denver
THE LEADER IN ENVIRONMENTAL TESTING

Tel: 303.736.0182
www.testamericainc.com

Reference: [445584]
Attachments: 2

"Lab Sample ID","Client Sample ID","Matrix","Sample Type","Collection Date","Percent Moisture","Analysis Method","Dilution Factor","Analysis Date","CAS","Analyte","Result","Unit","Flag","High Limit","High Limit Type","Low Limit","Low Limit Type","Percent Recovery","Lower Recovery Limit","Upper Recovery Limit","RPD","RPD Limit","Receipt Lab","Project Description","SDG","Lab Job ID","COC ID","Sample Type Desc","Receive Date","Total Sample Amount","Total Sample Amount Units","Leach Batch","Leach Method","Leach Date","Prep Batch","Prep Method","Prep Date","Prep Type","Initial Amount","Initial Amount Unit","Final Amount","Final Amount Unit","Re-Analysis Type","Analysis Batch","Analysis Lab","Instrument ID","Column_Detector ID","Basis","Analyte Type","Result Status","TPU","TPU Sigma","Decision Level","Retention Time","Spike Amount","Expected Amount","RER","RER Limit","Lower Breech Limit","Upper Breech Limit"
"280-99322-3","PO5","Water","","07-17-2017 09:00","","8321A","1","07-26-2017 14:30","","13C3 HFPO-DA","180","ppt","","","","","","91","50","200","","","TestAmerica Denver","HFPO-DA Testing - Deep Wells","","280-99322-1","","","07-18-2017 09:00","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","258.3","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Surrogate","PRIMARY","","","","0.893","194","194","","","","",""
"280-99322-3","PO5","Water","","07-17-2017 09:00","","8321A","1","07-26-2017 14:30","13252-13-6","Perfluoro(2-propoxypropanoic) acid","5.2","ppt","J","9.7","RL","4.9","MDL","","","","","","","TestAmerica Denver","HFPO-DA Testing - Deep Wells","","280-99322-1","","","07-18-2017 09:00","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","258.3","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Target","PRIMARY","","","","0.920","","","","","","",""
"LCS 280-381742/2-A","","Water","LCS","","","8321A","1","07-26-2017 14:15","","13C3 HFPO-DA","294","ppt","","","","","","147","50","200","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Surrogate","PRIMARY","","","","0.893","200","200","","","","",""
"LCS 280-381742/2-A","","Water","LCS","","","8321A","1","07-26-2017 14:15","13252-13-6","Perfluoro(2-propoxypropanoic) acid","207","ppt","","10","RL","5.1","MDL","103","70","130","0","20","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Spike","PRIMARY","","","","0.893","200","","","","","",""
"LCSD 280-381742/3-A","","Water","LCSD","","","8321A","1","07-26-2017 14:18","","13C3 HFPO-DA","283","ppt","","","","","","142","50","200","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample Duplicate","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Surrogate","PRIMARY","","","","0.907","200","200","","","","",""
"LCSD 280-381742/3-A","","Water","LCSD","","","8321A","1","07-26-2017 14:18","13252-13-6","Perfluoro(2-propoxypropanoic) acid","207","ppt","","10","RL","5.1","MDL","103","70","130","0","20","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample Duplicate","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Spike","PRIMARY","","","","0.920","200","","","","","",""
"LLCS 280-381742/4-A","","Water","LCS","","","8321A","1","07-26-2017 14:21","","13C3 HFPO-DA","333","ppt","","","","","","166","50","200","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Surrogate","PRIMARY","","","","0.934","200","200","","","","",""
"LLCS 280-381742/4-A","","Water","LCS","","","8321A","1","07-26-2017 14:21","13252-13-6","Perfluoro(2-propoxypropanoic) acid","17.8","ppt","","10","RL","5.1","MDL","89","70","130","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Lab Control Sample","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Spike","PRIMARY","","","","0.934","20.0","","","","","",""
"MB 280-381742/1-A","","Water","MB","","","8321A","1","07-26-2017 14:12","","13C3 HFPO-DA","257","ppt","","","","","","129","50","200","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Method Blank","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica

Denver","LC_LCMS7","","WET","Surrogate","PRIMARY","","","","0.934","200","200","","","","","
"MB 280-381742/1-A","","Water","MB","","","8321A","1","07-26-2017 14:12","13252-13-6","Perfluoro(2-propoxypropanoic) acid","ND","ppt","","10","RL","5.1","MDL","","","","","","","","HFPO-DA Testing - Deep Wells","","280-99322-1","","Method Blank","","","","","","","","280-381742","3535","07-24-2017 09:57","Total/NA","250","mL","5","mL","","280-382140","TestAmerica Denver","LC_LCMS7","","WET","Target","PRIMARY","","","","","","","","","","","

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Tel: (303)736-0100

TestAmerica Job ID: 280-99322-1
Client Project/Site: HFPO-DA Testing - Deep Wells
Revision: 1

For:
Town of Kure Beach - Public Works Depart
401 H Avenue
Kure Beach, North Carolina 28449

Attn: Jimmy Mesimer

Stephanie Rothmeyer

Authorized for release by:
8/2/2017 4:33:06 PM

Stephanie Rothmeyer, Project Manager I
(303)736-0182
stephanie.rothmeyer@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

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

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

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

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Qualifiers

LCMS

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

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

Job ID: 280-99322-1

Laboratory: TestAmerica Denver

Narrative

CASE NARRATIVE

Client: Town of Kure Beach - Public Works Depart

Project: HFPO-DA Testing - Deep Wells

Report Number: 280-99322-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples the reporting limits are adjusted relative to the dilution required.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

REVISION 1 CHANGES

Per client request, the report is revised to show results in ppt.

RECEIPT

The samples were received on 7/18/2017 at 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 0.4° C.

The following sample was received at the laboratory without a sample collection date or time documented on the chain of custody: PO5 (280-99322-3). The sample containers list a sample collection date and time of 7/17/17 at 0900. The samples were logged per the container labels. The client was notified on 7/18/17.

The chain of custody lists 3 samples: PO5-1, PO5-2, PO5-3. Per conversation with the client on 7/27/17, these are actually three containers for the same sample, so only one analytical result is requested with sample ID PO5.

PERFLUORINATED HYDROCARBONS

Sample PO5 (280-99322-3) was analyzed for Perfluorinated Hydrocarbons in accordance with DV-LG-0012. The samples were prepared on 07/24/2017 and analyzed on 07/26/2017.

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

Detection Summary

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Client Sample ID: PC05

Lab Sample ID: 280-99322-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Perfluoro(2-propoxypropanoic) acid	5.2	J	9.7	4.9	ppt	1		8321A	Total/NA

This Detection Summary does not include radiochemical test results.

Method Summary

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Method	Method Description	Protocol	Laboratory
8321A	HFPO-DA	SW846	TAL DEN

Protocol References:

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

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Sample Summary

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
280-99322-3	PC5	Water	07/17/17 09:00	07/18/17 09:00

Client Sample Results

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Method: 8321A - HFPO-DA

Client Sample ID: PC5
Date Collected: 07/17/17 09:00
Date Received: 07/18/17 09:00

Lab Sample ID: 280-99322-3
Matrix: Water

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoro(2-propoxypropanoic) acid	5.2	J	9.7	4.9	ppt		07/24/17 09:57	07/26/17 14:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*91*		*50 - 200*	*07/24/17 09:57*	*07/26/17 14:30*	*1*

Surrogate Summary

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Method: 8321A - HFPO-DA

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)
		3 HFPO-DA
Lab Sample ID	Client Sample ID	(50-200)
280-99322-3	FC5	91
DLCK 280-370795/12	Lab Control Sample	107
LCS 280-381742/2-A	Lab Control Sample	147
LCSD 280-381742/3-A	Lab Control Sample Dup	142
LLCS 280-381742/4-A	Lab Control Sample	166
MB 280-381742/1-A	Method Blank	129

Surrogate Legend

13C3 HFPO-DA = 13C3 HFPO-DA

TestAmerica Denver

Method: 8321A - HFPO-DA

Lab Sample ID: DLCK 280-370795/12 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 370795

Analyte	Spike Added	DLCK Result	DLCK Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoro(2-propoxypropanoic) acid	0.250	ND		ug/L		90	70 - 130

Surrogate	*DLCK %Recovery*	*DLCK Qualifier*	*Limits*
13C3 HFPO-DA	*107*		*50 - 200*

Lab Sample ID: MB 280-381742/1-A — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 382140 — **Prep Batch: 381742**

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Perfluoro(2-propoxypropanoic) acid	ND		10	5.1	ppt		07/24/17 09:57	07/26/17 14:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
13C3 HFPO-DA	*129*		*50 - 200*	*07/24/17 09:57*	*07/26/17 14:12*	*1*

Lab Sample ID: LCS 280-381742/2-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 382140 — **Prep Batch: 381742**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoro(2-propoxypropanoic) acid	200	207		ppt		103	70 - 130

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
13C3 HFPO-DA	*147*		*50 - 200*

Lab Sample ID: LCSD 280-381742/3-A — **Client Sample ID: Lab Control Sample Du**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 382140 — **Prep Batch: 381742**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Perfluoro(2-propoxypropanoic) acid	200	207		ppt		103	70 - 130	0	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
13C3 HFPO-DA	*142*		*50 - 200*

Lab Sample ID: LLCS 280-381742/4-A — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 382140 — **Prep Batch: 381742**

Analyte	Spike Added	LLCS Result	LLCS Qualifier	Unit	D	%Rec	%Rec. Limits
Perfluoro(2-propoxypropanoic) acid	20.0	17.8		ppt		89	70 - 130

Method: 8321A - HFPO-DA (Continued)

Lab Sample ID: LLCS 280-381742/4-A
Matrix: Water
Analysis Batch: 382140

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 381742

Surrogate	LLCS %Recovery	LLCS Qualifier	Limits
13C3 HFPO-DA	166		50 - 200

LCMS

Analysis Batch: 370795

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
DLCK 280-370795/12	Lab Control Sample	Total/NA	Water	8321A	

Prep Batch: 381742

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-99322-3	PC5	Total/NA	Water	3535	
MB 280-381742/1-A	Method Blank	Total/NA	Water	3535	
LCS 280-381742/2-A	Lab Control Sample	Total/NA	Water	3535	
LCSD 280-381742/3-A	Lab Control Sample Dup	Total/NA	Water	3535	
LLCS 280-381742/4-A	Lab Control Sample	Total/NA	Water	3535	

Analysis Batch: 382140

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
280-99322-3	PC5	Total/NA	Water	8321A	381742
MB 280-381742/1-A	Method Blank	Total/NA	Water	8321A	381742
LCS 280-381742/2-A	Lab Control Sample	Total/NA	Water	8321A	381742
LCSD 280-381742/3-A	Lab Control Sample Dup	Total/NA	Water	8321A	381742
LLCS 280-381742/4-A	Lab Control Sample	Total/NA	Water	8321A	381742

Lab Chronicle

Client: Town of Kure Beach - Public Works Depart
Project/Site: HFPO-DA Testing - Deep Wells

TestAmerica Job ID: 280-99322-1

Client Sample ID: PC5

Date Collected: 07/17/17 09:00
Date Received: 07/18/17 09:00

Lab Sample ID: 280-99322-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3535			258.3 mL	5 mL	381742	07/24/17 09:57	HMA	TAL DEN
Total/NA	Analysis	8321A		1			382140	07/26/17 14:30	AGCM	TAL DEN

Laboratory References:

TAL DEN = TestAmerica Denver, 4955 Yarrow Street, Arvada, CO 80002, TEL (303)736-0100

Accreditation/Certification Summary

Client: Town of Kure Beach - Public Works Depart — TestAmerica Job ID: 280-99322-1
Project/Site: HFPO-DA Testing - Deep Wells

Laboratory: TestAmerica Denver

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
A2LA	DoD ELAP		2907.01	10-31-17
A2LA	ISO/IEC 17025		2907.01	10-31-17
Alabama	State Program	4	40730	09-30-12 *
Alaska (UST)	State Program	10	UST-30	04-05-18
Arizona	State Program	9	AZ0713	12-20-17
Arkansas DEQ	State Program	6	88-0687	06-01-18
California	State Program	9	2513	01-08-18
Connecticut	State Program	1	PH-0686	09-30-18
Florida	NELAP	4	E87667	06-30-18
Georgia	State Program	4	N/A	01-08-18
Illinois	NELAP	5	200017	04-30-18
Iowa	State Program	7	370	12-01-18
Kansas	NELAP	7	E-10166	04-30-18
Louisiana	NELAP	6	02096	06-30-18
Maine	State Program	1	CO002	03-03-19
Minnesota	NELAP	5	8-999-405	12-31-17
Nevada	State Program	9	CO026	07-31-17
New Hampshire	NELAP	1	205310	04-28-18
New Jersey	NELAP	2	CO004	06-30-18
New York	NELAP	2	11964	04-01-18
North Carolina (WW/SW)	State Program	4	358	12-31-17
North Dakota	State Program	8	R-034	01-09-18
Oklahoma	State Program	6	8614	08-31-17
Oregon	NELAP	10	4025	01-08-18
Pennsylvania	NELAP	3	68-00664	07-31-18
South Carolina	State Program	4	72002001	01-08-18
Texas	NELAP	6	T104704183-16-12	09-30-17
USDA	Federal		P330-16-00397	12-15-19
Utah	NELAP	8	CO00026	07-31-17
Virginia	NELAP	3	460232	06-14-18
Washington	State Program	10	C583	08-02-17
West Virginia DEP	State Program	3	354	11-30-17
Wisconsin	State Program	5	999615430	08-31-17
Wyoming (UST)	A2LA	8	2907.01	10-31-17

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

TestAmerica Denver
4955 Yarrow Street
Arvada, CO 80002
Phone (303) 736-0100 Fax (303) 431-7171

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: Jimmy Mesimer	Lab PM: Rothmeyer, Stephanie K	Carrier Tracking No(s):	COC No: 119877
Client Contact: Jimmy Mesimer	Phone: 910-458-5816	E-Mail: stephanie.rothmeyer@testamericainc.com		Page: Page 1 of 1
Company: Town of Kure Beach - Public Works Depart				Job #:
Address: 401 H Avenue	Due Date Requested:			
City: Kure Beach	TAT Requested (days): Standard			
State, Zip: NC, 28449				
Phone: 910-458-5816(Tel)	PO #: Advance Payment Required			
Email: j.mesimer@tokb.org	WO #:			
Project Name: HFPO-DA Testing - Deep Wells	Project #: 28016983			
Site:	SSOW#:			

Analysis Requested

Field Filtered Sample (Yes or No); Perform MS/MSD (Yes or No); 8321A_HFPO_Du; Total Number of containers

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

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	8321A_HFPO_Du	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
Po5 - 1			G	Water			X		
Po5 - 2			G	Water			X		
Po5 - 3			G	Water			X		

280-99322 Chain of Custody

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

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

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

Special Instructions/QC Requirements:

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

Relinquished by	Date/Time	Company	Received by	Date/Time	Company
Jimmy Mesimer	7/17/17 / 09:00 Am	Kure Beach	[illegible]	7-18-17 0900	TAD
Jimmy Mesimer	7/17/17 / 09:00 Am	Kure Beach			
Jimmy Mesimer	7/17/17 / 09:00 Am	Kure Beach			

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: 119877

Cooler Temperature(s) °C and Other Remarks: 0.4 DR # 700 Transfer RP 7-18-17

Login Sample Receipt Checklist

Client: Town of Kure Beach - Public Works Depart

Job Number: 280-99322-1

Login Number: 99322
List Number: 1
Creator: True, Joshua A

List Source: TestAmerica Denver

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

To: Strynar, Mark[Strynar.Mark@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
Cc: Karoly, Cyndi[cyndi.karoly@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Brantley, Mark[mark.brantley@ncdenr.gov]; West, Steve[steve.west@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 6/22/2017 1:28:55 PM
Subject: RE: Discussion for sampling and analysis in Wilmington

That's fine, or even a little later. I probably won't be able to head toward Fayetteville until about 11:00 at the earliest.

Mark Brantley – can you or someone else meet me "in the middle", perhaps in Dunn, to pick up the Fayetteville sample kits?

We will send Wilmington's kits by courier.

On another note – the contract laboratory's instructions call for subambient transport & storage, and no nitric acid preservation. FYI.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:24 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Okay. My cell is Personal Phone / Ex. 6 if you have any issues. I get in at 7 AM. Can we shoot for 9 AM in case I do not get finished prepping today.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 9:21 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Brantley, Mark <mark.brantley@ncdenr.gov>; West, Steve <steve.west@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I would like to come as early as possible in order to get the kits to Fayetteville. Perhaps before lunch if possible.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 9:16 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

I am working to get this done today. Let me know when you will be available to come and get sample container tomorrow.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 8:25 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Thanks for the reply, Mark.

I received word from the Wilmington RO and it looks like they will need 16 bottles to finish out their projected sampling. I haven't heard from the Fayetteville office, but based on what we've received from then for the first sampling event, I would think they need approximately 12 bottles to finish up. This is all based on the sampling being done this week.

Given the tight time frame for next week's sampling, we will probably need to drive the sample kits down to Fayetteville tomorrow afternoon if possible. I would also like to deliver the first set to you if we receive Wilmington's set in time. Either way, if there is any way we can have the sample kits ready tomorrow I would have time to get them to the samplers.

Thanks once again for your help on this project.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, June 22, 2017 6:50 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

One change Chris. I had wishful thinking. I am actually working on Friday and am not off. I will be here.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 4:39 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I will find out the number. Let me contact the regional folks. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 4:09 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

I am off Friday but we could have them prepared for your visit to pick up. How many sample bottles do you need? We typically replicate sample 10% of the samples and have a trip blank and a high and low trip spike as well.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 1:53 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

It may be better if you could supply this material. Based on our conversation, the 1L bottles are preferable and we don't carry that size. Can we pick them up when we bring the first delivery? We may be able to get over there on Friday if that works with your schedules.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 21, 2017 1:50 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

We could provide sample bottles if they are needed. In addition we have always included trip blanks and spikes with our assays for QA/QC purposes. We should strongly consider doing so in any future sampling efforts.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 21, 2017 11:45 AM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Good morning. Wondering if you could clarify a question from the conference call yesterday. Will your laboratory be providing sample bottles and preservative for future sampling events? Also, I see from your 2009 SOP that blanks and spikes were mandated for the coolers. If you require those, will they be provided? We aren't able to make the spikes since they can't be confirmed by analysis.

Thanks for your help.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, June 21, 2017 8:04 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

Great.

Please let me know if I can help in any way as we proceed with this project.

We're very grateful for your help with coordinating this effort.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, June 20, 2017 3:39 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Received. Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Tuesday, June 20, 2017 2:57 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Jones, Nick <nick.jones@ncdenr.gov>; Perez, Helen I <helen.perez@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

All,

I've attached a copy of the field collection protocol that we have been using for PFAS compounds including GenX.

The shipping address and storage conditions are specified on page 6.

Please let us know if you have any questions.

Thank you very much,

Andy

-----Original Appointment-----
From: Buckley, Timothy
Sent: Tuesday, June 20, 2017 1:20 PM
To: chris.johnson@ncdenr.gov; Allenbach, Becky; Strynar, Mark; Medina-Vera, Myriam; cyndi.karoly@ncdenr.gov; linda.culpepper@ncdenr.gov
Cc: Lindstrom, Andrew; Jones, Nick; Perez, Helen I; Satterwhite, Dana
Subject: Discussion for sampling and analysis in Wilmington
When: Tuesday, June 20, 2017 2:00 PM-2:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Teleconference: Call in: Personal Phone / Ex. 6

Thank you all for making time for this discussion. I know that there is a lot of pressure to move quickly on this project. ORD/NERL is happy to provide analytical support. To guide our involvement/effort, I am hoping that collectively we can provide answers to the following questions.

1. What question are we attempting to address with this sampling effort?
2. What is the sampling design?

3. What is the status and timeline of the QAPP?
4. Given split sample analysis (contract lab and NERL lab), how will differences in reported concentrations be managed?
5. What is the plan for communicating results and who has the lead?
6. What is the project timeline?
7. Do we need on-going coordination meetings?

To: Fransen, Tom[tom.fransen@ncdenr.gov]
Cc: Cox, Heidi[heidi.cox@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Culpepper, Linda
Sent: Thur 8/31/2017 5:40:49 PM
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Tom – can you or Melanie send Dr. Strynar the GPS coordinate for the boat ramp at lock & dam #3 on the Cape Fear?

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Johnson, Chris
Sent: Thursday, August 31, 2017 1:14 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

The only information was passed verbally by phone. I believe I heard them say that the sample was collected at the Huske Dam, no exact position provided.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 11:59 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Wow where did that sample come from? Do you have GPS coordinates. The August results of the outfall 002 weeks 6-7 and week8 (which have not yet been reported) do not show anything near that high.

Could it have been the old Chemours discharge creek?

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, August 31, 2017 11:00 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>
Subject: FW: Brunswick Regional H2GO results from 8/14/17

Mark – sharing results we heard about yesterday on a call with the local water utilities and health directors.
Interesting results on page 9 of 12,600 ppt.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Cox, Heidi
Sent: Thursday, August 31, 2017 10:55 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Bob Walker said he collected it from the river at the boat ramp at the O'Huske Lock and Dam, which I believe is Lock & Dam #3.
Heidi

From: Culpepper, Linda
Sent: Wednesday, August 30, 2017 10:38 PM
To: Cox, Heidi <heidi.cox@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>; Grzyb, Julie <julie.grzyb@ncdenr.gov>
Subject: RE: Brunswick Regional H2GO results from 8/14/17

Heidi – please follow up with them to see where the sample on page 9 with the GenX test result of 12,600 ppt was taken. Not sure what O'Huske L&D represents. Thank you.

Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Cox, Heidi
Sent: Wednesday, August 30, 2017 12:11 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Allen, Trent <trent.allen@ncdenr.gov>
Subject: Brunswick Regional H2GO results from 8/14/17

Attached are the results from Brunswick Regional H2GO that were brought up by Bob Walker during the call this morning.
Heidi

Heidi Lane Cox
Regional Engineering Supervisor
Wilmington and Fayetteville Regional Offices
Public Water Supply Section
Department of Environmental Quality

(910) 796-7368 office
Personal Phone / Ex. 6
Heidi.cox@ncdenr.gov

127 Cardinal Drive Ext.
Wilmington, NC 28405

Nothing Compares

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

To: Watkins, Tim[Watkins.Tim@epa.gov]
Cc: Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Culpepper, Linda
Sent: Sat 8/19/2017 4:52:10 PM
Subject: Re: Laboratory PFAS Results for NC DEQ Cape Fear Watershed Sampling - DRAFT FINAL Copy

Thank you, Tim.

Sent from my iPhone

On Aug 18, 2017, at 4:31 PM, Watkins, Tim <Watkins.Tim@epa.gov> wrote:

Linda –

I am sending this message as a follow-up to my email below. When we officially transmit the final version of the report on Monday that it will include GenX sampling results for weeks 6 and 7. We have results from non-targeted analyses that require some additional explanation, so we will plan on sharing and explaining these results at our meeting scheduled for next week. I hope this meets your needs.

Tim Watkins
Deputy Director
National Exposure Research Laboratory
Office of Research and Development
US EPA
Personal Phone / Ex. 6
Watkins.tim@epa.gov

From: Watkins, Tim
Sent: Friday, August 18, 2017 3:00 PM
To: 'linda.culpepper@ncdenr.gov' <linda.culpepper@ncdenr.gov>
Cc: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>; Buckley, Timothy (Buckley.Timothy@epa.gov) <Buckley.Timothy@epa.gov>; Strynar, Mark <strynar.mark@epa.gov>
Subject: Laboratory PFAS Results for NC DEQ Cape Fear Watershed Sampling - DRAFT FINAL Copy

Linda –

I understand that you had a conversation with Mark Strynar earlier today in which you expressed a strong interest to receive the results of Week 6 and 7 PFAS sampling as soon as possible. I have attached a draft final version of the report that we are planning to send on Monday. This report contains the results for GenX as well as for the Non-Targeted Analytes (NTA). We are awaiting final review of this report by our headquarters office, but we feel as though the report will likely not change substantially, if at all, so we are providing you with this advanced draft final copy. We will be officially transmitting the final version of this report to you on Monday. We also look forward to our discussion regarding the NTA results next Tuesday.

Tim Watkins
Deputy Director
National Exposure Research Laboratory
Office of Research and Development
US EPA
Personal Phone / Ex. 6
Watkins.tim@epa.gov

To: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; McCord, James[mccord.james@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Thur 7/20/2017 3:49:07 PM
Subject: RE: EPA PFAS contact

I don't think we will need any additional sample bottles or HNO3. I picked up what I thought would finish out weeks 5 and 6 last week. If that changes, I will let you know today. We do, however, need any QC materials you want to accompany the samples. And, we need the unpreserved set of QC materials for the contract laboratory.

I hope to be able to deliver this week's samples before noon tomorrow. Wilmington is sampling today and we usually get their samples on Friday morning.

Will there be another contact for sample delivery tomorrow or should I call you, Andy?

Thanks!

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Thursday, July 20, 2017 11:34 AM
To: McCord, James <mccord.james@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: FW: EPA PFAS contact

James,

Chris Johnson will be coming tomorrow to drop off samples and pick up materials for the next round of sampling.

If you could help make sure we are ready to give him the materials he needs to complete this week's sampling it would be extremely helpful.

I think we will be needed empty bottles (24) and a set of QC spikes and blanks similar to last week.

James' phone number is 919-541-2137.

Thank you very much,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, July 19, 2017 3:40 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Understood. Thanks for letting us know, Andy.

I will be heading over there on Friday with this week's samples if all goes to plan. Talk to you again soon.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Lindstrom, Andrew [mailto:Lindstrom.Andrew@epa.gov]
Sent: Wednesday, July 19, 2017 3:08 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

Chris and Dana,

I spoke with Sandy this morning about her interest in obtaining assistance with the analysis of groundwater samples for GenX.

I asked that she make this request directly to our Laboratory Director, Dr. Jennifer Orme-Zavaleta.

Please let me know if I can help in any way.

Thank you,

Andy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, July 19, 2017 3:02 PM
To: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: EPA PFAS contact

My contact person at the ORD lab is Mark Strynar. I've copied him on this email, but he is out of the office right now. The other contact I have there is Andy Lindstrom, who is also copied on the email.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Satterwhite, Dana
Sent: Wednesday, July 19, 2017 2:44 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Mort, Sandra L <sandy.mort@ncdenr.gov>
Subject: EPA PFAS contact

Hi Chris,
Sandy Mort (copied on this email) has requested a contact person with EPA ORD for PFAS testing. Will you share that information with her?
Thank you,
Dana

Dana Satterwhite
Environmental Program Supervisor III
WW/GW Laboratory Certification Branch
North Carolina Department of Environmental Quality/Division of Water Resources

919 733 3908 ext. 202 office
dana.satterwhite@ncdenr.gov

Water Sciences Section
1623 Mail Service Center
Raleigh, NC 27699-1623

Nothing Compares

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Have you signed up to receive automatic email notices of changes to policies, regulations and resources pertaining to the NC Wastewater/Groundwater Laboratory Certification program that could have an impact on your day-to-day operations? If not, send a blank email to the following address:
DENR.DWQ.Lab_Cert-join@lists.ncmail.net

To: Strynar, Mark[Strynar.Mark@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 8/31/2017 4:04:49 PM
Subject: RE: Chemical Properties of Gen X

Mark, as you can tell by the previous email, we are reaching out to GEL laboratories in Charleston, SC for vetting as well. Will keep you informed as to progress. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Johnson, Chris
Sent: Thursday, August 31, 2017 8:57 AM
To: 'Strynar, Mark' <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Chemical Properties of Gen X

We appreciate your input and time. We have one other lab working on these samples. The third laboratory dropped out at the last minute citing capacity issues. I hope to have the second set of data this week. They didn't extract until Monday of this week.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 8:53 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Chemical Properties of Gen X

Chris,

I will give you my quick impression. I am unsure how they do their surrogate recovery and how it is used in quantitative calculations. This may influence some fringe data.

QAC-3 was a lab blank. The results of the report came back as expected <LOQ for most analytes with a very low level of detection for PFOA and PFDA (~0.2-0.3 ng/L) which most would call a non-detect.

QCB-3 was spiked at 150 ng/L for the PFAC-MXA (C4-C10 carboxylic acids, PFBS, PFHxS, and PFOS) as well as GenX. All the analytes except GenX appear to be in the +/- 20% of the target value. GenX at 238 ng/L is quite a bit high.

QCC-3 was spiked at 1000 ng/L for PFAC-MXA and GenX. For the PFAC-MXA the values appear to be in the +/- 20% range with most falling in the –20% range. The GenX is slightly above the +/- 20% range at 1220 ng/L but just barely. This data seems acceptable but has some flags.

QCD-3 was a 1:2:1 mixture of a Chemours outfall 002:CFR upstream water:DI water. For GenX the values is predicted to be 2370 ng/L. We have not yet assessed this sample to give our value so it is hard to tell how good this is. We may want to wait for the other 2 labs to report back and look for a consensus number. We will also give you this when we can get to it. For the other analytes I think the values seem acceptable. I did not for this sample the surrogate recovery was 17% so there was either a recovery issue or a signal suppression issue.

I will respond to your other request as soon as I can.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 30, 2017 1:22 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Chemical Properties of Gen X

I would think that it is even distributed throughout the strata. But, I will ask Dr. Strynar for confirmation.

Coincidentally, we were also discussing that here after the conference call this morning.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Culpepper, Linda
Sent: Wednesday, August 30, 2017 12:56 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: Fwd: Chemical Properties of Gen X

Chris - my knowledge is that the GenX compound is hydrophilic. Anything you have to augment the sinking/floating question ?

Sent from my iPhone
Begin forwarded message:

> **From:** "Holman, Sheila" <sheila.holman@ncdenr.gov>
> **Date:** August 30, 2017 at 11:26:35 AM EDT
> **To:** "Culpepper, Linda" <linda.culpepper@ncdenr.gov>
> **Subject: Fwd: Chemical Properties of Gen X**
>
> Can you help me with this question?
>
> Sent from my iPhone
> Begin forwarded message:
>
> > **Resent-From:** <SRS0=9nO2==brunswickcountync.gov=david.stanley@securence.com>
> > **From:** David Stanley <David.Stanley@brunswickcountync.gov>
> > **Date:** August 30, 2017 at 10:57:38 AM EDT
> > **To:** "Holman, Sheila" <sheila.holman@ncdenr.gov>, "Shehee, Mina" <mina.shehee@dhhs.nc.gov>
> > **Cc:** Cris Harrelson <cris.harrelson@brunswickcountync.gov>, Ann Hardy <Ann.Hardy@brunswickcountync.gov>
> > **Subject: Chemical Properties of Gen X**
> >
> > Shelia and Mina,
> >
> > I have a question that has come in regarding the chemical/physical properties of Gen X in water bodies.
> > Does Gen X float or sink when released into the a natural waterbody such as the Cape Fear River?
> >
> > Thank you,
> >
> > David M. Stanley III, MPH, REHS
> > Health and Human Services Executive Director
> > Brunswick County
> > 910.253.2250

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To: linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]
Cc: Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Watkins, Tim
Sent: Fri 8/18/2017 7:00:10 PM
Subject: Laboratory PFAS Results for NC DEQ Cape Fear Watershed Sampling - DRAFT FINAL Copy
NC DEQ GenX_results report 3_08162017 - DRAFT FINAL.docx

Linda –

I understand that you had a conversation with Mark Strynar earlier today in which you expressed a strong interest to receive the results of Week 6 and 7 PFAS sampling as soon as possible. I have attached a draft final version of the report that we are planning to send on Monday. This report contains the results for GenX as well as for the Non-Targeted Analytes (NTA). We are awaiting final review of this report by our headquarters office, but we feel as though the report will likely not change substantially, if at all, so we are providing you with this advanced draft final copy. We will be officially transmitting the final version of this report to you on Monday. We also look forward to our discussion regarding the NTA results next Tuesday.

Tim Watkins
Deputy Director
National Exposure Research Laboratory
Office of Research and Development
US EPA
Personal Phone / Ex. 6
Watkins.tim@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL EXPOSURE RESEARCH LABORATORY
RESEARCH TRIANGLE PARK, NC 27711

OFFICE OF
RESEARCH AND DEVELOPMENT

August 21,2017

MEMORANDUM

SUBJECT: Laboratory PFAS Results for NC DEQ Cape Fear Watershed Sampling: Week 6 & 7 GenX and Preliminary Non-Targeted Analysis

FROM: Timothy J. Buckley, Director
Exposure Methods and Measurements Division

THRU: Jennifer Orme-Zavaleta, Director
National Exposure Research Laboratory

TO: Linda Culpepper, Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

Enclosed please find our third report of PFAS concentrations in Cape Fear River water samples collected under the direction of NC DEQ. This report includes results for GenX from weeks 6 & 7 sampling as well as preliminary findings from our non-targeted analysis.

We look forward to meeting with you at 3 PM on Tuesday 22 August at our Laboratory in Research Triangle Park (Room C-111A) to go over these results and answer any questions that you might have.

Thank you for inviting us to be a part of this effort that addresses a very important public health concern in North Carolina. These results represent the effort of many within our lab but I would especially like to acknowledge Drs. Mark Strynar, Andy Lindstrom, James McCord, and Seth Newton in conducting the laboratory analyses, Dr. Myriam Medina-Vera who provided invaluable support and coordination, and Ms. Sania Tong-Argao who supported and oversaw quality assurance.

If you have any questions or concerns, do not hesitate to contact me at (919) 541-2454 or email buckley.timothy@epa.gov. I look forward to our continued work together.

Enclosure

CC: Becky B. Allenbach, USEPA Region 4

Jeff Morris, USEPA OPPT
Betsy Behl, USEPA, OW
Peter Grevatt, USEPA, OW

Executive Summary

The week 6 & 7 GenX results were received by our lab on July 28, 2017 for week 6, and August 1, and 4, 2017 for week 7, respectively. Results show that GenX concentrations throughout the river basin continue their decline starting with the Chemours outfall (week 7 maximum of 67.9 ng/L) and extending downstream to finished drinking water (maximum at Pender Co. finished water week 7 of 43.4 ng/L). Our QA/QC samples for these results are within expected tolerances (i.e. undetected in blanks and spiked samples within 20% of expected concentrations) with one exception: a high-level spike (200 ng/L) measured at 149 ng/L in week 6 which was outside our ±20 percent range. The GenX results are provided in Attachment B.

Our preliminary non-targeted results are limited to the Chemours outfall and Sweeney drinking water over weeks 1 – 6. We chose these sites because we believe the concentrations observed bound the concentrations for this portion of the watershed. Furthermore, we did not want to delay our reporting due to the additional time required to assemble and caveat results from the other locations. We are continuing to work on a comprehensive report that will include non-targeted results at all locations over the seven weeks of sampling.

We include five analytes in this initial non-targeted report (Table 1). An important limitation to our non-targeted analyte (NTA) results is that these results are considered semi-quantitative. We cannot know the exact concentration because no authentic standards exist for these chemicals. However, we are very confident of the chemical identity based on the high resolution mass spectrometry and knowledge of Chemours' chemical products.

Table 1. Non-Targeted Analytes (NTA) Measured by LC/TOFMS Analysis

Short Name	Chemical Name	Formula	CAS no.	Monoisotopic Mass (Da)
Nafion Byproduct 1	Unknown	$C_7HF_{13}O_5S$	66796-30-3	443.9337
Nafion Byproduct 2	Unknown	$C_7H_2F_{14}O_5S$	749836-20-2	463.9399
PFMOAA	(2,2-difluoro-2-(trifluoromethoxy)acetic acid)	$C_3HF_5O_3$	674-13-5	179.9846
PFO2HxA	perfluoro-3,5-dioxahexanoic acid	$C_4HF_7O_4$	39492-88-1	245.9763
PFO3OA	perfluoro-3,5,7-trioxaoctanoic acid	$C_5HF_9O_5$	39492-89-2	311.9680

We provide semi-quantitative "concentrations" in two forms. The first is the peak area that is associated with the monoisotopic mass for each compound. The peak area is proportional to the analyte concentration and it is useful in interpreting changes in concentration over time and between locations for a given analyte. For example, for PFMOAA measured in Sweeney Finished water, we see the peak area change from ~4.5 million to 3,000 counts from week 1 to 6. This can be interpreted as roughly a 1,500-fold decrease in concentration without knowing the exact

concentration. The second way we provide a semi-quantitative estimate of concentration is to scale the non-targeted analyte based on the measured concentration of GenX.

Where: [NTA] is the concentration of the non-targeted analyte (ng/L)
[GenX] is the concentration of GenX (ng/L)
NTA_{PA} is the integrated peak area for the non-targeted analyte
$GenX_{PA}$ is the integrated peak area for GenX

In essence, we are assuming that the mass spectrometer responds to the non-targeted analyte as if it were GenX. The actual instrument response may be weaker or stronger resulting in an under- or over-estimation of the non-targeted concentration. Our experience with this class of analytes suggests that estimates of this fashion are accurate to within ~10-fold of the given value. NTA estimated concentrations are particularly uncertain at the Chemours outfall during weeks 1-3. Concentrations were so high that even after samples were diluted 20X, we exceeded our calibration curve for GenX and were also likely saturating the mass spectrometer for both GenX and NTAs. The semi-quantitative estimate for these NTA are particularly uncertain and likely underestimated. These results are shown in Attachment C and have been flagged accordingly.

Whether considering peak area or estimated concentration, the non-targeted results show two very different time profiles. For three of the analytes, concentrations at the outfall and Sweeney finished water show a precipitous drop very similar to what was observed for GenX (Figures 1-4). These results suggest that whatever mitigation strategy was used to reduce GenX, was also effective for these three chemicals. The second time profile is for the Nafion byproduct analytes where concentrations vary but there is no clear trend (Figures 5 & 6). These results suggest the discharge of these chemicals was unaffected by whatever strategies were used to mitigate GenX discharge. Concentrations of the Nafion byproducts range from 2,900 to 73,900 ng/L at the Chemours outfall and 53 to 7,860 ng/L in Sweeney finished drinking water. Note that these concentrations are in the same range as GenX originally noted in Sun et al., 2016. Each analyte was graphed as a relative percentage of its maximum intensity over the sampling period. For the Nafion byproducts this maximum period occurred in the middle of sampling, while for the other analytes the maximum was during the first week. The plots show the two different time profiles for the six analytes and two locations (Figure 7).

