Description	Inputs	Common value(s)
Probabilistic coverage goal	95%	95%
PoD type	NOAEL	Case-specific
PoD value	0.06	Case-specific
BMDU (User input for BMDL PoDs)		Leave blank if PoD is NOAEL
PoD units	mg/kg body weight per day	mg/kg bw/day
Deterministic overall AF	4800,00	Case-specific
Deterministic RfD	0.0000125	Calculated
Exposure estimate (optional)	1.00	User supplied

Table 5A.2. PFOA: APROBA-Plus inputs related to variability and uncertainty of the hazard characterisation of PFOA.

Hazard characterization aspect		Inputs	Provisional value(s)
PoD	LCL	0.06	Calculated from inputs
(Modelled BMD uncertainty)	UCL	0.06	Calculated from inputs
NOAEL to BMD	LCL	0.0709	0.0709
(NOAEL only)	UCL	1.57	1.57
Interspecies scaling	LCL	1.00	3.68
(Allometric for oral)	UCL	1.00	5.49
Interspecies TK/TD	LCL	0.333	0.333
(Remaining TK & TD)	UCL	3.00	3.00
Duration extrapolation	LCL	0.50	0.50
	UCL	8.00	8.00
Intraspecies	LCL	2.24	2.24
	UCL	41.88	41.88
Other aspect #1	LCL	30.00	1.00
(lifelong accumulation)	UCL	120.00	1.00
Other aspect #2	LCL	1.00	1.00
(Description here)	UCL	1.00	1.00
Other aspect #3	LCL	1.00	1.00
(Description here)	UCL	1.00	1.00

ED_002003J_00022791-00067

Table 5A.3. PFOA: Contribution of the various sources of uncertainty to the overall uncertainty in the APROBA hazard assessment of PFOA.

Aspect	To overall uncertainty
PoD	--
NOAEL to BMD	29%
Interspecies scaling	--
Interspecies TK/TD	15%
Duration extrapolation	24%
Intraspecies	26%
Other aspect #1	6%
life-long accumulation	

Table 5A.4. PFOA: APROBA-Plus inputs related to the exposure assessment of PFOA.

Exposure unit: mg/kg bw/day						
		reported exposure		expert opinion on limits		deterministic
Description	Inputs	Lcl	Ucl	Extra lcl	Extra ucl	Exposure
Exposure #1	PFOA, 2-69y	0.00000084	0.00001219	0.00000084	0.00001219	0.00001219

Bijlage 5B. GenX

The critical endpoint for GenX as used in APROBA-plus was the globulin/albumin ratio observed in a chronic study in rats (Beekman et al., 2016). Although the dose-response data for this endpoint were not reported in the study, we used the default uncertainty distribution from WHO-IPCS (2014) to cover the uncertainty in the NOAEL (see Table 5B.2, NOAEL to BMD).

The interspecies scaling was treated in the same way as in PFOA, but the uncertainty for the toxicokinetic factor (related to the accumulation during the longer lifespan in humans) was assumed to be larger, as this factor was based on the assumption that it was similar to that in PFOA, without good information on GenX itself. Therefore, the uncertainty range for GenX was set at (15-240). See Table 5B.2, additional aspect #1)

The other uncertainties were set at the same values as in PFOA, see Table 5B.2.

Table 5B.3 shows the relative contributions to the total uncertainty related to the individual aspects. Finally, Table 5B.4 shows the input values for the exposure as used in the current analysis.

ED_002003J_00022791-00068

Table 5B.1. GenX: APROBA-Plus inputs related to (animal) study, endpoint and protection goals.

Description	Inputs	Common value(s)
End-point	albumine/globuline	Case-specific
Data type	Continuous	Case-specific
Data route	Oral	Case-specific
Study type	Chronic	Case-specific
Test species	Rat	Case-specific
Body weight test species (kg)	0.45	0.4
Human median body weight (kg)	60.00	60
Target BMR (= *M*, user input for BMDLs only)	5%	5%
Population incidence goal (= I)	1%	5%. 1%. 0.1%. 0.01%
Probabilistic coverage goal	95%	95%
PoD type	NOAEL	Case-specific
PoD value	0.10	Case-specific
BMDU (User input for BMDL PoDs)		Leave blank if PoD is NOAEL
PoD units	mg/kg bw/day	mg/kg bw/day
Deterministic overall AF	4752.00	Case-specific
Deterministic RfD	0.0000210	Calculated
Exposure estimate (optional)	1.00	User supplied

Table 5B.2. APROBA-Plus inputs related to variability and uncertainty of the hazard characterisation of GenX.

Hazard characterization aspect		Inputs	Provisional value(s)
PoD	LCL	0.10	Calculated from inputs
(Modelled BMD uncertainty)	UCL	0.10	Calculated from inputs
NOAEL to BMD	LCL	0.0709	0.0709
(NOAEL only)	UCL	1.57	1.57
Interspecies scaling	LCL	1.00	3.57
(Allometric for oral)	UCL	1.00	5.28
Interspecies TK/TD	LCL	0.333	0.333
(Remaining TK & TD)	UCL	3.00	3.00
Duration extrapolation	LCL	1.00	1.00
	UCL	1.00	1.00
Intraspecies	LCL	2.24	2.24
	UCL	41.88	41.88
Other aspect #1	LCL	15.00	1.00
(lifelong accumulation)	UCL	240.00	1.00
Other aspect #2	LCL	1.00	1.00
(Description here)	UCL	1.00	1.00

ED_002003J_00022791-00069

Hazard characterization aspect		Inputs	Provisional value(s)
Other aspect #3	LCL	1.00	1.00
(Description here)	UCL	1.00	1.00

Table 5B.3. Contribution of the various sources of uncertainty tot he overall uncertainty in the APROBA hazard assessment of GenX.

Aspect	Contribution to overall uncertainty
PoD	--
NOAEL to BMD	31%
Interspecies scaling	--
Interspecies TK/TD	16%
Duration extrapolation	--
Intraspecies	28%
Other aspect #1	25%
lifelong accumulation	

Table 5B.4. APROBA-Plus inputs related to the exposure assessment of GenX.

Exposure unit: mg/kg body weight per day						
		reported exposure		expert opinion on limits		deterministic
Description	Inputs	Lcl	Ucl	Extra lcl	Extra ucl	Exposure
exposure #1	GenX, 2-69y, P95	0,00000518	0,00002099	0,00000518	0,00002099	0,00002099

ED_002003J_00022791-00070

RIVM

De zorg voor morgen begint vandaag

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Culpepper, Linda
Sent: Thur 12/21/2017 9:11:32 PM
Subject: Re: [External] Re: Jordan Lake

Absolutely!! Know I did not get the info to you for the conf. Glad to collaborate if other opportunities arise.

Sent from my iPhone

On Dec 21, 2017, at 4:07 PM, Buckley, Timothy <Buckley.Timothy@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.

Thank you Linda.

On another front, I will be preparing an award nomination for the team of folks that worked with NC DEQ and Region 4 to respond to PFAS public health concerns. Would you be willing to provide a couple sentences describing the value/importance of our collaboration that I could quote in my write-up. Nominations are due Jan 3rd. I appreciate your help.

Tim

Timothy J. Buckley, PhD
Director, EMMD
National Exposure Research Laboratory
Phone: (919) 541-2454
Personal Phone / Ex. 6

From: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Sent: Thursday, December 21, 2017 3:43:51 PM
To: Allenbach, Becky; Walker, Mary; Kemker, Carol; Mitchell, Ken; Banister, Beverly; France, Danny; Sivertsen, Scott; Buckley, Timothy; Strynar, Mark
Cc: Green, Jason; Karoly, Cyndi
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

Email correspondence to and from this address is subject to the

North Carolina Public Records Law and may be disclosed to third parties.

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/

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/

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: Valberg, Amelia[valberg.amelia@epa.gov]; Twickler, Donna[twickler.donna@epa.gov]; Star, David[star.david@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; Gillespie, Andrew[Gillespie.Andrew@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; 'Migliarino, Maurice'[Maurice.Migliarino@dep.nj.gov]; Palmer, Leif[Palmer.Leif@epa.gov]; 'Maybury, Steve'[Steve.Maybury@dep.nj.gov]; rogers, rick[rogers.rick@epa.gov]; Bennett, James[bennett.james@epa.gov]; Lane, Bill F[Bill.Lane@ncdenr.gov]; Holman, Sheila[sheila.holman@ncdenr.gov]; Zobrist, Marcus[Zobrist.Marcus@epa.gov]; Burneson, Eric[Burneson.Eric@epa.gov]; Thompkins, Anita[Thompkins.Anita@epa.gov]
From: Garvey, Mark
Sent: Wed 2/7/2018 9:16:48 PM
Subject: FW: Chemours Meeting Feb. 8 - Final Agenda and Attendee List
Chemours Meeting. Attendee List. Feb 7_2018.docx
Revised Agenda for EPA multi_Regional_state meeting Feb 7_2018..docx

Below is the email just sent out to an earlier email group list. I'm including you to make sure you have the Final Agenda and updated Attendee list. If additional people are on the call/video, please let me know and I can add them to the attendee list as part of the meeting notes.

Thanks,
Mark

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: Saenz, Diana
Sent: Wednesday, February 07, 2018 3:36 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>; 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>; DeDora, Caroline <DeDora.Caroline@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>; Buso, Roberto X <Buso.Roberto@epa.gov>; Reinhart, Roger <Reinhart.Roger@epa.gov>; Valberg, Amelia <valberg.amelia@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>; 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>; Jones, Aaryn <Jones.Aaryn@epa.gov>; Vendinello, Lynn <Vendinello.Lynn@epa.gov>; Oif, Leslie <Oif.Leslie@epa.gov>; Rubini, Suzanne <Rubini.Suzanne@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Lamberth, Larry <Lamberth.Larry@epa.gov>; Doa, Maria <Doa.Maria@epa.gov>
Subject: Chemours Meeting Feb. 8 - Final Agenda and Attendee List

I have attached:

(1) Revised and final agenda for our meeting tomorrow with Chemours
(2) Attendee list for the meeting

Regions – can you please send the agenda and attendee list to your state counterparts?

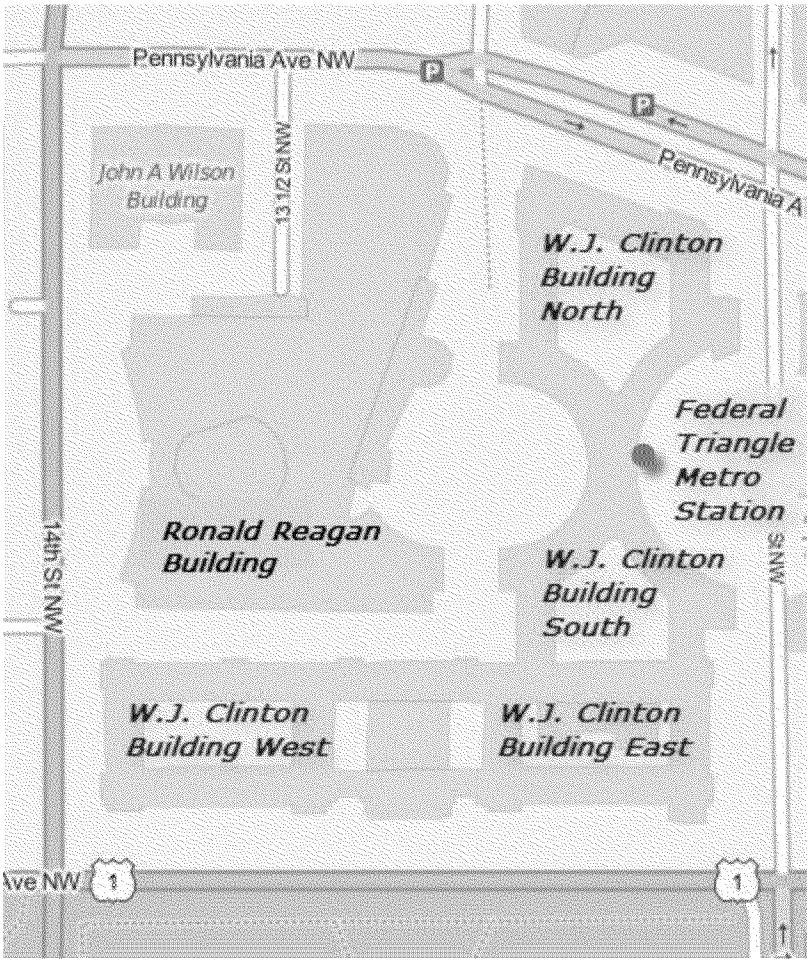
For those of you attending in person:

The meeting with Chemours will be in OECA's offices in:

U.S. EPA, William Jefferson Clinton Building South
1200 Pennsylvania Avenue NW
Washington DC 20460

The EPA WJC South Building is right above the Federal Triangle metro station (orange blue line).
As you come up from the metro and face the plaza (away from 12th street), the WJC South Building is on your left.

Here is a link to the EPA visiting headquarters information sheet:
https://www.epa.gov/aboutepa/visiting-epa-headquarters



EPA attendees will only need to show their badge to the guards as you enter the lobby of WJC South.

The meeting room is 6045.
We have also reserved our WCED conference space in Room 4140 to meet beforehand. We have this room reserved from 10:00 am on, if you need space to work in.

There is a bank of two elevators in the lobby. Take the elevators to the fourth flour, walk down the corridor to your right and you will come to a second foyer with 2 elevators. In the corner of this space will be the entrance to the 4140 conference room that is for EPA participants.

In addition, we have an office (near the 4140 conference room) that we can use to store any personal belongings.

Contact Information

Diana Saenz cell: Personal Phone / Ex. 6 / desk 202-564-4209
James Miles cell: Personal Phone / Ex. 6 / desk 202-564-5161

Please let me, James, or Mark know if you have any questions.
Thank you,
Diana

Diana J. Saenz
Associate Director
Waste and Chemical Enforcement Division
Office of Civil Enforcement/ U.S. EPA
1200 Pennsylvania Ave., N.W.
Mailcode 2249A
Washington, D.C. 20460
Phone: (202) 564-4209
Fax: (202) 564-0022
Saenz.Diana@epa.gov

To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; France, Danny[France.Danny@epa.gov]
From: Culpepper, Linda
Sent: Thur 11/16/2017 10:03:00 PM
Subject: Fwd: State moves to revoke Chemours' permit to discharge processed wastewater

FYI

Sent from my iPhone

Begin forwarded message:

Resent-From: <SRS0=yzWr=CO=prnews2.com=pr.2559318.343815@securence.com>
From: Jamie Kritzer <jamie.kritzer@ncdenr.gov>
Date: November 16, 2017 at 4:19:49 PM EST
To: <linda.culpepper@ncdenr.gov>
Subject: State moves to revoke Chemours' permit to discharge processed wastewater

Roy Cooper, Governor

Michael S Regan, Secretary

Release: IMMEDIATE
Date: Nov. 16, 2017

Contact: Jamie Kritzer
Phone: 919-707-8602

State moves to revoke Chemours' permit to discharge processed wastewater

RALEIGH – The N.C. Department of Environmental Quality announced today it is moving to revoke Chemours' permit to discharge p wastewater because the company failed to comply with its permit and failed to report an October spill.

In addition to moving to revoke Chemours wastewater permit, DEQ officials also notified Chemours the state will suspend its permit discharge process wastewater from its manufacturing area including the areas where GenX and other fluorinated compounds are produce suspension will take effect Nov. 30. Chemours is still required by the state to divert wastewater containing GenX and transport it out-of for disposal.

The notifications came in a letter DEQ sent to Chemours Thursday.

"It is unacceptable that Chemours has failed to disclose information required by law, information we need in order to protect the public," Michael S. Regan, secretary of the N.C. Department of Environmental Quality "We're taking action to suspend Chemours' wastewater p and moving to permanently revoke it because the company has repeatedly failed to follow the law."

DEQ is referring its probe of the Oct. 6 spill to the State Bureau of Investigation to determine if there is evidence of criminal violations f reporting the spill as required by law.

The revocation of Chemours' permit to discharge process wastewater from its manufacturing areas will take effect after the required 60 notice to Chemours and public participation in the permit process. The revocation does not apply to process wastewater from Kuraray Dupont facilities that is treated and discharged by Chemours under the wastewater discharge permit.

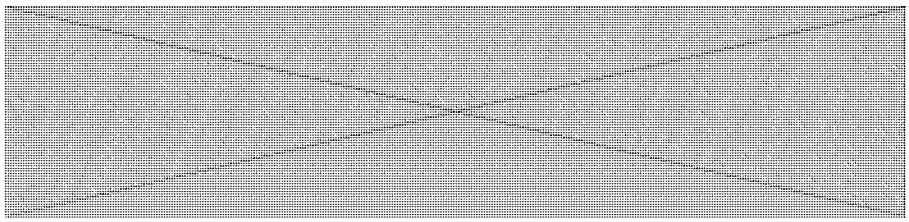
Earlier this week, DEQ cited Chemours with violating the conditions of its wastewater discharge permit because of the company's failu report the Oct. 6 spill. The spill came to light one month after it occurred when DEQ officials questioned Chemours about state water qu

results indicating elevated concentrations of GenX at Chemours' primary wastewater discharge outfall.

Chemours wastewater discharge permit requires that DEQ be notified within 24 hours of any discharge of significant amounts of waste tl abnormal in quantity or characteristic, as well as any non-compliance that potentially threatens public health or the environment.

DEQ determined that Chemours' violation of the reporting requirements in the permit following the Oct. 6 spill are sufficient basis for revocation of the permit to discharge process wastewater. DEQ will continue to collect and test water samples from the Cape Fear Ri including at the Chemours outfall.

# # #



If you would rather not receive future communications from North Carolina Department of Environmental Quality, let us know by clicking here.
North Carolina Department of Environmental Quality, 217 W. Jones St., Raleigh, North Carolina 27699 United States

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Detlef R. U. Knappe[knappe@ncsu.edu]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]; McCord, James[mccord.james@epa.gov]
From: Strynar, Mark
Sent: Wed 11/8/2017 5:10:55 PM
Subject: RE: [External] RE: PFMOBA

We have not reported this analyte to you in any of our reports. However we could go back and extract this ion from the data if we ran the sample on the TOFMS. At least we could see for the 6 week time course set and any additional samples run, though not all.

Mark

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Wednesday, November 08, 2017 12:04 PM
To: Detlef R. U. Knappe <knappe@ncsu.edu>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Re: [External] RE: PFMOBA

Dr. Knappe - any idea on trends seem if not concentrations?