As with GenX, our QA/QC results for the non-targeted results were within expected tolerances. We did not detect any of the analytes in field blanks indicating no field or lab contamination. Because there are no standards for these analytes, we have no assessment of accuracy. Duplicate analyses were within 20 percent. The laboratory methods for the results reported here are described in Sun *et al.,* 2016[1] and Strynar *et al.,* 2015

[1] Sun M; Arevalo E; Strynar M; Lindstrom A; Richardson M; Kearns B; Pickett A; Smith C; Knappe DRU: Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina. Environmental Science & Technology Letters. 2016

[2].

Concentration of GenX Measured in Cape Fear Watershed Samples

		Conc.	Flag
Week	Location / Sample Identifier	(ng/L	

[2]Strynar M, Dagnino S, McMahen R, Liang S, Lindstrom A, Andersen E, McMillan L, Thurman M, Ferrer I, Ball C. Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS). Environ Sci Technol. 2015

ED_002003J_00095878-00005

		)	
6	DWR #1- PO Hoffer WTP Raw Water	<10	1
6	DWR #2 - Bladen Bluffs Raw water (avg. 2 reps)	30.4	
6	DWR #3 - Bladen Bluffs Finished water	34.2	
6	DWR #4 - Smithfield Field Well	<10	1
6	NCDEQ 1 - LCFWSA Raw	35.1	
6	NCDEQ 2 - Sweeney Treated	69.5	
6	NCDEQ 3 - ASR Well	53.6	
6	NCDEQ 4 - WB Well 11	19.2	
6	NCDEQ 5 - IP-Raw	36.3	
6	NCDEQ 6 - IP-Finished	22.2	
6	NCDEQ 7 - NW Brunswick WTP - Finished	31.2	
6	NCDEQ 8 - Pender 421 WTP Finished	65.4	
6	NCDEQ 9 - WB Well 6	<10	1
6	NCDEQ 10 - CB Well 8	<10	1
6	NCDEQ 11 - CB Well 13	<10	1
6	Chemours Outfall 002 7-24-17	102	
6	Chemours Outfall 002 7-25-17 (avg. 2 reps)	74.6	
6	Chemours Outfall 002 7-26-17	71.3	
6	Chemours Outfall 002 7-27-17	77.1	
6	Chemours Outfall 002 7-28-17	63.4	
7	(2) Sweeney WTP finished	38.3	
7	(6) IP WTP Finished	12.7	
7	(7) NW Brunswick Finished	21.6	
7	(8) Pender 421 WTP Finished	39.2	
7	Pender Co. Finished water 7-31-17	43.4	
7	Chemours outfall 002 7-31-17	67.9	
7	Bladen Bluffs WTP Finished	36.2	
7	Chemours outfall 002 8-1-17	35.1	
7	Chemours outfall 002 8-2-17	41.9	
7	Chemours outfall 002 8-3-17	61.8	
7	Chemours outfall 002 8-4-17	44.0	
Flag			
1	Below Limit of Quantitation		

Semi-Quantitative Estimates of GenX and Non-Targeted Analytes Concentrations (ng/L) Measured at Chemours Outfall and Sweeney Finished Drinking Water During Sampling Weeks 1 – 6.

NTA	Location	Sample Week	NTA Area	GenX Area	GenX Conc. (ng/L)	NTA Conc. (ng/L)	Fla
PFMOAA	Chemours Outfall 002	1	63,712,278	10,363,496	21,760	134,000	1
PFO2HxA	Chemours Outfall 002	1	182,599,647	10,363,496	21,760	383,000	1
PFO3OA	Chemours Outfall 002	1	51,940,394	10,363,496	21,760	109,000	1
GenX	Chemours Outfall 002	1	10,363,496	10,363,496	21,760	21,800	1
Nafion Byproduct 1	Chemours Outfall 002	1	1,380,791	10,363,496	21,760	2,900	1
Nafion Byproduct 2	Chemours Outfall 002	1	14,039,048	10,363,496	21,760	29,500	1
PFMOAA	Sweeney	1	4,560,543	293,854	726	11,300	2
PFO2HxA	Sweeney	1	3,594,341	293,854	726	8,880	2
PFO3OA	Sweeney	1	1,265,760	293,854	726	3,130	2
GenX	Sweeney	1	293,854	293,854	726	726	2
Nafion Byproduct 1	Sweeney	1	21,356	293,854	726	53	2
Nafion Byproduct 2	Sweeney	1	664,104	293,854	726	1,640	2
PFMOAA	Chemours Outfall 002	2	37,373,851	8,345,860	15,250	68,300	1
PFO2HxA	Chemours Outfall 002	2	71,331,553	8,345,860	15,250	130,000	1
PFO3OA	Chemours Outfall 002	2	19,111,355	8,345,860	15,250	34,900	1
GenX	Chemours Outfall 002	2	8,345,860	8,345,860	15,250	15,300	1
Nafion Byproduct 1	Chemours Outfall 002	2	1,895,442	8,345,860	15,250	3,460	1
Nafion Byproduct 2	Chemours Outfall 002	2	13,230,172	8,345,860	15,250	24,200	1
PFMOAA	Sweeney	2	1,059,209	10,129	100	10,500	
PFO2HxA	Sweeney	2	738,362	10,129	100	7,290	
PFO3OA	Sweeney	2	251,372	10,129	100	2,480	
GenX	Sweeney	2	10,129	10,129	100	100	
Nafion Byproduct 1	Sweeney	2	14,447	10,129	100	143	
Nafion Byproduct 2	Sweeney	2	437,286	10,129	100	4,320	
PFMOAA	Chemours Outfall 002	3	11,265,308	9,390,564	21,527	25,800	1
PFO2HxA	Chemours Outfall 002	3	10,284,502	9,390,564	21,527	23,600	1
PFO3OA	Chemours Outfall 002	3	1,545,961	9,390,564	21,527	3,540	1
GenX	Chemours Outfall 002	3	9,390,564	9,390,564	21,527	21,500	1
Nafion Byproduct 1	Chemours Outfall 002	3	5,721,468	9,390,564	21,527	13,100	1
Nafion Byproduct 2	Chemours Outfall 002	3	17,252,514	9,390,564	21,527	39,600	1
PFMOAA	Sweeney	4	82,181	21,348	81	312	
PFO2HxA	Sweeney	4	210,440	21,348	81	798	
PFO3OA	Sweeney	4	168,842	21,348	81	641	
GenX	Sweeney	4	21,348	21,348	81	81	
Nafion Byproduct 1	Sweeney	4	31,581	21,348	81	120	
Nafion Byproduct 2	Sweeney	4	622,627	21,348	81	2,360	
PFMOAA	Chemours Outfall 002	5	558,337	287,302	713	1,390	3
PFO2HxA	Chemours Outfall 002	5	366,856	287,302	713	910	3
PFO3OA	Chemours Outfall 002	5	175,874	287,302	713	436	3
GenX	Chemours Outfall 002	5	287,302	287,302	713	713	3
Nafion Byproduct 1	Chemours Outfall 002	5	1,797,348	287,302	713	4,460	3

Nafion Byproduct 2	Chemours Outfall 002	5	15,762,943	287,302	713	39,100	3
PFMOAA	Sweeney	5	3,405	8,630	95	37	
PFO2HxA	Sweeney	5	100,174	8,630	95	1,100	
PFO3OA	Sweeney	5	63,750	8,630	95	702	
GenX	Sweeney	5	8,630	8,630	95	95	
Nafion Byproduct 1	Sweeney	5	14,352	8,630	95	158	
Nafion Byproduct 2	Sweeney	5	713,541	8,630	95	7,860	
PFMOAA	Chemours Outfall 002	6	113,443	16,637	102	696	
PFO2HxA	Chemours Outfall 002	6	70,333	16,637	102	431	
PFO3OA	Chemours Outfall 002	6	14,038	16,637	102	86	
GenX	Chemours Outfall 002	6	16,637	16,637	102	102	
Nafion Byproduct 1	Chemours Outfall 002	6	2,569,948	16,637	102	15,800	
Nafion Byproduct 2	Chemours Outfall 002	6	12,055,574	16,637	102	73,900	
PFMOAA	Sweeney	6	3,312	11,030	70	21	
PFO2HxA	Sweeney	6	185,715	11,030	70	1,170	
PFO3OA	Sweeney	6	123,515	11,030	70	778	
GenX	Sweeney	6	11,030	11,030	70	70	
Nafion Byproduct 1	Sweeney	6	11,504	11,030	70	72	
Nafion Byproduct 2	Sweeney	6	741,742	11,030	70	4,670	

Figure 1. GenX Concentration (ng/L) Profile

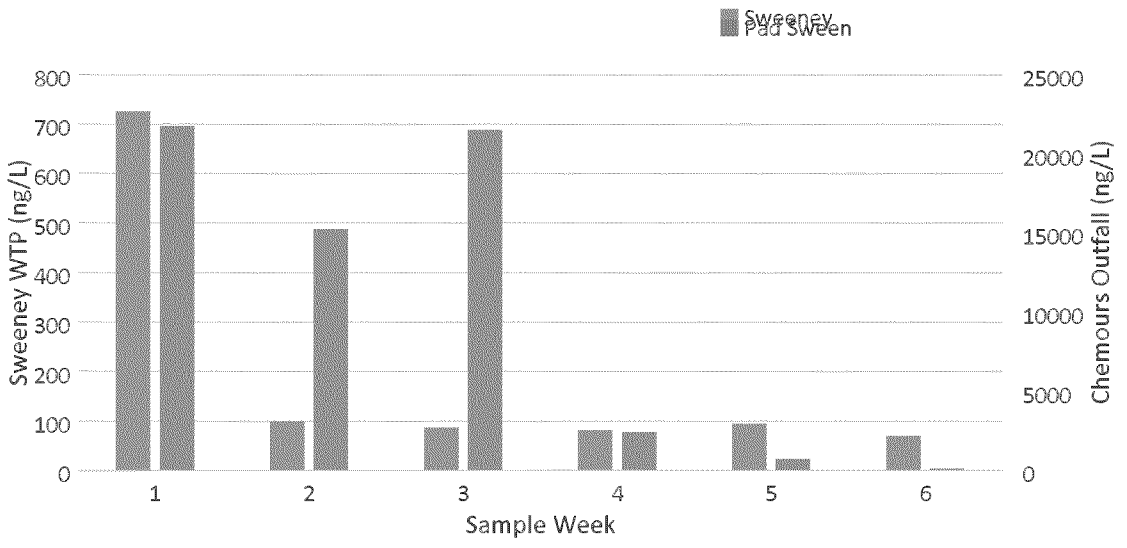


Figure 2. PFMOAA Concentration (ng/L) Profile

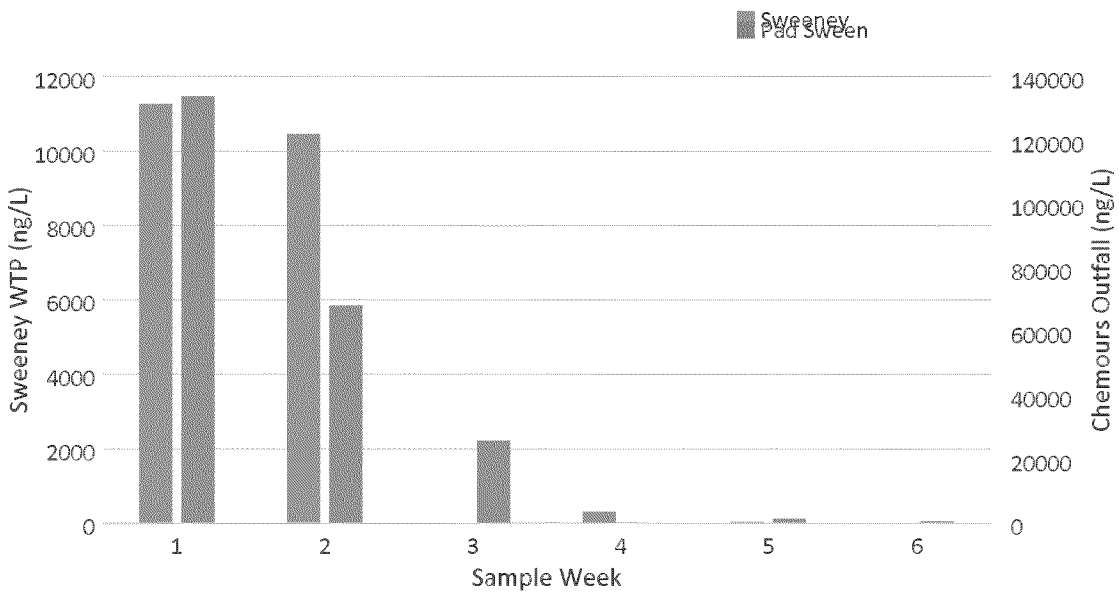


Figure 3. PFO2HxA Concentration (ng/L) Profile

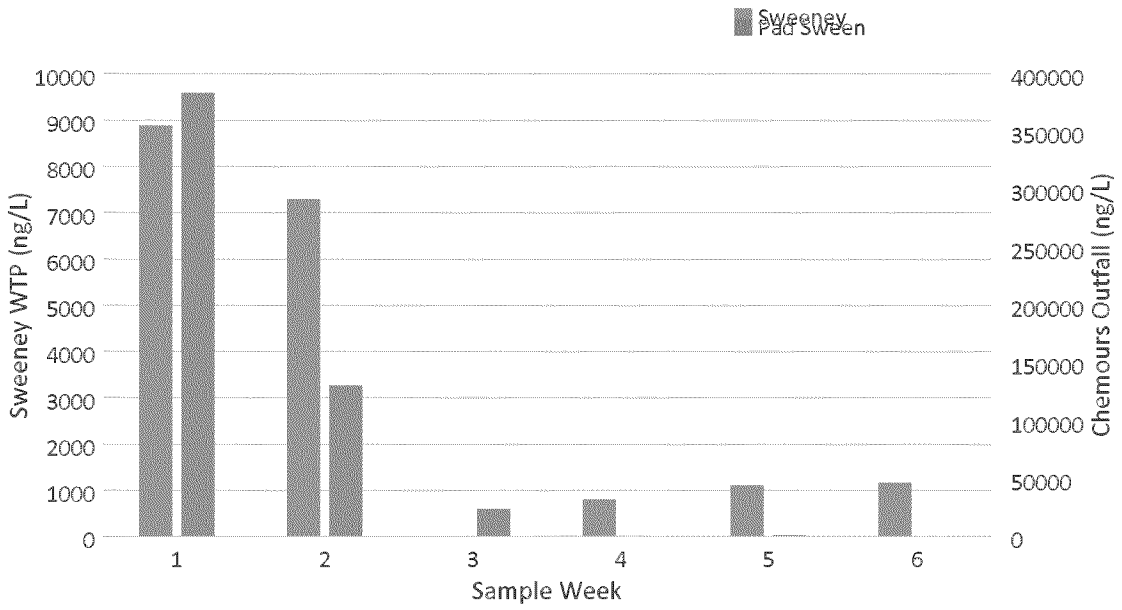


Figure 4. PFO3OA Concentration (ng/L) Profile

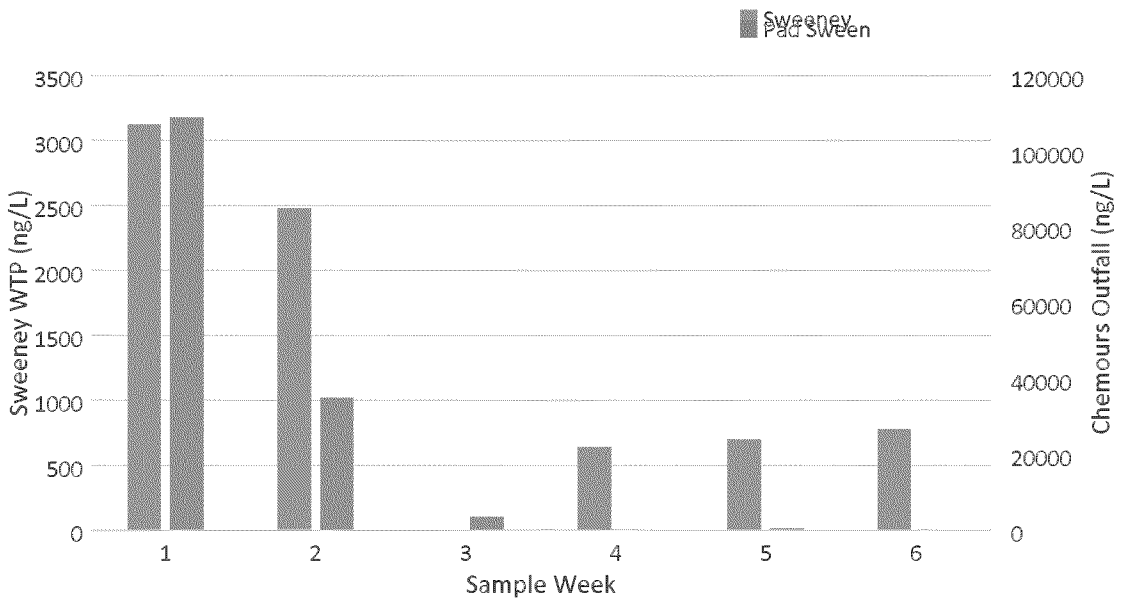


Figure 5. Nafion Byproduct 1 Concentration (ng/L) Profile

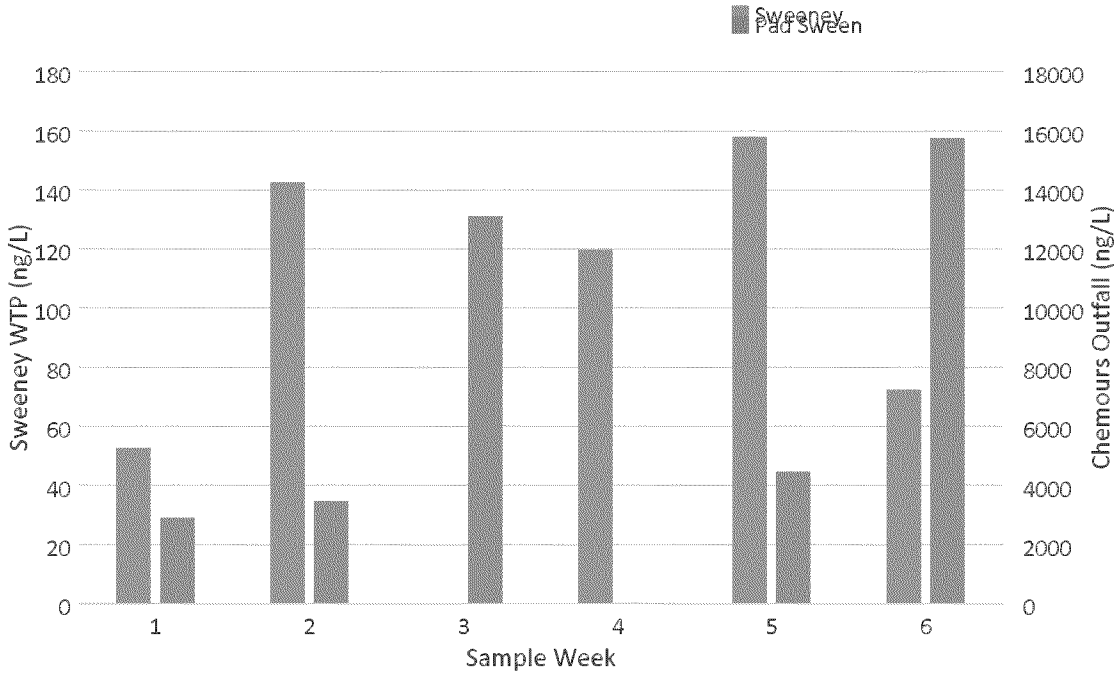


Figure 6. Nafion Byproduct 2 Concentration (ng/L) Profile

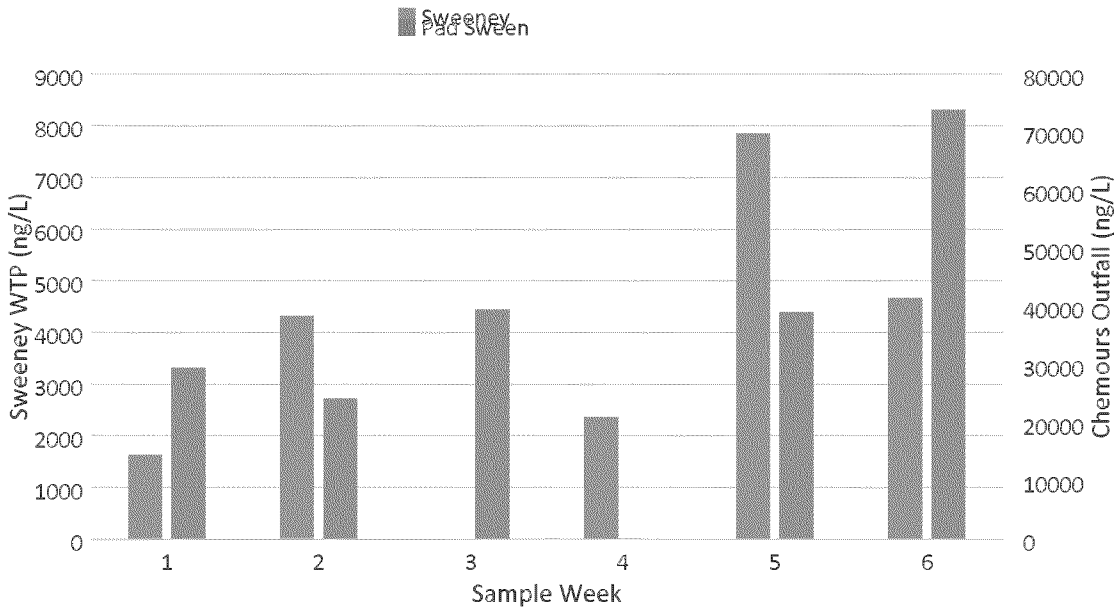
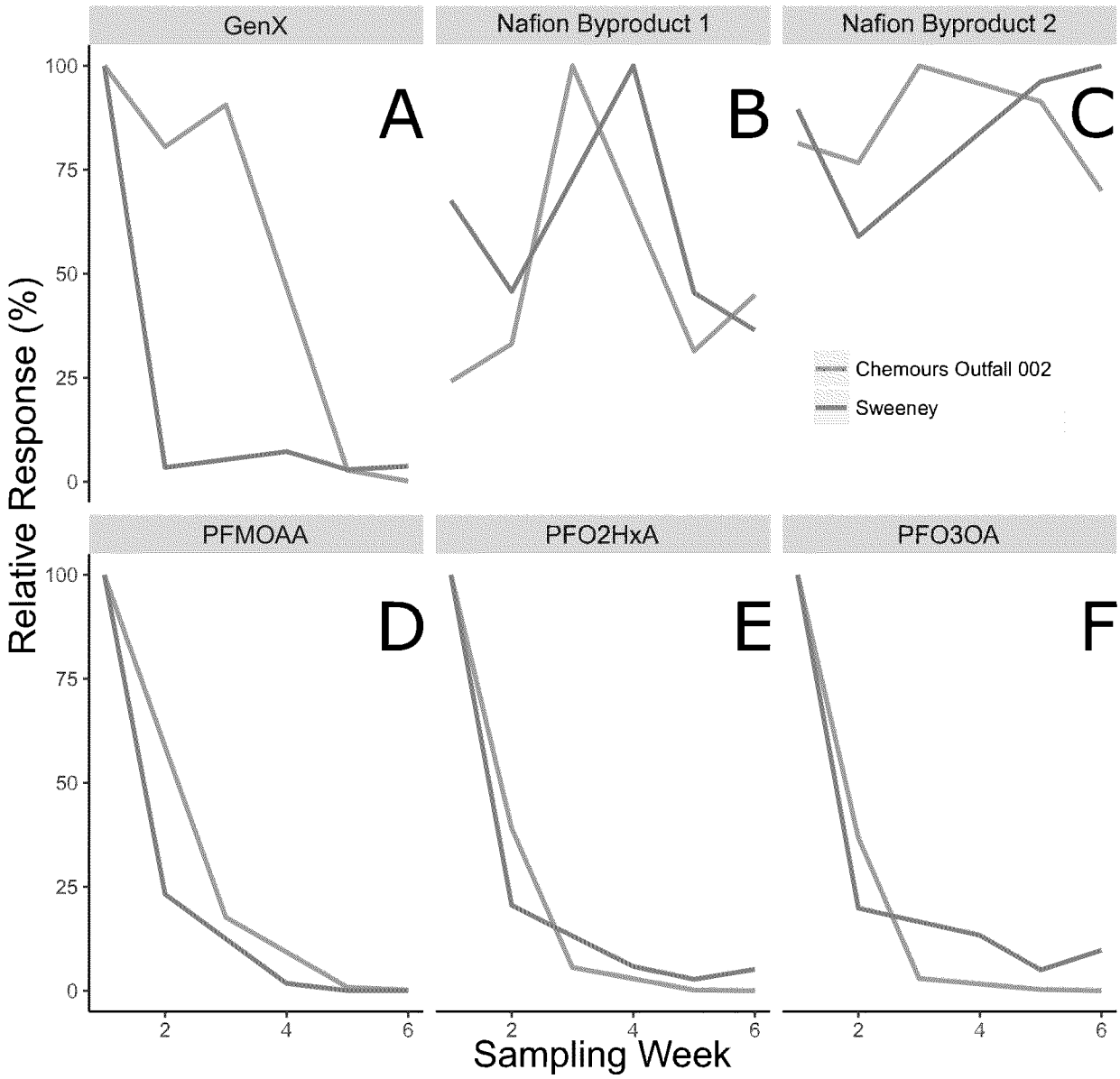


Figure 7. Relative change (compared to highest measured value) in PFAS concentration over weeks 1 – 6 for GenX and NTAs at the Chemours outfall and Sweeney Finished Drinking Water. GenX and NTAs in Panels A,D,E, & F show a consistent decreasing profile. The Nafion Byproduct concentrations are variable and do not show a clear trend.



To: Gregson, Jim[jim.gregson@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]
From: Boehm, Amy (Wilmington)
Sent: Fri 8/18/2017 3:48:50 PM
Subject: RE: QC Samples

Hi Jim – Either way is fine. Wilmington's a pretty small place!
ajb

From: Gregson, Jim [mailto:jim.gregson@ncdenr.gov]
Sent: Friday, August 18, 2017 11:35 AM
To: Johnson, Chris; Martin, Allen (Wilmington); Boehm, Amy (Wilmington); Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek)
Subject: RE: QC Samples

Yes and we will be happy to deliver them if we need to.

Jim Gregson
Regional Supervisor
Water Quality Regional Operations Section
Division of Water Resources
Department of Environmental Quality

910.796.7215 Reception Desk
910.796.7386 Direct
910.350.2004 Fax
Jim.gregson@ncdenr.gov

Wilmington Regional Office
127 Cardinal Drive Ext
Wilmington, NC 28405

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Johnson, Chris
Sent: Friday, August 18, 2017 11:08 AM
To: Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Can I proceed with shipment of 1/each 1-liter bottles for the 4 parameters? If so, I will get them to the Wilmington office where they will hold onto them for you. OK, Jim? Should be there on Tuesday.

Parameters to ship will be a blank, two spiked reagent grade water samples and a sample containing the analytes of concern in river water.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

Correspondence with this email address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

From: Martin, Allen (Wilmington) [mailto:Allen.Martin@sgs.com]
Sent: Thursday, August 17, 2017 7:11 PM
To: Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>; Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Chris,

We normally use 250 mL for a sampling volume; 1 L will be more than enough to perform both extractions.

I can potentially set up for an analysis similar to what you're describing. It would require some lead time for development and to get everything operational.

Allen

Allen Martin
Environment, Health & Safety
Method Development Manager

SGS North America
5500 Business Dr.
Wilmington, NC 28405-8446

Phone: +1 (910) 350-1903
Toll Free: +1 (866) 846-8290
Fax: +1 (910) 350-1557
E-mail: allen.martin@sgs.com

From: Boehm, Amy (Wilmington)
Sent: Thursday, August 17, 2017 6:02 PM
To: Johnson, Chris; Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Allen – please can you respond to the email string on this semi-quantitative approach for the 'sister' analytes, and sample volume?
Thanks!
Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 5:39 PM
To: Boehm, Amy (Wilmington); Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Also, the EPA lab is looking at the associated compounds semi-quantitatively. You may not necessarily need to run a curve for each compound, but report them as they correlate to other standards. I believe this is similar (but more reliable) to reporting tentatively identified compounds from a single-quadrupole mass spectrometer. Again, Mark is the expert and can clarify and/or correct where

I've strayed.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 4:59 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Thank you Mark and Chris – Attached, please find a copy of our COC form.

We are happy to pick-up the samples when they are available in Wilmington. Please just call or email me when they are ready and we can go get them.

We currently do not analyze for the GenX 'sister' compounds noted below. That is something that may be developed in future, but are not analytes we can currently report.

Please can you provide the exact list of analytes (or CofA) in that Wellington PFAC-MXA list? Their website does not seem to have this information and I will need that to set up the correct list and method. Depending on that list, we may need two aliquots of each test sample as we may need to extract by two different methods. Again, just depends on that list of compounds needed.

Thank you!
Amy

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
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To: Johnson, Chris; Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 3:01 PM
To: Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey

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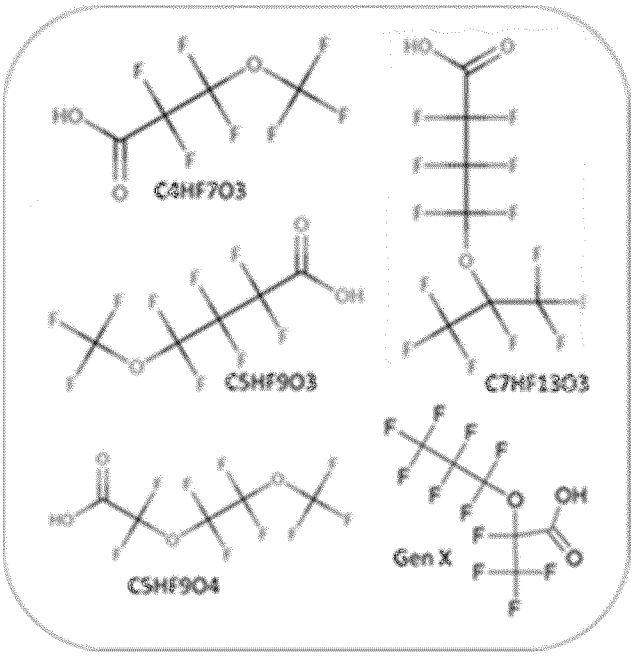
Subject: RE: QC Samples

I provided a list of associated compounds below. We are going to meet with EPA in the next few days to get more information on these compounds, so I will have a definitive list after that meeting. In the meantime, I have the QC samples available and ready to ship. We have a state courier that goes to the Wilmington Regional Office, so that may be the most economical shipping method. Your courier could pick them up there (Cardinal Drive Extension) if that's OK. The next courier run is on Monday, so they would be there on Tuesday. Please forward any paperwork you want completed to my attention later today or tomorrow and I will include in the shipment.

Here is the original list of what was being spiked into our earlier QC samples. The EPA laboratory has been extracting all these compounds by the same technique I believe. If not, Mark can correct me. These new samples should be similar:



Chris Johnson
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Subject: RE: QC Samples

Hi Chris – Please see below. Feel free to call email if you have any further questions. Thank you!
Amy

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.

  SGS Wilmington can courier samples to the lab within 50 miles of the lab. We can make arrangements for longer distances, negotiated on a case-by-case basis. The lab also receives samples by courier, FedEx, UPS

Monday-Friday during business hours and 9 a.m.- noon on Saturday. Our shipping address is: SGS, 5500 Business Drive, Wilmington, NC 28405.

• The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing. Yes, the lab will analyze up to 5 PT samples to assess capability at no cost. These samples will be expedited to the extent possible with a target TAT of 5-business-days.

• Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.

The target TAT is 5-business days for the capability samples from receipt of samples to final reporting via email/upload.

• Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of testing after that time.

Analysis of samples is $250/sample/test for PFAs,10-business day TAT. 5-business day TAT is 2X above that base cost. Extract and hold for later analysis is $125/sample. If SGS provides return shipping via FedEx overnight, we will assess $100/cooler. We do not charge for local (50mi) courier.

• Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.

SGS can provide pre-preserved bottles, coolers and shipping materials. Certified PFA-free water for equipment decontamination is $5/L.

• We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Samples analyzed for GenX are prepared using a different cartridge from our standard list of analytes. If our standard list of non-GenX analytes is requested, we would need to extract both upon receipt (or, within the 14-day holding time). After extraction, the holding time would be 28-days from extraction to analysis. Extract and hold charges are noted above.

Please can you advise the analyte list for non GenX compounds so that we can compare to our list? Depending on the list you need, we may be able to report all analytes from a single extraction.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 11:58 AM
To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

Hi, Amy. I would like to schedule sending the Quality Control samples for GenX that we discussed last week, and I have a couple of questions:

• How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.
• The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing.
• Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.
• Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of

testing after that time.

- Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.
- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx
Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx
Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx

To: Strynar, Mark[Strynar.Mark@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Satterwhite, Dana[dana.satterwhite@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 8/31/2017 2:58:44 PM
Subject: RE: Chemical Properties of Gen X

Thanks, again, Mark.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 31, 2017 10:56 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Chemical Properties of Gen X

GenX is the ammonium salt of the HFPO-DA. It is very water soluble and will dissociate into the anionic form whether it originates from the acid form (HFPO-DA) or the ammonium form (GenX). I would expect due to its solubility and surfactant like properties that it would be well mixed throughout the water column. I do not know how it interacts with suspended sediment, however as it is similar in structure and size to the C6 perfluoro acid (PFHxA) I would expect limited sorption to sediment with most in the water column dissolved.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 30, 2017 1:22 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: Chemical Properties of Gen X

I would think that it is even distributed throughout the strata. But, I will ask Dr. Strynar for confirmation.

Coincidentally, we were also discussing that here after the conference call this morning.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Culpepper, Linda
Sent: Wednesday, August 30, 2017 12:56 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: Fwd: Chemical Properties of Gen X

Chris - my knowledge is that the GenX compound is hydrophilic. Anything you have to augment the sinking/floating question ?

Sent from my iPhone
Begin forwarded message:

> **From:** "Holman, Sheila" <sheila.holman@ncdenr.gov>
> **Date:** August 30, 2017 at 11:26:35 AM EDT
> **To:** "Culpepper, Linda" <linda.culpepper@ncdenr.gov>
> **Subject: Fwd: Chemical Properties of Gen X**

Can you help me with this question?

Sent from my iPhone
Begin forwarded message:

Resent-From: <SRS0=9nO2==brunswickcountync.gov=david.stanley@securence.com>
From: David Stanley <David.Stanley@brunswickcountync.gov>
Date: August 30, 2017 at 10:57:38 AM EDT
To: "Holman, Sheila" <sheila.holman@ncdenr.gov>, "Shehee, Mina" <mina.shehee@dhhs.nc.gov>
Cc: Cris Harrelson <cris.harrelson@brunswickcountync.gov>, Ann Hardy <Ann.Hardy@brunswickcountync.gov>
Subject: Chemical Properties of Gen X

Shelia and Mina,

I have a question that has come in regarding the chemical/physical properties of Gen X in water bodies. Does Gen X float or sink when released into the a natural waterbody such as the Cape Fear River?

Thank you,

David M. Stanley III, MPH, REHS
Health and Human Services Executive Director
Brunswick County
910.253.2250

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To: Gregson, Jim[jim.gregson@ncdenr.gov]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; Boehm, Amy (Wilmington)[Amy.Boehm@sgs.com]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]
From: Johnson, Chris
Sent: Fri 8/18/2017 3:34:22 PM
Subject: RE: QC Samples

Amy, would you rather have your courier pick them up at the Wilmington regional office or have them delivered to your lab?

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Gregson, Jim
Sent: Friday, August 18, 2017 11:33 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>
Subject: RE: QC Samples

Yes and we will be happy to deliver them if we need to.

Jim Gregson
Regional Supervisor
Water Quality Regional Operations Section
Division of Water Resources
Department of Environmental Quality

910.796.7215 Reception Desk
910.796.7386 Direct
910.350.2004 Fax
Jim.gregson@ncdenr.gov

Wilmington Regional Office
127 Cardinal Drive Ext
Wilmington, NC 28405

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From: Johnson, Chris
Sent: Friday, August 18, 2017 11:08 AM
To: Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Can I proceed with shipment of 1/each 1-liter bottles for the 4 parameters? If so, I will get them to the Wilmington office where they will hold onto them for you. OK, Jim? Should be there on Tuesday.

Parameters to ship will be a blank, two spiked reagent grade water samples and a sample containing the analytes of concern in river water.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Chris,

We normally use 250 mL for a sampling volume; 1 L will be more than enough to perform both extractions.

I can potentially set up for an analysis similar to what you're describing. It would require some lead time for development and to get everything operational.

Allen

Allen Martin
Environment, Health & Safety
Method Development Manager

SGS North America
5500 Business Dr.
Wilmington, NC 28405-8446

Phone: +1 (910) 350-1903
Toll Free: +1 (866) 846-8290
Fax: +1 (910) 350-1557
E-mail: allen.martin@sgs.com

From: Boehm, Amy (Wilmington)
Sent: Thursday, August 17, 2017 6:02 PM
To: Johnson, Chris; Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Allen – please can you respond to the email string on this semi-quantitative approach for the 'sister' analytes, and sample volume?
Thanks!
Amy

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Sent: Thursday, August 17, 2017 5:39 PM

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Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

Chris I sent you additional details earlier on concentration and other sample details.

Mark

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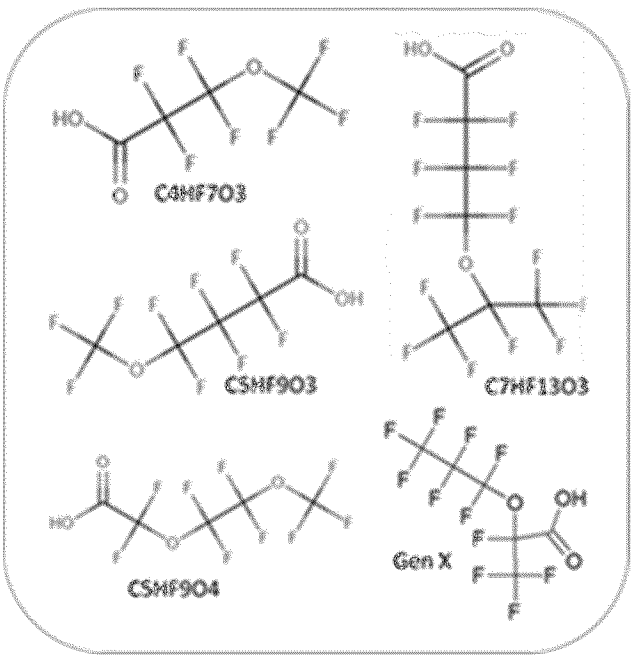

Chris Johnson
NC DEQ-DWR
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Sent: Thursday, August 17, 2017 1:11 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar.Mark@epa.gov; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>
Subject: RE: QC Samples

Hi Chris – Please see below. Feel free to call email if you have any further questions. Thank you!
Amy

• How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.

SGS Wilmington can courier samples to the lab within 50 miles of the lab. We can make arrangements for longer distances, negotiated on a case-by-case basis. The lab also receives samples by courier, FedEx, UPS Monday-Friday during business hours and 9 a.m.- noon on Saturday. Our shipping address is: SGS, 5500 Business Drive, Wilmington, NC 28405.

• The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing. Yes, the lab will analyze up to 5 PT samples to assess capability at no cost. These samples will be expedited to the extent possible with a target TAT of 5-business-days.

• Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.

The target TAT is 5-business days for the capability samples from receipt of samples to final reporting via email/upload.

• Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of testing after that time.

Analysis of samples is $250/sample/test for PFAs,10-business day TAT. 5-business day TAT is 2X above that base cost. Extract and hold for later analysis is $125/sample. If SGS provides return shipping via FedEx overnight, we will assess $100/cooler. We do not charge for local (50mi) courier.

• Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.

SGS can provide pre-preserved bottles, coolers and shipping materials. Certified PFA-free water for equipment decontamination is $5/L.

• We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Samples analyzed for GenX are prepared using a different cartridge from our standard list of analytes. If our standard list of non-GenX analytes is requested, we would need to extract both upon receipt (or, within the 14-day holding time). After extraction, the holding time would be 28-days from extraction to analysis. Extract and hold charges are noted above.

Please can you advise the analyte list for non GenX compounds so that we can compare to our list? Depending on the list you need, we may be able to report all analytes from a single extraction.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 11:58 AM
To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

Hi, Amy. I would like to schedule sending the Quality Control samples for GenX that we discussed last week, and I have a couple of questions:

• How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.

- The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing.
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- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx

To: Johnson, Chris[chris.johnson@ncdenr.gov]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]; Gregson, Jim[jim.gregson@ncdenr.gov]
From: Boehm, Amy (Wilmington)
Sent: Fri 8/18/2017 3:31:24 PM
Subject: RE: QC Samples

Hi Chris – That's fine by SGS. Again, we can only run for the Method 537 analytes (truncated PFAC-MXA list only), plus GenX.

We currently do not have capability for those handful of GenX 'sister' analytes. Allen advises that we do not have standards for those add on analytes, nor the capability, currently, to report "semi-quantitaive", "TIC"-like information.

Thanks,
Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Friday, August 18, 2017 11:08 AM
To: Martin, Allen (Wilmington); Boehm, Amy (Wilmington); Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Can I proceed with shipment of 1/each 1-liter bottles for the 4 parameters? If so, I will get them to the Wilmington office where they will hold onto them for you. OK, Jim? Should be there on Tuesday.

Parameters to ship will be a blank, two spiked reagent grade water samples and a sample containing the analytes of concern in river water.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Martin, Allen (Wilmington) [mailto:Allen.Martin@sgs.com]
Sent: Thursday, August 17, 2017 7:11 PM
To: Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>; Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Chris,

We normally use 250 mL for a sampling volume; 1 L will be more than enough to perform both extractions.

I can potentially set up for an analysis similar to what you're describing. It would require some lead time for development and to get everything operational.

Allen

Allen Martin
Environment, Health & Safety

Method Development Manager

SGS North America
5500 Business Dr.
Wilmington, NC 28405-8446

Phone: +1 (910) 350-1903
Toll Free: +1 (866) 846-8290
Fax: +1 (910) 350-1557
E-mail: allen.martin@sgs.com

From: Boehm, Amy (Wilmington)
Sent: Thursday, August 17, 2017 6:02 PM
To: Johnson, Chris; Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Allen – please can you respond to the email string on this semi-quantitative approach for the 'sister' analytes, and sample volume?
Thanks!
Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 5:39 PM
To: Boehm, Amy (Wilmington); Strynar, Mark
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Also, the EPA lab is looking at the associated compounds semi-quantitatively. You may not necessarily need to run a curve for each compound, but report them as they correlate to other standards. I believe this is similar (but more reliable) to reporting tentatively identified compounds from a single-quadrupole mass spectrometer. Again, Mark is the expert and can clarify and/or correct where I've strayed.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 4:59 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Thank you Mark and Chris – Attached, please find a copy of our COC form.

We are happy to pick-up the samples when they are available in Wilmington. Please just call or email me when they are ready and we can go get them.

We currently do not analyze for the GenX 'sister' compounds noted below. That is something that may be developed in future, but are not analytes we can currently report.

Please can you provide the exact list of analytes (or CofA) in that Wellington PFAC-MXA list? Their website does not seem to have this information and I will need that to set up the correct list and method. Depending on that list, we may need two aliquots of each test sample as we may need to extract by two different methods. Again, just depends on that list of compounds needed.

Thank you!
Amy

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 17, 2017 3:18 PM
To: Johnson, Chris; Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

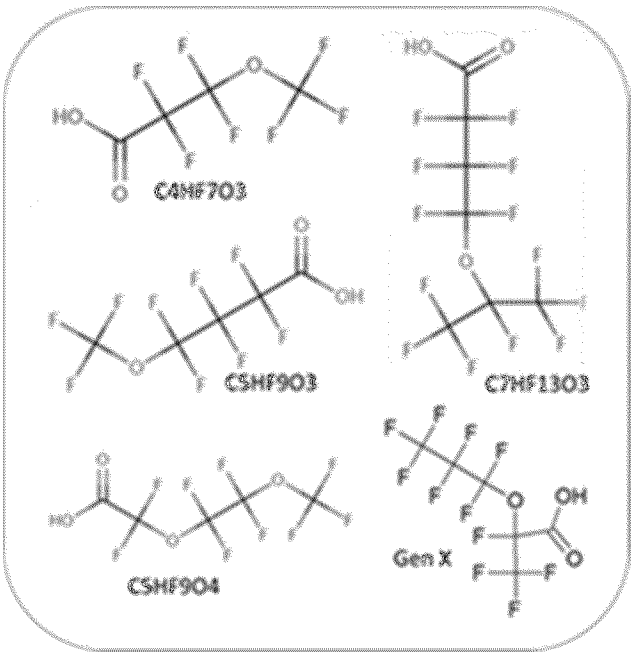
Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 3:01 PM
To: Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

I provided a list of associated compounds below. We are going to meet with EPA in the next few days to get more information on these compounds, so I will have a definitive list after that meeting. In the meantime, I have the QC samples available and ready to ship. We have a state courier that goes to the Wilmington Regional Office, so that may be the most economical shipping method. Your courier could pick them up there (Cardinal Drive Extension) if that's OK. The next courier run is on Monday, so they would be there on Tuesday. Please forward any paperwork you want completed to my attention later today or tomorrow and I will include in the shipment.

Here is the original list of what was being spiked into our earlier QC samples. The EPA laboratory has been extracting all these compounds by the same technique I believe. If not, Mark can correct me. These new samples should be similar:



Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 1:11 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar.Mark@epa.gov; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>
Subject: RE: QC Samples

Hi Chris – Please see below. Feel free to call email if you have any further questions. Thank you!
Amy

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.

  SGS Wilmington can courier samples to the lab within 50 miles of the lab. We can make arrangements for longer distances, negotiated on a case-by-case basis. The lab also receives samples by courier, FedEx, UPS Monday-Friday during business hours and 9 a.m.- noon on Saturday. Our shipping address is: SGS, 5500 Business Drive, Wilmington, NC 28405.

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  SGS can provide pre-preserved bottles, coolers and shipping materials. Certified PFA-free water for equipment decontamination is $5/L.

- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

  Samples analyzed for GenX are prepared using a different cartridge from our standard list of analytes. If our standard list of non-GenX analytes is requested, we would need to extract both upon receipt (or, within the 14-day holding time). After extraction, the holding time would be 28-days from extraction to analysis. Extract and hold charges are noted above.

  Please can you advise the analyte list for non GenX compounds so that we can compare to our list? Depending on the list you need, we may be able to report all analytes from a single extraction.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 11:58 AM
To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

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Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality

Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx
Information in this email and any attachments is confidential and intended solely for the use of the individual(s) to whom it is addressed or otherwise directed. Please note that any views or opinions presented in this email are solely those of the author and do not necessarily represent those of the Company. Finally, the recipient should check this email and any attachments for the presence of viruses. The Company accepts no liability for any damage caused by any virus transmitted by this email. All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx

To: Strynar, Mark[Strynar.Mark@epa.gov]; Boehm, Amy (Wilmington)[Amy.Boehm@sgs.com]; Johnson, Chris[chris.johnson@ncdenr.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]; Gregson, Jim[jim.gregson@ncdenr.gov]
From: Martin, Allen (Wilmington)
Sent: Fri 8/18/2017 1:05:21 PM
Subject: RE: QC Samples

Thank you Mark.

Allen

Allen Martin
Environment, Health & Safety
Method Development Manager

SGS North America
5500 Business Dr.
Wilmington, NC 28405-8446

Phone: +1 (910) 350-1903
Toll Free: +1 (866) 846-8290
Fax: +1 (910) 350-1557
E-mail: allen.martin@sgs.com

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Sent: Friday, August 18, 2017 6:24 AM
To: Boehm, Amy (Wilmington); Johnson, Chris
Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
Subject: RE: QC Samples

Here are the ten PFAS found in the Wellington PFAC MXA standard solution mixture.

Mark

From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 4:59 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
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need two aliquots of each test sample as we may need to extract by two different methods. Again, just depends on that list of compounds needed.

Thank you!
Amy

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Subject: RE: QC Samples

Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

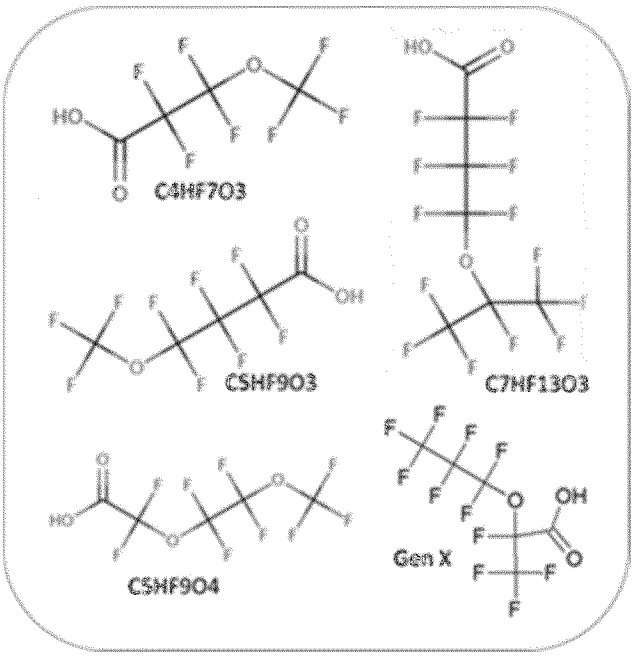
Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 3:01 PM
To: Boehm, Amy (Wilmington) <Amy.Boehm@sgs.com>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

I provided a list of associated compounds below. We are going to meet with EPA in the next few days to get more information on these compounds, so I will have a definitive list after that meeting. In the meantime, I have the QC samples available and ready to ship. We have a state courier that goes to the Wilmington Regional Office, so that may be the most economical shipping method. Your courier could pick them up there (Cardinal Drive Extension) if that's OK. The next courier run is on Monday, so they would be there on Tuesday. Please forward any paperwork you want completed to my attention later today or tomorrow and I will include in the shipment.

Here is the original list of what was being spiked into our earlier QC samples. The EPA laboratory has been extracting all these compounds by the same technique I believe. If not, Mark can correct me. These new samples should be similar:



Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 1:11 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar.Mark@epa.gov; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>
Subject: RE: QC Samples

Hi Chris – Please see below. Feel free to call email if you have any further questions. Thank you!
Amy

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.

  SGS Wilmington can courier samples to the lab within 50 miles of the lab. We can make arrangements for longer distances, negotiated on a case-by-case basis. The lab also receives samples by courier, FedEx, UPS Monday-Friday during business hours and 9 a.m.- noon on Saturday. Our shipping address is: SGS, 5500 Business Drive, Wilmington, NC 28405.

- The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing. Yes, the lab will analyze up to 5 PT samples to assess capability at no cost. These samples will be expedited to the extent possible with a target TAT of 5-business-days.

- Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.

  The target TAT is 5-business days for the capability samples from receipt of samples to final reporting via email/upload.

- Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of testing after that time.

  Analysis of samples is $250/sample/test for PFAs,10-business day TAT. 5-business day TAT is 2X above that base cost. Extract and hold for later analysis is $125/sample. If SGS provides return shipping via FedEx overnight, we will assess $100/cooler. We do not charge for local (50mi) courier.

- Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.

  SGS can provide pre-preserved bottles, coolers and shipping materials. Certified PFA-free water for equipment decontamination is $5/L.

- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

  Samples analyzed for GenX are prepared using a different cartridge from our standard list of analytes. If our standard list of non-GenX analytes is requested, we would need to extract both upon receipt (or, within the 14-day holding time). After extraction, the holding time would be 28-days from extraction to analysis. Extract and hold charges are noted above.

  Please can you advise the analyte list for non GenX compounds so that we can compare to our list? Depending on the list you need, we may be able to report all analytes from a single extraction.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 11:58 AM
To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

Hi, Amy. I would like to schedule sending the Quality Control samples for GenX that we discussed last week, and I have a couple of questions:

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.
- The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing.
- Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.
- Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of testing after that time.
- Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.
- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality

Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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To: Bob Pullano[rlp@gel.com]; bob.pullano@gel.com[bob.pullano@gel.com]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Mrkt@gel.com[Mrkt@gel.com]; Jannie Shaw-Busby@gel.com[jls@gel.com]
From: Johnson, Chris
Sent: Tue 9/5/2017 8:53:13 PM
Subject: RE: QC Samples

OK. Thank you Bob. I will be looking for the shipping instructions.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Bob Pullano [mailto:rlp@gel.com]
Sent: Tuesday, September 05, 2017 4:16 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; bob.pullano@gel.com
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Mrkt@gel.com; Jannie Shaw-Busby@gel.com <jls@gel.com>
Subject: Re: QC Samples

Chris,

I've spoken to our Marketing Group about your initial request. There was some miscommunication on my part, we certainly will analyze your four samples at no charge.

We'll have our Project Manager get with you on shipping instructions. Please don't hesitate to contact me for any additional information.

We look forward to participating in the study!

-Bob

On 9/5/2017 3:40 PM, Johnson, Chris wrote:

Good afternoon, Bob. Based on the quote we received, it looks like GEL will require payment for analyzing our vetting samples. The other laboratories participated in this QC testing free of charge. I don't imagine I will get approval for paying for this initial evaluation. But, if others involved vote to go that route, I will contact you for shipping instructions. Thanks for your assistance and your time.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Johnson, Chris
Sent: Thursday, August 31, 2017 12:03 PM
To: 'bob.pullano@gel.com' <bob.pullano@gel.com>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; 'Strynar, Mark' <Strynar.Mark@epa.gov>
Subject: FW: QC Samples

Good afternoon, Bob. Thanks for talking to me about GEL and the GenX vetting samples. Attached and below, you will find the information that was provided to the other contract laboratories regarding this QC testing. I have the set of samples ready to ship once you confirm GEL's interest and shipping instructions. If you decide to proceed, we would also need details regarding sample pricing and turn-around times. Please let me know if you have additional questions.

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908 ext224

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Friday, August 18, 2017 6:24 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Here are the ten PFAS found in the Wellington PFAC MXA standard solution mixture.

Mark

From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, August 17, 2017 3:18 PM
To: Johnson, Chris;
Cc: Culpepper, Linda; Huffman, Gregson, Jim
Subject: RE: QC Samples

Chris,

That is correct. We also spiked into the same samples a mixed PFAS standard from Wellington Labs called PFAC MXA. It is made up of the C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS (http://www.well-labs.com/docs/nat_and_ml_pfac24_17nov2016_wellington_reporter.pdf)

If they are running method 537 these are very familiar analytes.

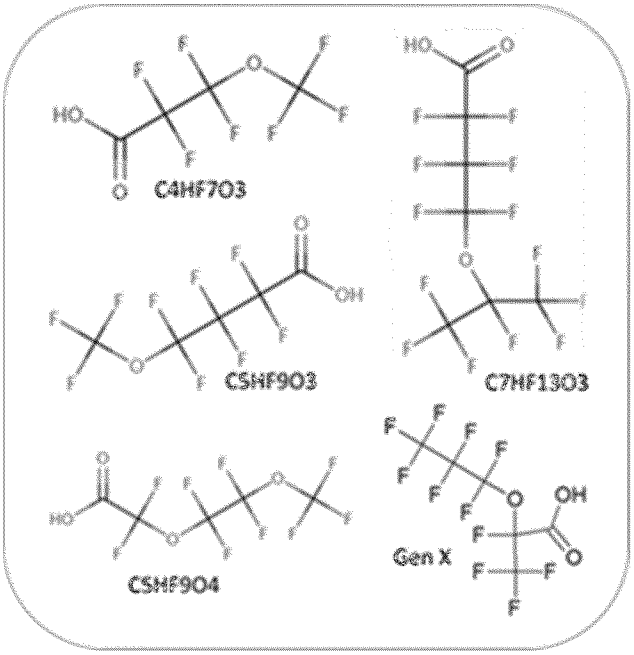
Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, August 17, 2017 3:01 PM

I provided a list of associated compounds below.

Here is the original list of what was being spiked into our earlier QC samples. The EPA laboratory has been extracting all these compounds by the same technique I believe. If not, Mark can correct me. These new samples should be similar:



Chris Johnson
NC DEQ-DWR
Water Sciences Section

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--

Bob Pullano
Director, Quality Systems
2040 Savage Road, Charleston, SC 29407 | PO Box 30712, Charleston, SC 29417
Office Main: 843.556.8171 Ext. 4429 | Fax: 843.766.1178
E-Mail: rlp@gel.com | Website: www.gel.com
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http://www.gellaboratories.com

To: Boehm, Amy (Wilmington)[Amy.Boehm@sgs.com]
Cc: Strynar, Mark[Strynar.Mark@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]
From: Johnson, Chris
Sent: Tue 9/5/2017 7:47:17 PM
Subject: RE: SGS/WO#31700745 report - GenX and others

Hi, Amy. Based on initial review, your data looks good. We are still evaluating other data, but hope to come to a decision very soon. We may have other resources for you as time goes on, such as some suggestions from the EPA laboratory. Thank you for your continued interest and communication with us.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Tuesday, September 05, 2017 3:15 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>
Subject: RE: SGS/WO#31700745 report - GenX and others

Hi Chris – Just checking in to see if you had the chance to review the data for PFAs and GenX sent last week? As you can imagine, folks here are very curious to hear any feedback you may have for us!

Thank you!

Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Tuesday, August 29, 2017 3:59 PM
To: Boehm, Amy (Wilmington)
Cc: Strynar, Mark; Culpepper, Linda; Martin, Allen (Wilmington); Milholland, Jeannie (Wilmington); McGuire, Brian (West Creek); Schoenwiesner, Brian bws (Wilmington)
Subject: RE: SGS/WO#31700745 report - GenX and others

Received. Thank you, Amy.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Tuesday, August 29, 2017 3:51 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>
Subject: SGS/WO#31700745 report - GenX and others

Hi Chris – Attached, the level II report for PFAs and GenX for the capability study samples.

Thanks again for this opportunity to assist you. All of us on the SGS team look forward to any feedback you may have for us. Please don't hesitate to call or email with any questions you may have, or if we may be of any further assistance.

Best regards,

Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Monday, August 28, 2017 3:41 PM
To: Boehm, Amy (Wilmington)
Cc: Strynar, Mark; Culpepper, Linda; Martin, Allen (Wilmington); Milholland, Jeannie (Wilmington); McGuire, Brian (West Creek); Schoenwiesner, Brian bws (Wilmington)
Subject: RE: SGS/WO#31700745 login - GenX and others

Great news, Amy. Thanks for the update. We look forward to seeing the data.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Monday, August 28, 2017 3:24 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>
Subject: RE: SGS/WO#31700745 login - GenX and others

Thanks Chris – All's well and we are working on the data review now. I anticipate getting final data out to you tomorrow (day 5).

The only issues encountered so far were levels of GenX in one of the samples above of our upper calibration range. That sample (I expect that is the river water sample) had to be re-prepped at a smaller volume, but results are consistent with the previous runs.

I'll send the final results to you as soon as the final review and reporting is completed.

Thanks for checking in and the offer of help!

Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Monday, August 28, 2017 3:15 PM
To: Boehm, Amy (Wilmington)
Cc: Strynar, Mark; Culpepper, Linda
Subject: RE: SGS/WO#31700745 login - GenX and others

Hi, Amy. How is the testing coming along? A reminder that Mark Strynar from EPA/ORD is available for questions as you progress

through the testing. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Tuesday, August 22, 2017 11:06 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>
Subject: SGS/WO#31700745 login - GenX and others

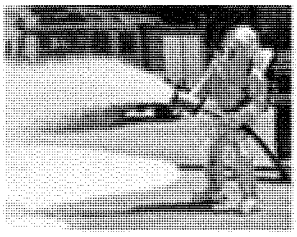
Hi Chris – The capability study samples arrived safely this a.m. Attached, is the login detail. Please call or email with any questions you may have, and thanks again for this opportunity!

Amy

Amy J. Boehm
Environmental Division
Senior Project Manager

SGS North America
5500 Business Drive
Wilmington NC, 28405

Direct Dial: 910-667-0135
General Phone: 910-350-1903 x 309
Fax: 910-350-1557
Email: amy.boehm@sgs.com



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Sent: Tue 9/5/2017 7:40:59 PM
Subject: RE: QC Samples

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Chris Johnson
NC DEQ-DWR
Water Sciences Section

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Chris Johnson
NC DEQ-DWR
Water Sciences Section
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Subject: RE: QC Samples

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Subject: RE: QC Samples

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If they are running method 537 these are very familiar analytes.

Chris I sent you additional details earlier on concentration and other sample details.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
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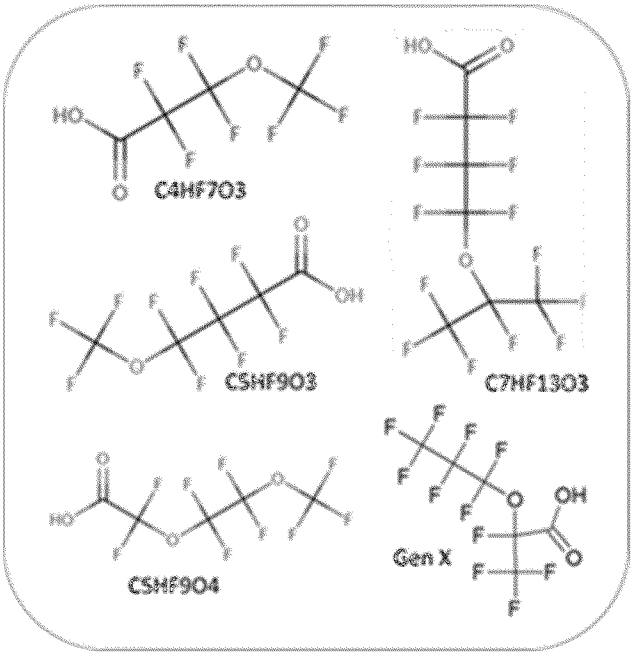

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]; Gregson, Jim[jim.gregson@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 8/17/2017 9:34:38 PM
Subject: RE: QC Samples

We do have additional aliquots of the QC samples since one of the other laboratories we were vetting has said they don't have capacity for the work, but do you think you could get what you need from one 1-liter sample? That is what we are sending for each of the QC materials.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
Sent: Thursday, August 17, 2017 4:59 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Pellechia, Geoffrey (Marlborough) <Geoffrey.Pellechia@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Gregson, Jim <jim.gregson@ncdenr.gov>
Subject: RE: QC Samples

Thank you Mark and Chris – Attached, please find a copy of our COC form.

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Cc: Culpepper, Linda; Huffman, David J; Schoenwiesner, Brian bws (Wilmington); Milholland, Jeannie (Wilmington); Martin, Allen (Wilmington); Pellechia, Geoffrey (Marlborough); McGuire, Brian (West Creek); Gregson, Jim
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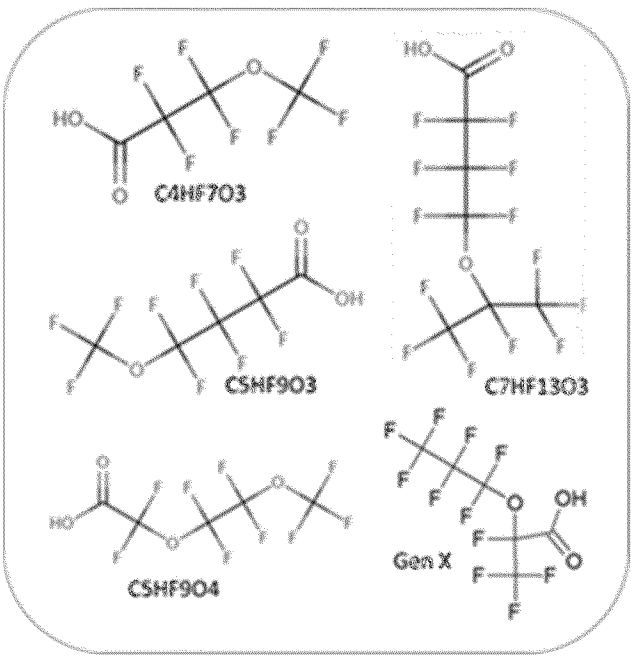

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
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To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

Hi, Amy. I would like to schedule sending the Quality Control samples for GenX that we discussed last week, and I have a couple of questions:

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.
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Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

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Raleigh, NC 27607

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From: Boehm, Amy (Wilmington)
Sent: Thur 8/17/2017 8:59:19 PM
Subject: RE: QC Samples
COC_SGS_ENVI_ILM_ShaleConvCoC_US_13.pdf

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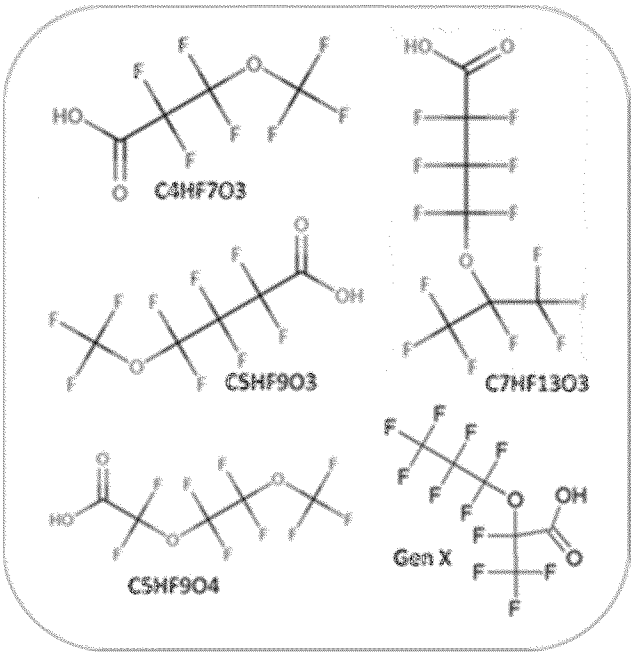

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CHAIN OF CUSTODY | CONVENTIONAL & SHALE

PROJECT INFO:

PROJECT:

P.O. #:

QUOTE #:

SITE REF:

TURN AROUND TIME:

REPORT LEVEL: (see reverse) ☐ Level I ☐ Level II ☐ Level IV

SPECIAL DELIVERABLES: ☐ State of Origin:
☐ EDD: ☐ Other:

SEND DOCUMENTATION / RESULTS TO:

COMPANY:

CONTACT:

ADDRESS:

PHONE:

EMAIL:

INVOICE TO: (☐ CHECK IF SAME)

COMPANY: CONTACT:

ADDRESS:

PHONE:

EMAIL:

SPECIAL INSTRUCTIONS / COMMENTS:

LAB ID	SAMPLE ID / DESCRIPTION	DATE	TIME	QC MS	QC MSD	QC DUP	TYPE (C, G)	MATRIX	CONT. QTY	PRESERVATIVE										ANALYSIS & METHOD										REMARKS

COLLECTED/RELINQUISHED BY (1):	DATE:	TIME:	RECEIVED BY:	RECEIVED BY LABORATORY:	DATE:	TIME:
				COC SEAL: ☐ *INTACT* ☐ *BROKEN* ☐ *ABSENT*		
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:	SAMPLE RECEIPT TEMP: °C		
				CARRIER:	TRACKING #:	
				NOTES:		

SGS NORTH AMERICA INC. | **ENVIRONMENTAL SERVICES** 5500 Business Drive Wilmington, NC 28405 910 350 1903 | 910 794 1613 **www.sgs.com**

Member of the SGS Group (SGS SA)

CONVENTIONAL REPORTS

SECTION	CONTENTS	I	II	IV
GENERAL BACKGROUND	Cover Page with a Glossary of Qualifiers	X	X	X
	Signature Page Authorizing the Release of the Report	X	X	X
	Case Narrative	TBD	X	X
	Chain of Custody Records	X	X	X
	Sample Receipt Form Change Orders Email Correspondence			X
ANALYTICAL RESULTS	Result Forms with Surrogate Recoveries	X	X	X
	QC Report (Method Blanks, LCS/LCSD, MS/MSD, Leachate Blanks)		X	X
SECTIONS	Raw Data including Chromatograms for Samples & QC			X
	All Analytical Data Including Prep Sheets & Run Logs			X
	Initial Calibration & Continuing Calibration Data			X

SAMPLE ACCEPTANCE POLICY

The Sample Acceptance Policy is a NELAC requirement that outlines the circumstances under which samples are accepted or rejected. Data from any samples that do not meet the following criteria are qualified in a manner that clearly defines the nature and substance of the variation. The most relevant ones are captured on the sample receipt login form.

The following information should be provided, at minimum, as well as other areas of concern:

- Sample identification, date/time and location of collection
- Preservation type
- Collector's name
- Sample type
- Unique ID (indelible ink) on the water-resistant container label
- Use of appropriate containers (Teflon®-lined top glass amber or protected from light)
- Adherence to specified holding times
- Adequate sample volume (enough for a repeat analysis)

When samples are received in condition that could possibly alter the sample integrity including some of the above requirements, SGS AP will contact the client for resolution of the issues. Generally, SGS AP will assess the sample condition and offer an opinion on the suitability of the samples submitted for analysis.

Please note that samples will be disposed of 90 days following the issuance of a report unless an archiving request is noted. If samples are archived charges may be assessed after 90 days in the freezer or 12 months in cold storage.

NELAC REQUIREMENTS

Under NELAC, we are required to inform our clients who request analyses by SW846 methodology that either a matrix spike (MS)/matrix spike duplicate (MSD) set, or a MS/sample duplicate (DUP) set be analyzed with each prep batch. The samples chosen for this purpose must be clearly identified on the documentation accompanying the samples.

Our COC is modified so that this identification can be made easily. Indicate by marking "yes" or 'X" in the box next to samples which require MS/MSD and/or sample duplicate tests. THESE QC SAMPLES ARE BILLABLE AT THE UNIT RATE.

SGS will provide batch QC for any projects that DO NOT provide the necessary sample volumes if at all possible. SGS will narrate any projects that do not have the required matrix spike (MS)/matrix spike duplicate (MSD) set, or a MS/sample duplicate (DUP) set.

Thank you for your attention and cooperation.

TERMS & CONDITIONS

All services are rendered in accordance with the applicable SGS General Conditions of Service accessible via:

http://www.sgs.com/terms_and_conditions.htm

CONTACTS

SGS NORTH AMERICA INC.
ENVIRONMENTAL SERVICES
5500 Business Drive, Wilmington, NC 28405
Phone: +1 910 350 1903 | +1 910 794 1613
Toll Free: +1 866 846 8290
Fax: +1 910 350 1557
na.environmental@sgs.com
www.sgs.com

Operations
Phillip Hanna, PhD, Vice President phillip.hanna@sgs.com

Technical
Bryan Vining, PhD, Director bryan.vining@sgs.com

Quality Assurance
Jeannie Millholland, Officer jeannie.millholland@sgs.com

Project Delivery
Randy Wright, Manager randy.wright@sgs.com
Michael Page, Manager michael.page@sgs.com

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SGS-00055 (09/13)
WHITE - Retained by Lab
YELLOW - Retained by Client

WHEN YOU NEED TO BE SURE

To: Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 8/17/2017 5:05:07 PM
Subject: RE: Region 4 lab

That's great. I am preparing to head over there now. Thanks, Mark.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Region 4 lab

Chris,

We just wanted to let you know what we are providing you today for proficiency testing. I am unsure how much you want to share with the contract labs. Nitric acid was NOT added to any sample prepared here.

(lab blank)
(3) replicates labeled QCA-1 to QCA-3: containing 1.0 L of DI water in 1 L HDPE bottle (lab blank)

(low spike)
(3) replicates labeled QCB-1 to QCB-3: containing 1.0 L of DI water in 1 L HDPE bottle with 150 ng/L of GenX (and 4 associated PFECAs) and 150 ng/L of a Wellington mixed PFAS standard (PFAC MXA C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS)

(high spike)
(3) replicates labeled QCC-1 to QCC-3: containing 1.0 L of DI water in 1 L HDPE bottle with 1000 ng/L of GenX (and 4 associated PFECAs) and 1000 ng/L of a Wellington mixed PFAS standard (PFAC MXA C4-C10 perfluorocarboxylic acids, PFBS, PFHxS and PFOS)

(CFR water)
(3) replicates labeled QCD-1 to QCD-3: containing 1.0 L of water consisting of: [the Chemours outfall 002 from 5/15-17, the Cape Fear River water upstream of Chemours, DI water in the ration 1:2:1] mixed in a large container and aliquoted into 3 separate bottles.

A replicate of the above sample (QCD-4) for EPA analysis was retained for comparison to contract lab values which will be analyzed internally.

See you soon.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 5:32 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: Region 4 lab

Mark, who would be our contact for the Region 4 laboratory? Thanks.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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To: Johnson, Chris[chris.johnson@ncdenr.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Milholland, Jeannie (Wilmington)[Jeannie.Milholland@sgs.com]; Schoenwiesner, Brian bws (Wilmington)[Brian.Schoenwiesner@sgs.com]; Martin, Allen (Wilmington)[Allen.Martin@sgs.com]; McGuire, Brian (West Creek)[Brian.McGuire@sgs.com]; Pellechia, Geoffrey (Marlborough)[Geoffrey.Pellechia@sgs.com]
From: Boehm, Amy (Wilmington)
Sent: Wed 8/16/2017 6:10:29 PM
Subject: RE: QC Samples

Hi Chris – Thanks you for the email. I will confer with the lab to respond to your questions below. I'll respond to your questions below you as soon as I hear from the team here.

Best regards,
Amy

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 11:58 AM
To: Boehm, Amy (Wilmington)
Cc: Culpepper, Linda; Strynar.Mark@epa.gov; Huffman, David J
Subject: QC Samples

Hi, Amy. I would like to schedule sending the Quality Control samples for GenX that we discussed last week, and I have a couple of questions:

- How do you want to receive the samples? If they are to be shipped to your laboratory, please provide shipping information.
- The initial check samples will be provided by an EPA laboratory. Confirm that these samples can be tested and reported at no cost to evaluate capability. If not, please estimate costs for the initial capability testing.
- Provide timetable for reporting the initial capability results. We are on a strict timetable to make a decision on what laboratory to use.
- Provide estimated pricing and turn-around times for 8-10 samples per week, and include any shipping costs that may be involved. This scope of work will be on the order of 3-6 weeks, but could potentially be longer depending on the status of testing after that time.
- Provide sampling details, including preservation and shipping requirements. Indicate the types of sampling materials needed and whether your laboratory will provide the materials to be used.
- We are interested in GenX results initially, but would like the option of having the data reprocessed at a later time to report any associated per- or poly-fluorinated compounds detected. Confirm that this is an option.

Please contact me if you need more information or have questions. Laboratory personnel at the EPA have indicated that they would be happy to discuss methodology if you want. Thank you.

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Water Sciences Section / Organic Chemistry Branch

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To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Wed 8/30/2017 7:02:52 PM
Subject: RE: SGS/WO#31700745 report - GenX and others

Thanks. Also, please see Linda Culpepper's request:

"Please also ask Dr. Strynar for his full list of chemicals they analyze for – he mentioned a list during our visit at EPA."