Sent from my iPhone
On Nov 8, 2017, at 12:01 PM, 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.
>
> That compound was included in the Sun et al., 2016 paper. It was however not a major player at the time.
>
> Mark
>
> ---
>
> **From:** Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
> **Sent:** Wednesday, November 08, 2017 8:40 AM
> **To:** Detlef R. U. Knappe <knappe@ncsu.edu>; Strynar, Mark <Strynar.Mark@epa.gov>
> **Subject:** PFMOBA
>
> We had a question from a publication H2GO issued:
> H2GO received additional perfluorinated compound results of finished water treated and supplied by Brunswick County.
> Samples taken on October 18 revealed GenX levels at 59.7 parts per trillion (ppt) and a total toxic mixture of perfluorinated
> compounds at 618.05 ppt; including an unknown compound, PFMOBA, at levels of over 270 ppt.
>
> I know PFMOBA was included in the 2016 publication. Do you have historic data to help look at trends.
> linda
>
> Linda Culpepper
> Acting 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.*

<sun et al., 2016 SI.pdf>
<sun et al., 2016.pdf>

To: Holman, Sheila[sheila.holman@ncdenr.gov]; Moore, Zack[zack.moore@dhhs.nc.gov]; Tilson, Betsey[Betsey.Tilson@dhhs.nc.gov]; Shehee, Mina[mina.shehee@dhhs.nc.gov]; Scott, Michael[michael.scott@ncdenr.gov]; michael.abraczinskas@ncdenr.gov[michael.abraczinskas@ncdenr.gov]; Heyl, Douglas[Douglas.Heyl@ncdenr.gov]; Kritzer, Jamie[jamie.kritzer@ncdenr.gov]; Gregson, Jim[jim.gregson@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Culpepper, Linda
Sent: Fri 12/8/2017 2:02:56 PM
Subject: FW: [External] Manuscript Elevated Clearance
McCord_GenX_Manuscript_Final.docx
NERL Fact Sheet McCord PFECAs method 11-28-17.docx

Thank you for sharing, Tim.

I'll be glad to collect any questions from DEQ and DHHS, so send them to me by Dec. 20th. Remember this is under EPA review and not ready to distribute.

Linda Culpepper
Interim 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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Friday, December 08, 2017 8:18 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>; Behl, Betsy <Behl.Betsy@epa.gov>; Morris, Jeff <Morris.Jeff@epa.gov>
Cc: Gillespie, Andrew <Gillespie.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; McCord, James <mccord.james@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: [External] Manuscript Elevated Clearance

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

The attached manuscript has been entered into STICS and has been identified for elevated clearance prior to submission. The manuscript is undergoing elevated clearance because it reports sensitive data of our PFAS measurements in the Cape Fear River including discharge, surface, and finished drinking water samples. All of the sampling results reported within the manuscript have previously been reported through NERL data reports to Linda Culpepper and Becky Allenbach. What is new and the focus of the paper is data supporting performance / validation of the laboratory method.

If you have any questions or concerns about the manuscript, please let me know. Andy Gillespie will be managing the elevated clearance within ORD which I anticipate will require 2 weeks brining us to Dec 22nd. Please provide any comments before that date.

Happy reading.

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

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Culpepper, Linda
Sent: Wed 11/8/2017 2:54:54 AM
Subject: RE: [External] Re: Brunswick County Northwest Water Treatment Plant Results

Thank you!

Linda Culpepper
Acting 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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Tuesday, November 07, 2017 9:54 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Moore, Zack <zack.moore@dhhs.nc.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>
Subject: [External] Re: Brunswick County Northwest Water Treatment Plant Results

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

Linda,

I expect to get the report to you on Thursday.

Tim

Timothy J. Buckley, PhD

Director, EMMD

National Exposure Research Laboratory

Phone: (919) 541-2454

Personal Phone / Ex. 6

From: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Sent: Tuesday, November 7, 2017 9:50:24 PM
To: Buckley, Timothy
Cc: Holman, Sheila; Moore, Zack; Allenbach, Becky
Subject: Brunswick County Northwest Water Treatment Plant Results

Tim – can you provide an update on the sample results for the week of Oct. 16th?

Glenn Walker with Brunswick County spoke with me tonight about GenX results for the NW water treatment plant facility from Oct. 19th sampling: 281 ppt in raw water and 193 ppt in the finished water.

Scott Sivertsen indicated their results for that week would be available Nov. 24th.

Appreciate your help.
linda

Linda Culpepper
Acting 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.

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Elizabeth Dittman[Beth.Dittman@dhhs.nc.gov]
From: Pritchett, Jamie R
Sent: Wed 9/27/2017 5:36:46 PM
Subject: RE: Request for PFAS data in the Cape Fear River

Hi Tim,

Friday works great; looks like our schedules are wide open. You are welcome to invite Linda Culpepper, although she is not involved in the work that we are doing with ATSDR. Therefore, I probably would not plan this around her schedule.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Wednesday, September 27, 2017 7:52 AM
To: Pritchett, Jamie R <Jamie.Pritchett@dhhs.nc.gov>
Cc: Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: RE: Request for PFAS data in the Cape Fear River

Jamie,

How does this Friday look for you? Does it make sense to loop in Linda Culpepper since she has served as our point of contact with NC?

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: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Tuesday, September 26, 2017 6:00 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>
Subject: RE: Request for PFAS data in the Cape Fear River

Hi Tim,

I just wanted to check in to see if you all would be available to discuss the data needs and availability. Beth and I will be talking with our project team at ATSDR next week to do some planning and would like to be able to provide them with an idea of the data we will have available for the assessment. Would it be possible to chat before next Thursday?

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699

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From: Pritchett, Jamie R
Sent: Wednesday, September 20, 2017 2:44 PM
To: 'Buckley, Timothy' <Buckley.Timothy@epa.gov>
Cc: Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>
Subject: RE: Request for PFAS data in the Cape Fear River

Hi Tim,

I think a call would be good to discuss in more detail what kind of information we are looking for and what you all may have. Would it be possible to do this next week some time? Beth and I are available any time next week except for Wednesday and Thursday afternoon after 3pm.

Let us know what works for you and we can set up a call-in number.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Wednesday, September 20, 2017 12:49 PM
To: Pritchett, Jamie R <Jamie.Pritchett@dhhs.nc.gov>
Cc: Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>
Subject: RE: Request for PFAS data in the Cape Fear River

Jamie,

Thank you for your interest and inquiry. We recognize your work in providing this health assessment as both incredibly important and challenging. We are happy to provide whatever supporting data/information that we can. I will circle back with the PIs for this work to identify what is available. It may be good for us to schedule a call to discuss what information you are seeking that cannot be obtained from Lindstrom's and Strynar's publications and the reports we have provided to NC DEQ.

Tim Buckley

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: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Wednesday, September 20, 2017 12:01 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>

Subject: Request for PFAS data in the Cape Fear River
Importance: High

Dear Dr. Buckley,

I received your contact information from Dr. Amy Risen, a toxicologist in our department. I am a health assessor/toxicologist for the Health Assessment, Consultation & Education (HACE) program in the N.C. Division of Public Health. Beth Dittman (cc'ed) is the principal investigator and also a health assessor/toxicologist in the HACE program. Our program is funded through the CDC's Agency for Toxic Substances and Disease Registry (ATSDR) and our primary focus is evaluating public health impacts from exposure to hazardous waste.

The HACE program will be responsible for the public health assessment of exposure to PFAS in the Cape Fear River. We are working closely with our technical project team at ATSDR to get started on this assessment and would like to start organizing any potential data available. Dr. Risen indicated that your group would be the best to contact to obtain PFAS data for the Cape Fear River based on a conversation she had with Dr. Andy Lindstrom on August 3. We are writing to request any quantitative PFAS (legacy and emerging) data from the Cape Fear River you may have to assist in our public health assessment.

We realize that some of this data may be provided in a summarized format in the published literature. However, in order to provide the most accurate information on potential health risks, we will need the raw data to evaluate.

This includes the following potential data communicated to Dr. Risen by Dr. Lindstrom:

- 2007 and forward: General data on legacy PFAS, including data used for the Nakayama et al. (2007) paper.
- 2012/2013: PFECA data collected from the development of the analytical method for these chemicals.
- 2013/2014: Data published in Sun et al. in 2016 on legacy PFASs, GenX, and additional PFECAs.
- 2015 and forward: Additional PFECA data from improved analytical method.

We greatly appreciate your team's continued work on this issue. Please let Beth or I know if you have any questions about this request. I can be reached at (919) 707-5912 and Beth can be reached at (919) 707-5906. Thank you in advance for your time and attention.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

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Raleigh, NC 27699

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To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Woosley, Julie[julie.woosley@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]; Smith, Emily J.[Smith.Emily@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Strynar, Mark
Sent: Tue 1/16/2018 4:18:21 PM
Subject: RE: [External] FW: Chemours groundwater testing

Thanks Julie. I will do so Tim.

Mark

From: Buckley, Timothy
Sent: Tuesday, January 16, 2018 10:18 AM
To: Woosley, Julie <julie.woosley@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: RE: [External] FW: Chemours groundwater testing

Mark,

I would refer her to this website.

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: Woosley, Julie [mailto:julie.woosley@ncdenr.gov]
Sent: Tuesday, January 16, 2018 10:14 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: RE: [External] FW: Chemours groundwater testing

She is talking about the map of results on the DEQ GenX webpage. Go to the Groundwater GenX page; it's the second link on the page.

The EPA document with GW results, including expanded PFAS compounds, has been made public. It is in our online electronic database:
http://edocs.deq.nc.gov/WasteManagement/0/edoc/744114/NCD047368642_NC%20DEQ%20GW%20Sampling%20Report%20from%20EPA%20Lab_20170913.pdf?searchid=f45659bb-78f1-49ef-ac75-ea0f02e8228b

Best,
Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management

1646 Mail Service Center
Raleigh, NC 27699-1646

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

From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Tuesday, January 16, 2018 9:43 AM
To: Woosley, Julie <julie.woosley@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: [External] FW: Chemours groundwater testing

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Julie and Linda,

See email request below for results from the Chemours onsite test well monitoring. Were these results made public? Are we ok to make available to Emily Donovan?

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: Strynar, Mark
Sent: Tuesday, January 16, 2018 8:19 AM
To: Emily Donovan [Personal Email / Ex. 6]
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Chemours groundwater testing

Hi Emily,

In concert with the NCDEQ we did do some sampling and analysis of PFAS from monitoring wells from the Chemours property. This information was shared with the NCDEQ back on September 21st according to the report date. Yes we did do non-targeted analysis for the same suite of PFAS we did for every other water sample we received over the summer/fall as part of the NCDEQ efforts. I see online they have the GenX data for those wells as well as PFOS and PFOA shown but not for the other analytes. https://files.nc.gov/ncdeq/GenX/GenX%20Sampling%20Map%2020170906_3.pdf This data likely came from the contract lab that was also doing analysis of samples from the site.

Tim is there any reason we can't share that report we sent to NCDEQ with Emily?

Mark

From: Emily Donovan [mailto: Personal Email / Ex. 6]
Sent: Friday, January 12, 2018 5:56 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Chemours groundwater testing

Hi Mark,

We met late last year when I toured the EPA. Have you done any groundwater testing for under the Chemours Fayetteville Works Site? Specifically non-targeted analysis. If so, could you please share your data with me?

Hope all is well.

All the best,

--
Emily Donovan
704.491.6635

To: Allenbach, Becky[Allenbach.Becky@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Woosley, Julie[julie.woosley@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Smith, Emily J.[Smith.Emily@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Strynar, Mark
Sent: Tue 1/16/2018 3:09:33 PM
Subject: RE: Chemours groundwater testing

Emily Donovan is a member of Clean Cape Fear https://www.cleancapefear.org/

Mark

From: Allenbach, Becky
Sent: Tuesday, January 16, 2018 10:05 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Woosley, Julie <julie.woosley@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: RE: Chemours groundwater testing

Tim, who is this person and her affiliation? Maybe I missed it?

Becky B. Allenbach, Chief
Grants and Drinking Water Protection Branch
Water Protection Division
EPA Region 4 - Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

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From: Buckley, Timothy
Sent: Tuesday, January 16, 2018 9:43 AM
To: Woosley, Julie <julie.woosley@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: FW: Chemours groundwater testing

Julie and Linda,

See email request below for results from the Chemours onsite test well monitoring. Were these results made public? Are we ok to make available to Emily Donovan?

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: Strynar, Mark
Sent: Tuesday, January 16, 2018 8:19 AM
To: Emily Donovan Personal Address / Ex. 6
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Chemours groundwater testing

Hi Emily,

In concert with the NCDEQ we did do some sampling and analysis of PFAS from monitoring wells from the Chemours property. This information was shared with the NCDEQ back on September 21st according to the report date. Yes we did do non-targeted analysis for the same suite of PFAS we did for every other water sample we received over the summer/fall as part of the NCDEQ efforts. I see online they have the GenX data for those wells as well as PFOS and PFOA shown but not for the other analytes. https://files.nc.gov/ncdeq/GenX/GenX%20Sampling%20Map%2020170906_3.pdf This data likely came from the contract lab that was also doing analysis of samples from the site.

Tim is there any reason we can't share that report we sent to NCDEQ with Emily?

Mark

From: Emily Donovan [mailto: Personal Address / Ex. 6
Sent: Friday, January 12, 2018 5:56 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Chemours groundwater testing

Hi Mark,

We met late last year when I toured the EPA. Have you done any groundwater testing for under the Chemours Fayetteville Works Site? Specifically non-targeted analysis. If so, could you please share your data with me?

Hope all is well.

All the best,

--
Emily Donovan
704.491.6635

To: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
Cc: Moore, Zack[zack.moore@dhhs.nc.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Pritchett, Jamie R[Jamie.Pritchett@dhhs.nc.gov]
From: Shehee, Mina
Sent: Tue 1/30/2018 7:36:46 PM
Subject: FW: Request for PFAS Data
FW: Request for PFAS data in the Cape Fear River

Dear Dr. Lindstrom,
I am emailing you to ask for an update about our request for data as listed below and attached email). The data we are requesting will be used for a North Carolina public health assessment regarding GenX and other PFAS compounds. Please let me know if there is anything we can do at our end to help with this request.
Thank you,
Mina Shehee

From: Shehee, Mina
Sent: Thursday, January 11, 2018 9:33 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: FW: Request for PFAS Data

Email address put in incorrectly, please see message below.

From: Shehee, Mina
Sent: Thursday, January 11, 2018 9:18 AM
To: 'Lindstrom.Andrew@epa.gov' <Lindstrom.Andrew@epa.gov>
Cc: 'Buckely.Timothy@epa.gov' <Buckely.Timothy@epa.gov>; Moore, Zack <zack.moore@dhhs.nc.gov>; Jamie Pritchett <jamie.pritchett@dhhs.nc.gov>
Subject: Request for PFAS Data

Dear Dr. Lindstrom,
I am contacting you by email to follow up on a request made by our Health Assessment, Consultation, & Education (HACE) program about data needs for a GenX/PFAS public health assessment (PHA) in the Cape Fear River (CFR) basin. Please see attached email for summary of previous request.

In order for the HACE program to conduct this assessment, past and current PFAS data in the CFR basin is needed. The HACE program has access to current data collected since June 2017 through the North Carolina Department of Environmental Quality, but it needs data collected prior to this time.

Specifically, full data sets used in the Nakayama et al. and Sun et al. papers are being requested. We appreciate that you have an extremely heavy workload and extensive demands on your time. Could you provide these data to our program so we can start our assessment?
Thank you,
Mina Shehee

Mina Shehee, PhD
Branch Head
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

919 707 5920 office
919 870 4807 fax
mina.shehee@dhhs.nc.gov

5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699-1912

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Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this email in error, please notify the sender immediately and delete all records of this email.

To: Morris, Jeff[Morris.Jeff@epa.gov]; Holman, Sheila[sheila.holman@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; nik.dzamov@epa.ohio.gov[nik.dzamov@epa.ohio.gov]; Flowers, Lynn[Flowers.Lynn@epa.gov]
Cc: Cherepy, Andrea[Cherepy.Andrea@epa.gov]; Bonnie.Buthker@epa.ohio.gov[Bonnie.Buthker@epa.ohio.gov]; Impellitteri, Christopher[Impellitteri.Christopher@epa.gov]; Scheuer, Amy[Scheuer.Amy@epa.gov]
From: Matthews, Lisa
Sent: Thur 10/26/2017 6:06:09 PM
Subject: slides for Oct 30 ECOS-EPA PFAS Call
Oct 30 2017 Call Agenda.docx

Good afternoon,
If you have not already done so, please send Amy Scheuer (scheuer.amy@epa.gov) and me your PowerPoint slides by Monday morning, October 30 to upload for the ECOS-EPA PFAS call in the afternoon.

If you prefer not to use slides, just let us know. Thanks so much, and we look forward to your presentations and updates.