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, August 30, 2017 1:34 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: SGS/WO#31700745 report - GenX and others

Starting to look at it now.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 30, 2017 10:47 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: FW: SGS/WO#31700745 report - GenX and others

Mark, can you look at this report and give me your impressions about the results? Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Boehm, Amy (Wilmington) [mailto:Amy.Boehm@sgs.com]
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To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Martin, Allen (Wilmington) <Allen.Martin@sgs.com>; Milholland, Jeannie (Wilmington) <Jeannie.Milholland@sgs.com>; McGuire, Brian (West Creek) <Brian.McGuire@sgs.com>; Schoenwiesner, Brian bws (Wilmington) <Brian.Schoenwiesner@sgs.com>
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Environmental Division
Senior Project Manager

SGS North America
5500 Business Drive
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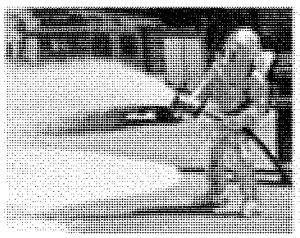
Direct Dial: 910-667-0135
General Phone: 910-350-1903 x 309
Fax: 910-350-1557
Email: amy.boehm@sgs.com



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From: Johnson, Chris
Sent: Tue 8/29/2017 7:59:17 PM
Subject: RE: SGS/WO#31700745 report - GenX and others

Received. Thank you, Amy.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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General Phone: 910-350-1903 x 309
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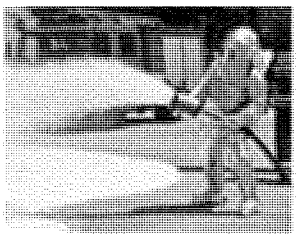
Email: amy.boehm@sgs.com



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31700745_FINAL.pdf

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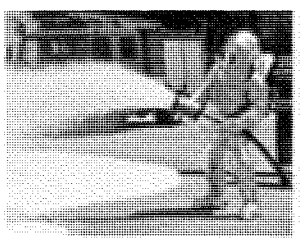

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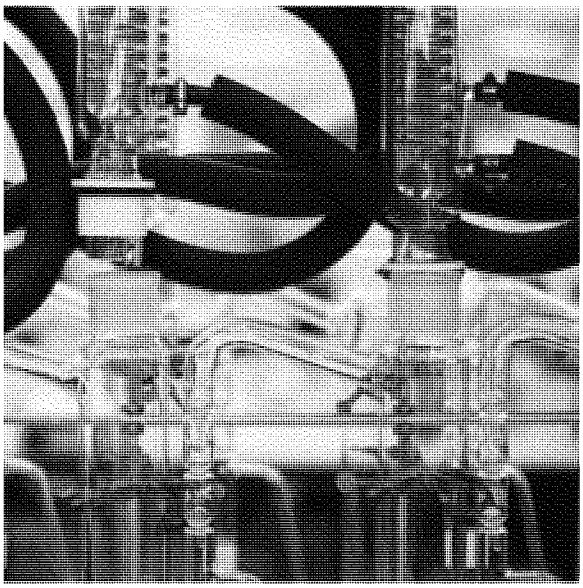

FINAL LAB REPORT

Gen X Etal Test

31700745

29-Aug-2017

Prepared by

SGS NORTH AMERICA

Prepared for

NC DENR DWR WBS Chemistry Lab

Chris Johnson

eel
IC
733
EN

This report is approve

Amy J. Boehm

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Project Manager

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Results reported relate only to the items tested.

SGS CERTIFICATIONS

Arkansas	88-0682
California (ELAP)	ELAP Cert #2914
CLIA	34D1013708
Connecticut	PH-0258
USDA Soil Permit	P330-17-00055
DoD	2726.01
Florida (Primary NELAP)	E87634
ISO 17025/IEC	2726.01
Louisiana DEQ	4115
Louisiana DOH	LA170030
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317
New Jersey	NC100
New York	11685
North Carolina DEQ	481
North Dakota	R-197
Oregon	NC200002
Pennsylvania	68-03675
South Carolina	99029002
Texas	T104704260
US Coast Guard	16714/159.317/SGS
Virginia	8914
Washington	C913
West Virginia	293

Rev. 04-Aug-2017

Laboratory Qualifiers

Report Definitions

DL	Method, Instrument, or Estimated Detection Limit per Analytical Method
CL	Control Limits for the recovery result of a parameter
LOQ	Reporting Limit
DF	Dilution Factor
RPD	Relative Percent Difference
LCS(D)	Laboratory Control Spike (Duplicate)
MS(D)	Matrix Spike (Duplicate)
MB	Method Blank

Qualifier Definitions

*	Recovery or RPD outside of control limits
B	Analyte was detected in the Lab Method Blank at a level above the LOQ
U	Undetected (Reported as ND or < DL)
J	Estimated Concentration.
E	Amount detected is greater than the Upper Calibration Limit
TIC	Tentatively Identified Compound
ND	Not Detected
P	RPD > 40% between results of dual columns
D	Spike or surrogate was diluted out in order to achieve a parameter result within instrument calibration range

Samples requiring manual integrations for various congeners and/or standards are marked and dated by the analyst. A code definition is provided below:

M1	Mis-identified peak
M2	Software did not integrate peak
M3	Incorrect baseline construction (i.e. not all of peak included; two peaks integrated as one)
M4	Pattern integration required (i.e. DRO, GRO, PCB, Toxaphene and Technical Chlordane)
M5	Other - Explained in case narrative

Note Results pages that include a value for "Solids (%)" have been adjusted for moisture content.

Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
QCA-3	31700745001	08/17/2017 14:00	08/22/2017 09:19	Water
QCB-3	31700745002	08/17/2017 14:00	08/22/2017 09:19	Water
QCC-3	31700745003	08/17/2017 14:00	08/22/2017 09:19	Water
QCD-3	31700745004	08/17/2017 14:00	08/22/2017 09:19	Water

Case Narrative

MB for HBN 139851 [HXX/2052]

GenX-W: Actual extracted volume was 50 ml, adjusted to correct spike calculations.

QCC-3

PFC E537-A Native analytes outside range of calibration - 10x dilution performed.

GenX-A Native analyte concentration was outside of the calibration range - 5x dilution performed.

QCD-3

GenX-A Due to the high analyte concentration a smaller aliquot (50 ml) was extracted. The final extract was diluted 2x to bring the analyte concentration within the range of the calibration.

Detectable Results Summary

Client Sample ID: QCA-3
Lab Sample ID:31700745001-B

	Parameter	Result	Units	
EPA 537 v1.1	PFOA	0.205	ng/L	J
	PFDA	0.284	ng/L	J

Client Sample ID: QCB-3
Lab Sample ID:31700745002-B

	Parameter	Result	Units
EPA 537 v1.1	PFBA	134	ng/L
	PFPeA	139	ng/L
	PFHxA	138	ng/L
	PFHpA	143	ng/L
	PFOA	142	ng/L
	PFNA	134	ng/L
	PFDA	133	ng/L
	PFBS	152	ng/L
	PFHxS	155	ng/L
	PFOS	144	ng/L
GenX	HFPO-DA (GenX)	238	ng/L

Client Sample ID: QCC-3
Lab Sample ID:31700745003-B

	Parameter	Result	Units
EPA 537 v1.1	PFBA	803	ng/L
	PFPeA	832	ng/L
	PFHxA	889	ng/L
	PFHpA	876	ng/L
	PFOA	865	ng/L
	PFNA	871	ng/L
	PFDA	896	ng/L
	PFBS	885	ng/L
	PFHxS	890	ng/L
	PFOS	982	ng/L
GenX	HFPO-DA (GenX)	1220	ng/L

Client Sample ID: QCD-3
Lab Sample ID:31700745004-B

	Parameter	Result	Units	
EPA 537 v1.1	PFBA	20.0	ng/L	
	PFPeA	27.4	ng/L	
	PFHxA	12.8	ng/L	
	PFHpA	11.0	ng/L	
	PFOA	5.41	ng/L	
	PFNA	1.50	ng/L	J
	PFDA	0.961	ng/L	J
	PFBS	2.41	ng/L	
	PFHxS	4.49	ng/L	
	PFOS	9.03	ng/L	
GenX	HFPO-DA (GenX)	2370	ng/L	

Results of QCA-3

Client Sample ID: **QCA-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745001-B
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by EPA 537 v1.1

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
PFBA	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFPeA	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFHxA	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFHpA	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFOA	**0.205**	J	0.199	1.99	ng/L	1	08/25/2017 15:01
PFNA	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFDA	**0.284**	J	0.199	1.99	ng/L	1	08/25/2017 15:01
PFBS	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFHxS	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
PFOS	ND	U	0.199	1.99	ng/L	1	08/25/2017 15:01
Surrogates							
13C2-PFHxA	105			70.0-130	%	1	08/25/2017 15:01
13C2-PFDA	104			70.0-130	%	1	08/25/2017 15:01
d5-NEtFOSAA	96.5			70.0-130	%	1	08/25/2017 15:01

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HKX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 08/23/2017 08:36
Prep Initial Wt./Vol.: 250.86 mL
Prep Extract Vol: 1 mL

Results of QCA-3

Client Sample ID: **QCA-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745001-A
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	4.92	9.85	ng/L	1	08/23/2017 18:08
Surrogates							
13C-GenX	80.5			70.0-130	%	1	08/23/2017 18:08

Batch Information

Analytical Batch: XLC1061
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2050
Prep Method: GenX Prep
Prep Date/Time: 08/24/2017 08:38
Prep Initial Wt./Vol.: 253.93 mL
Prep Extract Vol: 1 mL

Print Date: 08/29/2017

N.C. Certification # 481

Results of QCB-3

Client Sample ID: **QCB-3**
Client Project ID: **Gen X Final Test**
Lab Sample ID: 31700745002-B
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by EPA 537 v1.1

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
PFBA	**134**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFPeA	**139**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFHxA	**138**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFHpA	**143**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFOA	**142**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFNA	**134**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFDA	**133**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFBS	**152**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFHxS	**155**		0.198	1.98	ng/L	1	08/25/2017 15:32
PFOS	**144**		0.198	1.98	ng/L	1	08/25/2017 15:32
Surrogates							
13C2-PFHxA	92.2			70.0-130	%	1	08/25/2017 15:32
13C2-PFDA	102			70.0-130	%	1	08/25/2017 15:32
d5-NEtFOSAA	92.4			70.0-130	%	1	08/25/2017 15:32

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HKX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 08/23/2017 08:36
Prep Initial Wt./Vol.: 252.34 mL
Prep Extract Vol: 1 mL

Results of QCB-3

Client Sample ID: **QCB-3**
Client Project ID: **Gen X Eval Test**
Lab Sample ID: 31700745002-A
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**238**		4.96	9.93	ng/L	1	08/23/2017 18:39
Surrogates							
13C-GenX	86.8			70.0-130	%	1	08/23/2017 18:39

Batch Information

Analytical Batch: XLC1061
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2050
Prep Method: GenX Prep
Prep Date/Time: 08/24/2017 08:38
Prep Initial Wt./Vol.: 251.82 mL
Prep Extract Vol: 1 mL

Print Date: 08/29/2017

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Results of QCC-3

Client Sample ID: **QCC-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745003-B
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by EPA 537 v1.1

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
PFBA	**803**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFPeA	**832**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFHxA	**889**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFHpA	**876**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFOA	**865**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFNA	**871**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFDA	**896**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFBS	**885**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFHxS	**890**		1.99	19.9	ng/L	10	08/25/2017 16:03
PFOS	**982**		1.99	19.9	ng/L	10	08/25/2017 16:03
Surrogates							
13C2-PFHxA	NA	D		70.0-130	%	10	08/25/2017 16:03
13C2-PFDA	NA	D		70.0-130	%	10	08/25/2017 16:03
d5-NEtFOSAA	NA	D		70.0-130	%	10	08/25/2017 16:03

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HKX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 08/23/2017 08:36
Prep Initial Wt./Vol.: 250.9 mL
Prep Extract Vol: 1 mL

Print Date: 08/29/2017

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Results of QCC-3

Client Sample ID: **QCC-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745003-A
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**1220**		24.6	49.2	ng/L	5	08/25/2017 11:56
Surrogates							
13C-GenX	89.3			70.0-130	%	5	08/25/2017 11:56

Batch Information

Analytical Batch: XLC1063
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2050
Prep Method: GenX Prep
Prep Date/Time: 08/24/2017 08:38
Prep Initial Wt./Vol.: 254.09 mL
Prep Extract Vol: 1 mL

Print Date: 08/29/2017

N.C. Certification # 481

Results of QCD-3

Client Sample ID: **QCD-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745004-B
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by EPA 537 v1.1

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
PFBA	**20.0**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFPeA	**27.4**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFHxA	**12.8**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFHpA	**11.0**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFOA	**5.41**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFNA	**1.50**	J	0.199	1.99	ng/L	1	08/25/2017 16:34
PFDA	**0.961**	J	0.199	1.99	ng/L	1	08/25/2017 16:34
PFBS	**2.41**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFHxS	**4.49**		0.199	1.99	ng/L	1	08/25/2017 16:34
PFOS	**9.03**		0.199	1.99	ng/L	1	08/25/2017 16:34
Surrogates							
13C2-PFHxA	93.2			70.0-130	%	1	08/25/2017 16:34
13C2-PFDA	86.6			70.0-130	%	1	08/25/2017 16:34
d5-NEtFOSAA	61.5*			70.0-130	%	1	08/25/2017 16:34

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HKX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 08/23/2017 08:36
Prep Initial Wt./Vol.: 250.82 mL
Prep Extract Vol: 1 mL

Results of QCD-3

Client Sample ID: **QCD-3**
Client Project ID: **Gen X Etal Test**
Lab Sample ID: 31700745004-A
Lab Project ID: 31700745

Collection Date: 08/17/2017 14:00
Received Date: 08/22/2017 09:19
Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**2370**		49.7	99.5	ng/L	2	08/27/2017 15:08
Surrogates							
13C-GenX	17.0*			70.0-130	%	2	08/27/2017 15:08

Batch Information

Analytical Batch: XLC1064
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2052
Prep Method: GenX Prep
Prep Date/Time: 08/25/2017 15:03
Prep Initial Wt./Vol.: 50.26 mL
Prep Extract Vol: 1 mL

Print Date: 08/29/2017

N.C. Certification # 481

Batch Summary

Analytical Method: EPA 537 v1.1

Prep Method: EPA 537 1.1 PREP
Prep Batch: HXX2051
Prep Date: 08/23/2017 08:36

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 139651 [HXX/2051]	212089	08/25/2017 14:00	XLC1062	TQS1	ADM
LCS for HBN 139651 [HXX/2051]	212090	08/25/2017 14:31	XLC1062	TQS1	ADM
QCA-3	31700745001	08/25/2017 15:01	XLC1062	TQS1	ADM
QCB-3	31700745002	08/25/2017 15:32	XLC1062	TQS1	ADM
QCC-3	31700745003	08/25/2017 16:03	XLC1062	TQS1	ADM
QCD-3	31700745004	08/25/2017 16:34	XLC1062	TQS1	ADM

Method Blank

Blank ID: MB for HBN 139651 [HXX/2051]
Matrix: Water
Blank Lab ID: 212089
QC for Samples:
31700745001, 31700745002, 31700745003, 31700745004

Results by EPA 537 v1.1

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
PFBA	ND	U	0.200	2.00	ng/L	1
PFBS	ND	U	0.200	2.00	ng/L	1
PFDA	ND	U	0.200	2.00	ng/L	1
PFHpA	ND	U	0.200	2.00	ng/L	1
PFHxA	ND	U	0.200	2.00	ng/L	1
PFHxS	ND	U	0.200	2.00	ng/L	1
PFNA	ND	U	0.200	2.00	ng/L	1
PFOA	ND	U	0.200	2.00	ng/L	1
PFOS	ND	U	0.200	2.00	ng/L	1
PFPeA	ND	U	0.200	2.00	ng/L	1
Surrogates						
13C2-PFDA	77.3			70.0-130	%	1
13C2-PFHxA	82.7			70.0-130	%	1
d5-NEtFOSAA	76.1			70.0-130	%	1

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 8/23/2017 8:36:30AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 139651 [HXX/2051]
Blank Spike Lab ID: 212090
Date Analyzed: 08/25/2017 14:31

Matrix: Water

QC for Samples: 31700745001, 31700745002, 31700745003, 31700745004

Results by **EPA 537 v1.1**

	Blank Spike (ng/L)			
Parameter	Spike	Result	Rec (%)	CL
PFBA	80.0	74.0	92.5	70.0-130
PFBS	80.0	84.0	105	70.0-130
PFDA	80.0	79.8	99.7	70.0-130
PFHpA	80.0	79.0	98.8	70.0-130
PFHxA	80.0	79.4	99.2	70.0-130
PFHxS	80.0	84.9	106	70.0-130
PFNA	80.0	76.8	95.9	70.0-130
PFOA	80.0	80.7	101	70.0-130
PFOS	80.0	80.8	101	70.0-130
PFPeA	80.0	77.0	96.3	70.0-130
Surrogates				
13C2-PFDA			96.8	70.0-130
13C2-PFHxA			93.5	70.0-130
d5-NEtFOSAA			95.5	70.0-130

Batch Information

Analytical Batch: XLC1062
Analytical Method: EPA 537 v1.1
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2051
Prep Method: EPA 537 1.1 PREP
Prep Date/Time: 08/23/2017 08:36
Spike Init Wt./Vol.: 250 mL Extract Vol1 mL
Dupe Init Wt./Vol.: Extract Vol:

Batch Summary

Analytical Method: GenX

Prep Method: GenX Prep
Prep Batch: HXX2050
Prep Date: 08/24/2017 08:38

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 139650 [HXX/2050]	212087	08/23/2017 17:06	XLC1061	TQS1	ADM
LCS for HBN 139650 [HXX/2050]	212088	08/23/2017 17:37	XLC1061	TQS1	ADM
QCA-3	31700745001	08/23/2017 18:08	XLC1061	TQS1	ADM
QCB-3	31700745002	08/23/2017 18:39	XLC1061	TQS1	ADM
QCC-3	31700745003	08/25/2017 11:56	XLC1063	TQS1	ADM

Method Blank

Blank ID: MB for HBN 139650 [HXX/2050]
Blank Lab ID: 212087
QC for Samples:
31700745001, 31700745002, 31700745003

Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
HFPO-DA (GenX)	ND	U	5.00	10.0	ng/L	1
Surrogates						
13C-GenX	97.9			70.0-130	%	1

Batch Information

Analytical Batch: XLC1061
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2050
Prep Method: GenX Prep
Prep Date/Time: 8/24/2017 8:38:16AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 139650 [HXX/2050]
Blank Spike Lab ID: 212088
Date Analyzed: 08/23/2017 17:37

Matrix: Water

QC for Samples: 31700745001, 31700745002, 31700745003

Results by GenX

	Blank Spike (ng/L)			
Parameter	Spike	Result	Rec (%)	CL
HFPO-DA (GenX)	80.0	67.3	84.1	70.0-130
Surrogates				
13C-GenX			103	70.0-130

Batch Information

Analytical Batch: XLC1061
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2050
Prep Method: GenX Prep
Prep Date/Time: 08/24/2017 08:38
Spike Init Wt./Vol.: 250 mL Extract Vol1 mL
Dupe Init Wt./Vol.: Extract Vol:

Batch Summary

Analytical Method: GenX

Prep Method: GenX Prep
Prep Batch: HXX2052
Prep Date: 08/25/2017 15:03

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 139851 [HXX/2052]	212119	08/25/2017 18:06	XLC1063	TQS1	ADM
QCD-3	31700745004	08/27/2017 15:08	XLC1064	TQS1	ADM

Print Date: 08/29/2017

N.C. Certification # 481

Method Blank

Blank ID: MB for HBN 139851 [HXX/2052]
Blank Lab ID: 212119
QC for Samples:
31700745004

Matrix: Water

Results by GenX

Parameter	Result	Qual	DL	LOQ/CL	Units	DF
HFPO-DA (GenX)	ND	U	5.00	10.0	ng/L	1
Surrogates						
13C-GenX	93.0			70.0-130	%	1

Batch Information

Analytical Batch: XLC1063
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2052
Prep Method: GenX Prep
Prep Date/Time: 8/25/2017 3:03:22PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

SGS

CHAIN OF CUSTODY | CONVENTIONAL & SHALE

31700745

PROJECT INFO:
PROJECT: Gen X etal test
P.O. #:
QUOTE #:
SITE REF:
TURN AROUND TIME:
REPORT LEVEL: (see reverse) ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES: ☐ State of Origin: ☐ EDD: ☐ Other:

SEND DOCUMENTATION / RESULTS TO:
COMPANY: NC DEQ
CONTACT: Chris Johnson
ADDRESS:
PHONE: 919-733-3903
EMAIL: chris.johnson@ncdenr.gov

INVOICE TO: (☐ CHECK IF SAME)
COMPANY: CONTACT:
ADDRESS:
PHONE:
EMAIL:

SPECIAL INSTRUCTIONS / COMMENTS:
provided via email

PRESERVATIVE: N/A

ANALYSIS & METHOD: Gen X etal

LAB ID	SAMPLE ID / DESCRIPTION	DATE	TIME	QC MS	QC MSD	QC DUP	TYPE (C, G)	MATRIX	CONT. QTY	Gen X etal	REMARKS
	QCA-3	8/17/17	1400					W	1	✓	
	QCB-3	↓	↓					↓	1	✓	
	QCC-3	↓	↓					↓	1	✓	
	QCD-3	↓	↓				G/C	SW	1	✓	

COLLECTED/RELINQUISHED BY (1):	DATE:	TIME:	RECEIVED BY:	RECEIVED BY LABORATORY:	DATE:	TIME:
[signature]	8/18/17	11:55 AM		COC SEAL: ☐ INTACT ☐ BROKEN ☐ ABSENT		
RELINQUISHED BY (2): [signature]	DATE: 8-22-17	TIME: 0919	RECEIVED BY: 9:19AM 8/22/17 Shanee R Hudson	SAMPLE RECEIPT TEMP: °C		
				CARRIER:	TRACKING #:	
				NOTES:		

~~Ashley Owens 8/22/17 16:13~~ ee AO 8/22/17

Temp on arrival - 24.9 °C

SGS NORTH AMERICA INC. | ENVIRONMENTAL SERVICES 5500 Business Drive Wilmington, NC 28405 910 350 1903 | 910 794 1613 www.sgs.com

Member of the SGS Group (SGS SA)

SGS North America Inc.

Sample Receipt Checklist (SRC)

Client: **NCDNR-WA** Work Order No.: **31700745**

1. ___ Shipped
   x Hand Delivered

2. x COC Present on Receipt
   ___ No COC
   ___ Additional Transmittal Forms

3. ___ Custody Tape on Container
   x No Custody Tape

4. x Samples Intact
   ___ Samples Broken / Leaking

5. ___ Chilled on Receipt Actual Temp.(s) in °C: 24.9 Thermometer ID#: IR3
   x Ambient on Receipt
   ___ Walk-in on Ice; Coming down to temp.
   ___ Temperature Blank Present
   ___ WV samples-proxy not allowed

6. x Sufficient Sample Submitted
   ___ Insufficient Sample Submitted

7. ___ Chlorine absent
   ___ HNO3 < 2
   ___ HCL < 2
   ___ Additional Preservatives verified (see notes) N/A

8. x Received Within Holding Time
   ___ Not Received Within Holding Time

9. ___ No Discrepancies Noted
   x Discrepancies Noted *
   ___ NCDENR notified of Discrepancies*

10. ___ No Headspace present in VOC vials N/A
    ___ Headspace present in VOC vials >6mm

Notes:

Comments:

* = Sample collection dates & times missing from samples.

Inspected and Logged in by: AMO
Date: 8/22/2017

*NCDENR must be notified when collection, holding time or preservation requirements are not met. MI_11.11

To: Strynar, Mark[strynar.mark@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Scott, Michael[michael.scott@ncdenr.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Buckley, Timothy
Sent: Wed 12/6/2017 8:50:07 PM
Subject: RE: Quick call?

Mark,
I just spoke with Michael Scott. He has a technical question related to the appropriateness of the method GEL labs used to analyze GenX in honey. He will be reaching out to you via email.
Tim

Timothy J. Buckley, PhD
Director of the Exposure Methods & Measurements Division
National Exposure Research Laboratory
109 TW Alexander Drive
Research Triangle Park, NC 27711
Email: buckley.timothy@epa.gov
URL: http://www.epa.gov/heasd/staff/buckley.html
Phone: (919) 541-2454 (O); FAX: -0239
Personal Phone / Ex. 6

From: Scott, Michael [mailto:michael.scott@ncdenr.gov]
Sent: Wednesday, December 06, 2017 12:09 PM
To: Buckley, Timothy
Cc: Culpepper, Linda
Subject: Quick call?

Tim,
Just wanted to see if you and Mark would be available for a short call today regarding the recent testing of honey in Bladen County.
Thank you
Michael

Michael E. Scott
Director
Division of Waste Management
North Carolina Department of Environmental Quality
919-707-8246 office
Michael.scott@ncdenr.gov
217 West Jones Street
1646 Mail Service Center
Raleigh, NC 27699

Nothing Compares

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To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Mon 8/28/2017 8:31:49 PM
Subject: FW: Call

Mark, FYI. Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Joe Mattheis [mailto:JosephMattheis@eurofinsUS.com]
Sent: Monday, August 28, 2017 3:50 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: Call

Hi Chris,

Thanks for the information. I will let our lab know Mark Strynar of EPA can be contacted for questions.

Our lab completed the setup and internal QC studies for our modified Method 537 (PFC-Ext) which includes 14 PFCs + GenX, ADONA, F-53B major, and F-53B minor. This is the test we are utilizing to analyze the 4 samples you sent. The reporting levels for each compound are indicated in the table below. The samples were extracted today (8/28/2017) and will be analyzed in the next day or 2.

Test: PFC-Ext by Method 537

Parameter	CAS #	Reporting Limit	Federal Limit
ADONA	958445-44-8	2.0 ng/L	N/A
F-53B Major	73606-19-6	2.0 ng/L	N/A
F-53B Minor	83329-89-9	2.0 ng/L	N/A
GenX	13252-13-6	5.0 ng/L	N/A
N-ethyl Perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2991-50-6	2.0 ng/L	N/A
N-methyl Perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2355-31-9	2.0 ng/L	N/A
Perfluorobutanesulfonic acid (PFBS)	375-73-5	2.0 ng/L	N/A
Perfluorodecanoic acid (PFDA)	335-76-2	2.0 ng/L	N/A
Perfluoroheptanoic acid (PFHpA)	375-85-9	2.0 ng/L	N/A

Perfluorohexanesulfonic acid (PFHxS)	355-46-4	2.0 ng/L	N/A
Perfluorohexanoic acid (PFHxA)	307-24-4	2.0 ng/L	N/A
Perfluorolauric acid (PFDoA)	307-55-1	2.0 ng/L	N/A
Perfluoromyristic acid (PFTA)	376-06-7	2.0 ng/L	N/A
Perfluorononanoic acid (PFNA)	375-95-1	2.0 ng/L	N/A
Perfluorooctane sulfonate (PFOS)	1763-23-1	2.0 ng/L	N/A
Perfluorooctanoic acid (PFOA)	335-67-1	2.0 ng/L	N/A
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	2.0 ng/L	N/A
Perfluoroundecanoic acid (PFUnA)	2058-94-8	2.0 ng/L	N/A

Joseph M. Mattheis

Personal Phone / Ex. 6
Email: JosephMattheis@EurofinsUS.com

Please note that our standard Terms and Conditions apply to the prices quoted.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Monday, August 28, 2017 3:17 PM
To: Joe Mattheis
Cc: Strynar, Mark; Culpepper, Linda
Subject: RE: Call

Hi, Joe. Wanted to pass along that Mark Strynar with EPA is available for questions as your lab proceeds through the QC sample testing. Any word on how the testing is progressing? Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Joe Mattheis [mailto:JosephMattheis@eurofinsUS.com]
Sent: Thursday, August 17, 2017 2:53 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: RE: Call

Here is a COC we can use to ship the test samples. I will be there to pick them up in 30 Minutes.

joe

Joseph M. Mattheis

Personal Phone / Ex. 6

Email: JosephMattheis@EurofinsUS.com

Please note that our standard Terms and Conditions apply to the prices quoted.

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, August 16, 2017 1:34 PM
To: Joe Mattheis
Subject: Call

Joe, our call dropped off and I couldn't get back in touch. I think we had everything ironed out, though.

I will look for your email in the next day or so and let you know when I get the QC samples. Thanks.

Chris Johnson
Environmental Program Supervisor
Water Sciences Section / Organic Chemistry Branch

North Carolina Department of Environmental Quality
Division of Water Resources

919-733-3908 office

4405 Reedy Creek Road
Raleigh, NC 27607

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Notify us here to report this email as spam.

To: Strynar, Mark[Strynar.Mark@epa.gov]
From: Johnson, Chris
Sent: Tue 11/28/2017 8:44:04 PM
Subject: FW: Discussion for the upcoming Dec. 11th GenX seminar
GenX Workshop criteria.docx
Gen X Workshop agenda draft ver6.docx

FYI

Chris Johnson
NC DEQ-DWR
Water Sciences Section
919-733-3908

Correspondence with this email address is subject to North Carolina public record regulations and may be disclosed to third parties.

From: Green, Jason
Sent: Tuesday, November 28, 2017 3:06 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Pjetraj, Michael <michael.pjetraj@ncdenr.gov>; Manning, Tammy <tammy.manning@ncdenr.gov>; Carter, Heather <Heather.Carter@ncdenr.gov>; Bowyer, Jim <jim.bowyer@ncdenr.gov>; Woosley, Julie <julie.woosley@ncdenr.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>
Subject: RE: Discussion for the upcoming Dec. 11th GenX seminar

-----Original Appointment-----
From: Culpepper, Linda
Sent: Friday, November 17, 2017 1:21 PM
To: Culpepper, Linda; Green, Jason; Pjetraj, Michael; Manning, Tammy; Carter, Heather; Bowyer, Jim; Woosley, Julie; Scott, Michael; Johnson, Chris; Karoly, Cyndi
Subject: Discussion for the upcoming Dec. 11th GenX seminar
When: Tuesday, November 28, 2017 3:00 PM-3:30 PM (UTC-05:00) Eastern Time (US & Canada).
Where: STATEOP_MEETME_30 919-420-7945

update on the Dec 11th GenX/Emerging Contaminant workshop to be held at UNCW. If you cannot attend, please have someone sub in for you.

Draft

Understanding Emerging Contaminants in the Cape Fear Region
Workshop on Water Quality Research

December 11, 2017

UNCW Campus, CIS Auditorium 1008

DRAFT

Workshop Outcomes

- More comprehensive monitoring programs
- Identification of known and other priority contaminants
- Fate of PFOAS and other emerging contaminants in the environment
- NPDES permitting guidelines/issues
- Strengthen ties/collaborations with state, federal and academic institutions

Draft Agenda

9:00 Opening Remarks

9:30 Current Status

- Supply Status
  - Response to PFAS in drinking water - CFPUA
  - What are current levels of pollutants in drinking water, and what measures are being taken to treat finished water - CFPUA
  - HB 56 Response - UNCW, CFPUA
- Drinking Water Health Goal update and status of research on toxicology - NC DPH

10:00 Current Assessment Capabilities

- Emerging Contaminants in Cape Fear region – DWR/DWM
  - What is in the environment, and where is it at?
  - What type of ecosystem impacts are occurring? UNCW, Duke?
- Current analytical capacities – EPA Athens Lab, private labs, UNCW
  - What can we detect, and how accurate is the information?

11:00 Break

11:15 Monitoring Strategies

- Potential contaminated matrices (soil, air, water)- UNCW
- Present and future monitoring – NCSU, UNCW
- Examples of existing monitoring efforts, Netherlands, Rhine and how those can be modeled for collaboration between Duke (Ferguson?)

12:00 Lunch (Posters Session)

1:30 Afternoon Workgroup breakout session for Individual focus groups (7-9 attendees each?)

Identification of knowns vs unknowns
What will transport and fate information provide for future
What type of monitoring programs would CPF/NC benefit from?
Barriers of current and future research for implementation regulations.
How can these current monitoring strategies support health criteria development?
How will the current research support drinking water supply?

2:30 Review of focus groups

3:00 Closing Remarks

Potential Speakers and Attendees

Dr. Lawrence B. Cahoon – UNCW Biological Oceanographer and Limnologist - cahoon@uncw.edu – He has experience with the Cape Fear River.

Dr. Michael A. Mallin – UNCW Marine and Estuarine Ecology - mallinm@uncw.edu - He has experience with impacts of urban pollution, land use and how it affects water quality, techniques on mitigating urban pollution, and environmental management issues.

Cape Fear River Watch – An organization that protect and improve the water quality of the Lower Cape Fear River Basin through education, advocacy and action.

Dr. Ralph Mead – UNCW Dept. Of Chemistry and Biochemistry - meadr@uncw.edu Specializes in development of new techniques for organic geochemical analysis.

Dr. Chad Lane – UNCW Geochemist – lanec@uncw.edu – He has a lot of experience with sample extraction and analysis.

Dr. Detleff Knappe - NCSU Dept. of Civil, Construction, and Environmental Engineering – Focus on drinking water quality and treatment, water reuse, organic micropollutants, development of water treatment processes for polar and persistent organic pollutants - knappe@ncsu.edu

Chris Johnson – Organic Chemistry Branch Manager, Water Sciences Section, DWR - Specializes in Organic compound analysis and analytical method validation. - chris.johnson@ncdenr.gov

Dr. Mark Strynar – Physical Scientist EPA National Exposure Research Lab - strynar.mark@epa.gov – Expertise is the development of methods for the detection of xenobiotic compounds, in particular perfluorinated compounds (PFCs) in complex environmental and biological matrices.

Collaboratory (Greg Characklis ?)

Dr. Ferguson - Duke University

Local Health Directors, Water Directors (county and city)

NC Dept. of Public Health

NC Division of Water Resources

NC Division of Air Quality

NC Coastal Federation

Dr. Brooks Avery	UNCW
Dr. Joan Willey	UNCW
Dr. Steve Skrabal	UNCW
Dr. Bob Kieber	UNCW
Dr. Aswani Volety	UNCW

DRAFT

Other Participants

-DWR

-DAQ

-DWM

-DPH

Agenda

How can we (DEQ) best learn from the workshop

Additional topics?

Specific presentations?

Breakout Session Group Topics

- Identification of knowns vs unknowns
- What will transport and fate information provide?
- What type of monitoring programs would CPF/NC benefit from?
- Barriers of current and future research for implementation regulations.
- How can these current monitoring strategies support health criteria development?
- How will the current research support drinking water supply?

Group Questions for individual topics (all groups to receive the same questions)

- Where will information/data come from?
- What populations will be impacted?
- Which agencies will track/report findings?
- How will this information be reported?

To: Sivertsen, Scott[Sivertsen.Scott@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: France, Danny[France.Danny@epa.gov]
From: Strynar, Mark
Sent: Thur 2/15/2018 3:28:36 PM
Subject: RE: [External] RE: Lab standard
Nafion synthesis scheme.pptx
NC DEQ Test Wells Report_09132017.pdf

Scott,
I have directly contacted Synquest and asked for a quote to synthesize Nafion BP1 and BP2. In addition I asked if they had or could synthesize each analyte in Table 2 from our report. After an initial email response they still have not respond to my request. A recent C&E N article about GenX in the Cape Fear river asked for those who can synthesize get in touch with us. I have had two recent response I have not yet been able to get back to.

The contact at Synquest was Frank Waters. Please do duplicate my efforts. I have made no progress.

Mark

From: Sivertsen, Scott
Sent: Thursday, February 15, 2018 9:51 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: France, Danny <France.Danny@epa.gov>
Subject: RE: [External] RE: Lab standard

Mark,

What routes have you explored? I'm looking for a source and don't want to duplicate your efforts.

Scott

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, February 15, 2018 9:26 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Sivertsen, Scott <Sivertsen.Scott@epa.gov>; France, Danny <France.Danny@epa.gov>
Subject: Re: [External] RE: Lab standard

Thanks. Our attorneys have discussed with Chemours to get them to provide it to you.

Sent from my iPhone
On Feb 15, 2018, at 9:11 AM, Strynar, Mark <Strynar.Mark@epa.gov> wrote:

> External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.
>
> I have not yet been able to get this compound as a standard.
>
> Mark
>
> ---
>
> **From:** Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
> **Sent:** Tuesday, February 06, 2018 6:01 PM
> **To:** Sivertsen, Scott <Sivertsen.Scott@epa.gov>; France, Danny <France.Danny@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
> **Subject:** Lab standard
>
> Want to check on the ability to get a lab standard for PFMOAA, which was in the EPA NERL non-targeted analysis.
> PFMOAA (2,2-difluoro-2-(trifluoromethoxy)acetic acid) C3HF5O3 CAS no.674-13-5, DA = 179.9846

Mark – have you discussed getting this from the Chemours chemist, or know if it is one we can purchase for Athens to use?

Thank you,
linda

Linda Culpepper
Interim Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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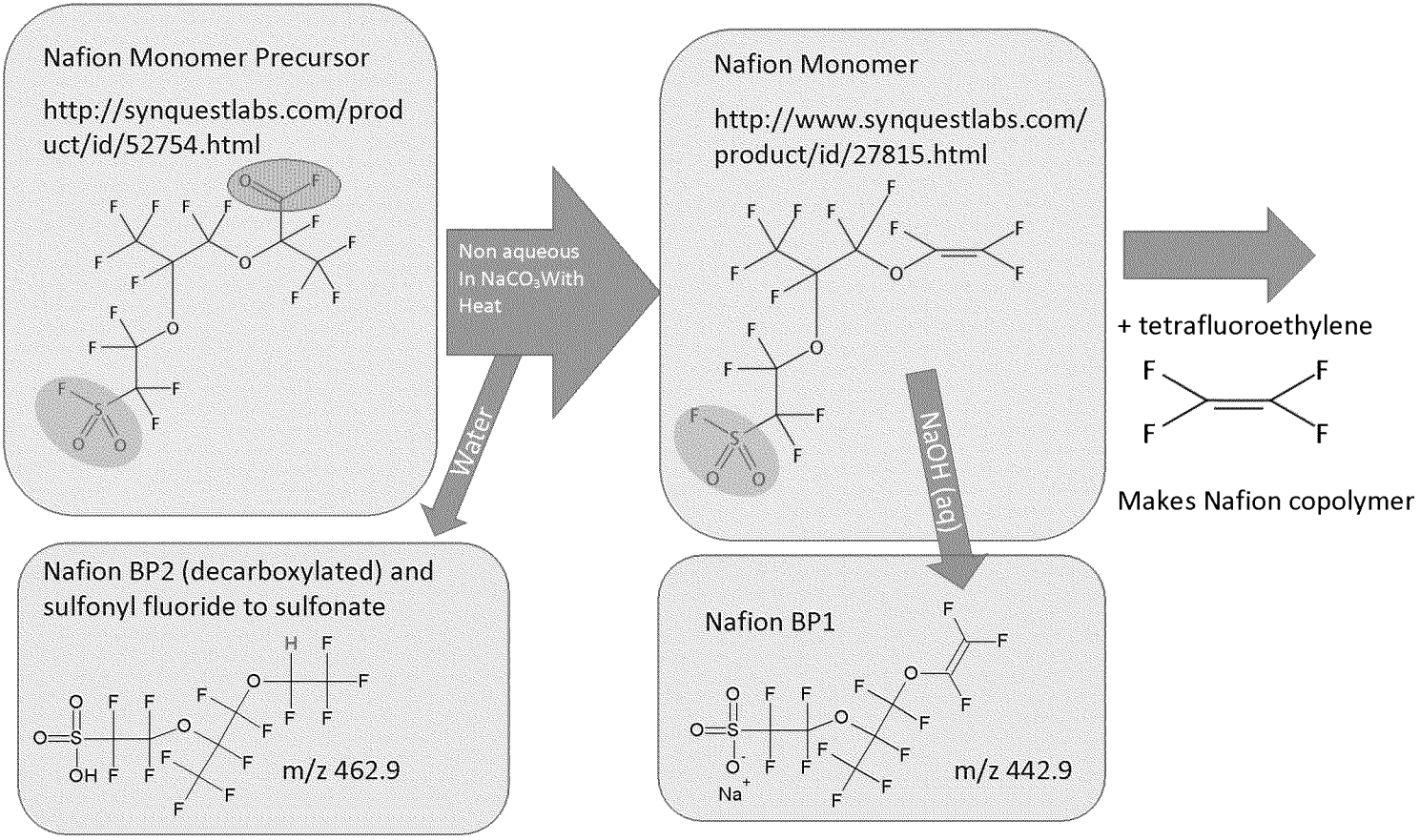
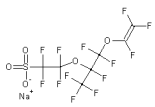

Nafion Monomer Precursor
http://synquestlabs.com/product/id/52754.html
Non aqueous In $NaCO_3$ With Heat
Water
Nafion Monomer
http://www.synquestlabs.com/product/id/27815.html
NaOH (aq)
+ tetrafluoroethylene
Makes Nafion copolymer
Nafion BP2 (decarboxylated) and sulfonyl fluoride to sulfonate
m/z 462.9
Nafion BP1
m/z 442.9



To: Bowyer, Jim[jim.bowyer@ncdenr.gov]
Cc: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
From: Strynar, Mark
Sent: Thur 6/21/2018 11:15:36 AM
Subject: RE: [External] RE: Assistance request Rainwater sample

Jim,

Ship at your convenience. I am away all next week at the Gordon Conference.