Lisa

From: Matthews, Lisa
Sent: Friday, October 20, 2017 11:26 AM
To: 'kristy.richardson@state.co.us' <kristy.richardson@state.co.us>; 'Nicole.lugli@ct.gov' <Nicole.lugli@ct.gov>; robert.kaliszewski@ct.gov; 'kerri.malinowski@maine.gov' <kerri.malinowski@maine.gov>; douglas.fine@state.ma.us; c.mark.smith@state.ma.us; 'delaneyr@michigan.gov' <delaneyr@michigan.gov>; 'krukowskim@michigan.gov' <krukowskim@michigan.gov>; 'remusm@michigan.gov' <remusm@michigan.gov>; 'clark.freise@des.nh.gov' <clark.freise@des.nh.gov>; 'Brandon.kernen@des.nh.gov' <Brandon.kernen@des.nh.gov>; 'Steve.Maybury@dep.nj.gov' <Steve.Maybury@dep.nj.gov>; 'eileen.murphy@dec.ny.gov' <eileen.murphy@dec.ny.gov>; 'robert.schick@dec.ny.gov' <robert.schick@dec.ny.gov>; 'jason.fagel@dec.ny.gov' <jason.fagel@dec.ny.gov>; 'Holman, Sheila' <sheila.holman@ncdenr.gov>; 'linda.culpepper@ncdenr.gov' <linda.culpepper@ncdenr.gov>; 'craig.butler@epa.ohio.gov' <craig.butler@epa.ohio.gov>; 'nik.dzamov@epa.ohio.gov' <nik.dzamov@epa.ohio.gov>; 'susan.kessler@epa.ohio.gov' <susan.kessler@epa.ohio.gov>; 'jenyfer.allen@epa.ohio.gov' <jenyfer.allen@epa.ohio.gov>; MASTERSON.Kevin@deq.state.or.us; 'marz.nicole@deq.state.or.us' <marz.nicole@deq.state.or.us>; 'steven.jetter@state.or.us' <steven.jetter@state.or.us>; 'Heidi.Hales@vermont.gov' <Heidi.Hales@vermont.gov>; 'chuck.schwer@vermont.gov' <chuck.schwer@vermont.gov>; 'kzar461@ecy.wa.gov' <kzar461@ecy.wa.gov>; 'janice.willey@navy.mil' <janice.willey@navy.mil>; 'aroberson@asdwa.org' <aroberson@asdwa.org>; Carolyn Hanson <chanson@ecos.org>; 'slongsworth@ecos.org' <slongsworth@ecos.org>; 'Bowe, Patrick' <Patrick.Bowe@ct.gov>; 'Iwenofu, Samuel (ECY' <siwe461@ECY.WA.GOV>; 'Ottaway, William (DEC' <william.ottaway@dec.ny.gov>; betsey.wingfield@ct.gov; 'Gloria.Post@dep.nj.gov' <Gloria.Post@dep.nj.gov>; 'elizabeth.lewis-michl@health.ny.gov' <elizabeth.lewis-michl@health.ny.gov>; Impellitteri, Christopher <Impellitteri.Christopher@epa.gov>; Caporale, Cynthia <Caporale.Cynthia@epa.gov>; Fitz-James, Schatzi <Fitz-James.Schatzi@epa.gov>; Raffaele, Kathleen <raffaele.kathleen@epa.gov>; Flowers, Lynn <Flowers.Lynn@epa.gov>; Sinks, Tom <Sinks.Tom@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Sonich-Mullin, Cynthia <Sonich-Mullin.Cynthia@epa.gov>; Gilliland, Alice <Gilliland.Alice@epa.gov>; McDonald, James <McDonald.James@epa.gov>; Gettle, Jeaneanne <Gettle.Jeaneanne@epa.gov>; Carter, Bobbi <Carter.Bobbi@epa.gov>; Behl, Betsy <Behl.Betsy@epa.gov>; Strong, Jamie <Strong.Jamie@epa.gov>; Foster, Stiven <Foster.Stiven@epa.gov>; Deener, Kathleen <Deener.Kathleen@epa.gov>; Barbery, Andrea <Barbery.Andrea@epa.gov>; Scheuer, Amy <Scheuer.Amy@epa.gov>; 'MARZ Nicole' <nicole.marz@state.or.us>; 'Karoly, Cyndi' <cyndi.karoly@ncdenr.gov>; Mundrick, Doug <Mundrick.Doug@epa.gov>; France, Danny <France.Danny@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Zapata, Cesar <Zapata.Cesar@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Heard, Anne <Heard.Anne@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>; 'Shehee, Mina' <mina.shehee@dhhs.nc.gov>; Hall, Renea <Hall.Renea@epa.gov>; Campbell-Dunbar, Shawneille <Campbell-Dunbar.Shawneille@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; 'Godreau, Jessica' <jessica.godreau@ncdenr.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; 'Dean, Glenda' <GLD@adem.alabama.gov>; efp@adem.alabama.gov; 'Harrison, Dennis' <DDH@adem.alabama.gov>; 'Hays, Lewis' <Lewis.Hays@dnr.ga.gov>; 'Capp, James' <James.Capp@dnr.ga.gov>; 'Carnley, Keith' <keith.carnley@dnr.ga.gov>; 'Booth, Elizabeth' <Elizabeth.Booth@dnr.ga.gov>; 'Justin.B.Green@dep.state.fl.us' <Justin.B.Green@dep.state.fl.us>; 'Zimmerman, Jay' <jay.zimmerman@ncdenr.gov>; 'Kinard, Doug' <KINARDDB@dhec.sc.gov>; 'Bird, Joel (ECY' <jbir461@ECY.WA.GOV>; Yaquian-Luna, Jose <yaquian-luna.josea@epa.gov>; Taylor, Dawn <Taylor.Dawn@epa.gov>; Sassman, Hannah <sassman.hannah@epa.gov>; Braverman, Carole <braverman.carole@epa.gov>; O'shea, Marie <OShea.Marie@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; 'Nwogu, Peter' <Peter.Nwogu@dnr.ga.gov>; Azzam, Nidal <Azzam.Nidal@epa.gov>; Maddaloni, Mark <Maddaloni.Mark@epa.gov>; Cutt, Diana <Cutt.Diana@epa.gov>; 'r[redacted]; 'Recer, Gregg M (HEALTH' <gregg.recer@health.ny.gov>; 'Leach, James F (HEALTH' <james.leach@health.ny.gov>; 'Deming, Justin H (HEALTH' <justin.deming@health.ny.gov>; 'Parsons, Patrick J (HEALTH' <patrick.parsons@health.ny.gov>; 'Spink, David C (HEALTH'

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<david.spink@health.ny.gov>; 'Wu, Qian (HEALTH' <qian.wu@health.ny.gov>; Gwinn, Maureen <gwinn.maureen@epa.gov>; 'Pociu, Shannon' <Shannon.Pociu@ct.gov>; Flaherty, Colleen <Flaherty.Colleen@epa.gov>; Hauchman, Fred <hauchman.fred@epa.gov>; 'Malone, Kevin M (HEALTH' <kevin.malone@health.ny.gov>; 'Adam DeWeese' <Adam.DeWeese@wisconsin.gov>; 'Amy LaChance' <LACHANCEA1@michigan.gov>; 'Cathrine Wunderlich' <cathrine.wunderlich@wisconsin.gov>; 'David McMillan' <Dave.McMillan@illinois.gov>; 'Eric Oswald' <OswaldE1@michigan.gov>; 'Mary Hollingsworth' <mholling@idem.in.gov>; 'Matt Prater' <mprater@idem.in.gov>; 'Randy Ellingboe' <randy.ellingboe@state.mn.us>; 'Richard Benzier' <benzier@michigan.gov>; 'Rick Cobb' <rick.cobb@Illinois.gov>; 'Sara Pierson' <spierson@idem.in.gov>; 'Steve Elmore' <Steve.Elmore@Wisconsin.gov>; 'Suzanne Ruch' <RuchS@michigan.gov>; helen.goeden@state.mn.us; James.kelly@state.mn.us; Connie.Sullinger@illinois.gov; 'klemansd@michigan.gov' <klemansd@michigan.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; 'seidelt@michigan.gov' <seidelt@michigan.gov>; 'argiroffp@michigan.gov' <argiroffp@michigan.gov>; 'alexanderc2@michigan.gov' <alexanderc2@michigan.gov>; 'DebruynD@michigan.gov' <DebruynD@michigan.gov>; 'Johnson, Thomas B (HEALTH' <thomas.johnson@health.ny.gov>; Gaines, Linda <Gaines.Linda@epa.gov>; 'Snyder, Sandra' <snydersl@dhec.sc.gov>; Klasen, Matthew <Klasen.Matthew@epa.gov>; 'Bush, Christina Rose (DHHS' <BushC6@michigan.gov>; Morris, Jeff <Morris.Jeff@epa.gov>; Cherepy, Andrea <Cherepy.Andrea@epa.gov>; Burden, Susan <Burden.Susan@epa.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; Freeman, Bruce <BMF@adem.alabama.gov>; Lahne Mattas-Curry <Mattas-Curry.Lahne@epa.gov>; Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Menghrajani, jacquelyn <Menghrajani.Jacquelyn@epa.gov>; Zambrana, Jose <Zambrana.Jose@epa.gov>
Cc: Kavlock, Robert <Kavlock.Robert@epa.gov>; Robbins, Chris <Robbins.Chris@epa.gov>; Rodan, Bruce <rodan.bruce@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
Subject: agenda for Oct 30 ECOS-EPA PFAS Call

ECOS-EPA PFAS Call
October 30, 2017
4:00-5:00 pm ET

Personal Phone / Ex. 6

Webinar link: http://epawebconferencing.acms.com/pfasoctober/

Agenda

1. Welcome and Introductions – Jennifer Orme-Zavaleta, EPA's Office of Research and Development (ORD) (5 mins)

2. Amended TSCA: How implementation could influence actions around PFAS – Jeff Morris, Director, EPA's Office of Pollution Prevention and Toxics (15 mins)

3. GenX in the Cape Fear River Basin

   - State update – Sheila Holman, NC DEQ Assistant Secretary for Environment (10 mins)

   - PFAS methods work to support NC – Tim Buckley, EPA ORD National Exposure Research Laboratory (5 mins)

4. Overview of the PFAS Investigation at Wright-Patterson AFB

   - Including the sampling of a sentinel well network designed to detect contamination before it impacts the city of Dayton's downgradient wellfields – Bonnie Buthker, Chief, Southwest District Office, Ohio EPA (10 mins)

5. Ohio EPA Progress on Analytical Methods

   - Drinking water and direct injection method for other waters – Nik Dzamov, Chief, Division of Environmental Services, Ohio EPA (5 mins)

6. Updates from the EPA PFAS Workgroups

- Methods Development – Chris Impellitteri, EPA ORD Co-Chair (5 mins)
- Toxicity – Lynn Flowers, EPA ORD Co-Chair (5 mins)

7. Open forum to share info (states)

8. Wrap-up and Adjourn – Jennifer Orme-Zavaleta, EPA ORD

These calls are held every other month for states and EPA to share information on PFAS methods, toxicity and treatment work. Please send any suggestions for December agenda topics to Lisa Matthews (matthews.lisa@epa.gov) and Sarah Grace Longsworth (slongsworth@ecos.org). Thank you.

Lisa Matthews
Senior Advisor and State Liaison
US EPA Office of Research and Development
202-564-6669 office
Personal Phone / Ex. 6

ECOS-EPA PFAS Call
October 30, 2017
4:00-5:00 pm ET

Call-in number: Personal Matters / Ex. 6
Webinar link: Personal Matters / Ex. 6

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To: Mitchell, Ken[Mitchell.Ken@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; France, Danny[France.Danny@epa.gov]
Cc: Hall, Renea[Hall.Renea@epa.gov]; michael.abraczinskas@ncdenr.gov[michael.abraczinskas@ncdenr.gov]; Alapaty, Kiran[Alapaty.Kiran@epa.gov]; Maguire, Megan[Maguire.Megan@epa.gov]; Hubbard, Carolyn[Hubbard.Carolyn@epa.gov]; Rinck, Todd[Rinck.Todd@epa.gov]; Brown, Ryan[Brown.Ryan@epa.gov]; Woosley, Julie[julie.woosley@ncdenr.gov]; Cox, Heidi[heidi.cox@ncdenr.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Scott, Michael[michael.scott@ncdenr.gov]; Gregson, Jim[jim.gregson@ncdenr.gov]; Smith, Emily J.[Smith.Emily@epa.gov]; Sauerhage, Maggie[Sauerhage.Maggie@epa.gov]; Worley, Gregg[Worley.Gregg@epa.gov]; Pollard, Solomon[Pollard.Solomon@epa.gov]; Velez, Ezequiel[Velez.Ezequiel@epa.gov]; Allen, Trent[trent.allen@ncdenr.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]
From: Culpepper, Linda
Sent: Tue 10/31/2017 8:03:51 PM
Subject: RE: [External] NEW PHONE NUMBER:
Copy of SGS results w-Chemours data.xlsx
Chemours data graphs.docx

Per our phone call, here's the water data received from SGS and with data received from Chemours for their outfall. I've asked Chemours for their October outfall data which will be added to the spread sheet.

If you have any questions, please let me know.
linda

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: Mitchell, Ken [mailto:Mitchell.Ken@epa.gov]
Sent: Tuesday, October 31, 2017 3:44 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>; Abraczinskas, Michael <michael.abraczinskas@ncdenr.gov>; Alapaty, Kiran <Alapaty.Kiran@epa.gov>; Maguire, Megan <Maguire.Megan@epa.gov>; Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Rinck, Todd <Rinck.Todd@epa.gov>; Brown, Ryan <Brown.Ryan@epa.gov>; Woosley, Julie <julie.woosley@ncdenr.gov>; France, Danny <France.Danny@epa.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Jones, Aaryn <Jones.Aaryn@epa.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Gregson, Jim <jim.gregson@ncdenr.gov>; Smith, Emily J. <Smith.Emily@epa.gov>; Sauerhage, Maggie <Sauerhage.Maggie@epa.gov>; Worley, Gregg <Worley.Gregg@epa.gov>; Pollard, Solomon <Pollard.Solomon@epa.gov>; Velez, Ezequiel <Velez.Ezequiel@epa.gov>
Subject: [External] NEW PHONE NUMBER:

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

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Code Personal Matters / Ex. 6

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

NOTICE: This communication may contain privileged or other confidential information. If you are not the intended recipient, or believe that you have received this communication in error, please do not print, copy, retransmit, disseminate, or otherwise use the information. Also, please indicate to the sender that you have received this communication in error, and delete the copy you received.

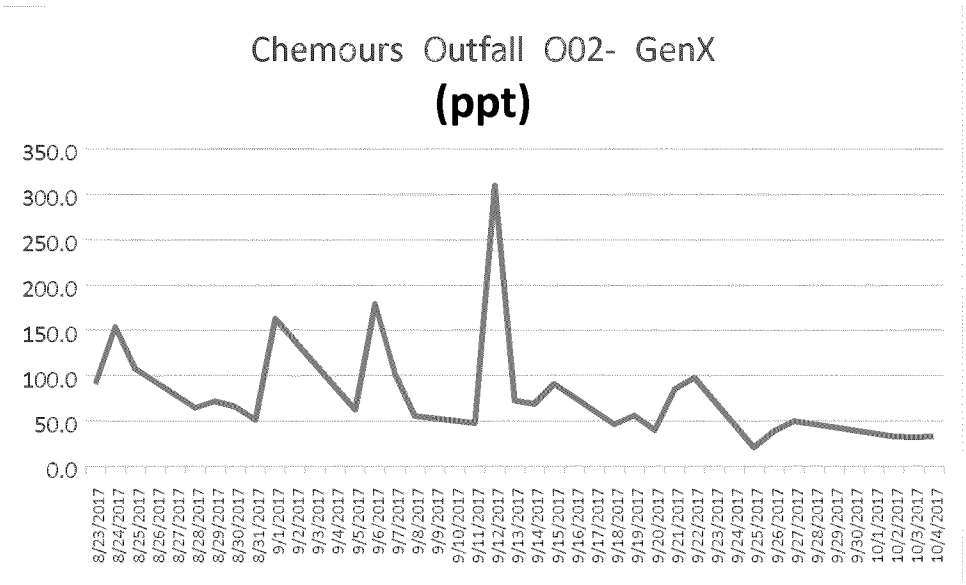
-----Original Appointment-----

From: Buckley, Timothy
Sent: Wednesday, October 04, 2017 3:08 PM
To: Buckley, Timothy; Allenbach, Becky; Strynar, Mark; Lindstrom, Andrew; Medina-Vera, Myriam; Culpepper, Linda
Cc: Hall, Renea; michael.abraczinskas@ncdenr.gov; Alapaty, Kiran; Maguire, Megan; Hubbard, Carolyn; Rinck, Todd; Brown, Ryan; Woosley, Julie; France, Danny; Cox, Heidi; Kemker, Carol; Mitchell, Ken; Jones, Aaryn; Scott, Michael; Gregson, Jim; Smith, Emily J.; Sauerhage, Maggie; Worley, Gregg; Pollard, Solomon; Velez, Ezequiel
Subject: FW: PFAS Cape Fear Partnership NC DEQ / R4 / NERL Partnership Check-in
When: Tuesday, October 31, 2017 3:30 PM-4:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: **Personal Phone / Ex. 6**

-----Original Appointment-----
From: Buckley, Timothy
Sent: Monday, September 18, 2017 9:59 AM
To: Buckley, Timothy; Allenbach, Becky; Culpepper, Linda; Strynar, Mark; Lindstrom, Andrew; Medina-Vera, Myriam
Cc: Woosley, Julie; France, Danny; Hall, Renea; michael.abraczinskas@ncdenr.gov; Cox, Heidi
Subject: PFAS Cape Fear Partnership NC DEQ / R4 / NERL Partnership Check-in
When: Occurs every Tuesday effective 9/19/2017 until 12/1/2017 from 3:30 PM to 4:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: **Personal Phone / Ex. 6**

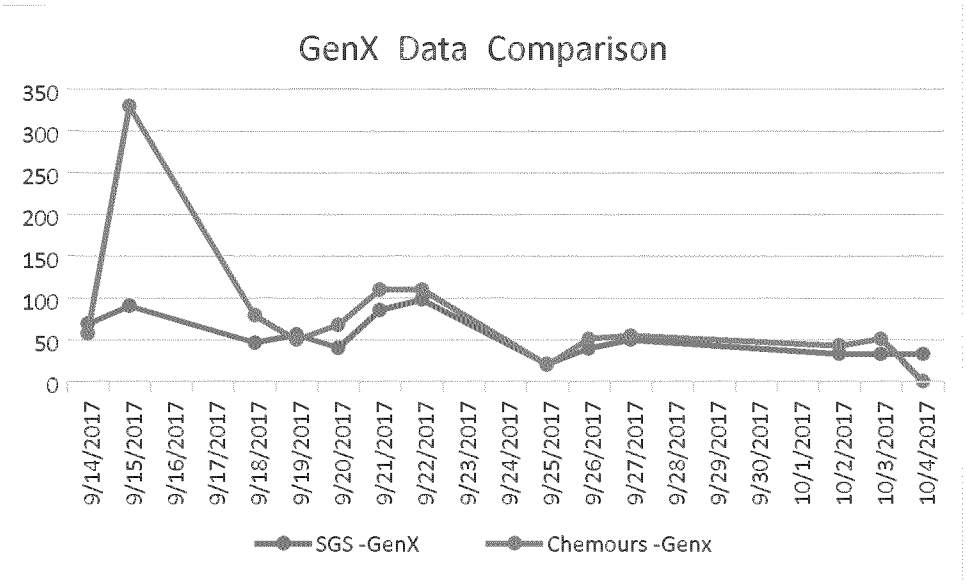
To facilitate communication and coordination of partnership activities.

DEQ samples with analysis from SGS laboratory

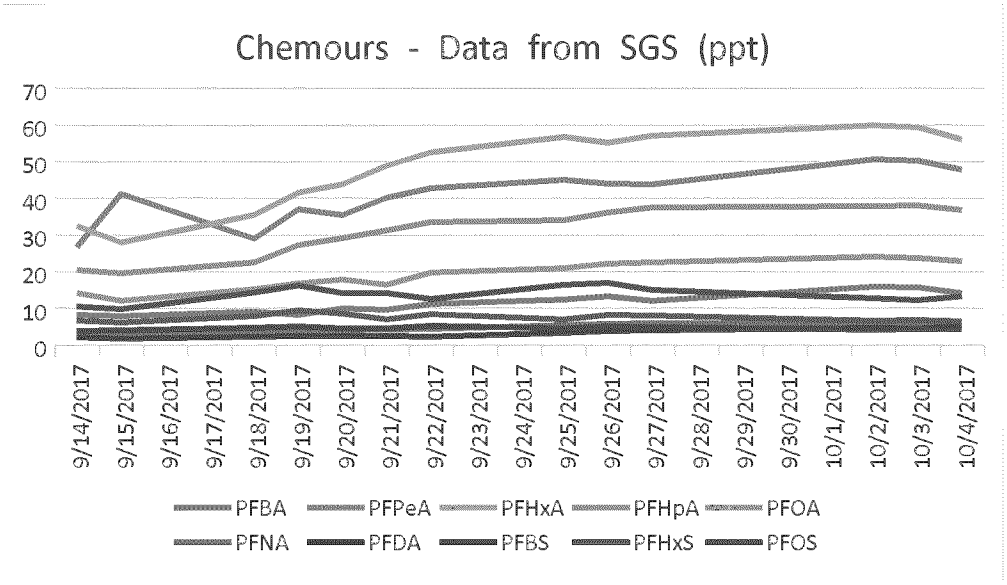


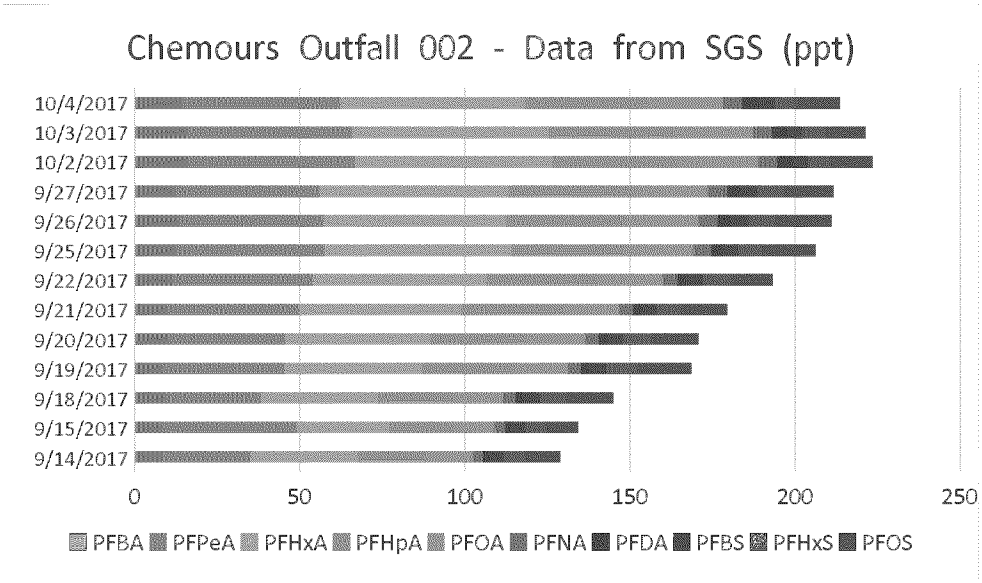
Dates above 140 ppt:

8/24/17 = 154	9/06/17 = 179	Aug ave = 87
9/1/17 = 163	9/12/17 = 310	Sept ave = 88



ED_002003J_00022844-00001


Chemours - Data from SGS (ppt)
70
60
50
40
30
20
10
0
9/14/2017
9/15/2017
9/16/2017
9/17/2017
9/18/2017
9/19/2017
9/20/2017
9/21/2017
9/22/2017
9/23/2017
9/24/2017
9/25/2017
9/26/2017
9/27/2017
9/28/2017
9/29/2017
9/30/2017
10/1/2017
10/2/2017
10/3/2017
10/4/2017
PFBA
PFPeA
PFHxA
PFHpA
PFOA
PFNA
PFDA
PFBS
PFHxS
PFOS


Chemours Outfall 002 - Data from SGS (ppt)
10/4/2017
10/3/2017
10/2/2017
9/27/2017
9/26/2017
9/25/2017
9/22/2017
9/21/2017
9/20/2017
9/19/2017
9/18/2017
9/15/2017
9/14/2017
0
50
100
150
200
250
PFBA
PFPeA
PFHxA
PFHpA
PFOA
PFNA
PFDA
PFBS
PFHxS
PFOS

SBS Results (ppb)

		9/14/2017	9/15/2017	9/18/2017	9/19/2017	9/20/2017	9/21/2017	9/22/2017	9/23/2017	9/25/2017	9/26/2017	9/27/2017	9/28/2017	9/29/2017	10/2/2017	10/3/2017	10/4/2017	Date	Date	Date	Date
Chemours Dupont 002	PFBA	8.39	7.90	9.20	9.35	10.1	9.75	11.2	12.4	13.3	12.2	pending	pending	16.0	15.8	14.3					
	PFPeA	39.9	41.3	39.1	37.1	35.8	40.2	42.8	46.1	44.1	42.9	pending	pending	50.8	50.2	48.0					
	PFHxA	32.6	38.0	35.5	41.7	43.6	49.0	52.7	56.8	55.2	57.2	pending	pending	60.0	59.5	56.1					
	PFHpA	30.5	34.7	32.7	37.4	36.2	31.4	33.7	34.1	36.2	37.7	pending	pending	38.0	38.1	36.6					
	PFOA	16.2	12.2	15.2	18.8	17.8	18.6	19.8	21.0	22.2	22.7	pending	pending	24.2	23.8	23.0					
	PFNA	3.15	3.22	3.78	3.88	4.10	4.20	4.40	5.40	5.82	5.88	pending	pending	5.90	5.78	5.84					
	PFDA	2.12	2.87	3.29	2.59	2.54	2.54	2.60	2.62	4.00	4.07	pending	pending	4.75	4.64	5.35					
	PFBS	3.99	4.19	4.90	5.21	4.72	4.65	5.37	4.67	5.18	5.01	pending	pending	4.36	4.51	4.50					
	PFHxS	6.75	6.22	8.00	9.47	8.92	7.06	8.44	7.07	8.37	8.08	pending	pending	9.69	9.88	9.58					
	PFOS	10.6	9.80	14.4	16.2	14.2	14.3	12.8	16.5	17.0	15.1	pending	pending	12.9	12.3	13.3					
	GenX	69.1	60.7	66.5	56.1	40.4	35.8	38.4	30.8	59.4	50.0	41.6	48.8	53.0	52.8	52.6					
	PFOA+PFOS	26.8	22	29.8	33.1	32.2	30.9	32.4	37.5	39.2	37.8	#VALUE!	#VALUE!	37.1	36.1	36.3	0	0	0	0	
Chemours delete		58	1004	70	50	68	150	150	20	51	55	43	51								

Result (ppt)

		9/18/2017	9/25/2017	10/2/2017	Date	Date	Date
Bladen Bluffs PW	PFBA	0.843 (J)	1.07 (J)	0.993 (J)			
	PFPeA	1.82 (J)	2.06	2.04 (J)			
	PFHxA	1.82 (J)	1.99	2.22			
	PFHpA	0.907 (J)	1.25 (J)	1.48 (J)			
	PFOA	0.705 (J)	0.908 (J)	2.09			
	PFNA	ND	ND	0.215 (J)			
	PFDA	ND	ND	ND			
	PFBS	0.218 (J)	0.217 (J)	ND			
	PFHxS	0.341 (J)	0.260 (J)	0.270 (J)			
	PFOS	0.820 (J)	0.482 (J)	0.351 (J)			
	GenX	ND	ND	ND			
	PFOA+PFOS	1.525 (J)	1.388 (J)	2.441 (J)			

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date
Int'l Paper	PFBA	10.3	9.25	8.87	9.72		
	PFPeA	19.4	15.8	19.7	19.3		
	PFHxA	16.1	13.0	15.2	16.7		
	PFHpA	7.70	6.16	7.26	8.38		
	PFOA	3.65	2.97	3.74	5.50		
	PFNA	0.501 (J)	0.525 (J)	0.551 (J)	0.559 (J)		
	PFDA	0.225 (J)	0.228 (J)	0.245 (J)	0.297 (J)		
	PFBS	1.88 (J)	1.73 (J)	2.06	1.58 (J)		
	PFHxS	1.73 (J)	1.39 (J)	1.82 (J)	1.48 (J)		
	PFOS	1.64 (J)	1.21 (J)	1.40 (J)	1.13 (J)		
	GenX	50.2	55.4	55.5	50.5		
	PFOA+PFOS	5.29 (J)	4.18 (J)	5.14 (J)	6.65 (J)		

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date
CSPUA	PFBA	12.8	8.38	7.77	14.1		
	PFPeA	38.1	28.8	29.4	37.7		
	PFHxA	39.3	28.1	24.7	37.9		
	PFHpA	22.6	16.4	16.4	26.2		
	PFOA	15.1	10.1	12.1	17.1		
	PFNA	4.27	3.55	3.98	4.98		
	PFDA	3.00	2.59	2.88	2.52		
	PFBS	5.57	4.54	4.90	4.54		
	PFHxS	7.91	6.28	7.37	7.30		
	PFOS	17.2	17.2	14.5	14.2		
	GenX	53.2	39.1	38.8	47.7		
	PFOA+PFOS	32.3	27.4	26.6	31.4	0	0

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date
Pender County	PFBA	12.2	10.8	10.1	11.5		
	PFPeA	25.0	21.2	21.7	25.3		
	PFHxA	18.9	16.1	15.3	18.7		
	PFHpA	8.88	6.93	6.90	9.77		
	PFOA	3.82	3.74	2.87	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)	2.06	1.78 (J)		
	PFHxS	1.62 (J)	1.26 (J)	1.53 (J)	1.57 (J)		
	PFOS	0.544 (J)	1.02 (J)	0.977 (J)	0.898 (J)		
	GenX	40.4	41.0	42.4	45.2		
	PFOA+PFOS	4.36 (J)	3.76 (J)	3.85 (J)	6.58 (J)		

Result (ppt)

		9/14/2017	9/21/2017	9/28/2017	10/5/2017	Date	Date
Brunswick County NW	PFBA	9.68	7.55	5.60	10.6		
	PFPeA	33.1	25.7	19.8	33.1		
	PFHxA	28.1	20.8	22.1	32.7		
	PFHpA	20.0	14.7	13.5	24.6		
	PFOA	13.0	7.98	8.38	18.7		
	PFNA	2.87	1.87 (J)	1.83 (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	4.99	4.79		
	PFOS	7.78	5.98	7.78	9.38		
	GenX	33.1	35.0	28.3	33.7		
	PFOA+PFOS	20.8	13.9	15.9	28.1	0.0	0.0

Comments:

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

J - Estimated (Below RL) / ND - Not Detected

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

PFOA recovered below LOQ in Method Blank (9/14-9/22 sample batch)

PFBA recovered below acceptance level in Matrix Spike (9/14-9/22 sample batch)

PFOS, 9-Cl PFS recovered above acceptance level in Matrix Spike (9/14-9/22 sample batch)

1 of 3 surrogates recovered below acceptance levels in Matrix Spike (9/14-9/22 sample batch)

1 of 3 surrogates recovered below acceptance levels in Sample Duplicate (9/14-9/22 sample batch)

GenX surrogate recovered below acceptance levels in Sample Duplicate (9/14-9/22 sample batch)

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

PFBA recovered below acceptance level in Matrix Spike (9/25-9/28 sample batch)

GenX surrogate recovered below acceptance levels in Blank Spike (9/25-9/28 sample batch)

GenX surrogate recovered below acceptance levels in Method Blank (9/25-9/28 sample batch)

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

GenX surrogate recovered below acceptance levels in Blank Spike (9/28-9/29 sample batch)

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

PFNA, PFDA, PFNA recovered above acceptance level in LCS (10/2-10/5 sample batch)

PFBS recovered below acceptance level in LCS (10/2-10/5 sample batch)

1 of 3 surrogates recovered below acceptance levels in LCS (10/2-10/5 sample batch)

GenX surrogate recovered below acceptance levels in LCS and MS (10/2-10/5 sample batch)

GenX RPD above acceptance levels in Sample Duplicate (10/2-10/5 sample batch)

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)	QC Comments:
	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	QC Comments:
	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)				QC Comments:
	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				QC Comments:
	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			QC Comments:
	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)			QC Comments:
	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				QC Comments:
	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)				QC Comments:
	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			

Comments:

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

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

PFOA recovered below LOQ in Method Blank (9/14-9/22 sample batch)
PFBA recovered below acceptance level in Matrix Spike (9/14-9/22 sample batch)
PFDS, 6:2 FTS recovered above acceptance level in Matrix Spike (9/14-9/22 sample batch)
1 of 3 surrogates recovered below acceptance levels in Matrix Spike (9/14-9/22 sample
1 of 3 surrogates recovered below acceptance levels in Sample Duplicate (9/14-9/22 sample
GenX surrogate recovered below acceptance levels in Sample Duplicate (9/14-9/22 sample

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

PFBA recovered below acceptance level in Matrix Spike (9/25-9/28 sample batch)
GenX surrogate recovered below acceptance levels in Blank Spike (9/25-9/28 sample batch)
GenX surrogate recovered below acceptance levels in Method Blank (9/25-9/28 sample

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

GenX surrogate recovered below acceptance levels in Blank Spike (9/28-9/29 sample batch)

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

PFuNA, PFTriA, PFTreA recovered above acceptance level in LCS (10/2-10/5 sample batch)
PFBS recovered below acceptance level in LCS (10/2-10/5 sample batch)
1 of 3 surrogates recovered below acceptance levels in LCS (10/2-10/5 sample batch)
GenX surrogate recovered below acceptance levels in LCS and MS (10/2-10/5 sample batch)
GenX RPD above acceptance levels in Sample Duplicate (10/2-10/5 sample batch)

nts:
: 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

nts:
: 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

nts:
: 1 of 3 surrogates recovered below acceptance levels

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

nts:
: 2 of 3 surrogates recovered below acceptance levels
: GenX surrogate recovered below acceptance levels

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

nts:
: 2 of 3 surrogates recovered below acceptance levels

nts:
: 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	3/31/2017
Chemours Outfall 002	PFBA	pending	pending	pending	pending	pending	pending	pending
	PFPeA	pending	pending	pending	pending	pending	pending	pending
	PFHxA	pending	pending	pending	pending	pending	pending	pending
	PFHpA	pending	pending	pending	pending	pending	pending	pending
	PFOA	pending	pending	pending	pending	pending	pending	pending
	PFNA	pending	pending	pending	pending	pending	pending	pending
	PFDA	pending	pending	pending	pending	pending	pending	pending
	PFBS	pending	pending	pending	pending	pending	pending	pending
	PFHxS	pending	pending	pending	pending	pending	pending	pending
	PFOS	pending	pending	pending	pending	pending	pending	pending
	GenX	91.0	154	108	64.7	71.8	66.2	51.7
	PFOA+PFOS	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!

		Result (ppt)					
		8/28/2017	9/5/2017	9/11/2017			
Bladen Bluffs FW	PFBA	pending	pending	pending			
	PFPeA	pending	pending	pending			
	PFHxA	pending	pending	pending			
	PFHpA	pending	pending	pending			
	PFOA	pending	pending	pending			
	PFNA	pending	pending	pending			
	PFDA	pending	pending	pending			
	PFBS	pending	pending	pending			
	PFHxS	pending	pending	pending			
	PFOS	pending	pending	pending			
	GenX	46.7	ND	ND			
	PFOA+PFOS						

		Result (ppt)					
		8/31/2017	9/7/2017				
Int'l Paper	PFBA	pending	pending				
	PFPeA	pending	pending				
	PFHxA	pending	pending				
	PFHpA	pending	pending				
	PFOA	pending	pending				
	PFNA	pending	pending				
	PFDA	pending	pending				
	PFBS	pending	pending				
	PFHxS	pending	pending				
	PFOS	pending	pending				
	GenX	29.1	37.9				
	PFOA+PFOS						

		Result (ppt)					
		8/31/2017	9/7/2017				

CFPUA	PFBA	pending	pending				
	PFPeA	pending	pending				
	PFHxA	pending	pending				
	PFHpA	pending	pending				
	PFOA	pending	pending				
	PFNA	pending	pending				
	PFDA	pending	pending				
	PFBS	pending	pending				
	PFHxS	pending	pending				
	PFOS	pending	pending				
	GenX	38.2	44.0				
	PFOA+PFOS	#VALUE!	#VALUE!				

Result (ppt)

		8/31/2017	9/7/2017				
Pender County	PFBA	pending	pending				
	PFPeA	pending	pending				
	PFHxA	pending	pending				
	PFHpA	pending	pending				
	PFOA	pending	pending				
	PFNA	pending	pending				
	PFDA	pending	pending				
	PFBS	pending	pending				
	PFHxS	pending	pending				
	PFOS	pending	pending				
	GenX	39.4	50.5				
	PFOA+PFOS						

Result (ppt)

		8/31/2017	9/7/2017				
Brunswick County NW	PFBA	pending	pending				
	PFPeA	pending	pending				
	PFHxA	pending	pending				
	PFHpA	pending	pending				
	PFOA	pending	pending				
	PFNA	pending	pending				
	PFDA	pending	pending				
	PFBS	pending	pending				
	PFHxS	pending	pending				
	PFOS	pending	pending				
	GenX	24.0	34.1				
	PFOA+PFOS	#VALUE!	#VALUE!				