Our address is:
Attn: Mark Strynar or Andy Lindstrom
US EPA
109 TW Alexander Dr.
Chemical Services Loading Dock E
Durham, NC 27711

From: Bowyer, Jim [mailto:jim.bowyer@ncdenr.gov]
Sent: Thursday, June 21, 2018 6:13 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: RE: [External] RE: Assistance request Rainwater sample

Mark,
I do have the samples and I believe we have at least 500 mL of the two. I can arrange to get those to you this week or early next week, whichever is most convenient.

Jim Bowyer, Ph.D.
Environmental Program Supervisor I
Division of Air Quality, Ambient Monitoring Section
Department of Environmental Quality

919 715 7484 office
919 715 0890 fax
Jim.Bowyer@ncdenr.gov

4403 Reedy Creek Road
1622 Mail Service Center
Raleigh, NC 27699-1622

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, June 20, 2018 9:05 AM
To: Bowyer, Jim <jim.bowyer@ncdenr.gov>
Cc: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: [External] RE: Assistance request Rainwater sample

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.

Jim,

Glad to do so. DO you have the sample and if so what volume?

Mark

From: Bowyer, Jim [mailto:jim.bowyer@ncdenr.gov]
Sent: Friday, June 15, 2018 1:44 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: Assistance request Rainwater sample

Dr. Strynar,
I would like to request assistance with determining whether a rain water sample that NC DAQ has collected in our Rainwater Collection Network from a site outside of the Fayetteville area actually has what was reported by our contract lab as being GenX is actually GenX or some other compound. The sample was collected as a thrufall sample under a red cedar thru a rainfall event. I was wondering if you might be able to differentiate between GenX and another biological compound from that evergreen?

Thanks for any assistance you may be able to offer to clarify this for us.

Jim Bowyer, Ph.D.
Environmental Program Supervisor II
Division of Air Quality, Ambient Monitoring Section
Department of Environmental Quality

919 715 7484 office
919 715 0890 fax
Jim.Bowyer@ncdenr.gov

4403 Reedy Creek Road
1622 Mail Service Center
Raleigh, NC 27699-1622

Nothing Compares

Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties.

To: Lee Ferguson[lee.ferguson@duke.edu]
Cc: Gregson, Jim[jim.gregson@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]; Karoly, Cyndi[cyndi.karoly@ncdenr.gov]; Satterwhite, Dana[Dana.Satterwhite@ncdenr.gov]; Wiggins, Kent[kent.wiggins@ncdenr.gov]; michael.abraczinskas@ncdenr.gov[michael.abraczinskas@ncdenr.gov]
From: Strynar, Mark
Sent: Thur 4/26/2018 2:30:52 PM
Subject: RE: Emerging contaminant scientific team meeting May 14?

Lee,

The lab tour was to accommodate the NCDEQs staff commitments. If they can change the time I am fine. We are scheduled 10-11:30 AM for the lab tour.

All,
We are trying to schedule and additional meeting while the NCDEQ folks are visiting my lab to discuss emerging chemicals in NC. Do any of you have scheduling conflicts with moving the lab tour to later in the day if we plan to have this other meeting earlier. FYI there are now other people who would need to travel to be at this meeting from remote locations.

Mark

From: Lee Ferguson [mailto:lee.ferguson@duke.edu]
Sent: Thursday, April 26, 2018 9:53 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Re: Emerging contaminant scientific team meeting May 14?

Hey Mark,

Thanks for being willing to host this meeting! It sounds like Jackie will need to leave by 1 pm in order to make it to a student exam. Any chance of swapping the meeting and the tour? Alternatively I suppose we could start the meeting at 11:30 and then Jackie could leave early when she needs to.

Lee
--
P. Lee Ferguson, Ph.D.
Associate Professor
Department of Civil & Environmental Engineering
Pratt School of Engineering &
Nicholas School of the Environment
Duke University
121 Hudson Hall, Box 90287
Durham, NC 27708-0287
http://ferguson.cee.duke.edu

Phone: 919-660-5460
Fax: 919-660-5454

On Apr 26, 2018, at 9:43 AM, Strynar, Mark <Strynar.Mark@epa.gov> wrote:

We have the lab tour planned from 10-11:30. Anytime after that is fine with me until 3:30 PM when I have another meeting.

Mark

From: Lee Ferguson [mailto:lee.ferguson@duke.edu]
Sent: Wednesday, April 25, 2018 9:27 AM
To: Mei Sun <msun8@uncc.edu>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Detlef R. U. Knappe <knappe@ncsu.edu>; Mead, Ralph N. <meadr@uncw.edu>; Warren, Jeffrey Dennis <jeff.warren@unc.edu>;

Jacqueline MacDonald Gibson <jackie.macdonald@unc.edu>; DeWitt, Jamie <DEWITTJ@ecu.edu>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; michael.abraczinskas@ncdenr.gov
Subject: Re: Emerging contaminant scientific team meeting May 14?

Hi everyone,

Thanks for getting back to me so quickly - it sounds like many of us can attend, and that's great to hear. Regarding timing - it sounds like a morning meeting will work best for Jackie, but we don't want to make it too early for Mei, Jamie, and Ralph (since they have longer drives). Linda, Mike, and Mark - do you have any time constraints regarding the meeting you'd already planned? I don't want to hijack your existing plans. If there is flexibility, then I'd propose meeting **10 am - 1 pm on May 14**.

All the best,
Lee
--
P. Lee Ferguson, Ph.D.
Associate Professor
Department of Civil & Environmental Engineering
Pratt School of Engineering &
Nicholas School of the Environment
Duke University
121 Hudson Hall, Box 90287
Durham, NC 27708-0287
http://ferguson.cee.duke.edu

Phone: 919-660-5460
Fax: 919-660-5454

On Apr 25, 2018, at 8:35 AM, Mei Sun <msun8@uncc.edu> wrote:

Dear Lee

Thank you for organizing the meeting. Yes, I'm interested. Do you know what time of the day we are talking about? I need to plan ahead for the 3-hour commute time from Charlotte. Thank you!

Mei Sun

Assistant Professor
Department of Civil and Environmental Engineering
University of North Carolina at Charlotte
Energy Production and Infrastructure Center 3163
9201 University City Blvd | Charlotte, NC 28223
Phone: 704-687-1723 | Fax: 704-687-0957
Website: https://coefs.uncc.edu/msun8/

On Tue, Apr 24, 2018 at 1:53 PM, Lee Ferguson <lee.ferguson@duke.edu> wrote:
Dear colleagues,

I've had conversations with most of you over the past months to refine and brainstorm collective ideas around emerging contaminant monitoring in NC waters, in the wake of the Cape Fear GenX issues. I think all of you have seen drafts of the "NC-ECO" consortium proposal that we drafted in the fall and distributed among interested parties and the NC General Assembly to start the conversation about how we could stand up a state-wide emerging contaminant monitoring program that draws on the best capabilities we all possess to ultimately protect human and

environmental health. I've been heartened by everyone's engagement and collaborative spirit, and I remain optimistic that something good can come out of all this! Last month I had a great conversation with Jeff Warren and the NC Policy Collaboratory, and it seems there is a great opportunity for us all to join forces to see if we can't get something moving forward together.

Given that, I'd like to propose that the time is right to get the group of us together in a room for a more direct discussion about the scientific opportunities and challenges we are facing. Ralph hosted a great symposium around this issue in December, down in Wilmington. I'm thinking of something a bit less formal and more discussion-oriented for a follow-up. Linda Culpepper and Mike Abraczinskas from DEQ visited us here at Duke yesterday and mentioned that they'll be at Mark's lab (EPA in RTP) on May 14th, and that this might be a good opportunity for a meeting among the DEQ, the EPA, and those of us academics who are interested and engaged in emerging contaminant research in NC waters.

So - with that said, can you please let me know if you are (a) interested and (b) available for a meeting at the US EPA laboratory in RTP on May 14th? I anticipate that a 2-3 hour block of time would be appropriate. If you have specific meeting time constraints or preferences, please let me know and we'll try to schedule around those. Finally, if there are important scientific stakeholders who I've missed on this email, certainly let me know and we can reach out to them. My intention here is to be inclusive of those who are engaged and interested in emerging contaminant detection, characterization, and monitoring in NC water, but at the same time to keep the group (and conversation) manageable.

All the best,
Lee
--
P. Lee Ferguson, Ph.D.
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Department of Civil & Environmental Engineering
Pratt School of Engineering &
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121 Hudson Hall, Box 90287
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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Strynar, Mark
Sent: Tue 8/8/2017 3:00:42 PM
Subject: PFECAs chemicals and CAS#s
Strynar et al., 2015 ES&T.pdf

Linda,

Here is what I have. This comes from my paper (see attached). It is also in Sun et al., 2106 Table S1. These are the 3 other large peaks besides GenX shown in Figure 2 in Sun et al.., 2016.

CAS (13252-13-6) HFPO-DA (aka GenX free acid)

CAS 39492-89-2 (m/z 310.9608) - called PFO3OA in Sun et al., 2016
CAS 39492-88-1 (m/z 244.9691) – called PFO2HxA in Sun et al., 2016
CAS 674-13-5 (not in Table below) (m/z 178.9773) - Called PFMOAA in Sun et al., 2106

Mark

Environmental Science & Technology

Table 1. Accurate Mass of Polyfluorinated Compounds and In-Source Artifacts Found in Extracted Water Samples

number	formula	CAS no.	name	[M][a]	$[M - H]^-$ m/z	$[2M - 2H + Na]^-$ m/z
Monoether PFECAs						
1	$C_3HF_5O_3$			179.9846	178.9773	380.9438
2	$C_4HF_7O_3$			229.9813	228.9740	480.9372
3	$C_5HF_9O_3$	863090-89-5		279.9782	278.9709	580.9310
4	$C_6HF_{11}O_3$	13252-13-6	undecafluoro-2-methyl-3-oxahexanoic acid	329.9750	328.9677	680.9247
5	$C_7HF_{13}O_3$			379.9718	378.9645	780.9182
6	$C_8HF_{15}O_3$			429.9686	428.9613	880.9118
Polyether PFECAs						
7	$C_7HF_{13}O_7$	39492-91-6	perfluoro-3,5,7,9,11-pentaoxadodecanoic acid	443.9515	442.9442	908.8776
8	$C_6HF_{11}O_6$	39492-90-5	perfluoro-3,5,7,9-butaoxadecanoic acid	377.9598	376.9525	776.8942
9	$C_5HF_9O_5$	39492-89-2	perfluoro-3,5,7-propaoxaoctanoic acid	311.9681	310.9608	644.9108
10	$C_4HF_7O_4$	39492-88-1	perfluoro-3,5-dioxahexanoic acid	245.9764	244.9691	512.9274
PFESAs						
11	$C_7HF_{13}O_5S$	66796-30-3[b]		443.9337	442.9264	
12	$C_7H_2F_{14}O_5S$			463.9399	462.9326	
Other						
	Na^+			22.9892		
	H^+			1.0073		
	CF_2O			65.9917		
	CF_2			49.9968		

[a]Indicates the monoisotopic mass of the neutral species. [b]CAS number for Nafion copolymer.

Dr. Mark J. Strynar
Physical Scientist
US EPA
National Exposure Research Laboratory
919-541-3706

Strynar.mark@epa.gov

To: Oneal, Gregg[gregg.oneal@ncdenr.gov]
From: Strynar, Mark
Sent: Tue 10/31/2017 7:28:25 PM
Subject: FW: Chemours -Emissions in Pounds -- GenX Enforcement Coordination Call -
DEQ Emissions Information Emerging Contaminants (revision).pdf

FYI,

Mark

From: Garvey, Mark
Sent: Tuesday, October 31, 2017 1:49 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Libelo, Laurence <Libelo.Laurence@epa.gov>
Subject: FW: Chemours -Emissions in Pounds -- GenX Enforcement Coordination Call -

Forwarding air info. I didn't see your name on the distribution of the email.

Mark Garvey
EPA Headquarters
Office of Civil Enforcement
Attorney
202-564-4168
garvey.mark@epa.gov

NOTE: This email and its attachments may contain confidential information, attorney-work product, enforcement sensitive material or privileged information.

From: Mitchell, Ken
Sent: Tuesday, October 31, 2017 10:32 AM
To: Garvey, Mark <Garvey.Mark@epa.gov>; Speir, Jeffrey <speir.jeffrey@epa.gov>; Miles, James <miles.james@epa.gov>; Toney, Anthony <Toney.Anthony@epa.gov>; Doa, Maria <Doa.Maria@epa.gov>; Star, David <star.david@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Ellis, Tony <Ellis.Tony@epa.gov>; Sullivan, Greg <Sullivan.Greg@epa.gov>; Saenz, Diana <Saenz.Diana@epa.gov>; Martinez, Jeffrey <Martinez.Jeffrey@epa.gov>; King, Carol <King.Carol@epa.gov>; Anderson, Kate <Anderson.Kate@epa.gov>; Henry, Tala <Henry.Tala@epa.gov>; Allison, Rose <Allison.Rose@epa.gov>; Swan, Russell <Swan.Russell@epa.gov>; Unger, LouAnn <unger.louann@epa.gov>; Bair, Rita <bair.rita@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Field, Stephen <Field.Stephen@epa.gov>; Schwartz, Paul <Schwartz.Paul@epa.gov>; Davis, Molly <Davis.Molly@epa.gov>; Ireland, Laurie <Ireland.Laurie@epa.gov>; Moyer, Adam <moyer.adam@epa.gov>; DeDora, Caroline <DeDora.Caroline@epa.gov>; Bean, Mark <Bean.Mark@epa.gov>; Bookman, Robert <Bookman.Robert@epa.gov>; Pratt, Stacie <Pratt.Stacie@epa.gov>; daw, harry <daw.harry@epa.gov>; Gorman, John <Gorman.John@epa.gov>; Klevs, Mardi <klevs.mardi@epa.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Denton, Loren <Denton.Loren@epa.gov>; Paul Buellesbach <paul.buellesbach@erg.com>; Dan-Tam Nguyen <Dan-Tam.Nguyen@erg.com>; Daryl Hudson <Daryl.Hudson@erg.com>; Schulz, Susan <Schulz.Susan@epa.gov>; Davis, Lauren O. <Davis.LaurenO@epa.gov>; Gordon, Scott <Gordon.Scott@epa.gov>; Fite, Mark <Fite.Mark@epa.gov>; George, Verne <George.Verne@epa.gov>; Bates, Keith <Bates.Keith@epa.gov>; Pollins, Mark <Pollins.Mark@epa.gov>; Theis, Joseph <Theis.Joseph@epa.gov>; Bahk, Benjamin <Bahk.Benjamin@epa.gov>; Poy, Thomas <poy.thomas@epa.gov>; Collins, Charlie <collins.charlie@epa.gov>; Aubee, Catherine <Aubee.Catherine@epa.gov>; rogers, rick <rogers.rick@epa.gov>; Wilson, Jennifer <wilson.jenniferA@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; Clark, Jacqueline <clark.jacqueline@epa.gov>; Duchovnay, Andrew <Duchovnay.Andrew@epa.gov>; Day, Christopher <Day.Christopher@epa.gov>; Coe, Mary <Coe.Mary@epa.gov>; Ramalho, Louis <Ramalho.Louis@epa.gov>; Lewis, Jennifer <Lewis.Jennifer@epa.gov>; Baptista, Chrisna <Baptista.Chrisna@epa.gov>; Niess, Claudia <niess.claudia@epa.gov>; Spann, Tony <Spann.Tony@epa.gov>; Timsina, Gopal <Timsina.Gopal@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Mancusi-Ungaro, Philip <Mancusi-Ungaro.Philip@epa.gov>; Bush, William <Bush.William@epa.gov>; Janovitz, Sara <Janovitz.Sara@epa.gov>; Hall, Renea <Hall.Renea@epa.gov>; Shell, Karrie-Jo <Shell.Karrie-Jo@epa.gov>; Devkota, Om <devkota.om@epa.gov>
Cc: Reinhart, Roger <Reinhart.Roger@epa.gov>; Buso, Roberto X <Buso.Roberto@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Banister, Beverly <Banister.Beverly@epa.gov>; Jones, Aaryn <Jones.Aaryn@epa.gov>
Subject: RE: Chemours -Emissions in Pounds -- GenX Enforcement Coordination Call -

Deliberative Process / Ex. 5

Kenneth L. Mitchell, Ph.D. |Special Assistant to the Director|
Air, Pesticides, and Toxics Management Division
U.S. Environmental Protection Agency |61 Forsyth Street, SW |Atlanta, GA 30303
Voice: 404-562-9065 |Fax: 404-562-9066|Email: mitchell.ken@epa.gov

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From: Garvey, Mark
Sent: Monday, October 30, 2017 3:59 PM
To: Speir, Jeffrey <speir.jeffrey@epa.gov>; Miles, James <miles.james@epa.gov>; Toney, Anthony <Toney.Anthony@epa.gov>; Doa, Maria <Doa.Maria@epa.gov>; Star, David <star.david@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Ellis, Tony <Ellis.Tony@epa.gov>; Sullivan, Greg <Sullivan.Greg@epa.gov>; Saenz, Diana <Saenz.Diana@epa.gov>; Martinez, Jeffrey <Martinez.Jeffrey@epa.gov>; King, Carol <King.Carol@epa.gov>; Anderson, Kate <Anderson.Kate@epa.gov>; Henry, Tala <Henry.Tala@epa.gov>; Allison, Rose <Allison.Rose@epa.gov>; Swan, Russell <Swan.Russell@epa.gov>; Unger, LouAnn <unger.louann@epa.gov>; Bair, Rita <bair.rita@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Field, Stephen <Field.Stephen@epa.gov>; Schwartz, Paul <Schwartz.Paul@epa.gov>; Davis, Molly <Davis.Molly@epa.gov>; Ireland, Laurie <Ireland.Laurie@epa.gov>; Moyer, Adam <moyer.adam@epa.gov>; DeDora, Caroline <DeDora.Caroline@epa.gov>; Bean, Mark <Bean.Mark@epa.gov>; Bookman, Robert <Bookman.Robert@epa.gov>; Pratt, Stacie <Pratt.Stacie@epa.gov>; daw, harry <daw.harry@epa.gov>; Gorman, John <Gorman.John@epa.gov>; Klevs, Mardi <klevs.mardi@epa.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Denton, Loren <Denton.Loren@epa.gov>; Paul Buellesbach <paul.buellesbach@erg.com>; Dan-Tam Nguyen <Dan-Tam.Nguyen@erg.com>; Daryl Hudson <Daryl.Hudson@erg.com>; Schulz, Susan <Schulz.Susan@epa.gov>; Davis, Lauren O. <Davis.LaurenO@epa.gov>; Gordon, Scott <Gordon.Scott@epa.gov>; Fite, Mark <Fite.Mark@epa.gov>; George, Verne <George.Verne@epa.gov>; Bates, Keith <Bates.Keith@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Pollins, Mark <Pollins.Mark@epa.gov>; Theis, Joseph <Theis.Joseph@epa.gov>; Bahk, Benjamin <Bahk.Benjamin@epa.gov>; Poy, Thomas <poy.thomas@epa.gov>; Collins, Charlie <collins.charlie@epa.gov>; Aubee, Catherine <Aubee.Catherine@epa.gov>; rogers, rick <rogers.rick@epa.gov>; Wilson, Jennifer <wilson.jenniferA@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; Clark, Jacqueline <clark.jacqueline@epa.gov>; Duchovnay, Andrew <Duchovnay.Andrew@epa.gov>; Day, Christopher <Day.Christopher@epa.gov>; Coe, Mary <Coe.Mary@epa.gov>; Ramalho, Louis <Ramalho.Louis@epa.gov>; Lewis, Jennifer <Lewis.Jennifer@epa.gov>; Baptista, Chrisna <Baptista.Chrisna@epa.gov>; Niess, Claudia <niess.claudia@epa.gov>; Spann, Tony <Spann.Tony@epa.gov>; Timsina, Gopal <Timsina.Gopal@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Mancusi-Ungaro, Philip <Mancusi-Ungaro.Philip@epa.gov>; Bush, William <Bush.William@epa.gov>; Janovitz, Sara <Janovitz.Sara@epa.gov>; Hall, Renea <Hall.Renea@epa.gov>; Shell, Karrie-Jo <Shell.Karrie-Jo@epa.gov>; Devkota, Om <devkota.om@epa.gov>
Cc: Reinhart, Roger <Reinhart.Roger@epa.gov>; Buso, Roberto X <Buso.Roberto@epa.gov>
Subject: RE: Chemours -Emissions in Pounds -- GenX Enforcement Coordination Call -

To the GenX Enforcement Coordination Call Participants:

Enforcement/Investigatory / Ex. 7(a)

http://www.ncleg.net/documentsites/committees/house2017-185/Meetings/2%20-%20Oct%2026%202017/DEQ%20Presentation.pdf

Chemours reported air emissions (pounds per year)

	2012	2013	2014	2015	2016
C3 dimer acid fluoride	500	539	545	669	591
C3 dimer acid (GenX)	1	3	4	3	3
C3 dimer acid ammonium salt	1	3	3	2	2

- All data based on chemical process computational model.
- Air emission data for other emerging contaminants has been received and is being analyzed by staff.
- Source information, emissions data, and stack parameters needed to conduct air dispersion modeling has been received.

Mark Garvey
EPA Headquarters
Office of Civil Enforcement
Attorney
202-564-4168
garvey.mark@epa.gov

NOTE: This email and its attachments may contain confidential information, attorney-work product, enforcement sensitive material or privileged information.

From: Speir, Jeffrey
Sent: Thursday, October 26, 2017 2:17 PM
To: Garvey, Mark <Garvey.Mark@epa.gov>; Miles, James <miles.james@epa.gov>; Toney, Anthony <Toney.Anthony@epa.gov>; Doa, Maria <Doa.Maria@epa.gov>; Star, David <star.david@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Ellis, Tony <Ellis.Tony@epa.gov>; Sullivan, Greg <Sullivan.Greg@epa.gov>; Saenz, Diana <Saenz.Diana@epa.gov>; Martinez, Jeffrey <Martinez.Jeffrey@epa.gov>; King, Carol <King.Carol@epa.gov>; Anderson, Kate <Anderson.Kate@epa.gov>; Henry, Tala <Henry.Tala@epa.gov>; Allison, Rose <Allison.Rose@epa.gov>; Swan, Russell <Swan.Russell@epa.gov>; Unger, LouAnn <unger.louann@epa.gov>; Bair, Rita <bair.rita@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Field, Stephen <Field.Stephen@epa.gov>; Schwartz, Paul <Schwartz.Paul@epa.gov>; Davis, Molly <Davis.Molly@epa.gov>; Ireland, Laurie <Ireland.Laurie@epa.gov>; Moyer, Adam <moyer.adam@epa.gov>; DeDora, Caroline <DeDora.Caroline@epa.gov>; Bean, Mark <Bean.Mark@epa.gov>; Bookman, Robert <Bookman.Robert@epa.gov>; Pratt, Stacie <Pratt.Stacie@epa.gov>; daw, harry <daw.harry@epa.gov>; Gorman, John <Gorman.John@epa.gov>; Klevs, Mardi <klevs.mardi@epa.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Denton, Loren <Denton.Loren@epa.gov>; Paul Buellesbach <paul.buellesbach@erg.com>; Dan-Tam Nguyen <Dan-Tam.Nguyen@erg.com>; Daryl Hudson <Daryl.Hudson@erg.com>; Schulz, Susan <Schulz.Susan@epa.gov>; Davis, Lauren O. <Davis.LaurenO@epa.gov>; Gordon, Scott <Gordon.Scott@epa.gov>; Fite, Mark <Fite.Mark@epa.gov>; George, Verne <George.Verne@epa.gov>; Bates, Keith <Bates.Keith@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Pollins, Mark <Pollins.Mark@epa.gov>; Theis, Joseph <Theis.Joseph@epa.gov>; Bahk, Benjamin <Bahk.Benjamin@epa.gov>; Poy, Thomas <poy.thomas@epa.gov>; Collins, Charlie <collins.charlie@epa.gov>; Aubee, Catherine <Aubee.Catherine@epa.gov>; rogers, rick <rogers.rick@epa.gov>; Wilson, Jennifer <wilson.jenniferA@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; Clark, Jacqueline <clark.jacqueline@epa.gov>; Duchovnay, Andrew <Duchovnay.Andrew@epa.gov>; Day, Christopher <Day.Christopher@epa.gov>; Coe, Mary <Coe.Mary@epa.gov>; Ramalho, Louis <Ramalho.Louis@epa.gov>; Lewis, Jennifer <Lewis.Jennifer@epa.gov>; Baptista, Chrisna <Baptista.Chrisna@epa.gov>; Niess, Claudia <niess.claudia@epa.gov>; Spann, Tony <Spann.Tony@epa.gov>; Timsina, Gopal <Timsina.Gopal@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Mancusi-Ungaro, Philip <Mancusi-Ungaro.Philip@epa.gov>; Bush, William <Bush.William@epa.gov>; Janovitz, Sara <Janovitz.Sara@epa.gov>; Hall, Renea <Hall.Renea@epa.gov>; Shell, Karrie-Jo <Shell.Karrie-Jo@epa.gov>; Devkota, Om <devkota.om@epa.gov>
Cc: Reinhart, Roger <Reinhart.Roger@epa.gov>; Buso, Roberto X <Buso.Roberto@epa.gov>
Subject: RE: Chemours - GenX Enforcement Coordination Call - TSCA CBI

As I mentioned on the call this afternoon, I am sending the following documents:

1. NC DEQ's October 24 letter to Chemours stating its decision not to suspend Chemours' NPDES permit;
2. NC and Chemours' September 8 Partial Consent Order, to which the document above refers; and
3. Cape Fear Public Utility Authority's October 16 complaint filed in federal district court.

Jeffrey Speir

Attorney-Adviser
U.S. Environmental Protection Agency
OECA – OCE – Water Enforcement Division
1200 Pennsylvania Avenue, NW (2243-A)
Washington, DC 20460
(202) 564-0872

From: Garvey, Mark
Sent: Thursday, October 26, 2017 8:57 AM
To: Miles, James <miles.james@epa.gov>; Toney, Anthony <Toney.Anthony@epa.gov>; Doa, Maria <Doa.Maria@epa.gov>; Star, David <star.david@epa.gov>; Tucker, Marlene <Tucker.Marlene@epa.gov>; Ellis, Tony <Ellis.Tony@epa.gov>; Sullivan, Greg <Sullivan.Greg@epa.gov>; Saenz, Diana <Saenz.Diana@epa.gov>; Martinez, Jeffrey <Martinez.Jeffrey@epa.gov>; King, Carol <King.Carol@epa.gov>; Anderson, Kate <Anderson.Kate@epa.gov>; Henry, Tala <Henry.Tala@epa.gov>; Allison, Rose <Allison.Rose@epa.gov>; Swan, Russell <Swan.Russell@epa.gov>; Unger, LouAnn <unger.louann@epa.gov>; Bair, Rita <bair.rita@epa.gov>; Shoven, Heather <shoven.heather@epa.gov>; Field, Stephen <Field.Stephen@epa.gov>; Schwartz, Paul <Schwartz.Paul@epa.gov>; Davis, Molly <Davis.Molly@epa.gov>; Ireland, Laurie <Ireland.Laurie@epa.gov>; Moyer, Adam <moyer.adam@epa.gov>; DeDora, Caroline <DeDora.Caroline@epa.gov>; Bean, Mark <Bean.Mark@epa.gov>; Bookman, Robert <Bookman.Robert@epa.gov>; Pratt, Stacie <Pratt.Stacie@epa.gov>; daw, harry <daw.harry@epa.gov>; Gorman, John <Gorman.John@epa.gov>; Klevs, Mardi <klevs.mardi@epa.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Denton, Loren <Denton.Loren@epa.gov>; Paul Buellesbach <paul.buellesbach@erg.com>; Dan-Tam Nguyen <Dan-Tam.Nguyen@erg.com>; Daryl Hudson <Daryl.Hudson@erg.com>; Schulz, Susan <Schulz.Susan@epa.gov>; Davis, Lauren O. <Davis.LaurenO@epa.gov>; Gordon, Scott <Gordon.Scott@epa.gov>; Fite, Mark <Fite.Mark@epa.gov>; George, Verne <George.Verne@epa.gov>; Bates, Keith <Bates.Keith@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Pollins, Mark <Pollins.Mark@epa.gov>; Theis, Joseph <Theis.Joseph@epa.gov>; Bahk, Benjamin <Bahk.Benjamin@epa.gov>; Poy, Thomas <poy.thomas@epa.gov>; Speir, Jeffrey <speir.jeffrey@epa.gov>; Collins, Charlie <collins.charlie@epa.gov>; Aubee, Catherine <Aubee.Catherine@epa.gov>; rogers, rick <rogers.rick@epa.gov>; Wilson, Jennifer <wilson.jenniferA@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; Clark, Jacqueline <clark.jacqueline@epa.gov>; Duchovnay, Andrew <Duchovnay.Andrew@epa.gov>; Day, Christopher <Day.Christopher@epa.gov>; Coe, Mary <Coe.Mary@epa.gov>; Ramalho, Louis <Ramalho.Louis@epa.gov>; Lewis, Jennifer <Lewis.Jennifer@epa.gov>; Baptista, Chrisna <Baptista.Chrisna@epa.gov>; Niess, Claudia <niess.claudia@epa.gov>; Spann, Tony <Spann.Tony@epa.gov>; Timsina, Gopal <Timsina.Gopal@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Mancusi-Ungaro, Philip <Mancusi-Ungaro.Philip@epa.gov>; Bush, William <Bush.William@epa.gov>; Janovitz, Sara <Janovitz.Sara@epa.gov>; Hall, Renea <Hall.Renea@epa.gov>; Shell, Karrie-Jo <Shell.Karrie-Jo@epa.gov>; Devkota, Om <devkota.om@epa.gov>
Cc: Reinhart, Roger <Reinhart.Roger@epa.gov>; Buso, Roberto X <Buso.Roberto@epa.gov>
Subject: RE: Chemours - GenX Enforcement Coordination Call - TSCA CBI

Deliberative Process / Ex. 5

By Everyone (4 minutes)

Mark Garvey
EPA Headquarters
Office of Civil Enforcement
Attorney
202-564-4168
garvey.mark@epa.gov

NOTE: This email and its attachments may contain confidential information, attorney-work product, enforcement sensitive material or privileged information.

-----Original Appointment-----
From: Miles, James
Sent: Friday, September 22, 2017 11:45 AM
To: Miles, James; Toney, Anthony; Doa, Maria; Star, David; Garvey, Mark; Tucker, Marlene; Ellis, Tony; Sullivan, Greg; Saenz, Diana; Martinez, Jeffrey; King, Carol; Anderson, Kate; Henry, Tala; Allison, Rose; Swan, Russell; Unger, LouAnn; Bair, Rita; Shoven, Heather; Field, Stephen; Schwartz, Paul; Davis, Molly; Ireland, Laurie; Moyer, Adam; DeDora, Caroline; Bean, Mark; Bookman, Robert; Pratt, Stacie; daw, harry; Gorman, John; Klevs, Mardi; Kemker, Carol; Denton, Loren; Paul Buellesbach; Dan-Tam Nguyen; Daryl Hudson; Schulz, Susan; Davis, Lauren O.; Gordon, Scott; Fite, Mark; George, Verne; Bates, Keith; Mitchell, Ken; Pollins, Mark; Theis, Joseph; Bahk, Benjamin; Poy, Thomas; Speir, Jeffrey; Collins, Charlie; Aubee, Catherine; rogers, rick; Wilson, Jennifer; Harris, Kimberly; Clark, Jacqueline; Duchovnay, Andrew; Day, Christopher; Coe, Mary; Ramalho, Louis; Lewis, Jennifer; Baptista, Chrisna; Niess, Claudia; Spann, Tony; Timsina, Gopal; Allenbach, Becky; Mancusi-Ungaro, Philip; Bush, William; Janovitz, Sara; Hall, Renea; Shell, Karrie-Jo; Devkota, Om
Cc: Reinhart, Roger; Buso, Roberto X
Subject: Chemours - Enforcement Coordination Call - TSCA CBI
When: Thursday, October 26, 2017 12:30 PM-1:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Personal Phone / Ex. 6

Continuing bi-weekly call through Nov.

To: Mort, Sandra L[sandy.mort@ncdenr.gov]; Beth.Dittman@dhhs.nc.gov[Beth.Dittman@dhhs.nc.gov]
From: Strynar, Mark
Sent: Thur 4/26/2018 1:36:41 PM
Subject: Strynar slides from TRACs meeting
Strynar TRACs presentation 4-24-18.pptx

Sandy and Beth,

Here are my slides from the TRACs meeting presentation.

Mark

Dr. Mark J. Strynar
Physical Scientist
US EPA
National Exposure Research Laboratory
919-541-3706
Strynar.mark@epa.gov

Investigations of per- and polyfluorinated compounds in environmental samples and contemporary products

Mark Strynar[1], James McCord[2], Johnsie Lang[2], Seth Newton[1], Andrew Lindstrom[1], Zack Hopkins[3], Detlef Knappe[3]

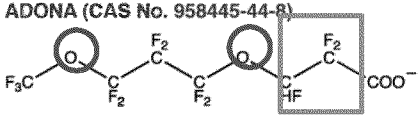
1. National Exposure Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC;
2. ORISE Fellow, Oak Ridge Associated Universities, Oak Ridge, TN;
3. Department of Civil, Construction, and Environmental Engineering, North Carolina State University, Raleigh, NC

TRACs
April 25th, 2018

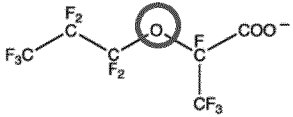
ED_002003J_00096000-00001

Fluoropolymer manufacture

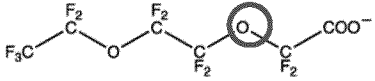
ADONA (CAS No. 958445-44-8)



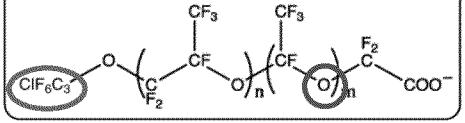
GenX (CAS No. 62037-80-3)



Asahi's product (CAS No. 908020-52-0)

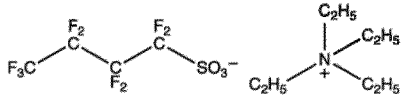


Solvay's product (CAS No. 329238-24-6)

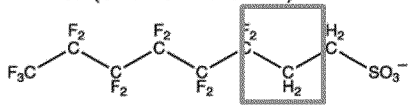


Metal plating

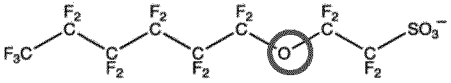
$N(Et)_4$-PFBS (CAS No. 25628-08-4)



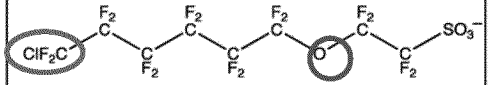
6:2 FTSA (CAS No. 27619-97-2)



F-53 (CAS No. 754925-54-7)



F-53B (CAS No. 73606-19-6)

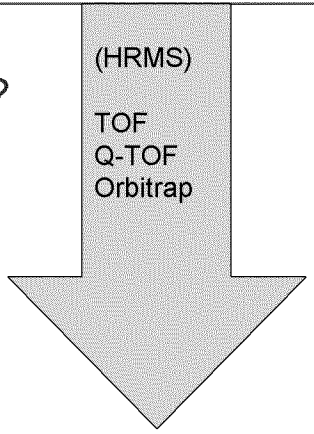


Wang et al. *Environment International*, **2013,** *60,* pp 242–248

What is Non-Targeted Analysis

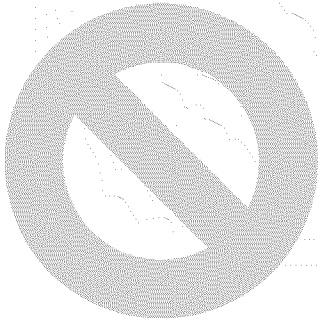
- Targeted Analysis
  - How much PFOA is in my sample?

- Suspect Screening
  - Which chemicals in this database are in my sample?
- Non-Targeted Screening
  - What are the chemicals in my sample?