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 surrogate recovered below acceptance levels in LCS (8/23-8/31 sample batch)

Sample comments 9/1/17 - 9/13/17

GenX surrogate recovered below acceptance levels in Method Blank (9/1-9/13 sample batch)

GenX surrogate RPD above acceptance levels in Sample Duplicate (9/1-9/13 sample batch)

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	pending	
	PFPeA	pending	
	PFHxA	pending	
	PFHpA	pending	
	PFOA	pending	
	PFNA	pending	
	PFDA	pending	
	PFBS	pending	
	PFHxS	pending	
	PFOS	pending	
	GenX	ND	

	8/29/2017		
DAK Americas WWTP Effluent	PFBA	pending	
	PFPeA	pending	
	PFHxA	pending	
	PFHpA	pending	
	PFOA	pending	
	PFNA	pending	
	PFDA	pending	
	PFBS	pending	
	PFHxS	pending	
	PFOS	pending	
	GenX	23.4	

Sample Comments:
8/29/2017: GenX surrogate recovered above acceptance level

8/29/2017

Rockfish WWTP Effluent	PFBA	pending	
	PFPeA	pending	
	PFHxA	pending	
	PFHpA	pending	
	PFOA	pending	
	PFNA	pending	
	PFDA	pending	
	PFBS	pending	
	PFHxS	pending	
	PFOS	pending	
	GenX	ND	

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	

Sample Comments:
9/6/2017: GenX surrogate recovered below acceptance level

Result (ppt)

		8/23/2017	8/24/2017	8/25/2017	8/28/2017	8/29/2017	8/30/2017	
Chemours Outfall 002	PFuNA	pending	pending	pending	pending	pending	pending	QC Comments:
	PFDoA	pending	pending	pending	pending	pending	pending	8/24/2017: GenX
	PFTriA	pending	pending	pending	pending	pending	pending	8/25/2017: GenX
	PFTreA	pending	pending	pending	pending	pending	pending	
	PFDS	pending	pending	pending	pending	pending	pending	
	NMeFOSAA	pending	pending	pending	pending	pending	pending	
	NetFOSAA	pending	pending	pending	pending	pending	pending	
	6:2 FTS	pending	pending	pending	pending	pending	pending	
	8:2 FTS	pending	pending	pending	pending	pending	pending	

Result (ppt)

		8/31/2017	9/1/2017	9/5/2017	9/6/2017	9/7/2017	9/8/2017	
Chemours Outfall 002	PFuNA	pending	pending	pending	pending	pending	pending	QC Comments:
	PFDoA	pending	pending	pending	pending	pending	pending	8/31/2017: GenX
	PFTriA	pending	pending	pending	pending	pending	pending	9/1/2017: GenX
	PFTreA	pending	pending	pending	pending	pending	pending	9/5/2017: GenX
	PFDS	pending	pending	pending	pending	pending	pending	
	NMeFOSAA	pending	pending	pending	pending	pending	pending	
	NetFOSAA	pending	pending	pending	pending	pending	pending	
	6:2 FTS	pending	pending	pending	pending	pending	pending	
	8:2 FTS	pending	pending	pending	pending	pending	pending	

Result (ppt)

		9/11/2017	9/12/2017	9/13/2017	
Chemours Outfall 002	PFuNA	pending	pending	pending	QC Comments:
	PFDoA	pending	pending	pending	9/13/2017: GenX surrogate recovered below
	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)

		8/31/2017	9/5/2017	9/11/2017	
Bladen Bluffs FW	PFuNA	pending	pending	pending	QC Comments:
	PFDoA	pending	pending	pending	
	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)

		8/31/2017	9/7/2017		
Int'l Paper	PFuNA	pending	pending		QC Comments:
	PFDoA	pending	pending		
	PFTriA	pending	pending		
	PFTreA	pending	pending		
	PFDS	pending	pending		
	NMeFOSAA	pending	pending		
	NetFOSAA	pending	pending		
	6:2 FTS	pending	pending		
	8:2 FTS	pending	pending		

Result (ppt)

		8/31/2017	9/7/2017		
CFPUA	PFuNA	pending	pending		QC Comments:
	PFDoA	pending	pending		8/31/2017: GenX surrogate recovered below
	PFTriA	pending	pending		
	PFTreA	pending	pending		
	PFDS	pending	pending		
	NMeFOSAA	pending	pending		
	NetFOSAA	pending	pending		
	6:2 FTS	pending	pending		
	8:2 FTS	pending	pending		

Result (ppt)

		8/31/2017	9/7/2017		
Pender County	PFuNA	pending	pending		QC Comments:
	PFDoA	pending	pending		
	PFTriA	pending	pending		
	PFTreA	pending	pending		
	PFDS	pending	pending		
	NMeFOSAA	pending	pending		
	NetFOSAA	pending	pending		
	6:2 FTS	pending	pending		
	8:2 FTS	pending	pending		

Result (ppt)

		8/31/2017	9/7/2017		
Brunswick County NW	PFuNA	pending	pending		QC Comments:
	PFDoA	pending	pending		
	PFTriA	pending	pending		
	PFTreA	pending	pending		
	PFDS	pending	pending		
	NMeFOSAA	pending	pending		
	NetFOSAA	pending	pending		
	6:2 FTS	pending	pending		

8:2 FTS	pending	pending	

Comments:

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

Sample comments 8/23/17 - 8/31/17

GenX surrogate recovered below acceptance levels in LCS (8/23-8/31 sample batch)

Sample comments 9/1/17 - 9/13/17

GenX surrogate recovered below acceptance levels in Method Blank (9/1-9/13 sample

GenX surrogate RPD above acceptance levels in Sample Duplicate (9/1-9/13 sample batch)

nts:
: GenX surrogate recovered below acceptance levels
: GenX surrogate recovered below acceptance levels

nts:
: GenX surrogate 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
	PFDoA	pending
	PFTriA	pending
	PFTreA	pending
	PFDS	pending
	NMeFOSAA	pending
	NetFOSAA	pending
	6:2 FTS	pending
	8:2 FTS	pending

8/29/2017

Cross Creek WWTP Effluent	PFuNA	pending
	PFDoA	pending
	PFTriA	pending
	PFTreA	pending
	PFDS	pending
	NMeFOSAA	pending
	NetFOSAA	pending
	6:2 FTS	pending
	8:2 FTS	pending

8/29/2017

DAK Americas WWTP Effluent	PFuNA	pending
	PFDoA	pending
	PFTriA	pending
	PFTreA	pending
	PFDS	pending
	NMeFOSAA	pending
	NetFOSAA	pending
	6:2 FTS	pending
	8:2 FTS	pending

8/29/2017

v acceptance levels

Rockfish WWTP Effluent	PFuNA	pending
	PFDoA	pending
	PFTriA	pending
	PFTreA	pending
	PFDS	pending
	NMeFOSAA	pending
	NetFOSAA	pending
	6:2 FTS	pending
	8:2 FTS	pending

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Culpepper, Linda
Sent: Wed 12/6/2017 10:52:31 PM
Subject: RE: [External] RE: Quick call?

Tim – Mark shared a quick overview of the Jordan Lake and Town of Cary data this afternoon. We're set to talk with Dr. Stapleton at Duke University tomorrow. Appreciated hearing about the study, and the support on the honey evaluation. Thank you.

Linda Culpepper
Interim 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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Wednesday, December 06, 2017 3:50 PM
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>
Subject: [External] RE: Quick call?

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

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 <Buckley.Timothy@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>
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

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

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Culpepper, Linda
Sent: Thur 8/24/2017 7:24:00 PM
Subject: RE: Timing for Non-targeted results reporting

Going over the information in a Power Point may be helpful and can talk further Monday.

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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, August 24, 2017 2:49 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>
Subject: RE: Timing for Non-targeted results reporting

Would you like a report similar to what we have done for GenX or would you prefer in the form of a PowerPoint presentation?

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Thursday, August 24, 2017 1:21 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>
Subject: RE: Timing for Non-targeted results reporting

Monday is fine for us. 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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, August 24, 2017 9:30 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>

Subject: Timing for Non-targeted results reporting

Linda,

Please let me know what will work best for you.

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

To: Strynar, Mark[Strynar.Mark@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Mort, Sandra L[sandy.mort@ncdenr.gov]
From: Scott, Michael
Sent: Wed 12/6/2017 9:19:16 PM
Subject: RE: [External] RE: Quick call?
[External] Honey Extraction details
Honey GenX lab report.pdf

Mark,

I have attached the original email that DHHS received and the lab report from GEL regarding the honey sample that contained Gen X. I would like to discuss this information with you along with Sandy Mort in our group when you have some time. Just let us know and 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

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: Wednesday, December 6, 2017 3:51 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>
Subject: [External] RE: Quick call?

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

No problem. Here until 4:30 PM.

Mark

From: Buckley, Timothy
Sent: Wednesday, December 06, 2017 3:50 PM
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>
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 <Buckley.Timothy@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>
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

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GEL Laboratories LLC
a member of The GEL Group INC

PO Box 30712 Charleston, SC 29417
2040 Savage Road Charleston, SC 29407
P 843.556.8171
F 843.766.1178

gel.com

November 22, 2017

Mr. Glenn Willis
Personal Testing
834 Pages Lake Rd
Saint Pauls, North Carolina 28384

Re: Routine Analysis-Glenn Willis
Work Order: 437124

Dear Mr. Willis:

GEL Laboratories, LLC (GEL) appreciates the opportunity to provide the enclosed analytical results for the sample(s) we received on November 06, 2017. This original data report has been prepared and reviewed in accordance with GEL's standard operating procedures.

Our policy is to provide high quality, personalized analytical services to enable you to meet your analytical needs on time every time. We trust that you will find everything in order and to your satisfaction. If you have any questions, please do not hesitate to call me at (843) 556-8171, ext. 4778.

Sincerely,

Valerie Davis

Valerie Davis for
Hope Taylor
Project Manager

Purchase Order: SIGNED QUOTE
Enclosures

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis Report
for

SCCZ001

Client SDG: 437124 GEL Work Order: 437124

The Qualifiers in this report are defined as follows:

* A quality control analyte recovery is outside of specified acceptance criteria

** Analyte is a Tracer compound

** Analyte is a surrogate compound

U Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.

h Preparation or preservation holding time was exceeded

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the Certificate of Analysis.

The designation ND, if present, appears in the result column when the analyte concentration is not detected above the limit as defined in the 'U' qualifier above.

This data report has been prepared and reviewed in accordance with GEL Laboratories LLC standard operating procedures. Please direct any questions to your Project Manager, Hope Taylor.

Reviewed by Valerie Davis

GEL LABORATORIES LLC

2040 Savage Road Charleston SC 29407 - (843) 556-8171 - www.gel.com

Certificate of Analysis

Report Date: November 22, 2017

Company :	Personal Testing
Address :	834 Pages Lake Rd
	Saint Pauls, North Carolina 28384
Contact:	Mr. Glenn Willis
Project:	Routine Analysis-Glenn Willis
Client Sample ID:	HONEY
Sample ID:	437124001
Matrix:	Misc Liquid
Collect Date:	07-OCT-17 12:00
Receive Date:	06-NOV-17
Collector:	Client
Project:	SCCZ01417
Client ID:	SCCZ001

Parameter	Qualifier	Result	DL	RL	Units	PF	DF	Analyst	Date	Time	Batch	Method
LCMSMS PFCs												
EPA 537Mod PFCs by LC-MS/MS "As Received"												
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	h	**2070**	81.7	248	ng/L	2.48	1	JLS	11/22/17	1127	1721071	1

The following Prep Methods were performed:

Method	Description	Analyst	Date	Time	Prep Batch
EPA 537 Modified	PFCs Extraction in Liquid	GXC1	11/21/17	0950	1721070

The following Analytical Methods were performed:

Method	Description	Analyst Comments
1	EPA 537 Modified	

Notes:

Column headers are defined as follows:

DF: Dilution Factor	Lc/LC: Critical Level
DL: Detection Limit	PF: Prep Factor
MDA: Minimum Detectable Activity	RL: Reporting Limit
MDC: Minimum Detectable Concentration	SQL: Sample Quantitation Limit

GEL LABORATORIES LLC

2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Report Date: November 22, 2017

Personal Testing
834 Pages Lake Rd
Saint Pauls, North Carolina

Contact: **Mr. Glenn Willis**

Workorder: **437124**

Parmname	NOM		Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time
Perfluorinated Compounds												
Batch 1721071												
QC1203925307 LCS												
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	19.9				20.0	ng/L		101	(70%-130%)	JLS	11/22/17	11:05
QC1203925306 MB												
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)				U	ND	ng/L					11/22/17	10:44
QC1203925308 437124001 MS												
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	2500	h	2070	h	4880	ng/L		112	(70%-130%)		11/22/17	11:48
QC1203925309 437124001 MSD												
2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	2500	h	2070	h	5150	ng/L	6	123	(0%-30%)		11/22/17	12:10

Notes:

The Qualifiers in this report are defined as follows:

- ** Analyte is a surrogate compound
- < Result is less than value reported
- > Result is greater than value reported
- A The TIC is a suspected aldol-condensation product
- B The target analyte was detected in the associated blank.
- C Analyte has been confirmed by GC/MS analysis
- D Results are reported from a diluted aliquot of the sample
- E Concentration of the target analyte exceeds the instrument calibration range
- H Analytical holding time was exceeded
- J Value is estimated
- JNX Non Calibrated Compound
- N Organics--Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
- N Presumptive evidence based on mass spectral library search to make a tentative identification of the analyte (TIC). Quantitation is based on nearest internal standard response factor
- N/A RPD or %Recovery limits do not apply.
- N1 See case narrative

GEL LABORATORIES LLC
2040 Savage Road Charleston, SC 29407 - (843) 556-8171 - www.gel.com

QC Summary

Workorder: **437124**

Parmname	NOM	Sample	Qual	QC	Units	RPD%	REC%	Range	Anlst	Date	Time

ND	Analyte concentration is not detected above the detection limit
NJ	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
P	Organics--The concentrations between the primary and confirmation columns/detectors is >40% different. For HPLC, the difference is >70%.
Q	One or more quality control criteria have not been met. Refer to the applicable narrative or DER.
R	Sample results are rejected
U	Analyte was analyzed for, but not detected above the MDL, MDA, MDC or LOD.
UJ	Compound cannot be extracted
X	Consult Case Narrative, Data Summary package, or Project Manager concerning this qualifier
Y	QC Samples were not spiked with this compound
^	RPD of sample and duplicate evaluated using +/-RL. Concentrations are <5X the RL. Qualifier Not Applicable for Radiochemistry.
h	Preparation or preservation holding time was exceeded

N/A indicates that spike recovery limits do not apply when sample concentration exceeds spike conc. by a factor of 4 or more or %RPD not applicable.
^ The Relative Percent Difference (RPD) obtained from the sample duplicate (DUP) is evaluated against the acceptance criteria when the sample is greater than five times (5X) the contract required detection limit (RL). In cases where either the sample or duplicate value is less than 5X the RL, a control limit of +/- the RL is used to evaluate the DUP result.
***** Indicates that a Quality Control parameter was not within specifications.
For PS, PSD, and SDILT results, the values listed are the measured amounts, not final concentrations.

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless qualified on the QC Summary.

Page: _____ of _____
Project #:
GEL Quote #:
COC Number (1):
PO Number:

GEL Chain of Custody and Analytical Request

GEL Work Order Number:

GEL Laboratories, LLC
2040 Savage Road
Charleston, SC 29407
Phone: (843) 556-8171
Fax: (843) 766-1178

437124

Client Name:
Phone #: 910.865.5484
Project/Site Name: Glenn Willis
Fax #:
Address: 834 Pages Lake Rd St Pauls NC 28384
Collected by:
Send Results To: WillisGlitt@aol.com

Sample Analysis Requested (5) (Fill in the number of containers for each test)

Sample ID (* For composites - indicate start and stop date/time)	*Date Collected (mm-dd-yy)	*Time Collected (Military) (hhmm)	QC Code (2)	Field Filtered (3)	Sample Matrix (4)	Should this sample be considered: Radioactive	TSCA Regulated	Total number of containers	PE Gen	<-- Preservative Type (6)	Comments Note: extra sample is required for sample specific QC
Honey	100717				1						

TAT Requested: Normal: Rush: Specify: (Subject to Surcharge)
Fax Results: Yes / No
Circle Deliverable: C of A / QC Summary / Level 1 / Level 2 / Level 3 / Level 4

Remarks: Are there any known hazards applicable to these samples? If so, please list the hazards

Sample Collection Time Zone: Eastern, Central, Mountain, Pacific, Other _____

Chain of Custody Signatures

Relinquished By (Signed)	Date	Time	Received by (signed)	Date	Time
1			1	11/6/17	1200
2			2		
3			3		

Sample Shipping and Delivery Details

GEL PM:
Method of Shipment:
Date Shipped:
Airbill #:
Airbill #:

1.) Chain of Custody Number = Client Determined
2.) QC Codes: N = Normal Sample, TB = Trip Blank, FD = Field Duplicate, EB = Equipment Blank, MS = Matrix Spike Sample, MSD = Matrix Spike Duplicate Sample, G = Grab, C = Composite
3.) Field Filtered: For liquid matrices, indicate with a - Y - for yes the sample was field filtered or - N - for sample was not field filtered.
4.) Matrix Codes: DW=Drinking Water, GW=Groundwater, SW=Surface Water, WW=Waste Water, W=Water, SO=Soil, SD=Sediment, SL=Sludge, SS=Solid Waste, O=Oil, F=Filter, P=Wipe, U=Urine, F=Fecal, N=Nasal
5.) Sample Analysis Requested: Analytical method requested (i.e. 8260B, 6010B/7470A) and number of containers provided for each (i.e. *8260B - 3, 6010B/7470A - 1*).
6.) Preservative Type: HA = Hydrochloric Acid, NI = Nitric Acid, SH = Sodium Hydroxide, SA = Sulfuric Acid, AA = Ascorbic Acid, HX = Hexane, ST = Sodium Thiosulfate, If no preservative is added = leave field blank

For Lab Receiving Use Only
Custody Seal Intact? YES NO
Cooler Temp: C

WHITE = LABORATORY YELLOW = FILE PINK = CLIENT

ED_002003J_00022850-00006

GEL Laboratories LLC

SAMPLE RECEIPT & REVIEW FORM 437124

Client: SCCZ	SDG/AR/COC/Work Order:
Received By: ZKW	Date Received: 11/6/17
Carrier and Tracking Number	Circle Applicable: FedEx Express FedEx Ground UPS Field Services Courier (Other) USPS 9410 8036 9930 0093 4634 94

Suspected Hazard Information	Yes	No	*If Net Counts > 100cpm on samples not marked "radioactive", contact the Radiation Safety Group for further investigation.
Shipped as a DOT Hazardous?		✓	Hazard Class Shipped: UN#:
COC/Samples marked or classified as radioactive?		✓	Maximum Net Counts Observed* (Observed Counts - Area Background Counts): 0 (CPM) mR/Hr Classified as: Rad 1 Rad 2 Rad 3
Is package, COC, and/or Samples marked HAZ?		✓	If yes, select Hazards below, and contact the GEL Safety Group. PCB's Flammable Foreign Soil RCRA Asbestos Beryllium Other:

	Sample Receipt Criteria	Yes	NA	No	Comments/Qualifiers (Required for Non-Conforming Items)
1	Shipping containers received intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
2	Chain of custody documents included with shipment? 11/6/17	✓		✓	CoFC Emailed
3	Samples requiring cold preservation within (0 ≤ 6 deg. C)?*			✓	Preservation Method: Wet Ice Ice Packs Dry ice (None) Other: *all temperatures are recorded in Celsius TEMP: 21C
4	Daily check performed and passed on IR temperature gun?	✓			Temperature Device Serial #: IR3-16 Secondary Temperature Device Serial # (If Applicable):
5	Sample containers intact and sealed?	✓			Circle Applicable: Seals broken Damaged container Leaking container Other (describe)
6	Samples requiring chemical preservation at proper pH?		✓		Sample ID's and Containers Affected: If Preservation added, Lot#:
7	Do any samples require Volatile Analysis?			✓	If Yes, Are Encores or Soil Kits present? Yes___ No___ (If yes, take to VOA Freezer) Do VOA vials contain acid preservation? Yes___ No___ N/A___ (If unknown, select No) VOA vials free of headspace? Yes___ No___ N/A___ Sample ID's and containers affected:
8	Samples received within holding time? VSO 11/22/17	✓		✓	ID's and tests affected:
9	Sample ID's on COC match ID's on bottles?			✓	Sample ID's and containers affected: No ID on sample
10	Date & time on COC match date & time on bottles?			✓	Sample ID's affected: No Date/Time on sample
11	Number of containers received match number indicated on COC?	✓			Sample ID's affected:
12	Are sample containers identifiable as GEL provided?			✓	
13	COC form is properly signed in relinquished/received sections?	✗			Chain of Custody Not Properly Relinquished

Comments (Use Continuation Form if needed):

PM (or PMA) review: Initials KLAIOTT Date 11/9/17 Page 1 of 1

GL-CHL-SR-001 Rev 5

List of current GEL Certifications as of 22 November 2017

State	Certification
Alaska	UST-0110
Arkansas	88-0651
CLIA	42D0904046
California	2940
Colorado	SC00012
Connecticut	PH-0169
Delaware	SC00012
DoD ELAP/ ISO17025 A2LA	2567.01
Florida NELAP	E87156
Foreign Soils Permit	P330-15-00283, P330-15-00253
Georgia	SC00012
Georgia SDWA	967
Hawaii	SC00012
Idaho Chemistry	SC00012
Idaho Radiochemistry	SC00012
Illinois NELAP	200029
Indiana	C-SC-01
Kansas NELAP	E-10332
Kentucky SDWA	90129
Kentucky Wastewater	90129
Louisiana NELAP	03046 (AI33904)
Louisiana SDWA	LA170010
Maryland	270
Massachusetts	M-SC012
Michigan	9976
Mississippi	SC00012
Nebraska	NE-OS-26-13
Nevada	SC000122018-1
New Hampshire NELAP	205415
New Jersey NELAP	SC002
New Mexico	SC00012
New York NELAP	11501
North Carolina	233
North Carolina SDWA	45709
North Dakota	R-158
Oklahoma	9904
Pennsylvania NELAP	68-00485
Puerto Rico	SC00012
S.Carolina Radchem	10120002
South Carolina Chemistry	10120001
Tennessee	TN 02934
Texas NELAP	T104704235-17-12
Utah NELAP	SC000122017-24
Vermont	VT87156
Virginia NELAP	460202
Washington	C780
West Virginia	997404

LCMSMS-Misc
Technical Case Narrative
(SCCZ)
SDG #: 437124

Product: **The Extraction and Analysis of Per and Polyfluroalkyl Substances Using LCMSMS**
Analytical Method: EPA 537 Modified
Analytical Procedure: GL-OA-E-076 REV# 4
Analytical Batches: 1721071 and 1721070

The following samples were analyzed using the above methods and analytical procedure(s).

GEL Sample ID#	Client Sample Identification
437124001	HONEY
1203925306	Method Blank (MB)
1203925307	Laboratory Control Sample (LCS)
1203925308	437124001(HONEY) Matrix Spike (MS)
1203925309	437124001(HONEY) Matrix Spike Duplicate (MSD)

The samples in this SDG were analyzed on an "as received" basis.

Data Summary:

All sample data provided in this report met the acceptance criteria specified in the analytical methods and procedures for initial calibration, continuing calibration, instrument controls and process controls where applicable, with the following exceptions.

Technical Information

Holding Time Specifications
Not all samples in this SDG met the specified holding time requirements. The following samples were received by the laboratory after the recommended holding time had expired.

Sample	Analyte	Value
1203925308 (HONEYMS)	2, 3, 3, 3-Tetrafluoro-2-(1, 1, 2, 2, 3, 3, 3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	Received 06-NOV-17, out of holding 21-OCT-17
1203925309 (HONEYMSD)	2, 3, 3, 3-Tetrafluoro-2-(1, 1, 2, 2, 3, 3, 3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	Received 06-NOV-17, out of holding 21-OCT-17
437124001 (HONEY)	2, 3, 3, 3-Tetrafluoro-2-(1, 1, 2, 2, 3, 3, 3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	Received 06-NOV-17, out of holding 21-OCT-17

Miscellaneous Information

Additional Comments
Due to the matrix of the sample, a reduced aliquot (Approximately 2 mL) of the sample was diluted in water and extracted per the Standard Operating Procedure (GL-OA-E-076 Rev 4. The matrix QC was treated in the same manner as the sample. 1203925308 (HONEYMS), 1203925309 (HONEYMSD) and 437124001 (HONEY).

Certification Statement

Where the analytical method has been performed under NELAP certification, the analysis has met all of the requirements of the NELAC standard unless otherwise noted in the analytical case narrative.

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Scott, Michael[michael.scott@ncdenr.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Strynar, Mark
Sent: Wed 12/6/2017 8:51:06 PM
Subject: RE: Quick call?

No problem. Here until 4:30 PM.

Mark

From: Buckley, Timothy
Sent: Wednesday, December 06, 2017 3:50 PM
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>
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 <Buckley.Timothy@epa.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>
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

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To: Pritchett, Jamie R[Jamie.Pritchett@dhhs.nc.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
Cc: Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Biales, Adam[Biales.Adam@epa.gov]
From: Strynar, Mark
Sent: Thur 10/12/2017 6:43:42 PM
Subject: RE: Request for PFAS data in the Cape Fear River

Jamie,

I have no time to dig up this old data if it is even available. If it is not in the data Andy sent earlier I am sorry to say the answer right now would be no update.

Mark

From: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Monday, October 09, 2017 12:36 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>
Subject: RE: Request for PFAS data in the Cape Fear River
Importance: High

Hello Mark and Andy,

I was wondering if there was any update on this data request? We are trying to get started with the health assessment with CDC/ATSDR.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

5505 Six Forks Road
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Raleigh, NC 27699

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, September 28, 2017 3:52 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>; Pritchett, Jamie R

<Jamie.Pritchett@dhhs.nc.gov>
Subject: FW: Request for PFAS data in the Cape Fear River
Importance: High

Mark and Andy,

See request below. I spoke briefly with Jamie about this request and he clarified that he is looking for data that underlies the more general findings reported in your Cape Fear publications. Do you have more detailed data from these studies that could be made available to support their health assessment? With respect to our recent reports to NC DEQ, I indicated to Jamie that we did not have any additional data that was any more detailed. I am copying Jamie so he will be a part of the conversation.

Thanks.

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: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Wednesday, September 20, 2017 12:01 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>
Subject: Request for PFAS data in the Cape Fear River
Importance: High

Dear Dr. Buckley,

I received your contact information from Dr. Amy Risen, a toxicologist in our department. I am a health assessor/toxicologist for the Health Assessment, Consultation & Education (HACE) program in the N.C. Division of Public Health. Beth Dittman (cc'ed) is the principal investigator and also a health assessor/toxicologist in the HACE program. Our program is funded through the CDC's Agency for Toxic Substances and Disease Registry (ATSDR) and our primary focus is evaluating public health impacts from exposure to hazardous waste.

The HACE program will be responsible for the public health assessment of exposure to PFAS in the Cape Fear River. We are working closely with our technical project team at ATSDR to get started on this assessment and would like to start organizing any potential data available. Dr. Risen indicated that your group would be the best to contact to obtain PFAS data for the Cape Fear River based on a conversation she had with Dr. Andy Lindstrom on August 3. We are writing to request any quantitative PFAS (legacy and emerging) data from the Cape Fear River you may have to assist in our public health assessment.

We realize that some of this data may be provided in a summarized format in the published literature. However, in order to provide the most accurate information on potential health risks, we will need the raw data to evaluate.

This includes the following potential data communicated to Dr. Risen by Dr. Lindstrom:

- 2007 and forward: General data on legacy PFAS, including data used for the Nakayama et al. (2007) paper.
- 2012/2013: PFECA data collected from the development of the analytical method for these chemicals.
- 2013/2014: Data published in Sun et al. in 2016 on legacy PFASs, GenX, and additional PFECAs.
- 2015 and forward: Additional PFECA data from improved analytical method.

We greatly appreciate your team's continued work on this issue. Please let Beth or I know if you have any questions about this request. I can be reached at (919) 707-5912 and Beth can be reached at (919) 707-5906. Thank you in advance for your time and attention.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

5505 Six Forks Road
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Raleigh, NC 27699

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To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Culpepper, Linda
Sent: Wed 7/19/2017 8:24:55 PM
Subject: NC DEQ - GenX

Do you have time to discuss a few items regarding future sampling?

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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Monday, June 26, 2017 2:59 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

I am confirmed.

BTW, have you heard that story will air CBS Nightly News tonight?

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, June 26, 2017 2:56 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

We can use my conf. call line **Personal Phone / Ex. 6** at 6pm tonight.
Thanks.

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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Monday, June 26, 2017 2:54 PM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

Sounds good. Who is going to call who?

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: Allenbach, Becky
Sent: Monday, June 26, 2017 2:41 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

I am thinking 6 tonight might be best. I can wait to leave the office. I will be commuting in at 8 in the morning and it might be more difficult.

Becky B. Allenbach, Acting Deputy Director
Water Protection Division
EPA Region 4 - Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

From: Buckley, Timothy
Sent: Monday, June 26, 2017 2:25 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

I am tied up until 4 PM today. I can meet 6 PM tonight or 8 – 8:30 AM tomorrow.

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, June 26, 2017 2:09 PM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Call with ORD Lab

It would be around 6pm tonight or later. Tomorrow I can do 8-8:30am or earlier if needed, and then at 7pm.

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: Allenbach, Becky [mailto:Allenbach.Becky@epa.gov]
Sent: Monday, June 26, 2017 2:07 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Call with ORD Lab

Well, we really need the ORD folks. They just arrived at our lab in Athens. Is there another time after your 3:15? I am copying Tim here

Becky B. Allenbach, Acting Deputy Director
Water Protection Division
EPA Region 4 - Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, June 26, 2017 2:02 PM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

I actually have time right now until 3:15pm. Could that work?

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: Allenbach, Becky [mailto:Allenbach.Becky@epa.gov]
Sent: Monday, June 26, 2017 1:54 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: RE: Call with ORD Lab

Hi Linda:

If today is not good for a call, would tomorrow work if the ORD rep can be available?

Becky

Becky B. Allenbach, Acting Deputy Director
Water Protection Division
EPA Region 4 – Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

From: Allenbach, Becky
Sent: Friday, June 23, 2017 2:21 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Hall, Renea <Hall.Renea@epa.gov>
Subject: Call with ORD Lab
Importance: High

Hi Linda:

Our ORD wanted to discuss a few items that Chris was not sure about. We are both available for a call at 10 or 1 on Monday. Do either of those work for you and whomever you want to be present?

Becky

Becky B. Allenbach, Acting Deputy Director
Water Protection Division
EPA Region 4 – Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Banister, Beverly
Sent: Tue 9/5/2017 7:22:29 PM
Subject: Re: State orders Chemours to stop chemical releases, begins legal action and steps to suspend permit

Thanks Linda. Appreciate the update.
Beverly

Sent from my iPhone

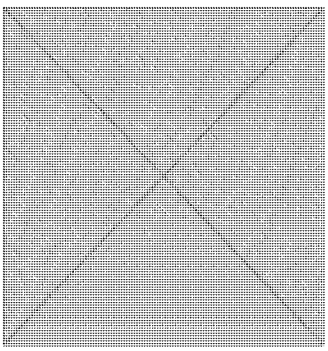
On Sep 5, 2017, at 2:49 PM, Culpepper, Linda <linda.culpepper@ncdenr.gov> wrote:

Sent from my iPhone

Begin forwarded message:

Resent-From: <SRS0=J0uR=AG=prnews2.com=pr.2559318.340687@securence.com>
From: Jamie Kritzer <jamie.kritzer@ncdenr.gov>
Date: September 5, 2017 at 2:42:24 PM EDT
To: <linda.culpepper@ncdenr.gov>
Subject: State orders Chemours to stop chemical releases, begins legal action and steps to suspend permit

Roy Cooper, Governor



M Regan, Secreta

Release: IMMEDIATE
Date: Sept. 5, 2017

Contact: Jamie Kritzer
Phone: 919-707-8602

State orders Chemours to stop chemical releases, begins legal action and steps to suspend permit
DEQ, DOJ start civil court action against Chemours, DEQ notifies company wastewater permit to be suspended

RALEIGH – State officials ordered Chemours on Tuesday to stop releasing all fluorinated compounds into the Cape Fear Rive legal action against the company and the process to suspend its permit for discharging wastewater into the river.

On Tuesday, the state of North Carolina initiated a lawsuit against Chemours in Bladen County Superior Court by filing a summ court. Acting on behalf of the N.C. Department of Environmental Quality, attorneys with N.C. Department of Justice will seek a against Chemours, the state said in a letter with the summons.

In a separate letter also sent Tuesday, DEQ notified Chemours that the state has begun the process to suspend the company's wast for failure to adequately disclose the release of GenX into the river. The permit governs Chemours' discharge of wastewater Fayetteville facility and without it, the company cannot release any wastewater into the Cape Fear River. Under the law, DEQ n company a 60-day notice before suspending the permit.

"Protecting people's drinking water is our top priority, and we've put Chemours on notice that it must stop discharging these chem Cape Fear River immediately," said Michael Regan, secretary of the N.C. Department of Environmental Quality. "Chemours releasing all fluorinated compounds and fully disclose all chemicals in its waste stream, and we're taking action to make sure tha

In June, DEQ and the N.C. Department of Health and Human Services began investigating the presence of GenX, a chemical Chemours' Fayetteville Works facility, in the Cape Fear River. As part of its investigation, the state continues to test water at mul in the Lower Cape Fear and in groundwater on the facility's property in Bladen County for the presence of GenX and other fl compounds.

The state's investigation and pressure from citizens and local officials prompted Chemours to stop discharging GenX into the C June. Since the GenX discharge stopped, concentrations of GenX have dropped below the health goal of 140 parts per trillion. Las also demanded that Chemours stop the release of additional chemical compounds including the Nafion byproducts, one day afte Environmental Protection Agency informed the state that those compounds had also been detected in the facility's waste strea information is known about the potential human health effects of GenX and less is known about the Nafion byproduct

Tuesday's civil court summons and letter from the North Carolina Attorney General's Office reiterate DEQ's demands that Chem discharge of all fluorinated compounds and disclose all compounds in its waste stream. In the letter, state attorneys wrote: "DEQ h cause to believe that Chemours has violated or is threatening to violate provisions" of state law and "[t]herefore, has directed th General's Office to institute a civil action for injunctive relief to restrain the violation or threatened violation of the law

Injunctive relief could include an order issued by a judge requiring the company to cease the discharge for the time being or take protect public health and safety.

Tuesday's letter from DEQ puts Chemours on notice that the agency intends to suspend the company's National Pollutant D Elimination System, or NPDES, permit, which allows the company to discharge wastewater into the Cape Fear River

In its letter to the company, DEQ writes, "There is sufficient cause to suspend the permit under the provisions cited in this letter. W no evidence in the permit file indicating that Chemours or DuPont (Chemours' predecessor) disclosed the discharge to surface wa compounds at the Fayetteville Works. In particular, the NPDES permit renewal applications submitted to DWR (Division of Wat contain no reference to "GenX" or to any chemical name, formula, or CAS number that would identify any GenX compounds in th

DuPont ran the Fayetteville Works facility that produces GenX until 2015 when Chemours was created as a spin-off com

The letter also calls on the company to meet several earlier demands, including stopping the discharge of any chemicals related including the Nafion byproducts, by Sept. 8 and stopping the discharge of any other perfluorinated or polyfluorinated compounds addition, the letter demands that Chemours provide complete information about all chemicals included in the Fayetteville facili stream, according to a schedule previously set by DEQ.

Additional legal steps are expected soon.

###

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North Carolina Dept. of Environment and Natural Resources, 217 W. Jones St., Raleigh, North Carolina 27699 United States

To: Moore, Zack[zack.moore@dhhs.nc.gov]; Shehee, Mina[mina.shehee@dhhs.nc.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]; Crofton, Kevin[Crofton.Kevin@epa.gov]
From: Risen, Amy J
Sent: Fri 8/11/2017 3:01:31 PM
Subject: FW: EPA Contact about PFECAs
Non-target PFCs for NC DEQ Report Draft08102017.pptm

The power point received this morning tells us the specific set of chemicals that will be reported on for drinking water samples (attached). I've spoken with NCCT to understand what type of toxicity research they will be performing for the PFECAs (see PFECAs in table further down email chain).

We will not have any toxicity data within the timeframe that we will be receiving drinking water results for PFECAs. However, a couple health effects investigations have been initiated, and the work at NCCT is expected to provide the fastest information (preliminary results may be available in as soon as one month).

NCCT is an organization that performs high throughput screening assays and computational data modeling to fill knowledge gaps in the field of toxicology. The water chemists at NREL contacted NCCT for assistance in acquiring toxicity data for these new chemicals they are finding in the water. Two types of work projects are currently being discussed, and we may expect to start seeing toxicity data in a month or so.

- Human cells lines will be screened for a variety of health effect mechanisms. They will test some individual chemicals and some extracts from samples collected (to represent the real-world mixture of chemicals).
- Computational modeling will be used to determine if these new chemicals are similar enough to any other better-studied chemicals to allow the prediction of health effects. This type of modeling is based on similarity of chemical structure and is called read across.

The results we anticipate receiving from the EPA lab on municipal drinking water samples will include:
3 of the PFECAs: These are the PFECAs that were predicted to be at highest concentrations by semi-quantitative data reported by Sun et al 2016. (See 3 highlighted chemicals in table further down email chain)
2 PFESAs: These belong to a different class of emerging fluorinated chemicals, which are also of interest to research scientists. PFESAs have been previously described by Strynar et al 2015.

I will be preparing a health effects research update to complement the new water chemistry data we will be receiving. It will help to explain why we have not yet had any health effects information to share, and describe what everyone is doing to try to provide information. My summary will include 1) a list of databases searched that yielded no toxicity research data, 2) screening and modeling research that has been initiated at NCCT, and 3) an epidemiological study that has been proposed. Please let me know if you have comments, or anything else you'd like for me to consider.

Best,
Amy

Amy Risen, PhD
Environmental Toxicologist
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

(919) 707-5911 office
(919) 870-4807 fax
Amy.Risen@dhhs.nc.gov

5505 Six Forks Road
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Raleigh, NC 27699-1912

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From: Crofton, Kevin [mailto:Crofton.Kevin@epa.gov]
Sent: Thursday, August 10, 2017 2:17 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Thomas, Russell <Thomas.Russell@epa.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>
Subject: RE: EPA Contact about PFECAs

Amy

We'll be glad to keep you in the loop! If you are interested in the planning phase I'll add you to that workgroup.