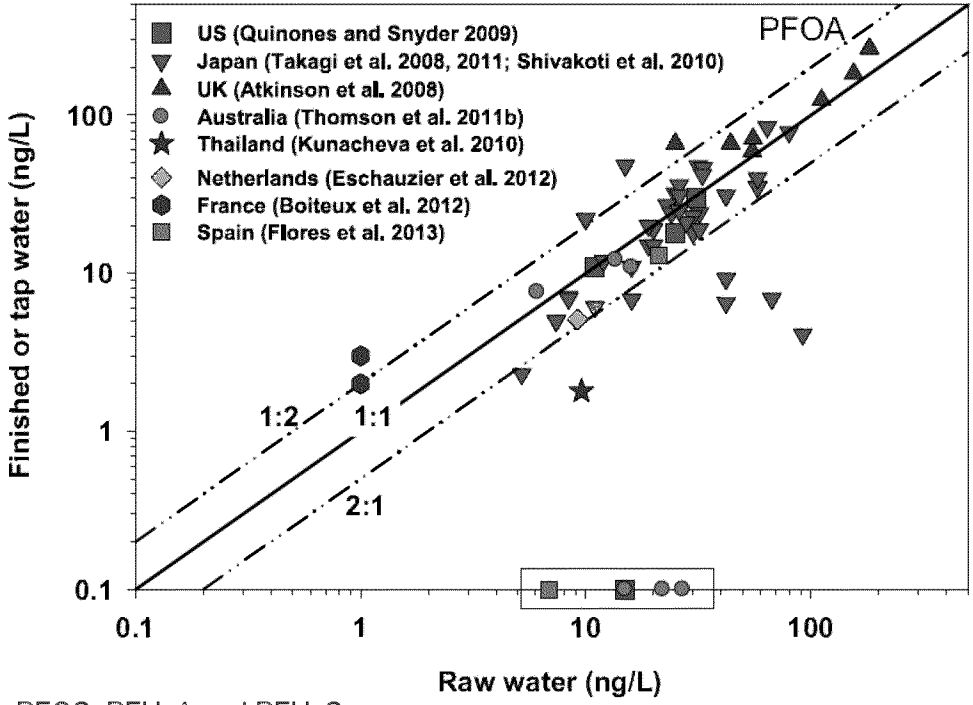
OTHER PFASs: The Era of HRMS & Non-Targeted Analysis

- How do we find compounds without knowing what they are?
- How do we prioritize unknowns for further analysis?
- How do we identify/quantify without analytical standards?



→ ???

PFAS Generally Not Removed During Conventional Drinking Water Treatment

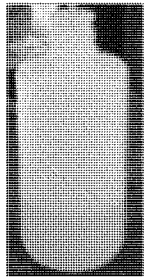


Similar for PFOS, PFHxA and PFHxS

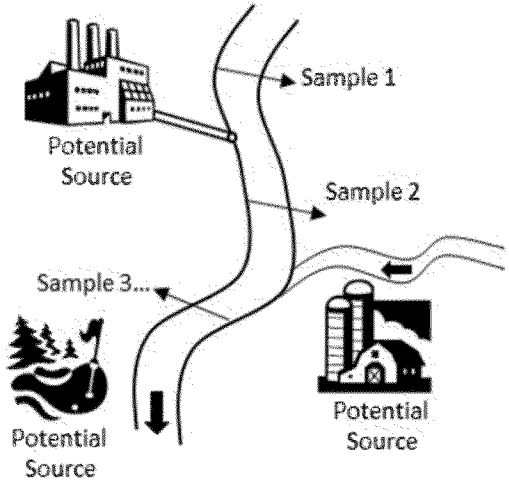
Rahman et al., (2014) *Water Research,* 50:318-340

Data Generation: Source Determination by NTA

Surface Water
Ground Water
WWTP Effluent
Drinking Water



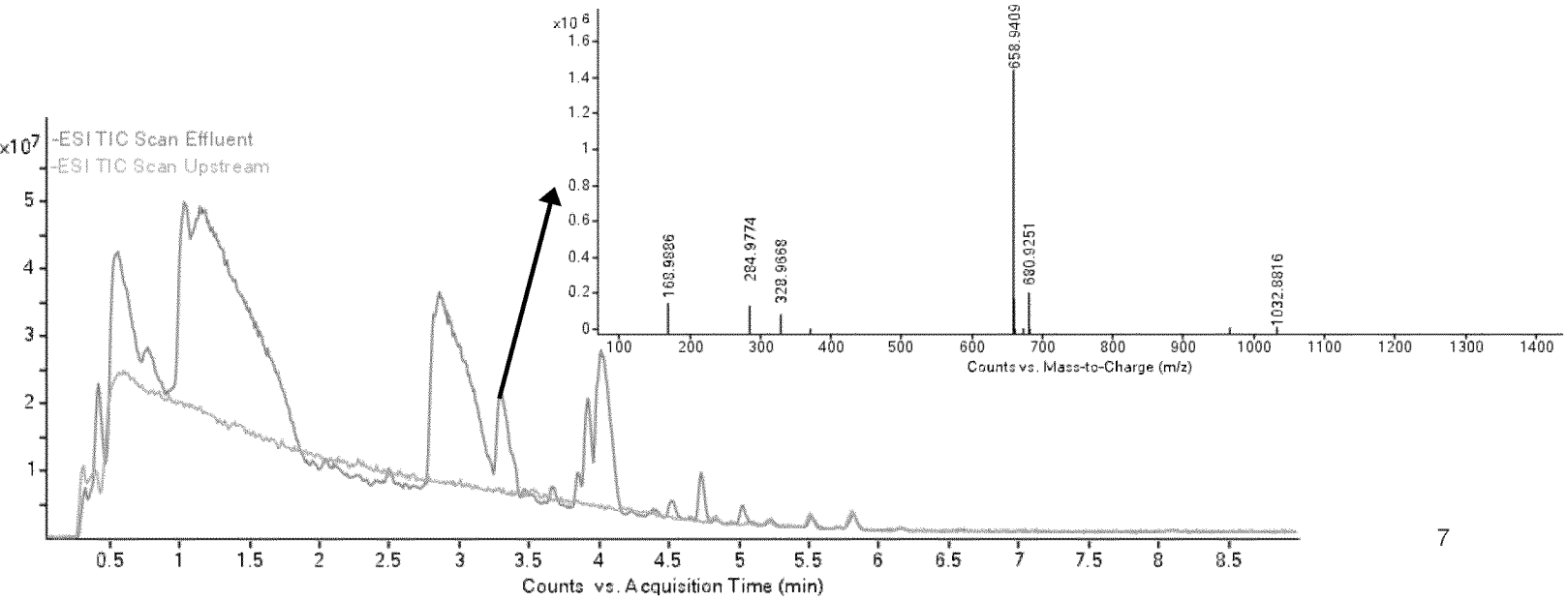
HDPE Bottles



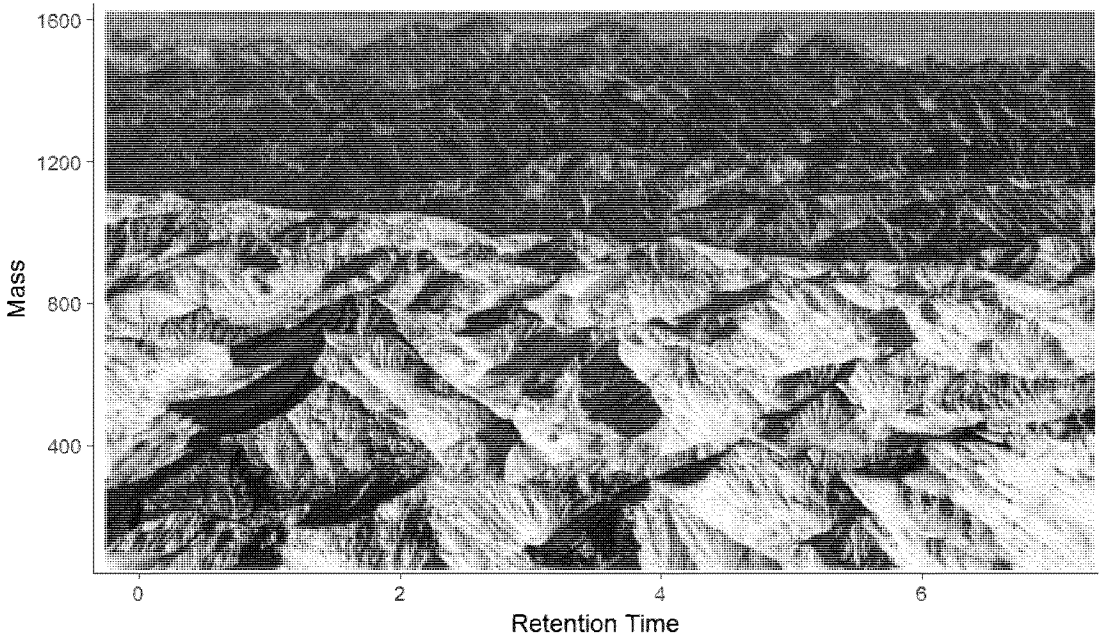
Sampling from geographically or temporally displaced locations allows triangulation of sourcing

Strynar et al. *Environ. Sci. Technol.*, **2015**, *49* (19), pp 11622–11630

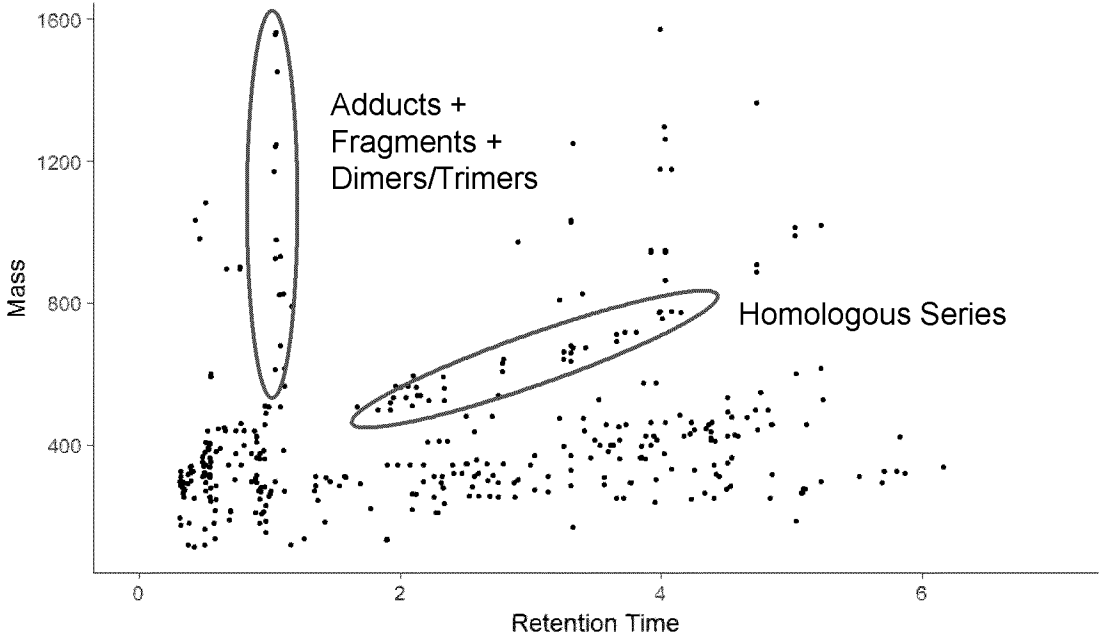
Chromatographic and MS Data



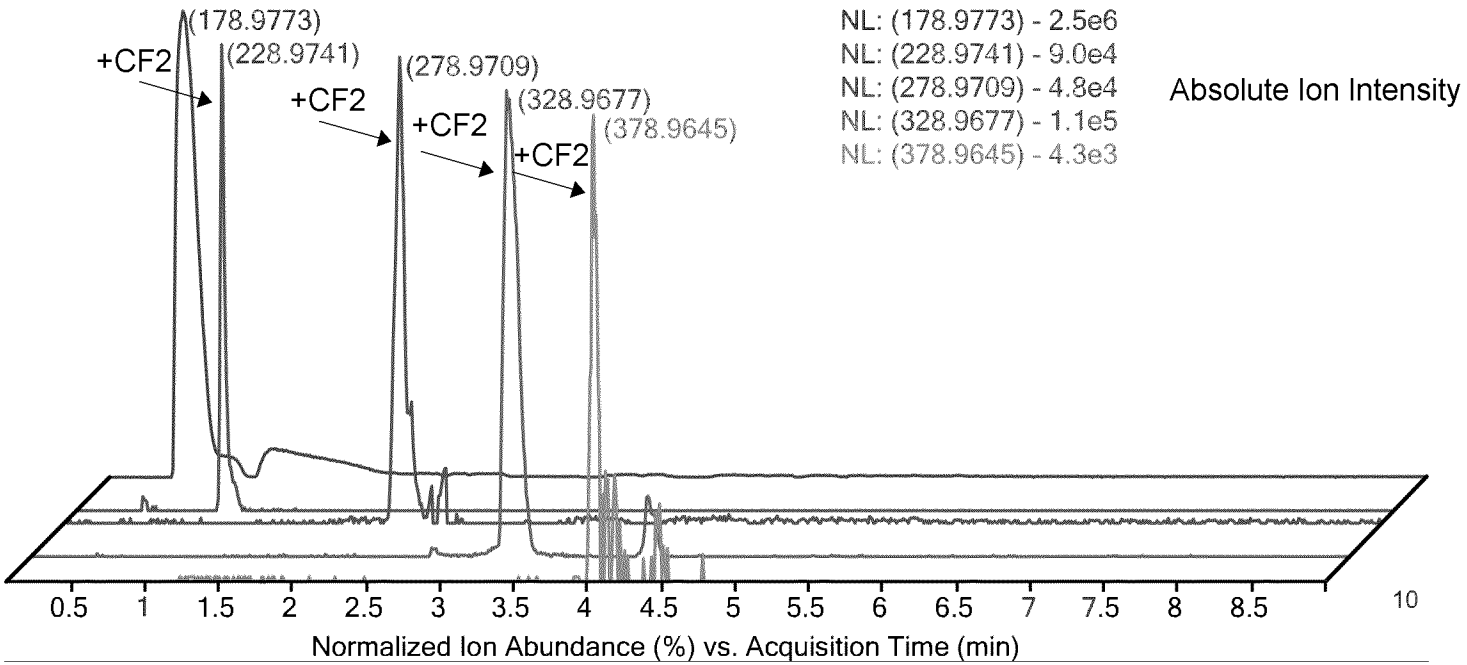
Mass + RT Pairs



Relationships Reveal Underlying Chemistry



Homologous Series



Feature Finding: Unique & Highly Different Features

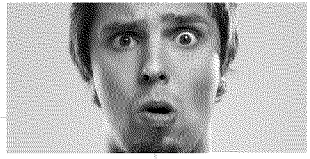
Cmpd	m/z	RT	Effluent Peak Area	Upstream Peak Area
1	194.9263	0.31	1277673	NA
2	174.9502	0.32	128095	NA
3	272.9487	0.35	893478	NA
4	290.9396	0.37	82068	NA
5	119.0345	0.37	56430	NA
6	179.0558	0.38	51910	NA
7	340.9372	0.4	1961449	NA
8	324.9428	0.41	75414	NA
9	248.961	0.42	235520	NA
10	112.9856	0.42	9963533	NA
11	1033.987	0.43	185007	NA
12	340.9376	0.49	847790	NA
13	118.9927	0.5	242003	NA
14	162.9821	0.5	1382091	NA
15	1083.984	0.51	14125	NA

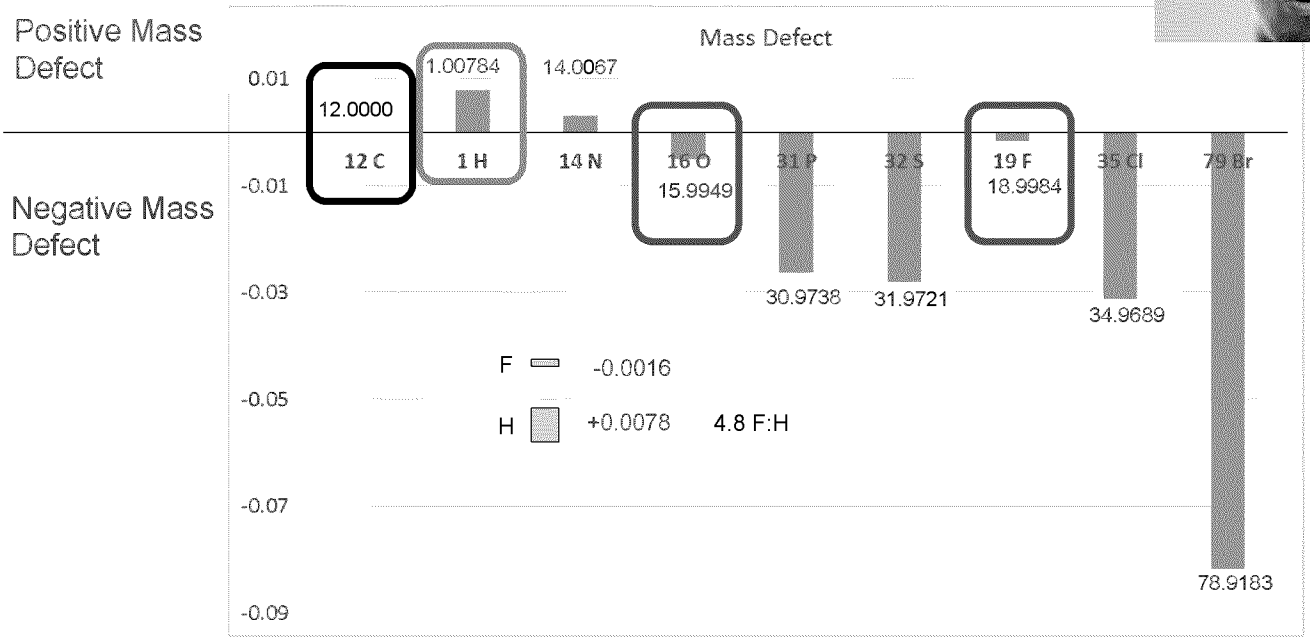
Hundreds of Features of Interest

Useful For:

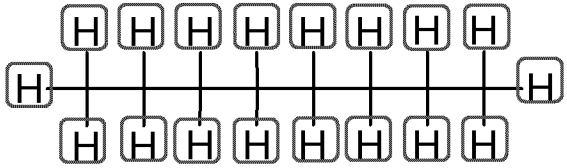
- Identification of increasing/decreasing chemicals
- Features unique to a specific location, time, treatment, etc.

Isotope Signatures: Negative Mass Defect

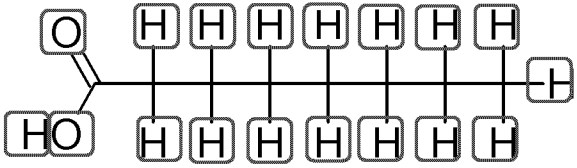




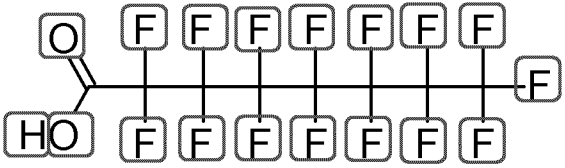
Example of Mass Defect



Octane
MI mass 114.1409

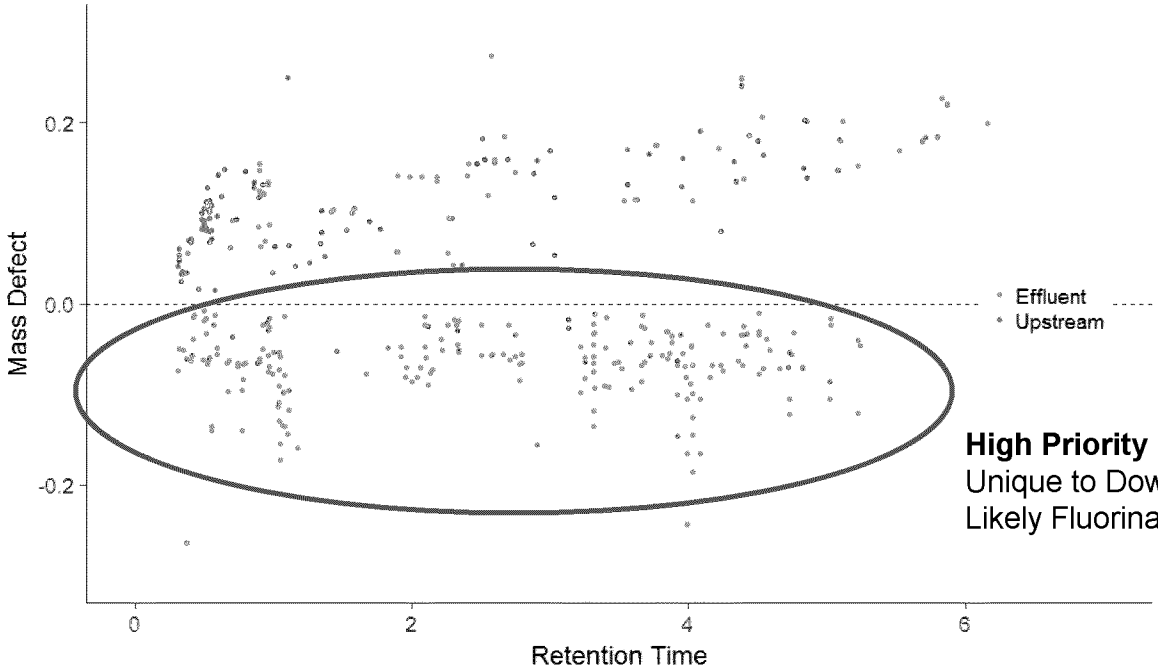


Octanoic Acid
MI mass 144.1150



Perfluorooctanoic Acid
MI mass 413.9737

Mass Defect of Chemours Outfall 002 and Upstream Features



High Priority Species:
Unique to Downstream,
Likely Fluorinated

Environmental Science & Technology

November 2015

Article

pubs.acs.org/est

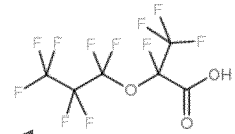
Identification of Novel Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Sulfonic Acids (PFESAs) in Natural Waters Using Accurate Mass Time-of-Flight Mass Spectrometry (TOFMS)

Mark Strynar,[*,†] Sonia Dagnino,[†,‡] Rebecca McMahen,[†,‡] Shuang Liang,[†,‡] Andrew Lindstrom,[†] Erik Andersen,[†] Larry McMillan,[§] Michael Thurman,[∥] Imma Ferrer,[∥] and Carol Ball[⊥]

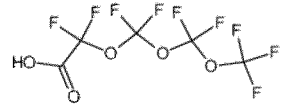
Table 1. Accurate Mass of Polyfluorinated Compounds and In-Source Artifacts Found in Extracted Water Samples

number	formula	CAS no.	name	$[M]^{\alpha}$	$[M - H]^-$ m/z	$[2M - 2H + Na]^-$ m/z	$[2M - H]^-$ m/z
Monoether PFECAs							
1	$C_3HF_5O_3$			179.9846	178.9773	380.9438	358.9619
2	$C_4HF_7O_3$			229.9813	228.9740	480.9372	458.9553
3	$C_5HF_9O_3$	863090-89-5		279.9782	278.9709	580.9310	558.9491
4	$C_6HF_{11}O_3$	13252-13-6	undecafluoro-2-methyl-3-oxahexanoic acid	329.9750	328.9677	680.9247	658.9427
5	$C_7HF_{13}O_3$			379.9718	378.9645	780.9182	758.9363
6	$C_8HF_{15}O_3$			429.9686	428.9613	880.9118	858.9299
Polyether PFECAs							
7	$C_7HF_{13}O_7$	39492-91-6	perfluoro-3,5,7,9,11-pentaoxadodecanoic acid	443.9515	442.9442	908.8776	886.8957
8	$C_6HF_{11}O_6$	39492-90-5	perfluoro-3,5,7,9-butaoxadecanoic acid	377.9598	376.9525	776.8942	754.9123
9	$C_5HF_9O_5$	39492-89-2	perfluoro-3,5,7-propaoxaoctanoic acid	311.9681	310.9608	644.9108	622.9289
10	$C_4HF_7O_4$	39492-88-1	perfluoro-3,5-dioxahexanoic acid	245.9764	244.9691	512.9274	490.9455
PFESAs							
11	$C_7HF_{13}O_5S$	66796-30-3[b]		443.9337	442.9264		
12	$C_7H_2F_{14}O_5S$			463.9399	462.9326		

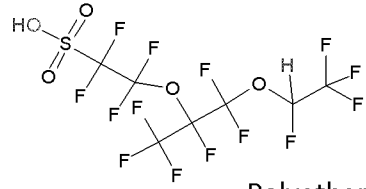
Example Structures



Monoether (6): GenX (HFPO-DA)



Polyethers (4):



Polyethers sulfonates (2):

November 2016

Environmental Science & Technology Letters

Letter

pubs.acs.org/journal/estlcu

Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina

Mei Sun,*[†,‡] Elisa Arevalo,[‡] Mark Strynar,[§] Andrew Lindstrom,[§] Michael Richardson,[∥] Ben Kearns,[∥] Adam Pickett,[⊥] Chris Smith,[#] and Detlef R. U. Knappe[‡]

StarNews 150th 1867 - 2017

Toxin taints CFPUA drinking water

MOST POPULAR

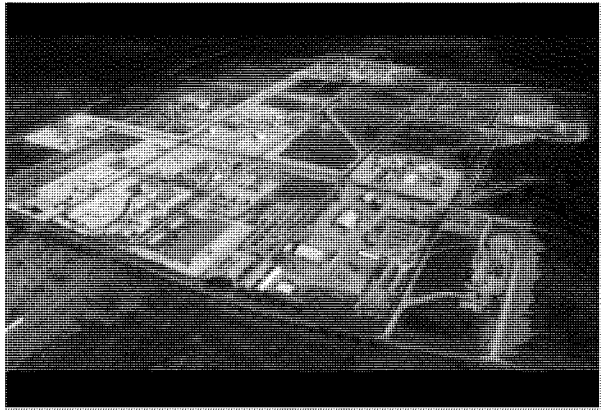
1 Carolina Surf condos - in danger of collapse - condemned, evacuated
Jul 2 at 5:50 AM

2 Man injured by hook, not bit by shark at Wrightsville Beach
Jun 30 at 1:43 PM

3 Murder suspect had other charges pending
Jul 2 at 5:44 AM

4 Residents not allowed back into Carolina Surf condos
Jul 4 at 7:33 AM

OUR PICKS

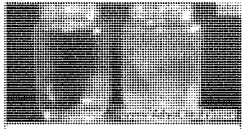


HIDE CAPTION

A 2000 aerial photo of Fayetteville Works on the Cumberland-Bladen county line. The site, home to several plants, one of which makes GenX, is about 100 miles upstream from Wilmington. [COURTESY OF THE FAYETTEVILLE OBSERVER]

By Vaughn Hagerty StarNews Correspondent
Posted Jun 7, 2017 at 10:31 AM
Updated Jun 8, 2017 at 10:38 AM

Utility can't filter out chemical produced upriver



June 2017

Cape Fear River
Fayetteville to Wilmington, NC

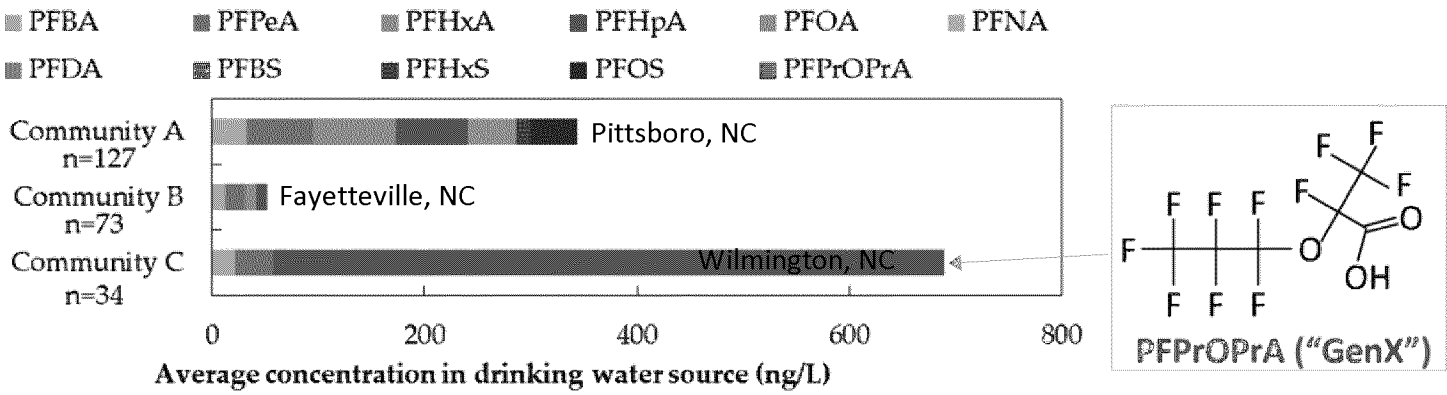
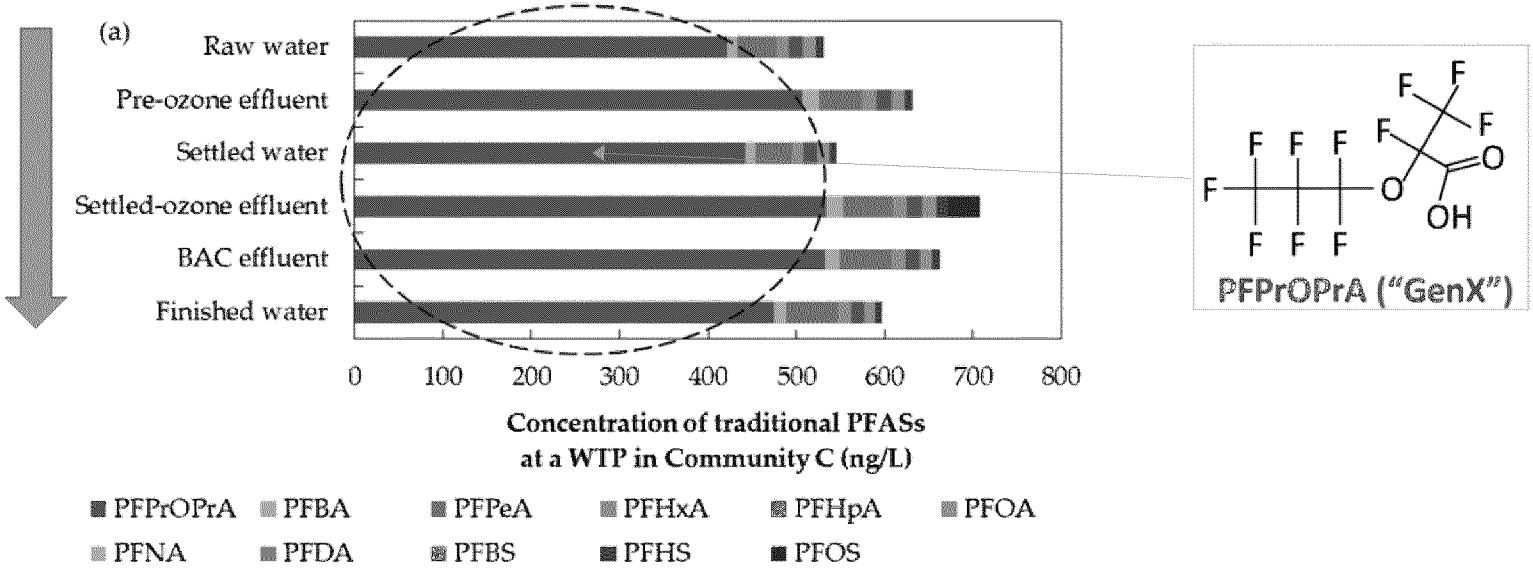
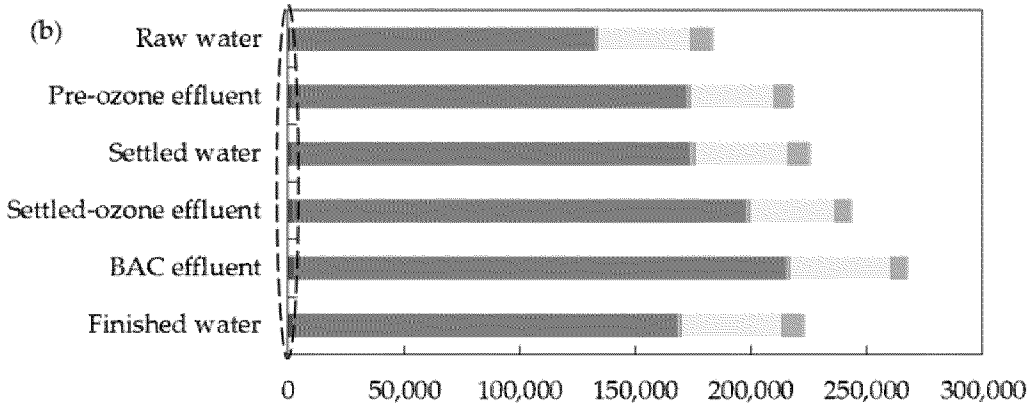


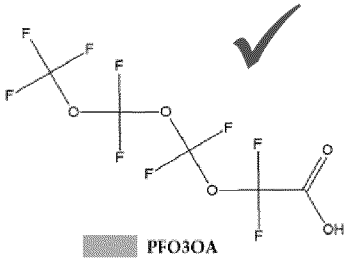
Figure 1. Occurrence of PFASs at drinking water intakes in the CFR watershed. Concentrations represent averages of samples collected between June and December 2013. Individual samples with concentrations below the quantitation limits (QLs) were considered as 0 when calculating averages, and average concentrations below the QLs were not plotted.