Kevin

Kevin M. Crofton, PhD
Deputy Director
National Center for Computational Toxicology
+1-919-541-2672 (office)
Personal Phone / Ex. 6

From: Buckley, Timothy
Sent: Thursday, August 10, 2017 1:39 PM
To: Thomas, Russell <Thomas.Russell@epa.gov>; Crofton, Kevin <Crofton.Kevin@epa.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>
Subject: FW: EPA Contact about PFECAs

Rusty and Kevin,

I wanted to introduce you to Amy Risen. Amy is the toxicologist with NC DEQ who will have the challenging role of assessing risk associated with the non-targeted PFCs we will be reporting. I told her that we working with you on strategies to screen for toxicity. If possible, can you loop her in on what you are planning and learning?

Thanks.

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: Risen, Amy J [mailto:Amy.Risen@dhhs.nc.gov]
Sent: Thursday, August 10, 2017 11:07 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>

Subject: FW: EPA Contact about PFECAs

Hello Dr. Buckley,

I'm not sure if we've crossed paths on any of the GenX meetings, but I know I've seen your name. One of my roles is to predict human health effects, and our department then uses findings to suggest non-regulatory risk-based statements that can be used for communication.

We're going to need to do some outreach pretty soon on the PFECAs. There is essentially no data that I'm aware of on the toxicity of these compounds (not including GenX). Some folks at EPA headquarters told us they did not believe it would be appropriate to read across any health effects from other PFAS, due to differences in the chemical structure. I'm open to ideas though.

I'd like to follow up with you on the phone to discuss this, and if you have time today that would be wonderful. I'll give your office a call in a few minutes, and I'll be in my office most of the day today. Tomorrow I'll be in most of the day, except gone for a longish lunch meeting.

Table 1: Perfluoroalkyl Ether Carboxylic Acids (PFECAs) Reported in Cape Fear River & Drinking Water by Sun et al 2016.

Abbreviation	Chemical Name	CAS
*PFPrOPrA	Perfluoro-2-propoxypropanoic acid	13252-13-6, 62037-80-3
PFMOAA	Perfluoro-2-methoxyacetic acid	674-13-5
PFMOPrA	Perfluoro-3-methoxypropanoic acid	377-73-1
PFMOBA	Perfluoro-4-methoxybutanoic acid	863090-89-5
PFO2HxA	Perfluoro-(3,5-dioxahexanoic) acid	39492-88-1
PFO3OA	Perfluoro-(3,5,7-trioxaoctanoic) acid	39492-89-2
PFO4DA	Perfluoro-(3,5,7,9-tetraoxadecanoic) acid	39492-90-5

*PFPrOPrA has been referred to as GenX
Sun et al. Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in
the Cape Fear River Watershed of North Carolina. Environmental Science & Technology Letters. Nov
2016. DOI: 10.1021/acs.estlett.6b00398.

Best,
Amy

Amy Risen, PhD
Environmental Toxicologist
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

(919) 707-5911 office
(919) 870-4807 fax
Amy.Risen@dhhs.nc.gov

5505 Six Forks Road
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From: Culpepper, Linda
Sent: Wednesday, August 09, 2017 3:53 PM
To: Shehee, Mina <mina.shehee@dhhs.nc.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: RE: EPA Contact about PFECAs

Just finished a phone call with EPA and sent you an email in follow up.
Timothy Buckley is going to introduce you to the Computational Toxicology Center contacts.

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: Shehee, Mina
Sent: Wednesday, August 09, 2017 12:19 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: EPA Contact about PFECAs
Importance: High

Linda,
Zack said he met with you and Noelle about messaging for the next set of test results, namely the PFECAs. He said you might know of someone at EPA who intimated that we could say something about the health effects behind the PFECAs. Is this the case? If so, may we have the point of contact at EPA about health effects and PFECAs? We would like to discuss this with EPA.
Thanks,
Mina

Mina Shehee, PhD
Branch Head
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

919 707 5920 office
919 870 4807 fax
mina.shehee@dhhs.nc.gov

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To: Crofton, Kevin[Crofton.Kevin@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Thomas, Russell[Thomas.Russell@epa.gov]
From: Risen, Amy J
Sent: Thur 8/10/2017 9:39:55 PM
Subject: RE: EPA Contact about PFECAs

Kevin that would be great.

If possible, I'd also like to have a quick chat tomorrow so I can get a rough idea of the work you're doing. I'll try your office in the morning.

Thanks!
Amy

Amy Risen, PhD
Environmental Toxicologist
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

(919) 707-5911 office
(919) 870-4807 fax
Amy.Risen@dhhs.nc.gov

5505 Six Forks Road
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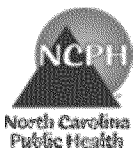
Raleigh, NC 27699-1912



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From: Crofton, Kevin [mailto:Crofton.Kevin@epa.gov]
Sent: Thursday, August 10, 2017 2:17 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Thomas, Russell <Thomas.Russell@epa.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>
Subject: RE: EPA Contact about PFECAs

Amy

We'll be glad to keep you in the loop! If you are interested in the planning phase I'll add you to that workgroup.

Kevin

Kevin M. Crofton, PhD
Deputy Director
National Center for Computational Toxicology
+1-919-541-2672 (office)
Personal Phone / Ex. 6

From: Buckley, Timothy
Sent: Thursday, August 10, 2017 1:39 PM

To: Thomas, Russell <Thomas.Russell@epa.gov>; Crofton, Kevin <Crofton.Kevin@epa.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>
Subject: FW: EPA Contact about PFECAs

Rusty and Kevin,

I wanted to introduce you to Amy Risen. Amy is the toxicologist with NC DEQ who will have the challenging role of assessing risk associated with the non-targeted PFCs we will be reporting. I told her that we working with you on strategies to screen for toxicity. If possible, can you loop her in on what you are planning and learning?

Thanks.

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: Risen, Amy J [mailto:Amy.Risen@dhhs.nc.gov]
Sent: Thursday, August 10, 2017 11:07 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: FW: EPA Contact about PFECAs

Hello Dr. Buckley,

I'm not sure if we've crossed paths on any of the GenX meetings, but I know I've seen your name. One of my roles is to predict human health effects, and our department then uses findings to suggest non-regulatory risk-based statements that can be used for communication.

We're going to need to do some outreach pretty soon on the PFECAs. There is essentially no data that I'm aware of on the toxicity of these compounds (not including GenX). Some folks at EPA headquarters told us they did not believe it would be appropriate to read across any health effects from other PFAS, due to differences in the chemical structure. I'm open to ideas though.

I'd like to follow up with you on the phone to discuss this, and if you have time today that would be wonderful. I'll give your office a call in a few minutes, and I'll be in my office most of the day today. Tomorrow I'll be in most of the day, except gone for a longish lunch meeting.

Table 1: Perfluoroalkyl Ether Carboxylic Acids (PFECAs) Reported in Cape Fear River & Drinking Water by Sun et al 2016.

Abbreviation	Chemical Name	CAS
*PFPrOPrA	Perfluoro-2-propoxypropanoic acid	13252-13-6, 62037-80-3
PFMOAA	Perfluoro-2-methoxyacetic acid	674-13-5
PFMOPrA	Perfluoro-3-methoxypropanoic acid	377-73-1

PFMOBA	Perfluoro-4-methoxybutanoic acid	863090-89-5
PFO2HxA	Perfluoro-(3,5-dioxahexanoic) acid	39492-88-1
PFO3OA	Perfluoro-(3,5,7-trioxaoctanoic) acid	39492-89-2
PFO4DA	Perfluoro-(3,5,7,9-tetraoxadecanoic) acid	39492-90-5
*PFPrOPrA has been referred to as GenX Sun et al. Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina. Environmental Science & Technology Letters. Nov 2016. DOI: 10.1021/acs.estlett.6b00398.		

Best,
Amy

Amy Risen, PhD
Environmental Toxicologist
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

(919) 707-5911 office
(919) 870-4807 fax
Amy.Risen@dhhs.nc.gov

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Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: RE: EPA Contact about PFECAs

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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: Shehee, Mina
Sent: Wednesday, August 09, 2017 12:19 PM
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Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: EPA Contact about PFECAs
Importance: High

Linda,
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Thanks,
Mina

Mina Shehee, PhD
Branch Head
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Grzyb, Julie[julie.grzyb@ncdenr.gov]; Mort, Sandra L[sandy.mort@ncdenr.gov]
From: Woosley, Julie
Sent: Thur 9/14/2017 4:11:54 PM
Subject: RE: Updated PFAS analytical pricing from GEL Labs, Charleston SC
Chemours Data_DWM August 2017_lg.format (002).xlsx

Attached is the GEL lab GW samples data. 11 different compounds were detected, but no others were at the same magnitude as GenX.

Thank you,
Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

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From: Culpepper, Linda
Sent: Thursday, September 14, 2017 11:58 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Grzyb, Julie <julie.grzyb@ncdenr.gov>; Woosley, Julie <julie.woosley@ncdenr.gov>; Mort, Sandra L <sandy.mort@ncdenr.gov>
Subject: FW: Updated PFAS analytical pricing from GEL Labs, Charleston SC

Forwarding the items we discussed:

- GEL Labs info. on their capabilities
- Superior Court partial order
- SGS contact:

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

Will forward the GEL Lab analysis from the Hazardous Waste Section (Julie Woosley, Section Chief and Sandy Mort, Toxicologist).

We will keep in touch with you and Andy on the schedule for the Chemours process area sampling event for next week (Julie Grzyb, NPDES Branch Head and Trent Allen, Fayetteville Regional Office Supervisor).

Appreciated your time on the call today.
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: Mort, Sandra L
Sent: Tuesday, September 12, 2017 11:45 AM
To: Woosley, Julie <julie.woosley@ncdenr.gov>; Scott, Michael <michael.scott@ncdenr.gov>
Cc: Culpepper, Linda <linda.culpepper@ncdenr.gov>; Cooper, Harvi <harvi.cooper@ncdenr.gov>; Ghiold, Joe <joe.ghiold@ncdenr.gov>; Mccarty, Bud <bud.mccarty@ncdenr.gov>
Subject: Updated PFAS analytical pricing from GEL Labs, Charleston SC

GEL will do the following PFAS suite (a total of 34 PFAS analytes) for $500 per sample on water matrices (standard turn-around-time):

Method 537 PFAS Target Analyte list (#14 PFAS)
GEL's standard additional 10 PFAS included with their Method 537
GenX
Nafion* + 2 Nafion byproducts** identified by EPA-NERL
6 non-target PFECAs*** identified by EPA-NERL in Figure 2b. of the Sun et al (2016) paper (the D. Knappe research group, NCSU)

* GEL has located a Nafion calibration standard
** The 2 Nafion byproducts will be provided as estimated concentrations using the USEPA NERL lab method for PFECA estimated concentrations based on related PFAS peak height
*** GEL has located calibration standards for 2 of the 6 "additional PFECAs". These are coming from a Florida supplier. Quantified concentrations will be provided for these 2 PFECAs if the samples analyses can be completed within the required method sample holding times.

I will forward a copy of the hardcopy quote when I receive it (today or tomorrow).
Sandy

Sandy Mort, Ph.D., M.S.
Environmental Toxicologist / Risk Assessor
Division of Waste Management – Hazardous Waste & Brownfields
NC Department of Environmental Quality

(919) 707-8217 - Direct Line & Fax
sandy.mort@ncdenr.gov

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Raleigh, NC 27699-1646

Nothing Compares

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Chemours Groundwater, Surface Water and Outfall Sample Data Summary PRELIMINARY DRAFT DATA

Samples Collected August 2017

GEL Laboratory Results

PFAS code			**PFPrOPrA (GenX)**	4:2 FTS	6:2 FTS	8:2 FTS	NEtFOSAA	NMeFOSAA	PFBS	PFBA
PFAS chemical name			2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	Fluorotelomer sulfonate 4:2 (4:2 FTS)	Fluorotelomer sulfonate 6:2 (6:2 FTS) (THPFOS)	Fluorotelomer sulfonate 8:2 (8:2 FTS)	N-ethylperfluoro-1-octanesulfonamido-acetic acid	N-methylperfluoro-1-octanesulfonamido-acetic acid	Perfluoro butanesulfonate (PFBS)	Perfluorobutyric acid (PFBA)
Carbon-chain length			6	6	8	10	12	11	4	4
Chemical formula			C6HF11O3	C6H5F9O3S	C8H5F13O3S	C10H5F17O3S	C12H8F17NO4S	C11H8F17NO4S	C4HF9O3S	C4HF7O2
PFAS class			PFECA	FTS	FTS	FTS	other	other	PFSA	PFCA
CASN			13252-13-6	757124-72-4	27619-97-2	39108-34-4	2991-50-6	2355-31-9	375-73-5	375-22-4
NC DHHS GenX Drinking Water Health Goal, ng/L			140							
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L										
NC DEQ IMAC (12/5/06), PFOA, ng/L										
Sample ID	Date Collected	Screened Well Interval (feet)								
Groundwater Samples			ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Insitu-1	08/01/17	7.0 - 17.0	**519**	<1.65	<1.67	<3.37	<3.51	<3.51	0.703 J	7.16
LTW-01	08/03/17	11.0 - 26.0	**37000**	<16.8	<16.9	<34.2	<35.7	<35.7	<15.9	260
LTW-01-D, Duplicate	08/03/17	11.0 - 26.0	**36200**	<16.0	<16.2	<32.7	<34.0	<34.0	<15.1	267
LTW-02	08/02/17	28.0 - 38.0	**11000**	<8.32	<8.40	<17.0	<17.7	<17.7	<7.87	88.9
LTW-03	08/01/17	15.0 - 30.0	**12500**	<7.82	<7.91	<16.0	<16.6	<16.6	<7.41	333
LTW-04	08/03/17	12.0 - 27.0	**24500**	<17.1	<17.3	<34.9	<36.3	<36.3	<16.2	481
LTW-05	08/02/17	29.0 - 44.0	**61300**	<31.4	<31.8	<64.2	<66.9	<66.9	<29.8	545
MW-1S	08/03/17	21.0 - 24.0	**12900**	<16.3	<16.5	<33.4	<34.8	<34.8	<15.5	161
SMW-0-05P	08/04/17	45.0 - 60.0	**21700**	<16.4	<16.6	<33.5	<34.9	<34.9	5.79 J	93.3
SMW-01	08/01/17	5.0 - 15.0	**2620**	<7.67	<7.75	<15.7	<16.3	<16.3	<7.26	20.1
SMW-06 B	08/04/17	58 - 68	**39500**	<16.1	<16.3	<33.0	<34.4	<34.4	<15.3	593 J
SMW-09	08/03/17	52 - 62	**22900**	<16.7	<16.9	<34.2	<35.6	<35.6	<15.8	580
SMW-10	08/04/17	39 - 49	<1.77	<1.67	<1.68	<3.40	<3.54	<3.54	<1.58	<1.77
SMW-11	08/03/17	13 - 23	**4270**	<17.4	<17.6	<35.5	<37.0	<37.0	<16.4	37.3
SMW-12	08/02/17	88 - 98	**1600**	<1.59	1.85	<3.24	<3.38	<3.38	<1.50	20.3
Surface Water Intake			ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	NA	7.41	<1.63	1.82	<3.32	<3.46	<3.46	5.08	10.8
Facility Outfall			ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	NA	132	<1.53	2.37	<3.13	<3.26	<3.26	5.23	30.1

Notes:
Bold and shaded values exceed the available drinking water NCDHHS Health Goal (GenX) or USEPA Health Advisory Level (PFOA, PFOS, PFOA+PFOS)

GenX = PFPrOPrA; CASN 13252-13-6; 2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)

CASN = Chemical Abstract Number J = estimated concentration

Chemours Groundwater, Surface Water and Outfall Sample Data Summary

Samples Collected August 2017

GEL Laboratory Results

PFAS code		PFDS	PFDA	PFDoA	PFHpS	PFHpA
PFAS chemical name		Perfluorodecane-sulfonate (PFDS)	Perfluorodec-anoic acid (PFDA)	Perfluorododec-anoic acid (PFDoA)	Perfluoroheptane-sulfonate (PFHpS)	Perfluoroheptanoic acid (PFHpA)
Carbon-chain length		10	10	12	7	7
Chemical formula		C10HF21O3S	C10GF19O2	C12HF23O2	C7HF15O3S	C7HF13O2
PFAS class		PFSA	PFCA	PFCA	PFSA	PFCA
CASN		335-77-3	335-76-2	307-55-1	375-92-8	375-85-9
NC DHHS GenX Drinking Water Health Goal, ng/L						
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L						
NC DEQ IMAC (12/6/06), PFOA, ng/L						
Sample ID	Date Collected					
Groundwater Samples		ng/L	ng/L	ng/L	ng/L	ng/L
Insitu-1	08/01/17	<1.70	<1.76	<1.76	<1.67	0.704 J
LTW-01	08/03/17	<17.3	<17.8	<17.8	<16.9	59.6
LTW-01-D, Duplicate	08/03/17	<16.5	<17.0	<17.0	<16.2	55.5
LTW-02	08/02/17	<8.58	<8.85	<8.85	<8.40	13.4
LTW-03	08/01/17	<8.07	<8.32	<8.32	<7.91	16.7
LTW-04	08/03/17	<17.6	<18.2	<18.2	<17.3	74.5
LTW-05	08/02/17	<32.5	<33.5	<33.5	<31.8	567
MW-1S	08/03/17	<16.9	<17.4	<17.4	<16.5	58.2
SMW-0-05P	08/04/17	<16.9	<17.4	<17.4	<16.6	105
SMW-01	08/01/17	<7.92	<8.16	<8.16	<7.75	11.5
SMW-06 B	08/04/17	<16.7	<17.2	<17.2	<16.3	214
SMW-09	08/03/17	<17.3	<17.8	<17.8	<16.9	78.0
SMW-10	08/04/17	<1.72	<1.77	<1.77	<1.68	<1.77
SMW-11	08/03/17	<17.9	<18.5	<18.5	<17.6	11.1 J
SMW-12	08/02/17	<1.64	<1.69	<1.69	<1.61	<1.69
Surface Water Intake		ng/L	ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	<1.68	2.40	<1.73	0.714 J	18.3
Facility Outfall		ng/L	ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	<1.58	2.45	<1.63	0.691 J	17.8