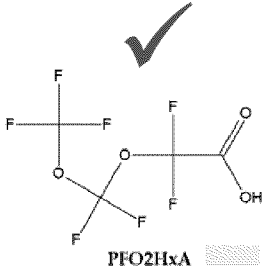

(a)
Raw water
Pre-ozone effluent
Settled water
Settled-ozone effluent
BAC effluent
Finished water
0
100
200
300
400
500
600
700
800
Concentration of traditional PFASs
at a WTP in Community C (ng/L)
PFPrOPrA
PFBA
PFPeA
PFHxA
PFHpA
PFOA
PFNA
PFDA
PFBS
PFHS
PFOS
PFPrOPrA ("GenX")

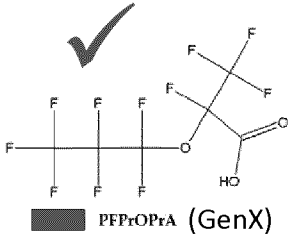


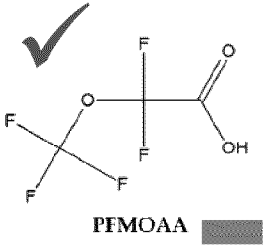
Peak area counts of emerging PFASs at a WTP in Community C

PFPrOPrA PFMOAA PFMOPrA PFMOBA
PFO2HxA PFO3OA PFO4DA





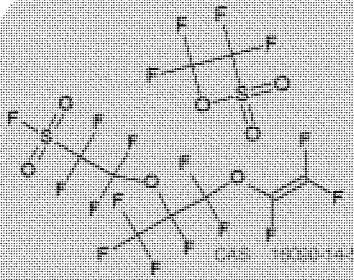




Chemours Site TSCA Inventory

Sulfonates

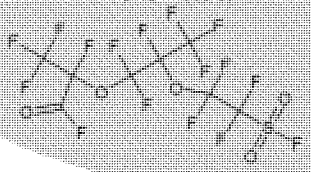
CAS 647-16-1



CAS 1000-14-4

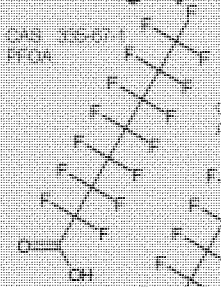
CAS 677-07-0

CAS 4089-59-1

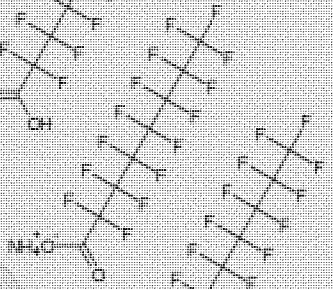


Legacy

CAS 335-67-1
PFOA

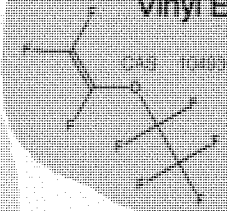


CAS 3825-26-1
APFO



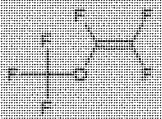
CAS 335-98-0

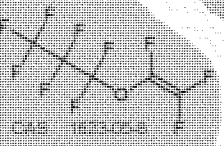
Vinyl Ethers



CAS 1646-67-1

CAS 1187-93-5

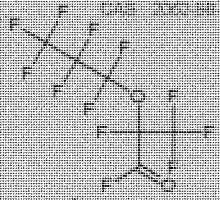




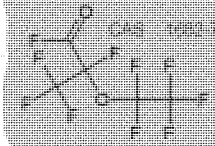
CAS 1623-05-8

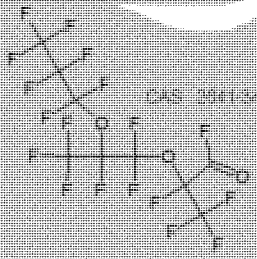
Acid Fluorides

CAS 355-08-9



CAS 1946-71-6

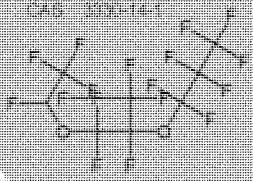




CAS 1641-61-1

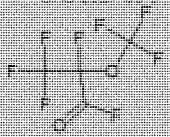
Other

CAS 3008-14-1



CAS 691-94-1

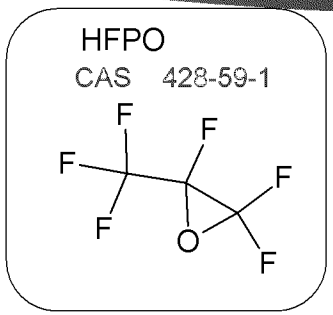
CAS 3327-93-2



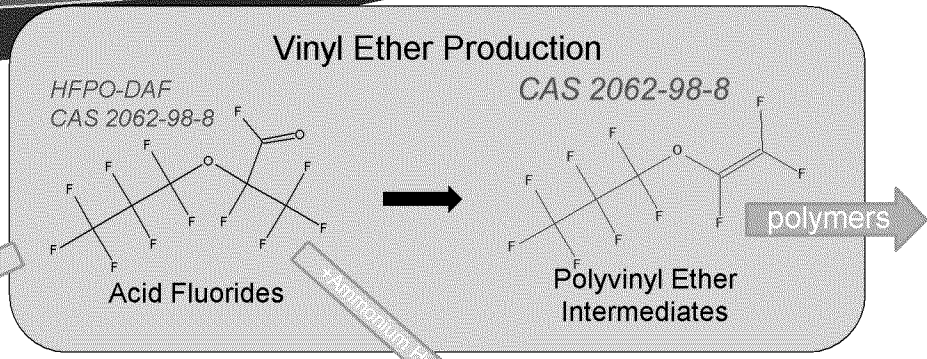
DUPONT FAYETTEVILLE PLANT
22828 NC HIGHWAY 87 WEST
FAYETTEVILLE, NC 28306-7332

http://iaspub.epa.gov/enviro/tsca.get_chem_info?v_registry_id=110000559609

Hexafluoropropylene Oxide (HFPO) Based Chemistry

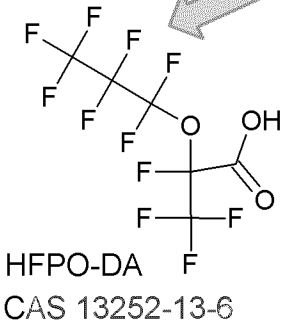


Dimerized to HFPO-DAF

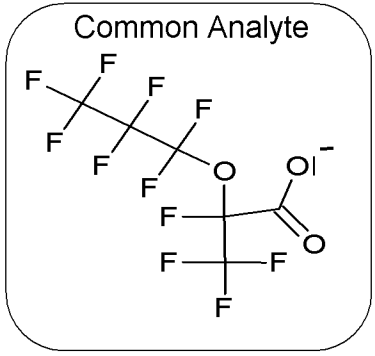


In Water

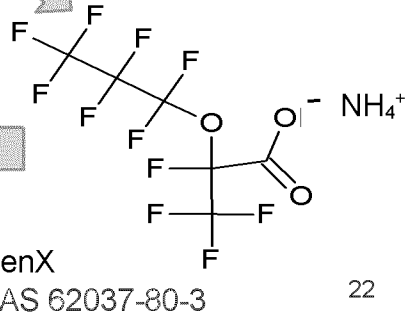
2 Ammonium Hydroxide



In Water

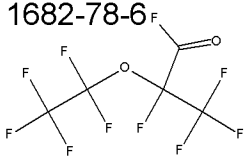


In water

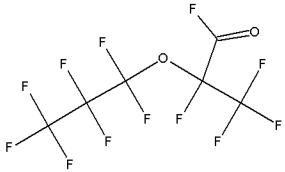


Polyvinyl Ether Production

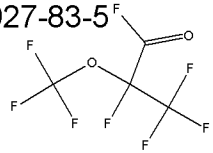
CAS 1682-78-6



CAS 2062-98-8

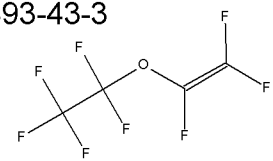


CAS 2927-83-5

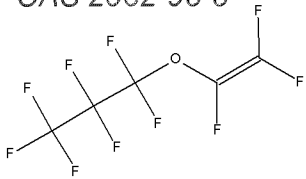


Acid Fluorides

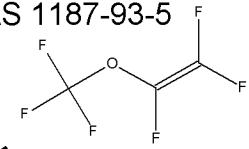
CAS 10493-43-3



CAS 2062-98-8



CAS 1187-93-5

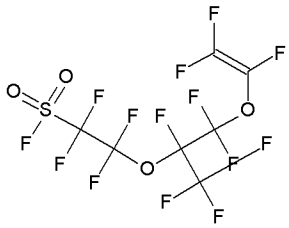


Polyvinyl Ether Intermediates

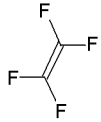
Head-$(CF_2)_n(CF_2O)_m$-Head Polyvinyl Ether

Nafion Polymer

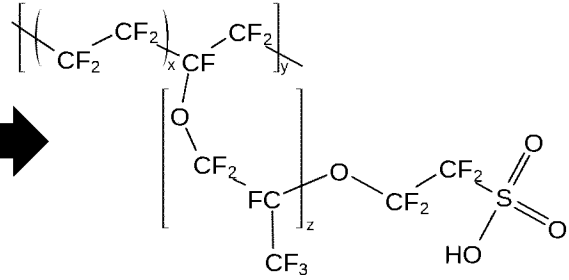
- Nafion is a sulfonated tetrafluoroethylene based fluoropolymer-copolymer.
- proton conductor for proton exchange membrane (PEM) fuel cells



CAS 16090-14-5

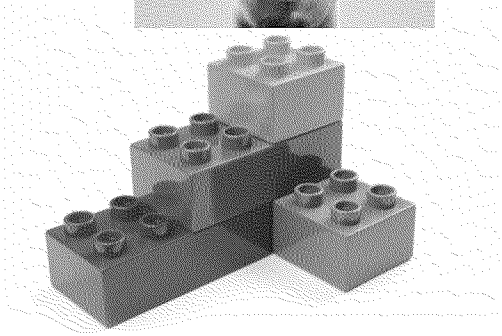


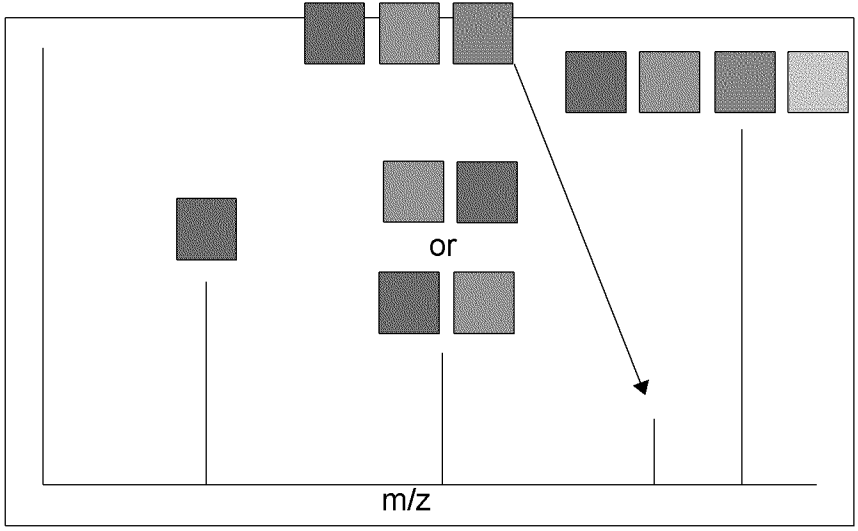
CAS 116-14-3



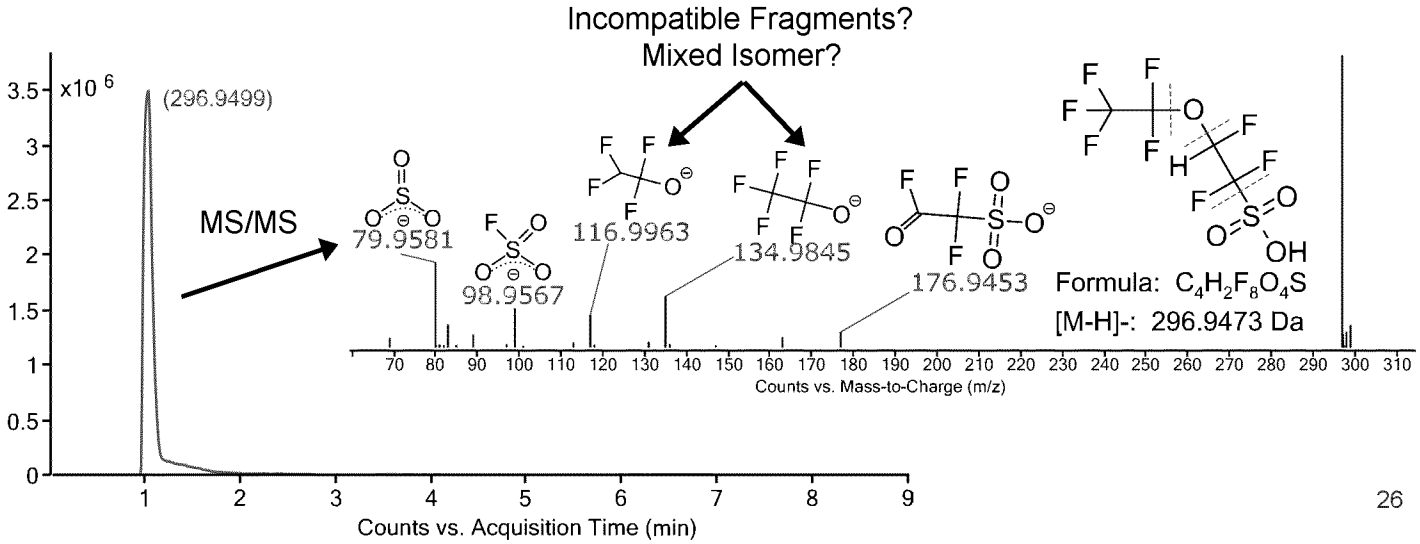
CAS 66796-30-3

Mass Spectrometry Fragments

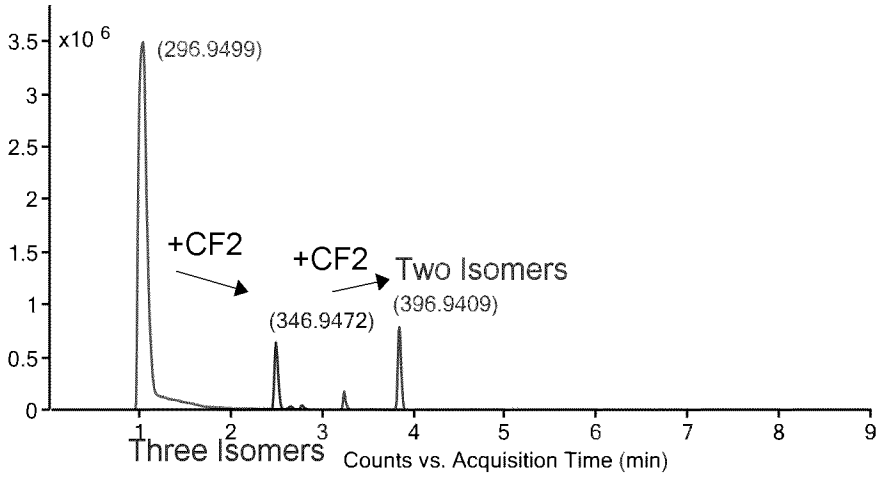




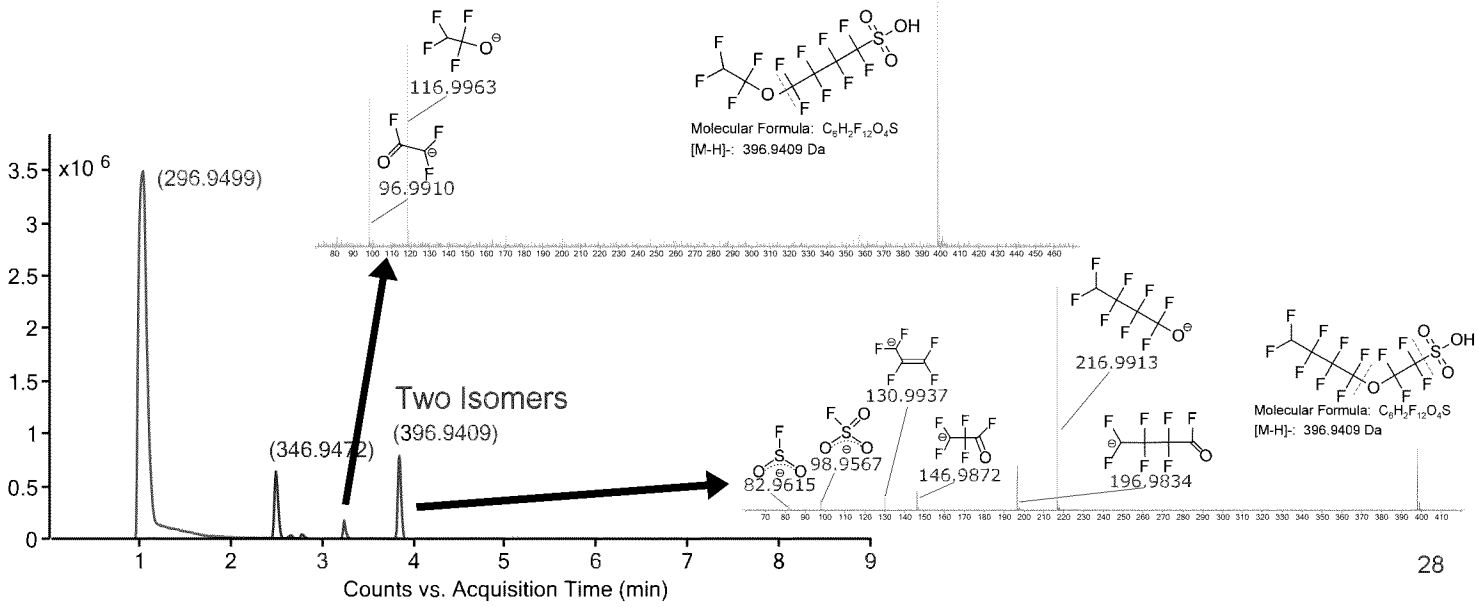
Novel Sulfonated Fluoroethers



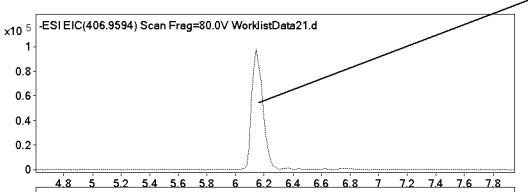
Homologous Series Improves Confirmation

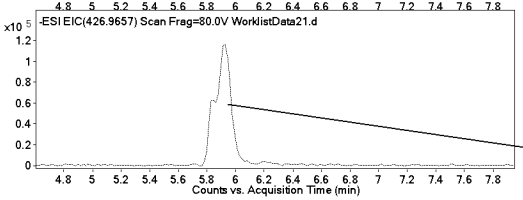


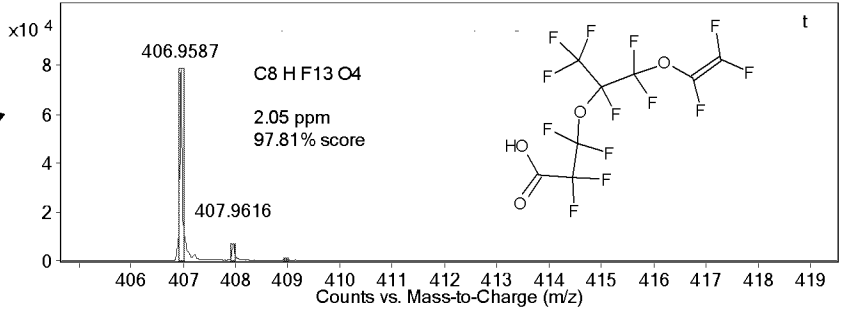
Unique MS/MS Fingerprints

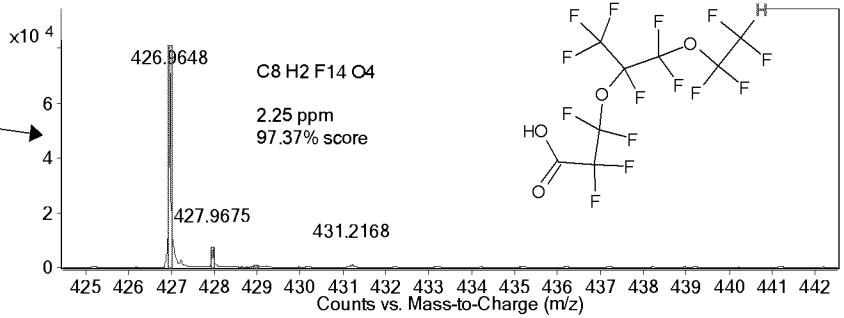


Additional Polyfluoro Ether Carboxylic Acids

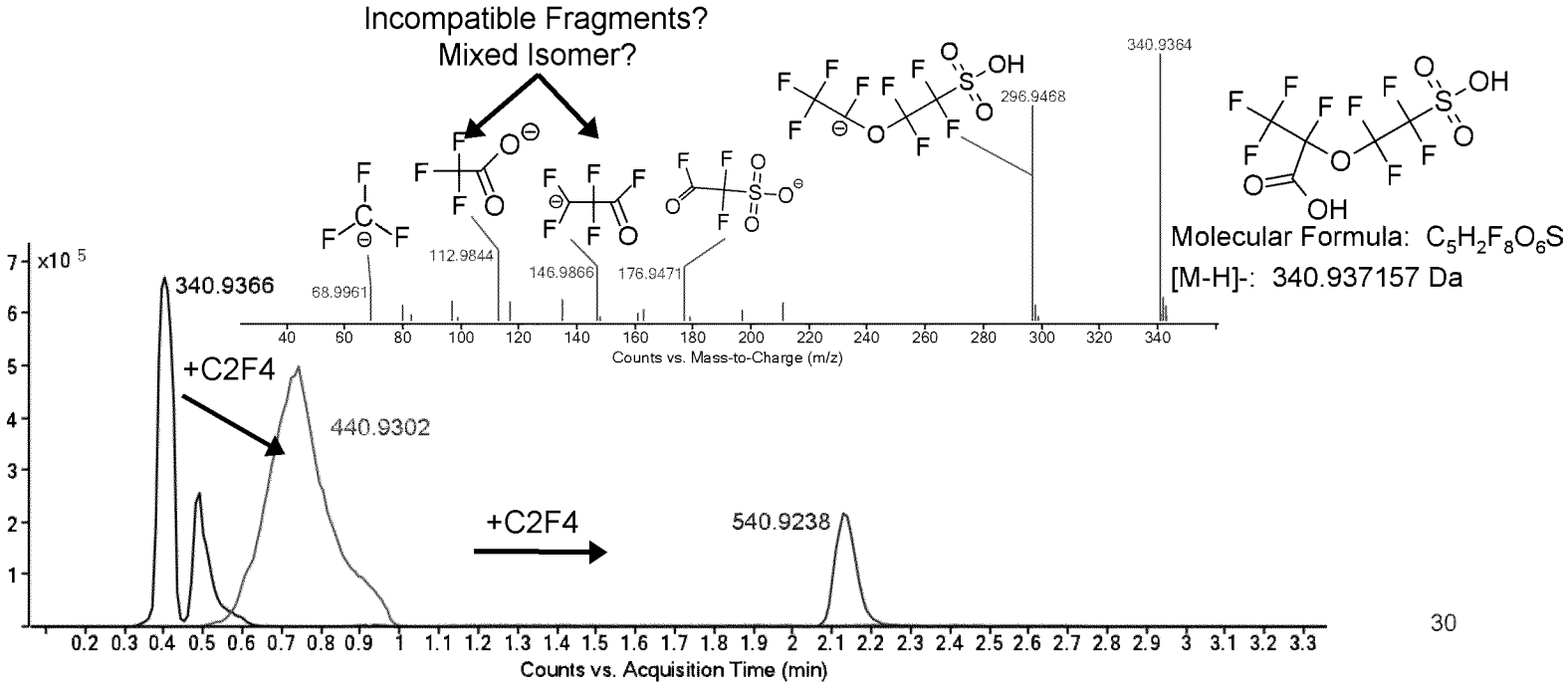






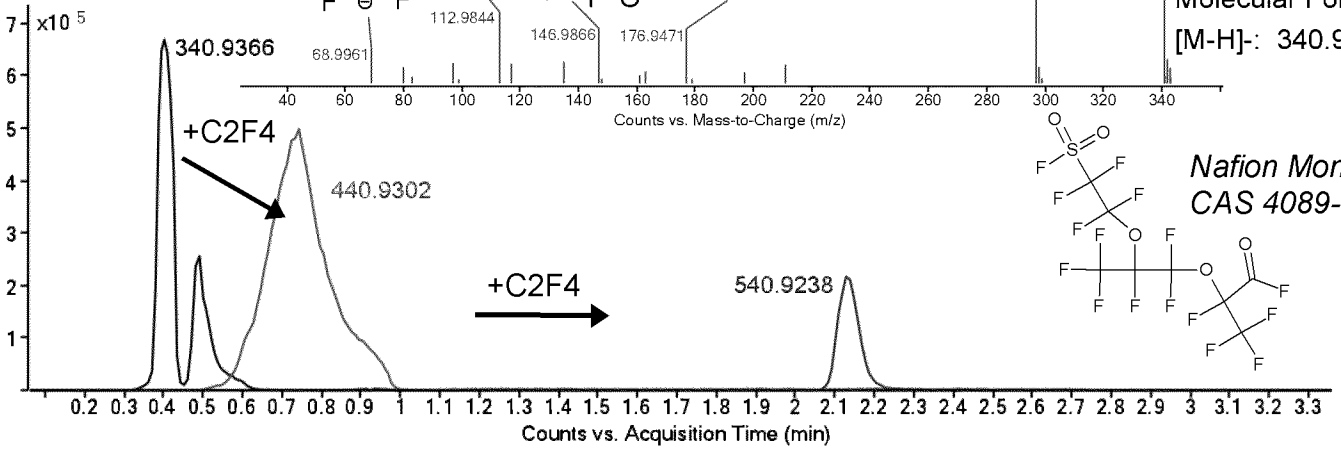


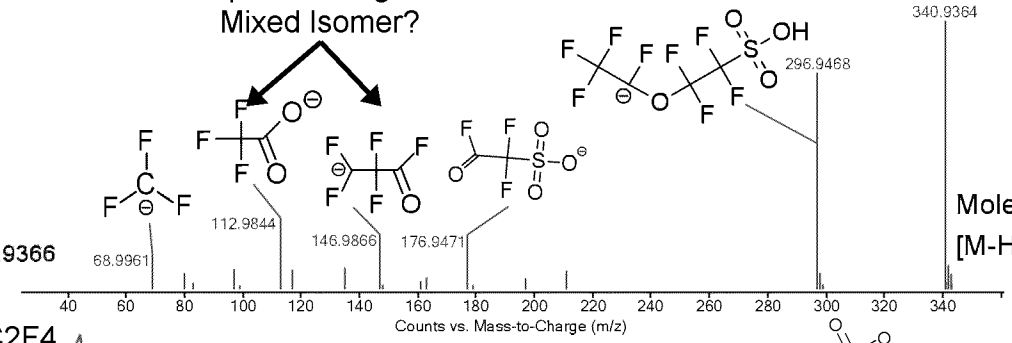
Double Headed Fluoropolymer Intermediates

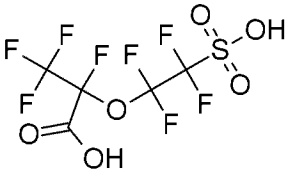


Double Headed Fluoropolymer Intermediates

Incompatible Fragments?
Mixed Isomer?







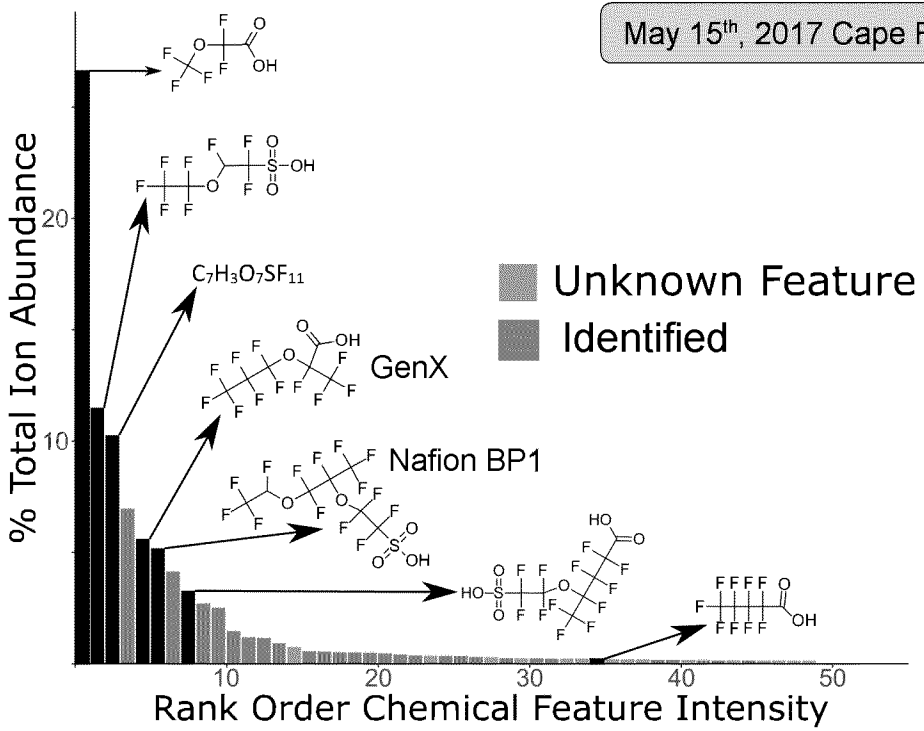
Molecular Formula: $C_5H_2F_8O_6S$

[M-H]-: 340.937157 Da

Nafion Monomer Precursor
CAS 4089-58-1

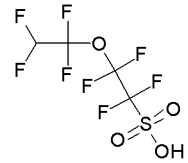
Perfluorinated Compound Ion Abundance

May 15th, 2017 Cape Fear River



Retrospective Analysis

Year	Date	296.9473	346.9472	396.9409	406.9594	426.9657	340.9372	440.9302	540.9238
2011	11-4-11	✓	✓	✓	✓	✓	×	×	×
	1-26-12	✓	×	×	✓	✓	×	×	×
2012	2-1-12	✓	×	×	✓	✓	×	✓	×
	2-9-12	✓	✓	✓	✓	✓	✓	×	×
	5-4-12	✓	×	×	[illegible]	[illegible]	×	×	×
	5-4-12	✓	×	×	[illegible]	[illegible]	×	×	×
2014	11-24-14	✓	×	×	[illegible]	[illegible]	×	×	×
2015	5-12-15	✓	✓	✓	[illegible]	[illegible]	✓	✓	✓
	5-12-15	✓	✓	✓	[illegible]	[illegible]	✓	✓	✓
	8-6-15	✓	✓	✓	[illegible]	[illegible]	✓	✓	✓
2017	5-12-17	✓	×	✓	[illegible]	[illegible]	✓	✓	✓
	6-20-17	✓	✓	✓	[illegible]	[illegible]	×	✓	✓
	6-27-17	✓	✓	✓	[illegible]	[illegible]	×	×	×
	7-4-17	✓	✓	✓	✓	✓	×	×	×
	7-11-17	✓	✓	✓	✓	✓	×	×	×
	7-18-17	✓	✓	✓	✓	✓	×	×	×
	7-25-17	✓	✓	✓	✓	✓	×	×	×
	8-3-17	✓	✓	✓	✓	✓	×	×	×



Formula: $C_4H_2F_8O_4S$
[M-H]-: 296.9473 Da

Retrospective Analysis

Year	Date	296.9473	346.9472	396.9409	406.9594	426.9657	340.9372	440.9302	540.9238
2011	11-4-11	✓	✓	✓	✓	✓	×	×	×
	1-26-12	✓	×	×	✓	✓	×	×	×
2012	2-1-12	✓	×	×	✓	✓			
	2-9-12	✓	✓	✓	✓	✓			
	5-4-12	✓	×	×	✓	×			
	5-4-12	✓	×	×	×	✓			
2014	11-24-14	✓	×	×	✓	×			
2015	5-12-15	✓	✓	✓	✓	✓			
	5-12-15	✓	✓	✓	×	✓			
	8-6-15	✓	✓	✓	×	✓			
2017	5-12-17	✓	×	✓	×	✓			
	6-20-17	✓	✓	✓	✓	✓			
	6-27-17	✓	✓	✓	✓	✓			
	7-4-17	✓	✓	✓	✓	✓			
	7-11-17	✓	✓	✓	✓	✓			
	7-18-17	✓	✓	✓	✓	✓			×
	7-25-17	✓	✓	✓	✓	✓	×	×	×
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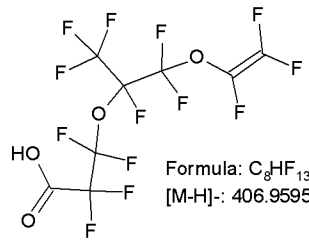
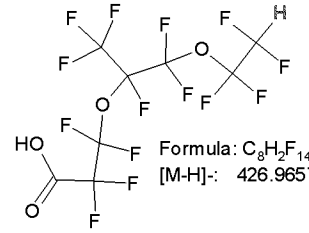


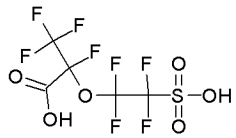
Formula: $C_8HF_{13}O_4$
[M-H]-: 406.9595 Da



Formula: $C_8H_2F_{14}O_4$
[M-H]-: 426.9657 Da

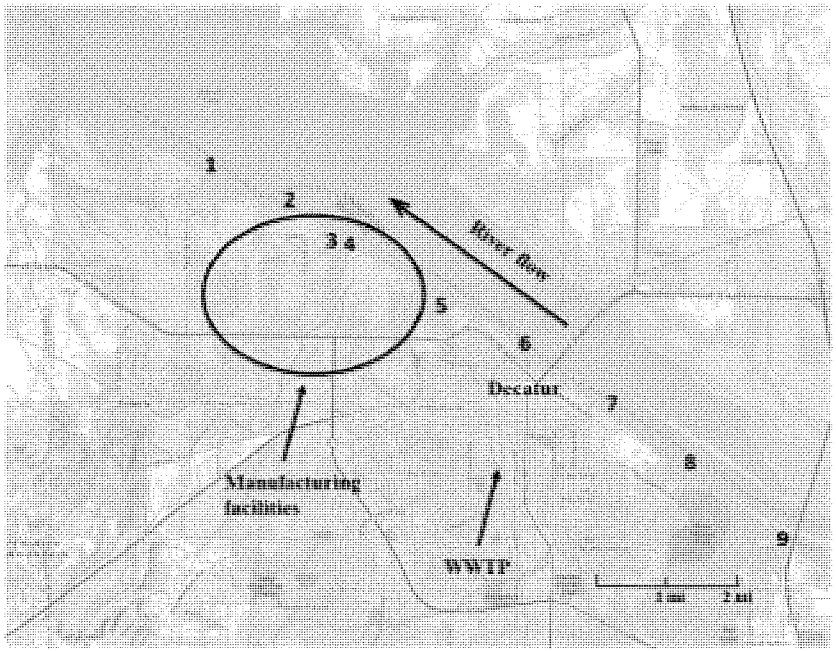
Retrospective Analysis

Year	Date	296.9473	346.9472	396.9409	406.9594	426.9657	340.9372	440.9302	540.9238
2011	11-4-11	✓	✓	✓	✓	✓	×	×	×
	1-26-12	✓	×	×	✓	✓	×	×	×
2012	2-1-12	✓	×				×	✓	×
	2-9-12	✓	✓				✓	×	×
	5-4-12	✓	×				×	×	×
	5-4-12	✓	×				×	×	×
2014	11-24-14	✓	×				×	×	×
2015	5-12-15	✓	✓				✓	✓	✓
	5-12-15	✓	✓				✓	✓	✓
	8-6-15	✓	✓				✓	✓	✓
2017	5-12-17	✓	×				✓	✓	✓
	6-20-17	✓	✓	✓	✓	✓	×	✓	✓
	6-27-17	✓	✓	✓	✓	✓	×	×	×
	7-4-17	✓	✓	✓	✓	✓	×	×	×
	7-11-17	✓	✓	✓	✓	✓	×	×	×
	7-18-17	✓	✓	✓	✓	✓	×	×	×
	7-25-17	✓	✓	✓	✓	✓	×	×	×
	8-3-17	✓	✓	✓	✓	✓	×	×	×



Formula: $C_5H_2F_8O_6S$
[M-H]-: 340.9372 Da

Decatur, AL Tennessee River



Environmental Science & Technology
Article
pubs.acs.org/est

Novel Polyfluorinated Compounds Identified Using High Resolution Mass Spectrometry Downstream of Manufacturing Facilities near Decatur, Alabama

Seth Newton,[†] Rebecca McMahen,[‡] James A. Stoeckel,[§] Michael Chislock,[§] Andrew Lindstrom,[†] and Mark Strynar[*,†]

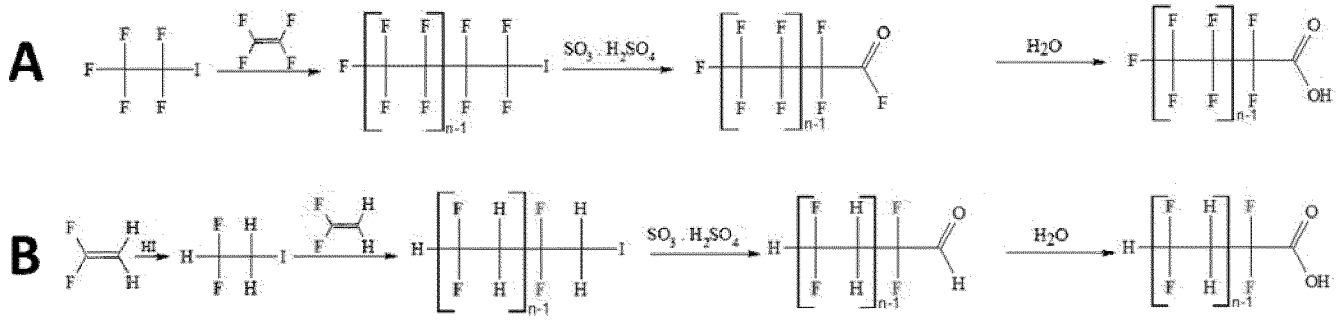


Figure 3. Synthesis reaction for the production of a traditional perfluorinated carboxylic acid using tetrafluoroethene (A) and the hypothesized synthesis of the proposed polyfluorinated carboxylic acids using 1,1-difluoroethene (B) where $n = 2-10$.

Application to contemporary products

- Paper/paperboard (Schaider et al., 2016)
- AFFF formulations
- Dispersions and surfactants

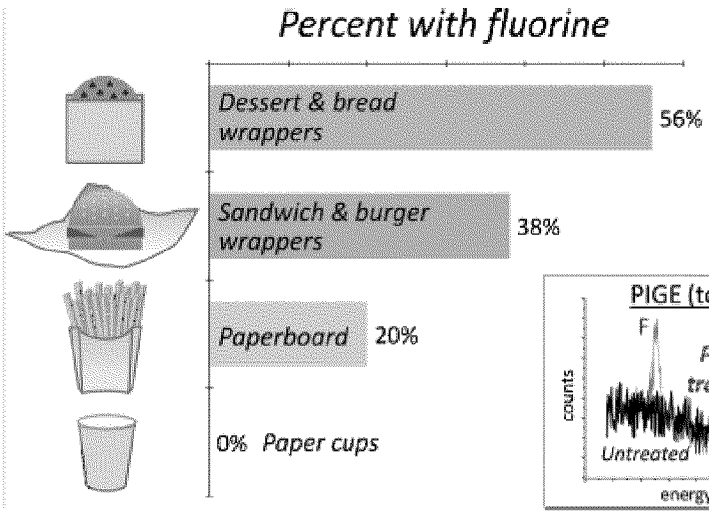
Application to Paper/Paperboard

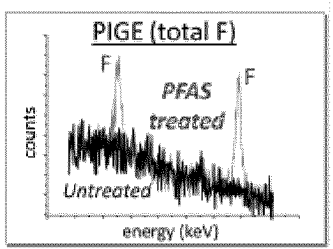
Schaider et al., 2016

Environmental Science & Technology Letters
Letter
pubs.acs.org/journal/estlcu

Fluorinated Compounds in U.S. Fast Food Packaging

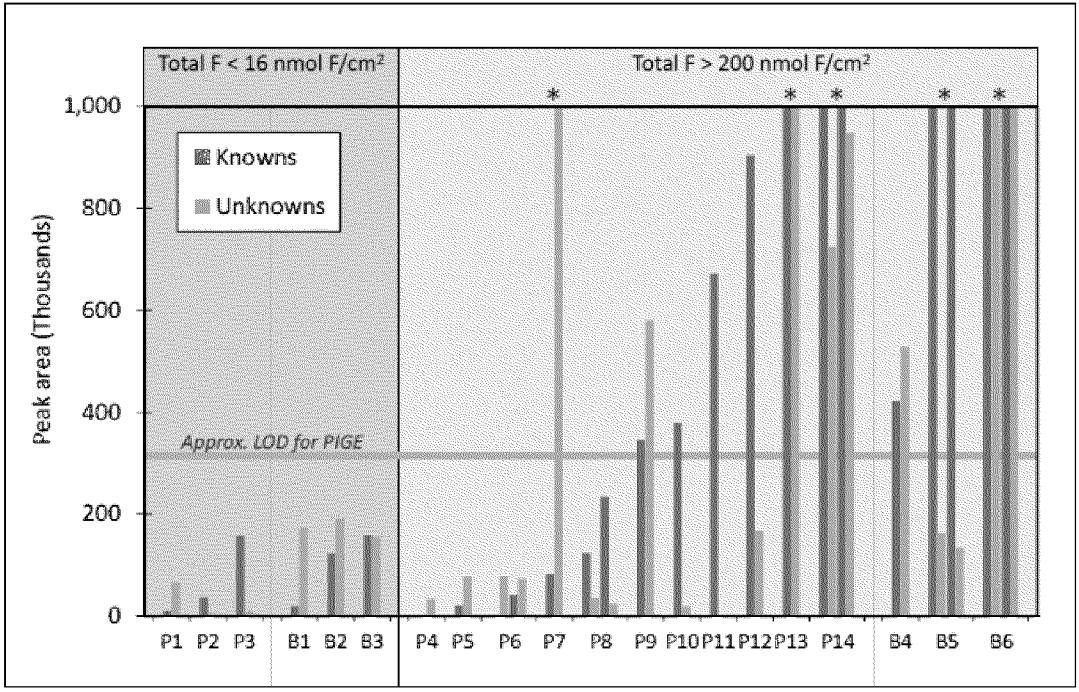
Laurel A. Schaider,[*,†] Simona A. Balan,[‡] Arlene Blum,[§,∥] David Q. Andrews,[⊥] Mark J. Strynar,[#] Margaret E. Dickinson,[▽] David M. Lunderberg,[▽] Johnsie R. Lang,[○] and Graham F. Peaslee[@]





Application to Paper/Paperboard

Schaider et al., 2016



Questions?

Contact Information
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The views expressed in this presentation are those of the author(s) and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency.

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Cc: McCord, James[mccord.james@epa.gov]
From: Strynar, Mark
Sent: Tue 10/31/2017 7:27:48 PM
Subject: RE: [External] RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)
likely Air Emission contributors to HFPO-DA detected.pptx
Strynar GenX thermal conversion.pptx
Fluoro ether chemistry 10-24-17.pptx

Greg,

I was great to meet with you and your colleagues today. I don't have their emails so please share with them.

Here is some data I said I would share that I could recall. If I missed something please do ping me back. Also I am going to forward some emission estimates from Chemours that I got today that I suspect you got but just to be sure.

NCDEQ orders Chemours to stop chemical release
https://deq.nc.gov/state-orders-chemours-stop-chemical-releases-begins-legal-action-and-steps-suspend-permit

Lawyers fight back
http://pulse.ncpolicywatch.org/2017/09/16/chemourss-lawyers-fight-back-deq-lets-parse-arguments/#sthash.rQFNGKIq.dpbs

Legal letter
https://www.scribd.com/document/359064548/9-8-17-Chem-DEQ-Letter-002

Mark

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]
Sent: Monday, October 30, 2017 2:55 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: [External] RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark,
We would like to visit with you and the lab form 10 to 11 am tomorrow. I feel an hour should be sufficient time unless you think otherwise. Should we just plan to meet you at the front desk?
Thanks,
Gregg

Thomas Gregg O'Neal, III, P.E.
Engineer
Division of Air Quality, Technical Services Section
North Carolina Department of Environmental Quality

919 707-8415 office
gregg.oneal@ncdenr.gov

217 West Jones Street
1601 Mail Service Center
Raleigh, NC 27699

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Monday, October 30, 2017 2:02 PM
To: Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: [External] RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to report.spam@nc.gov.

Tomorrow works fine from me between 7-11 AM. After that I am full. Wednesday is terrible for me. I am pretty much in meetings all day 9:30 am to 4:30 PM.

Mark

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]
Sent: Monday, October 30, 2017 1:46 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark,
I would like arrange a visit for some of the NC DAQ Tech Services staff to meet and see your lab sometime this week if possible. Tomorrow would be optimum or early Wednesday.
Thanks,
Gregg

Thomas Gregg O'Neal, III, P.E.
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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Thursday, September 28, 2017 7:29 AM
To: Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Ok Gregg. FYI I do not run Method 537. That method is an EPA standard method. We run our own internal developed methods for PFAS.

Mark

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]

Sent: Wednesday, September 27, 2017 3:11 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark,
I think at this time with other issues taking priority over here at DAQ we will have to try to work out another date and time. I will try to get back with you sometime in the coming weeks to arrange this. I still very much want to see the M537 equipment.
Thanks
Gregg

Thomas Gregg O'Neal, III, P.E.
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Raleigh, NC 27699

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Wednesday, September 27, 2017 8:12 AM
To: Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Gregg,

Thursday from 3-4 PM is booked. I have to leave at 4 PM to attend my daughters volleyball game otherwise I am usually here to 4:30.

Mark

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]
Sent: Tuesday, September 26, 2017 3:45 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark,
I think Thursday at 3:00pm would be nice based on your schedule. Please let me know if you are ok with this.

Gregg

Thomas Gregg O'Neal, III, P.E.
Engineer
Division of Air Quality, Technical Services Section
North Carolina Department of Environmental Quality

919 707-8415 office
gregg.oneal@ncdenr.gov

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Tuesday, September 26, 2017 3:23 PM
To: Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

I am here all week. I have very little going on Friday from lunch to 3:30 PM if that works in your time slot. I am very bust Wednesday so it will not work for me. Thursday could work but I have meetings 10-11 am and from 1-3 pm.

Mark

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]
Sent: Tuesday, September 26, 2017 2:02 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark,
What is your arability this week? I have 3-4 of us that would like to visit and see this equipment in operation.
Thanks,
Gregg

Thomas Gregg O'Neal, III, P.E.
Engineer
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gregg.oneal@ncdenr.gov

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1601 Mail Service Center
Raleigh, NC 27699

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Tuesday, September 26, 2017 1:14 PM

To: Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: RE: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Gregg,
I have UPLC-MS/MS and HPLC-MS/MS as well as TOFMS, and QTOFMS apparatus we use regularly for PFAS measurements. I am glad to show it to you anytime we are around. I have been working closely with Chris Johnson and Linda Culpepper at NCDEQ since the GenX issue broke in June 2017 for water analysis.

Let me know what you availability is.

Mark

From: Merrill, Raymond
Sent: Tuesday, September 26, 2017 1:08 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Merrill, Raymond <Merrill.Raymond@epa.gov>; Oneal, Gregg <gregg.oneal@ncdenr.gov>
Subject: FW: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Mark
I'm forwarding an email from Gregg Oneal at NC DENR.
From our phone conversation, I know that you are in contact with folks at NC DENR related to PFOA and/or PFOS analysis by LC/MS/MS.
Greg is in the air program at DENR and as you can read from his email below, he has a general interest in gathering information and some familiarity with the equipment used for these analyses.

With this introduction, I'll leave it in your hands to make the connection with Gregg formally.
Let me know if you need something from me.
Thanks
Ray

Raymond Merrill Ph.D. (Ray)| USEPA/OAQPS/AQAD/Measurement Technology Group
109 TW Alexander Drive (E143-02) | Research Triangle Park, NC 27711
email: merrill.raymond@epa.gov | Phone (919)541-5225 | Fax: (919) 541-0516

From: Oneal, Gregg [mailto:gregg.oneal@ncdenr.gov]
Sent: Tuesday, September 26, 2017 10:27 AM
To: Merrill, Raymond <Merrill.Raymond@epa.gov>
Subject: Would like to see an operational i.e. EPA's (HPLC/MS/MS)

Ray,
Does EPA-RTP have an operational (HPLC/MS/MS) that some of us from NCDEQ-DAQ Technical Services could see? This is the equipment listed in the EPA Drinking Water Method 537 and does the PFOA lab analysis. Do you know a contact? Some of us would like to get a better understanding if possible of this analysis and the equipment operation.
Thanks,
Gregg

Thomas Gregg O'Neal, III, P.E.
Engineer
Division of Air Quality, Technical Services Section
North Carolina Department of Environmental Quality

919 707-8415 office
gregg.oneal@ncdenr.gov

217 West Jones Street

1601 Mail Service Center
Raleigh, NC 27699

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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Wellborn, Floyd[Wellborn.Floyd@epa.gov]
From: Strynar, Mark
Sent: Thur 4/26/2018 1:34:50 PM
Subject: RE: [External] Emerging contaminant scientific team meeting May 14?

Hi Linda,

I have been away at a conference in Cincy. As soon as I have detail about this I will let everyone know.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Tuesday, April 24, 2018 4:57 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Wellborn, Floyd <Wellborn.Floyd@epa.gov>
Subject: FW: [External] Emerging contaminant scientific team meeting May 14?

Mark – we were just on an EPA/NC update conf. call. Floyd's lab is interested in participating as well.
Carol Kemker at R4 was also interested.

linda

Linda Culpepper
Interim Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Lee Ferguson [mailto:lee.ferguson@duke.edu]
Sent: Tuesday, April 24, 2018 1:54 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Detlef Knappe <knappe@ncsu.edu>; Mei Sun <msun8@uncc.edu>; Mead, Ralph N. <meadr@uncw.edu>; Warren, Jeffrey Dennis <jeff.warren@unc.edu>; Jacqueline MacDonald Gibson <jackie.macdonald@unc.edu>; dewittj@ecu.edu; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Abraczinskas, Michael <michael.abraczinskas@ncdenr.gov>
Subject: [External] Emerging contaminant scientific team meeting May 14?

External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.

Dear colleagues,

I've had conversations with most of you over the past months to refine and brainstorm collective ideas around emerging contaminant monitoring in NC waters, in the wake of the Cape Fear GenX issues. I think all of you have seen drafts of the "NC-ECO" consortium proposal that we drafted in the fall and distributed among interested parties and the NC General Assembly to start the conversation about how we could stand up a state-wide emerging contaminant monitoring program that draws on the best capabilities we all possess to ultimately protect human and environmental health. I've been heartened by everyone's engagement and collaborative spirit, and I remain optimistic that something good can come out of all this! Last month I had a great conversation with Jeff Warren and the NC Policy Collaboratory, and it seems there is a great opportunity for us all to join forces to see if we can't get something moving forward together.

Given that, I'd like to propose that the time is right to get the group of us together in a room for a more direct discussion about the scientific opportunities and challenges we are facing. Ralph hosted a great symposium around this issue in December, down in Wilmington. I'm thinking of something a bit less formal and more discussion-oriented for a follow-up. Linda Culpepper and Mike Abraczinskas from DEQ visited us here at Duke yesterday and mentioned that they'll be at Mark's lab (EPA in RTP) on May 14th, and that this might be a good opportunity for a meeting among the DEQ, the EPA, and those of us academics who are interested and

engaged in emerging contaminant research in NC waters.

So - with that said, can you please let me know if you are (a) interested and (b) available for a meeting at the US EPA laboratory in RTP on May 14th? I anticipate that a 2-3 hour block of time would be appropriate. If you have specific meeting time constraints or preferences, please let me know and we'll try to schedule around those. Finally, if there are important scientific stakeholders who I've missed on this email, certainly let me know and we can reach out to them. My intention here is to be inclusive of those who are engaged and interested in emerging contaminant detection, characterization, and monitoring in NC water, but at the same time to keep the group (and conversation) manageable.

All the best,
Lee
--
P. Lee Ferguson, Ph.D.
Associate Professor
Department of Civil & Environmental Engineering
Pratt School of Engineering &
Nicholas School of the Environment
Duke University
121 Hudson Hall, Box 90287
Durham, NC 27708-0287
http://ferguson.cee.duke.edu

Phone: 919-660-5460
Fax: 919-660-5454

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Green, Jason[jason.green@ncdenr.gov]
From: Strynar, Mark
Sent: Fri 12/22/2017 1:47:34 PM
Subject: RE: [External] RE: Jordan Lake

Linda,

Please do keep us in mind. I have some ideas of locations to sample to sleuth out sources.
We also have a lot of experience on the Haw and northern reaches Lake Jordan.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Friday, December 22, 2017 8:43 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Green, Jason <jason.green@ncdenr.gov>
Subject: Re: [External] RE: Jordan Lake

Hi Mark - thank you. We appreciated you sharing Dr. Stapleton's research with us.

We are going to back track to determine sources, similar to our work with other emerging contaminants 1,4-dioxane and bromide, which in the midst of another 18 month study. The health information on the fluoridated chemicals will be essential to the prioritization of our work. We appreciate EPA's help on those fronts to inform our Science Advisory Board as they provide recommendations to us.

Jason has extensive experience in the upper reaches of the lake and potential contributing sources in the Haw due to work on the other compounds. Will be a staged approach. Glad for Jason to share the sampling plan after the QAP is in place early in the new year.

I've asked Tim and Danny France about setting up a conf call in early Jan so we can plan for SESD analysis capacity. Not sure if the have other states impacting their scheduling, and want to give them an idea of our ambient sampling schedule.

Hope you and your family enjoy the holiday season as well. Take good care.
Lindan

Sent from my iPhone
On Dec 22, 2017, at 7:12 AM, Strynar, Mark <Strynar.Mark@epa.gov> wrote:

CAUTION: External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to report.spam@nc.gov.

Hi Linda,

I had seen this data. I saw her present it to the Town of Cary DW folks. One drinking water source that concerns me locally is Pittsboro. As you may know the Haw river is its source water. Would that be included in the Jordan Lake study as it flows into Jordan but does not influence the Cary/Apex DW plant?

Have a happy and safe Christmas/New Year's holiday.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, December 21, 2017 3:44 PM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Kemker, Carol

<Kemker.Carol@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; Banister, Beverly <Banister.Beverly@epa.gov>; France, Danny <France.Danny@epa.gov>; Sivertsen, Scott <Sivertsen.Scott@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Green, Jason <jason.green@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>
Subject: FW: Jordan Lake

You may have already received the Duke University data set that was shared with us by Dr. Stapleton. Attaching just in case you did not.
Forwarding the article. As we've indicated to the local water utilities and health directors, we are gearing up to start taking samples
at our ambient monitoring stations. When we heard the data from Dr. Stapleton, we decided to focus on Jordan Lake first and Falls Lake
nearby in early January. Similar to our research on 1,4-dioxane and bromide, we'll evaluate the ambient stations and work from there
to isolate potential sources. Jason Green is our main point of contact for the sampling. He helped host the research workshop held
in Wilmington on Dec. 11th.

Tim and Danny – would be good to set another planning meeting. I'll arrange my schedule around yours.

Any questions, please let us know.
linda

Linda Culpepper
Interim Director
Division of Water Resources
North Carolina Department of Environmental Quality

1611 Mail Service Center
Phone: 919-707-9014

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From: Kritzer, Jamie
Sent: Thursday, December 21, 2017 3:15 PM
To: Regan, Michael S <Michael.Regan@ncdenr.gov>; Holman, Sheila <sheila.holman@ncdenr.gov>; Nicholson, John A. <John.Nicholson@ncdenr.gov>; Heyl, Douglas <Douglas.Heyl@ncdenr.gov>; Miller, Anderson <anderson.miller@ncdenr.gov>; Kritzer, Jamie <jamie.kritzer@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Munger, Bridget <bridget.munger@ncdenr.gov>
Subject: Jordan Lake

Elevated levels of unregulated chemicals found in Jordan Lake, Cary drinking water

http://www.wral.com/elevated-levels-of-perfluorinated-chemicals-found-in-cary-drinking-water/17205916/

<image001.jpg>

Elevated levels of unregulated chemicals found in Jordan Lake, Cary drinking water :: WRAL.com
www.wral.com
Researchers at Duke University have discovered elevated levels of several

perfluorinated compounds - an unregulated family of industrial chemicals including some that can raise cancer risks - in Jordan Lake and drinking water treated by Cary.

Chemical cousins to PFAs, PFOAs, found in Jordan Lake, Town of Cary drinking water

http://pulse.ncpolicywatch.org/2017/12/21/chemical-cousins-pfas-pfoas-found-jordan-lake-town-cary-drinking-water/

<image002.jpg>

Chemical cousins to PFAs, PFOAs, found in Jordan Lake, Town of Cary drinking water - The Progressive Pulse

pulse.ncpolicywatch.org

This is a developing story; it will be updated as more information becomes available. Chemical compounds in the same family as GenX have been found in Jordan Lake and the Town of Cary's drinking water, raising concerns that these substances are widespread in North Carolina. It's important to note that no GenX was found in any ...

Jamie Kritzer

Communications Director

N.C. Department of Environmental Quality

1601 Mail Service Center, Raleigh, NC 27699-1601

Office: (919) 707-8602

Personal Phone / Ex. 6

To: Bowyer, Jim[jim.bowyer@ncdenr.gov]
Cc: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
From: Strynar, Mark
Sent: Wed 6/20/2018 1:04:55 PM
Subject: RE: Assistance request Rainwater sample

Jim,

Glad to do so. DO you have the sample and if so what volume?

Mark

From: Bowyer, Jim [mailto:jim.bowyer@ncdenr.gov]
Sent: Friday, June 15, 2018 1:44 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: Assistance request Rainwater sample

Dr. Strynar,
I would like to request assistance with determining whether a rain water sample that NC DAQ has collected in our Rainwater Collection Network from a site outside of the Fayetteville area actually has what was reported by our contract lab as being GenX is actually GenX or some other compound. The sample was collected as a thrufall sample under a red cedar thru a rainfall event. I was wondering if you might be able to differentiate between GenX and another biological compound from that evergreen?

Thanks for any assistance you may be able to offer to clarify this for us.

Jim Bowyer, Ph.D.
Environmental Program Supervisor II
Division of Air Quality, Ambient Monitoring Section
Department of Environmental Quality

919 715 7484 office
919 715 0890 fax
Jim.Bowyer@ncdenr.gov

4403 Reedy Creek Road
1622 Mail Service Center
Raleigh, NC 27699-1622

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To: Zimmerman, Scott J[scott.j.zimmerman@dhhs.nc.gov]
From: Strynar, Mark
Sent: Mon 1/22/2018 6:55:27 PM
Subject: RE: DEQ-DHHS Gen-X Conference Call
PHCB-043-SOP-03_PFASs in water_Final_Signed.pdf
PHCB-062_PFECAs_InWaterSOP_FinalSigned.pdf
Strynar R4 state labs webinar.pptx
PFC Analytical Lessons Learned.pptx
Strynar et al., 2015 ES&T.pdf
strynar et al., 2015 SI.pdf
Sun et al. GenX in the Cape Fear River 2016.pdf
Sun et al., 2016 SI.pdf

Scott,

Here is some info you may find helpful as you gear up to perform these kind of analyses for PFAS in water. These two SOPs are used to isolate PFAs from water samples. They include both GenX (HFPO-DA) as well as legacy PFAS (ex. PFOS and PFOA). The methods will isolate all of the PFAS we have looked for in the Cape Fear river all summer for NCDEQ. However, as discussed on the phone call we do not have standards for many analytes found in the river.

The powerpoint presentation shows what chemicals we have looked for and how we process. On our Waters Acquity MS/MS we use a holdup column in front on the injector but after the mixing chamber to scrub the system of PFAs. In the analytical lessons learned slide deck see #12 and #13 it shows our setup.

Last I attached our most recent papers on this topic for reference. Strynar et al., 2015 and Sun et al., 2016.

Mark

-----Original Appointment-----
From: Zimmerman, Scott J [mailto:scott.j.zimmerman@dhhs.nc.gov]
Sent: Monday, January 22, 2018 10:57 AM
To: Zimmerman, Scott J; Strynar, Mark
Subject: FW: DEQ-DHHS Gen-X Conference Call]
When: Monday, January 22, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: 866-434-5269 Code: 8723109

Thanks, Mark.

-----Original Appointment-----
From: Zimmerman, Scott J
Sent: Monday, January 22, 2018 10:54 AM
To: Zimmerman, Scott J; Price, Cindy; Pettit, Dee A; Karoly, Cyndi; Culpepper, Linda; Good, Norman
Cc: Johnson, Chris
Subject: FW: DEQ-DHHS Gen-X Conference Call
When: Monday, January 22, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Personal Phone / Ex. 6

-----Original Appointment-----
From: Zimmerman, Scott J
Sent: Monday, January 22, 2018 10:52 AM
To: Zimmerman, Scott J; Price, Cindy; Pettit, Dee A; Karoly, Cyndi; Culpepper, Linda; Good, Norman
Subject: DEQ-DHHS Gen-X Conference Call
When: Monday, January 22, 2018 1:00 PM-2:00 PM (UTC-05:00) Eastern Time (US & Canada).

Where: Personal Phone / Ex. 6

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NERL/EMMD developed methods for PFAS analysis (2005-2016) (Strynar/Lindstrom)

Peer reviewed publications on all media

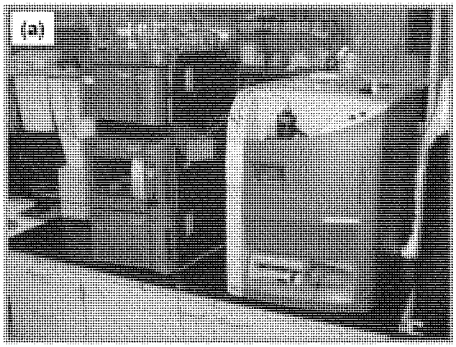
- -surface/ground/waste-water
- -soil/sediment
- -whole-fish homogenate, fillet, livers
- -serum (human, bald-eagle, feline, and dosed rodent)
- -dosed rodent (urine, mammary gland, liver, whole pup)
- -house dust

Typical Analysis of Samples for PFAS

- Matrix matched (when possible) extracted standard curves with stable isotope dilution quantitation
- As many matched stable isotope labeled internal standards as possible to account for matrix interference and analyte recovery
- High level of QA/QC (~10% duplicates, method blanks, solvent blanks QA/QC pools or NIST SRM samples (when available)
- Typical sensitivity LC-MS/MS methods is 1-10 pg OC.
- LOQ is method specific

United States Environmental Protection Agency

Analytical Equipment

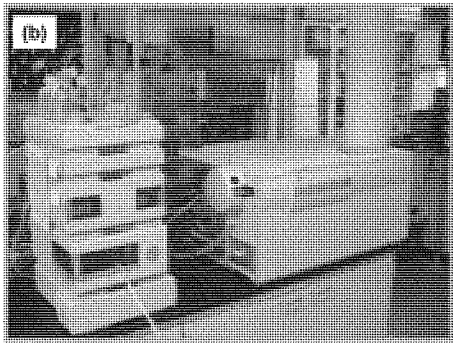


UPLC MS/MS System
UPLC - Waters Acquity

MS/MS - Micromass Quatro Premier XE

Column - Acquity UPLC BEH C18 1.7 um 2.1x50 mm

Gradient separation
A 2mM Ammonium Acetate
B Methanol



HPLC/TOFMS System
HPLC - Agilent 1100

TOFMS - Agilent LC/MSD TOF

Column - Agilent Eclipse Plus C18 3.5 um 3.0x50 mm custom packed

Gradient separation
A 2mM Ammonium Acetate
B Methanol

Figure 2. Picture of the (a) UPLC/MS/MS and (b) LC/TOFMS systems used

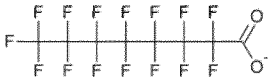
- Low resolution
- Nominal mass
- Chevy

- High resolution
- Exact mass
- Ferrari

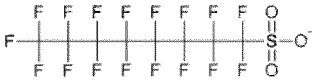
ED_002003J_00096082-00003

EPA United States Environmental Protection Agency

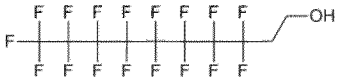
Some Typical PFAS



Perfluorocarboxylic acids
(ex. PFOA)

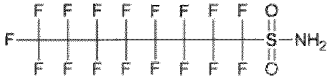


Perfluorosulfonic acids
(ex. PFOS)

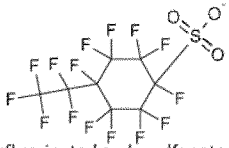


Fluorotelomer alcohol
(ex. 8:2 FTOH)

Perfluorophosphonic/phosphinic acids
(ex. If R=OH then PFOPA
If R=C8 perfluoroalkane then 8:8 PFPi)

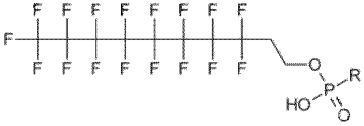


Perfluorosulfonamide
(ex. FOSA)

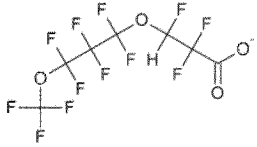


Perfluorinated cyclo sulfonates
(ex. PFECHS)

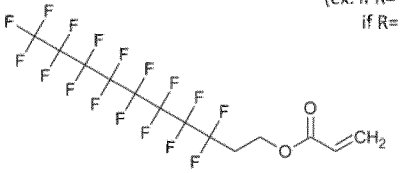
Perfluorosulfonamidoethanol
(ex. N-EtFOSE)



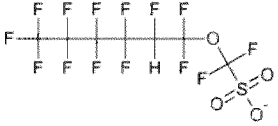
Fluorotelomer phosphate esters
(ex. if R= OH then 8:2 monoPAP
if R= 8:2 FTO ester then 8:2 diPAP)



Polyfluorinated ether carboxylates
(ex. 4,8-dioxa-3H-perfluorononanoate)



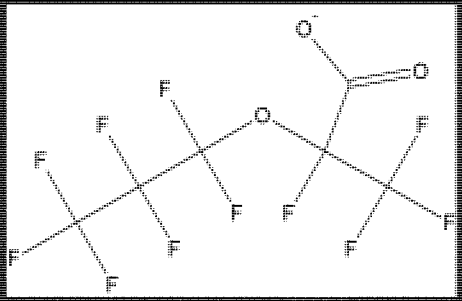
Polyfluorinated polymeric unit
(ex. 1H,1H,2H,2H-perfluorodecyl acrylate)



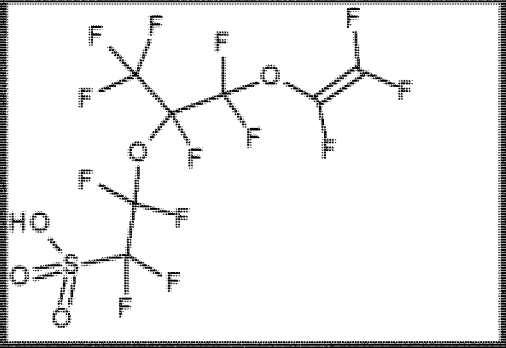
Polyfluorinated ether sulfonates
(ex. Perfluoro [hexyl ethyl ether sulfonate])

Some newly discovered PFAS NERL/EMMD

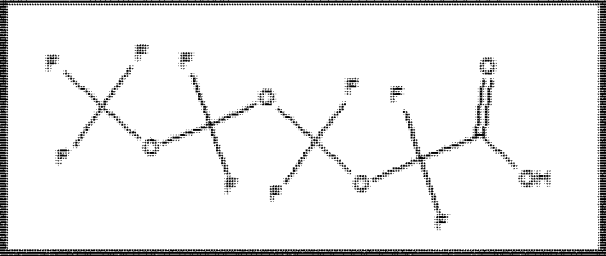
Cape Fear River NC; Strynar et al., 2015 ES&T



GenX plus 5 related



Nafion +1 related



Polyether fluoros plus 3 related

Sun et al., 2016 submitted ES&T Letters
Concentration and GAC removal efficiency in DW

Contamination Issues

PFC Analytical Lessons Learned

- "When in doubt assume PFC contamination is the culprit"

Equipment/Materials we found to have PFCS

PTFE lined septa
PTFE lines
Solvents
Low binding pipette tips (C6-C12)
Polypropylene vials, caps, centrifuge tubes
Blank matrix (serum, fish, livers…..)
Preparatory/Analytical Equipment

Most common contaminants

C6, C7, C8 (carboxylates)

Recommended vials/tubes/tips
BD Falcon Tubes (sterile or nonsterile) 15 ml or 50 ml
Gennesse pipette tips
Triple rinse with methanol (last resort)

EPA
United States Environmental Protection Agency

Problems with analysis of PFCs at trace levels

PFCs are found in all sorts of lab equipment and supplies

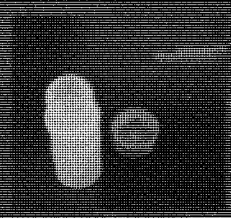
Solvents (methanol, acetonitrile)

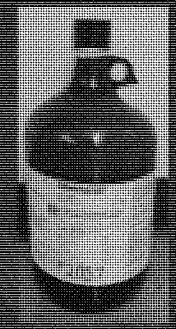
PP vials and centrifuge tubes (mold release)

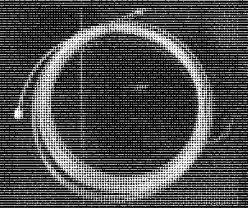
LC vial caps septa (PTFE/silicone)

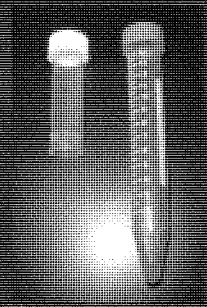
LC and SPE pump equipment
- pump head seals (graphitized Teflon)
- PTFE tubing

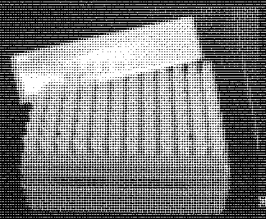
Low binding pipette tips









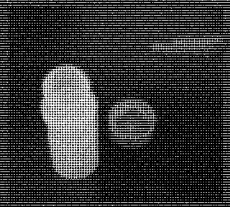


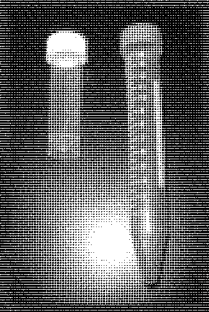
Problems with analysis of PFCs at trace level contd.

A Blank matrix (water, serum, soil, house dust, fish) is difficult to find
-necessary for QC pool or matrix matched standard curves

Blanks are [illegible] to gauge day to day contamination issues
- double blanks (solvent blank, no matrix no I.S.)
- method blank (no matrix, I.S.)
- matrix blank (matrix, I.S.)

Biggest issue is [illegible]

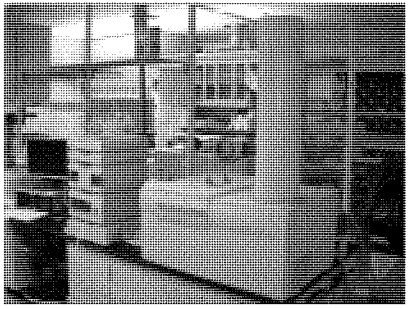




Instrumentation Issues

United States Environmental Protection Agency

Analytical equipment MAY need to be altered



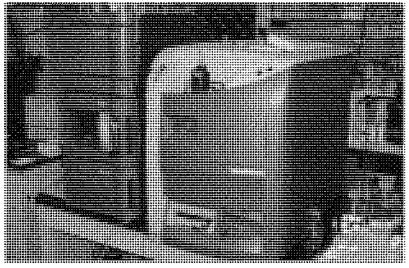
LC/MSD TOF

HPLC Agilent 1100

MSD TOF Agilent 1969A

Capabilities accurate 1-10 ppm

-pg OC



LC/MS/MS

UPLC Waters Acquity **Modifications**

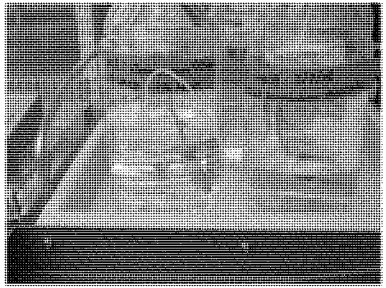
MS/MS Quatro Premier XE

Capabilities low pg – high fg OC

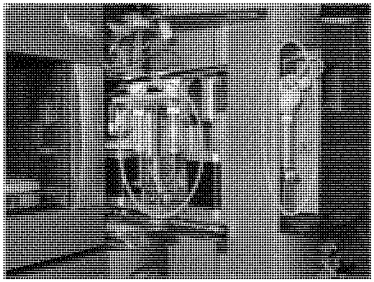
ED_002003J_00096082-00011

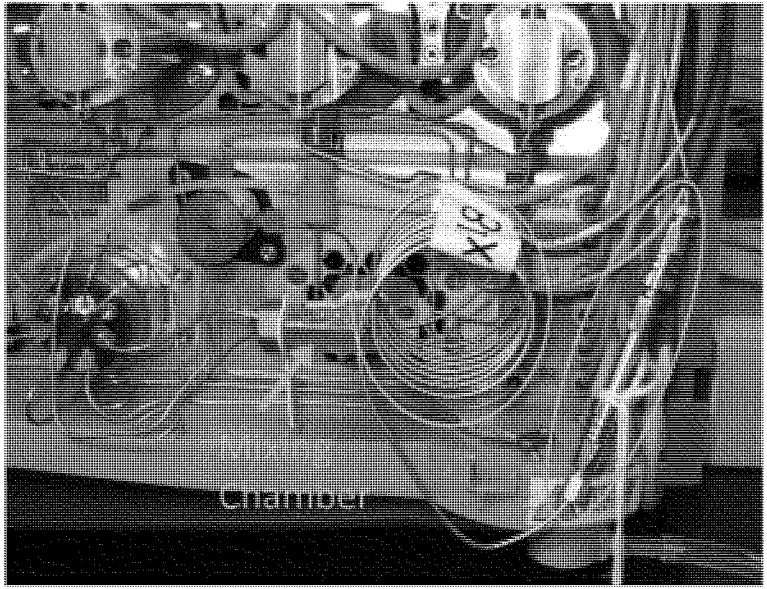
System Modifications: Instrumental background noise – gradients separations

PEEK/SS filters



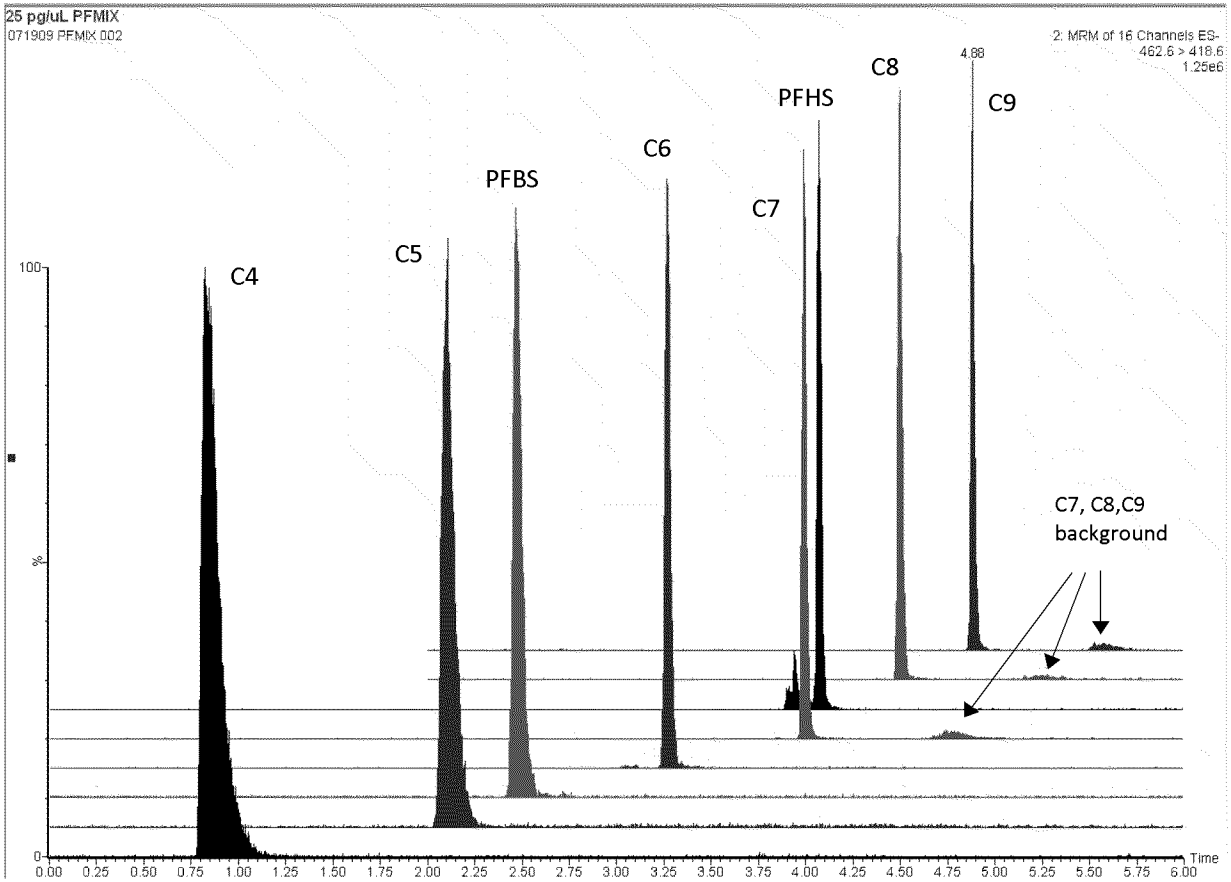
No changes can be made





Critical in separating instrument contamination for analytical peaks

Hold up column and standards



Water Sample Issues

Method Summary – Water Sample Collection

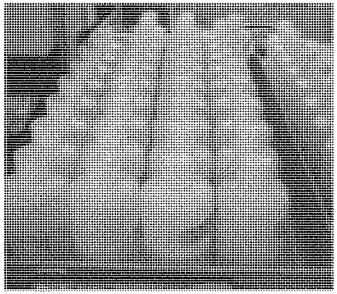
SS Kemmerer sampler

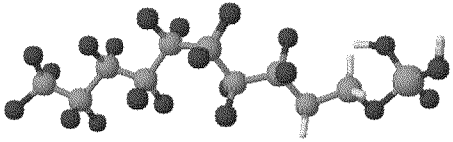
Lab-made dip sampler

Nalgene 1L HDPE bottles: PFC free

Quality Assurance – Quality Control

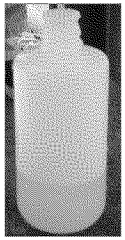
Trip spike (50 ng/L) MOST PEOPLE DO NOT DO THIS
Trip blank (DI)
Lab QC spikes (5 and 50 ng/L)
Replication (>10%)
Occasionally standard addition



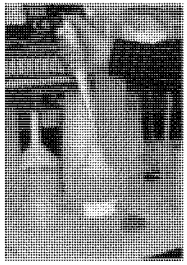


Target Compounds
C_4-C_{10} carboxylic acids
PFBS, PFHS, PFOS, PFDS
Internal Standards
$^{13}C_4$-PFBA $^{13}C_2$-PFHxA, $^{18}O_2$-PFHxS,
$^{13}C_2$-PFOA, $^{13}C_4$-PFNA $^{18}O_2$-PFOS, $^{18}O_2$-PFHxS,

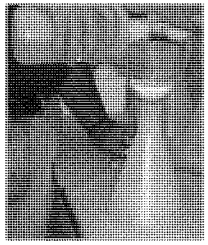
Method Summary – Sample Processing



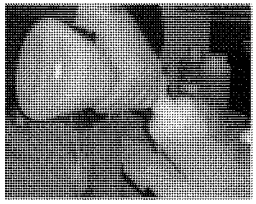
1 L HDPE bottles
5 mL HNO_3 (35%)
Shipped ambient



Add IS
Shake



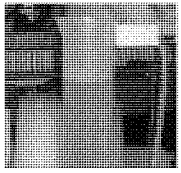
Filter contents Whatman GF/A 1.7 um



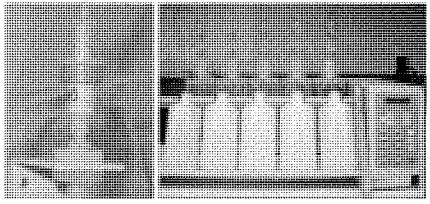
MeOH rinse bottle (10 mL)
Add filtered water back

Found to be very critical step for good recovery

Trip Spike!!!!



Subsample 500 mL
Store 500 mL



Load onto SPE tube Waters Plus style WAX/HLB

Elute for LC/MS-MS analysis

Nakayama et al., 2007 Environ. Sci. Technol. 2007, 41, 5271-5276

Biological Sample Issues