Chemours Groundwater, Surface Water and Outfall Sample Data Summary

Samples Collected August 2017

GEL Laboratory Results

PFAS code		PFHxS	PFHxA	PFNS	PFNA
PFAS chemical name		Perfluorohexane sulfonate (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorononane-sulfonate (PFNS)	Perfluorononanoic acid (PFNA)
Carbon-chain length		6	6	9	9
Chemical formula		C6HF13O3S	C6HF11O2	C9HF19O3S	C9HF17O2
PFAS class		PFSA	PFCA	PFSA	PFCA
CASN		355-46-4	307-24-4	68259-12-1	375-95-1
NC DHHS GenX Drinking Water Health Goal, ng/L					
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L					
NC DEQ IMAC (12/6/06), PFOA, ng/L					
Sample ID	Date Collected				
Groundwater Samples		ng/L	ng/L	ng/L	ng/L
Insitu-1	08/01/17	0.709 J	2.35	<1.69	<1.76
LTW-01	08/03/17	13.0 J	31.1	<17.1	<17.8
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LTW-02	08/02/17	<8.05	10.0	<8.49	<8.85
LTW-03	08/01/17	<7.57	14.5	<7.99	<8.32
LTW-04	08/03/17	<16.5	42.8	<17.4	<18.2
LTW-05	08/02/17	<30.4	174	<32.1	<33.5
MW-1S	08/03/17	<15.8	26.2	<16.7	35.3
SMW-0-05P	08/04/17	8.86 J	74.9	<16.7	<17.4
SMW-01	08/01/17	2.75 J	7.98 J	<7.83	<8.16
SMW-06 B	08/04/17	<15.8	121	<16.5	<17.2
SMW-09	08/03/17	17.3	95.5	<17.1	<17.8
SMW-10	08/04/17	<1.61	<1.77	<1.70	<1.77
SMW-11	08/03/17	<16.8	10.3 J	<17.7	<18.5
SMW-12	08/02/17	<1.54	1.32 J	<1.62	<1.69
Surface Water Intake		ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	9.2	25.7	<1.66	3.23
Facility Outfall		ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	8.94	25.9	<1.56	3.07

Chemours Groundwater, Surface Water and Outfall Sample Data Summary

Samples Collected August 2017

GEL Laboratory Results

PFAS code		PFOSA	PFOS	PFOA	**PFOS + PFOA**
PFAS chemical name		Perfluorooctane-sulfonamide (PFOSA)	Perfluorooctane-sulfonate (PFOS)	Perfluorooctanoic acid (PFOA)	Calculated sum (NC DWM)
Carbon-chain length		8	8	8	
Chemical formula		C8H2F17NO2S	C8HF1703S	C8HF15O2	
PFAS class		PFOSA	PFSA	PFCA	
CASN		754-91-6	1763-23-1	335-67-1	
NC DHHS GenX Drinking Water Health Goal, ng/L					
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L			70 ng/L	70 ng/L	70 ng/L as Σ(PFOS + PFOA)
NC DEQ IMAC (12/6/06), PFOA, ng/L				2000 ng/L	
Sample ID	Date Collected				
Groundwater Samples		ng/L	ng/L	ng/L	ng/L
Insitu-1	08/01/17	<1.63	<1.76	1.46 J	
LTW-01	08/03/17	<16.6	28.5	**96.2**	**125**
LTW-01-D, Duplicate	08/03/17	<15.8	30.7	**94.3**	**125**
LTW-02	08/02/17	<8.23	<8.85	<8.85	
LTW-03	08/01/17	<7.74	<8.32	<8.32	
LTW-04	08/03/17	<16.9	<18.2	<18.2	
LTW-05	08/02/17	<31.1	<33.5	<33.5	
MW-1S	08/03/17	<16.2	11.0 J	**101**	**112 J**
SMW-0-05P	08/04/17	<16.2	<17.4	**2050**	**2050**
SMW-01	08/01/17	<7.59	4.42 J	19.1	23.5 J
SMW-06 B	08/04/17	<16	<17.2	**3750**	**3750**
SMW-09	08/03/17	<16.6	<17.8	61.7	61.7
SMW-10	08/04/17	<1.65	<1.77	<1.77	
SMW-11	08/03/17	<17.2	<18.5	40.3	
SMW-12	08/02/17	<1.57	<1.69	0.837 J	
Surface Water Intake		ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	<1.61	19.9	14.1	
Facility Outfall		ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	<1.51	21.2	14.8	

Chemours Groundwater, Surface Water and Outfall Sample Data Summary

Samples Collected August 2017

GEL Laboratory Results

PFAS code		PFPeS	PFPeA	PFTeDA	PFTrDA	PFUdA
PFAS chemical name		Perfluoropentane-sulfonate (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluoro-tetradecanoic acid (PFTeDA)	Perfluoro-tridecanoic acid (PFTrDA)	Perfluoro-undecanoic acid (PFUdA)
Carbon-chain length		5	5	14	13	11
Chemical formula		C5HF11O3S	C5HF9O2	C14HF27O2	C13HF25O2	C11HF21O2
PFAS class		PFSA	PFCA	PFCA	PFCA	PFCA
CASN		2706-91-4	2706-90-3	376-06-7	72629-94-8	2058-94-8
NC DHHS GenX Drinking Water Health Goal, ng/L						
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L						
NC DEQ IMAC (12/6/06), PFOA, ng/L						
Sample ID	Date Collected					
Groundwater Samples		ng/L	ng/L	ng/L	ng/L	ng/L
Insitu-1	08/01/17	<1.65	10.1	<1.76	<1.76	<1.76
LTW-01	08/03/17	<16.8	306	<17.8	<17.8	<17.8
LTW-01-D, Duplicate	08/03/17	<16.0	315	<17.0	<17.0	<17.0
LTW-02	08/02/17	<8.32	342	<8.85	<8.85	<8.85
LTW-03	08/01/17	<7.82	1560	<8.32	<8.32	<8.32
LTW-04	08/03/17	<17.1	1760	<18.2	<18.2	<18.2
LTW-05	08/02/17	<31.4	4690 J	<33.5	<33.5	<33.5
MW-1S	08/03/17	<16.3	353	<17.4	<17.4	<17.4
SMW-0-05P	08/04/17	<16.4	313	<17.4	<17.4	<17.4
SMW-01	08/01/17	<7.67	26.2	<8.16	<8.16	<8.16
SMW-06 B	08/04/17	<16.1	2390	<17.2	<17.2	<17.2
SMW-09	08/03/17	<16.7	329	<17.8	<17.8	<17.8
SMW-10	08/04/17	<1.67	<1.77	<1.77	<1.77	<1.77
SMW-11	08/03/17	<17.4	41.1	<18.5	<18.5	<18.5
SMW-12	08/02/17	<1.59	38.2	<1.69	<1.69	<1.69
Surface Water Intake		ng/L	ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	1.34 J	27.4	<1.73	<1.73	<1.73
Facility Outfall		ng/L	ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	1.29 J	29.7	<1.63	<1.63	0.616 J

Chemours Surface Water and Outfall Sample Data Summary PRELIMINARY DRAFT DATA

Samples Collected August 2017

GEL Laboratory Results

PFAS code		**PFPrOPrA (GenX)**	4:2 FTS	6:2 FTS	8:2 FTS	NEtFOSAA	NMeFOSAA	PFBS	PFBA	PFDS	PFDA	PFDoA	PFHpS	PFHpA	PFHxS	PFHxA	PFNS	PFNA	PFOSA	PFOS	PFOA	**PFOS + PFOA**	PFPeS	PFPeA	PFTeDA	PFTrDA	PFUdA
PFAS chemical name		2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)-propanoic acid (PFPrOPrA)	Fluorotelomer sulfonate 4:2 (4:2 FTS)	Fluorotelomer sulfonate 6:2 (6:2 FTS)	Fluorotelomer sulfonate 8:2 (8:2 FTS)	N-ethylperfluoro-1-octanesulfonamido-acetic acid	N-methylperfluoro-1-octanesulfonamido-acetic acid	Perfluorobutanesulfonate (PFBS)	Perfluorobutyric acid (PFBA)	Perfluorodecane-sulfonate (PFDS)	Perfluorodecanoic acid (PFDA)	Perfluorododecanoic acid (PFDoA)	Perfluoroheptane-sulfonate (PFHpS)	Perfluoroheptanoic acid (PFHpA)	Perfluorohexane-sulfonate (PFHxS)	Perfluorohexanoic acid (PFHxA)	Perfluorononane-sulfonate (PFNS)	Perfluorononanoic acid (PFNA)	Perfluorooctane-sulfonamide (PFOSA)	Perfluorooctane-sulfonate (PFOS)	Perfluorooctanoic acid (PFOA)	Calculated sum (NC DWM)	Perfluoropentane-sulfonate (PFPeS)	Perfluoropentanoic acid (PFPeA)	Perfluoro-tetradecanoic acid (PFTeDA)	Perfluoro-tridecanoic acid (PFTrDA)	Perfluoro-undecanoic acid (PFUdA)
Carbon-chain length		6	6	8	10	12	11	4	4	10	10	12	7	7	6	6	9	9	8	8	8		5	5	14	13	11
Chemical formula		C6HF11O3	C6H5F9O3S	C8H5F13O3S	C10H5F17O3S	C12H8F17NO4S	C11H6F17NO4S	C4HF9O3S	C4HF7O2	C10HF21O3S	C10OF19O2	C12HF23O2	C7HF15O3S	C7HF13O2	C6HF13O3S	C6HF11O2	C9HF19O3S	C9HF17O2	C8H3F17NO2S	C8HF17O3S	C8HF15O2		C5HF11O3S	C5HF9O2	C14HF27O2	C13HF25O2	C11HF21O2
PFAS class		PFECA	FTS	FTS	FTS	other	other	PFSA	PFCA	PFSA	PFCA	PFCA	PFSA	PFCA	PFSA	PFCA	PFSA	PFCA	PFOSA	PFSA	PFCA		PFSA	PFCA	PFCA	PFCA	PFCA
CASN		13252-13-6	757124-72-4	27619-97-2	39108-34-4	2991-50-6	2355-31-9	375-73-5	375-22-4	335-77-3	335-76-2	307-55-1	375-92-8	375-85-9	355-46-4	307-24-4	68259-12-1	375-95-1	754-91-6	1763-23-1	335-67-1		2706-91-4	2706-90-3	376-06-7	72629-94-8	2058-94-8
NC DHHS GenX Drinking Water Health Goal, ng/L		140																									
USEPA Drinking Water Health Advisory (PFOS + PFOA), ng/L																				70 ng/L	70 ng/L	70 ng/L as Σ(PFOS + PFOA)					
NC DEQ IMAC (12/6/06), PFOA, ng/L																					2000 ng/L						
Sample ID:	Date Collected																										
Surface Water Intake		ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Intake	08/01/17	7.41	<1.63	1.82	<3.32	<3.46	<3.46	5.08	10.8	<1.68	2.40	<1.73	0.714 J	18.3	9.2	25.7	<1.68	3.23	<1.61	19.9	14.1	34	1.34 J	27.4	<1.73	<1.73	<1.73
Facility Outfall		ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Outfall	08/01/17	132	<1.53	2.37	<3.13	<3.26	<3.26	5.23	30.1	<1.58	2.45	<1.63	0.691 J	17.8	8.94	25.9	<1.56	3.07	<1.51	21.2	14.6	36	1.29 J	29.7	<1.63	<1.63	0.616 J

To: Crofton, Kevin[Crofton.Kevin@epa.gov]; Houck, Keith[Houck.Keith@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; amy.risen@dhhs.nc.gov[amy.risen@dhhs.nc.gov]; Koporec, Kevin[Koporec.Kevin@epa.gov]; Thomas, Brett[Thomas.Brett@epa.gov]
Cc: Guiseppi-Elie, Annette[Guiseppi-Elie.Annette@epa.gov]; Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]
From: Gillespie, Andrew
Sent: Thur 9/21/2017 8:22:14 PM
Subject: outline of study plan - bioassay tests on cape fear river samples containing PFCs
Study Plan Outline.docx
NCDEQ Cape Fear Water Samples.xlsx

Colleagues - attached is a summary and first rough cut plan for a potential bioassay study using the concentrated water samples from the cape fear river collected by DEQ and analyzed by EPA/NERL.

The spreadsheet is a summary of available samples, with a little bit of available concentration data for two sites.

Please look it over and send me any comments, corrections, revisions, etc.

In particular, from NCCT it would be good to know if this is enough information to propose how many and which samples to use for the bioassay work, or if more information or discussion is needed.

Thanks, Andy

Andrew J. R. Gillespie, Ph. D.
Associate Director
US EPA/ORD/NERL

Available samples from PFC study 9/21/2017

Note - samples are in methanol, not sure how to convert concentrations in water (reported below for a few site

					Estimated Water Sample Concentratio	
Date	**Week**	**Sample ID**	**Location**	**Approx. Volume ml**	**PFMOAA**	**PFO2Hx**
6/29/2017	1	DWR Sample 1	Chemours Outfall	0.5		
6/29/2017	1	DWR Sample 2	Balden Bluff Raw Water	0.1		
6/29/2017	1	NEQ Sample 1	LCFWSA Raw Water	0.5		
6/29/2017	1	NEQ Sample 2	Sweeny Finished Water	0.5		
6/29/2017	1	NEQ Sample 3	ASH Well	0.1		
6/29/2017	1	NEQ Sample 4	Wrightsville Beach Well #11	0.5		
6/29/2017	1	NEQ Sample 5	International Paper Raw	0.5		
6/29/2017	1	NEQ Sample 6	International Paper Finished	0		
6/29/2017	1	NEQ Sample 7	N.W Brunswick WTP Finished Wate	0.5		
6/29/2017	1	NEQ Sample 8	Pender WTP Finished	0.05		
6/29/2017	1	EPA 5-15-17	Chemours Upstream	0.5		
6/29/2017	1	EPA-5-15-17	Chemours Outfall	0.5		
6/29/2017	1	DWR 20X Dilu	Chemour Outfall 002	0.5	134,000	383,000
6/29/2017	1	DWR 2 5x Dilu	Bladen Bluffs	0.5		
6/29/2017	1	NC DEQ 1 5x Dilu	LCFWSA RAW	0.5		
6/29/2017	1	NCDEQ 2 5x Dilu	Sweeny Finished Water	0.5	11,300	8,880
6/29/2017	1	NC DEQ 3 5x Dilu	ASR Well	0.5		
6/29/2017	1	NC DEQ 5 5x Dilu	International Paper Raw	0.5		
6/29/2017	1	NC DEQ 6 5x Dilu	International Paper Finished Water	0.5		
6/29/2017	1	NC DEQ 7 5x Dilu	N.W Brunswick WTP Finished Wate	0.5		
6/29/2017	1	NC DEQ 8 5x Dilu	Pender WTP Finished	0.5		
7/3/2017	2	NC DEQ 2	Sweeny Finished	0.5	10,500	7,290
7/3/2017	2	DWR #2	Bladen Bluff Raw Water	0.5		
7/3/2017	2	NC DEQ 1	LCFWSA RAW	0.5		
7/3/2017	2	NC DEQ 3	ASH Well	0.5		
7/3/2017	2	NC DEQ 4	Wrightsville Beach Weell #11	0.5		
7/3/2017	2	NC DEQ 5	International Paper Water	0.5		
7/3/2017	2	NC DEQ 6	International Paper Finished Water	0.5		
7/3/2017	2	NC DEQ 7	N.W Brunswick WTP Finished	1		
7/3/2017	2	NC DEQ 8	Pender WTP Finished	1		
7/3/2017	2	DWR# 1	Chemours Outfall 002	0.5	68,300	130,000
7/3/2017	2	NCDEQ #3 2x Dilu I	ASW well #11	0.5		
7/3/2017	2	Redo 7-15-17 20x D	Chemour Outfall 002	0.5		
7/6/2017	3	DEQ 1	DEQ #1	0.25		
7/6/2017	3	DWR 1 20 X Dilu	Chemours Outfall	1	25,800	23,600

7/6/2017	3	DEQ 2	Bladen Bluff Raw	0.05		
7/6/2017	3	DEQ 3	PO Hoffer Raw	0.5		
7/6/2017	3	DEQ 1	LCFWSA RAW	0.25		
7/6/2017	3	DEQ 2	Sweeny Finshed	0		
7/6/2017	3	DEQ 3	ASR Well	0.5		
7/6/2017	3	DEQ 4	WB Well	0.5		
7/6/2017	3	DEQ 5 #1	IP - Raw	0.5		
7/6/2017	3	DEQ 5 #2	IP Raw 2	0.05		
7/6/2017	3	DEQ 6	IP Finished	0.5		
7/6/2017	3	DEQ 7	Brunswick	0.5		
7/6/2017	3	DEQ	Pender WTP	0.5		
7/17/2017	4	DWR 1	Chemours Outfall	0.05		
7/17/2017	4	DWR 2	Bladen Bluffs Raw	0		
7/17/2017	4	DWR	PO Huffer WTP Raw	0.5		
7/17/2017	4	1	LCFWSA- RAW REP 1	1		
7/17/2017	4	1	LCFWSA- RAW REP 2	0.25		
7/17/2017	4	2	Sweeny Finished	0.5	312	798
7/17/2017	4	3	ASR Well	0.25		
7/17/2017	4	4	WB Well #1	0.5		
7/17/2017	4	5	IP Raw	0.5		
7/17/2017	4	6	IP Finished	0.5		
7/17/2017	4	7	NW Brunswick	0.5		
7/17/2017	4	8	Pender 421 WTP Finished	0.5		
7/17/2017	4	5x Dilu	Chemours Outfall	0		
7/17/2017	4	20x Dilu	Chemours Outfall	0.5		
7/17/2017	4	5x Dilu	Chemours Outfall	0.5		
7/21/2017	5	DWR 1	PO Hoffer	0.5		
7/21/2017	5	DWR 2	Chemours Oufall	0.5	1,390	910
7/21/2017	5	DWR 3	Balden Bluffs Raw	0.5		
7/21/2017	5	DWR 4	Bladen Bluffs Finished	0.5		
7/21/2017	5	DWR 5	Smithfiedl Field Well	0.5		
7/21/2017	5	1	LCSFWSA	0.25		
7/21/2017	5	3	ASR Well	0.5		
7/21/2017	5	4	WB Well	0.5		
7/21/2017	5	5	IP Raw	0.5		
7/21/2017	5	6	IP Finised	0.5		
7/21/2017	5	7	NW Brunswick	0.5		
7/21/2017	5	8	Pender WTP Finished	0.5		
7/21/2017	5	9	WB Well #6	0.5		
7/21/2017	5	2	Sweeny WTP	0.5	37	1,100
7/21/2017	5	20X	Outfall	0.5		
7/31/2017	6	DWR 1	Hoffer Raw	0.5		

7/31/2017	6	DWR 2	Bladen Bluffs Rep 1	0.5		
7/31/2017	6	DWR 2	Bladen Bluffs Rep 2	0.5		
7/31/2017	6	DWR 3	Balden Bluff Finished	0.5		
7/31/2017	6	DWR 4	Smithfield	1		
7/31/2017	6	NCDEQ 1	LCFWSA Raw	0.5		
7/31/2017	6	NCDEQ 2	Sweeny Finished	0.5	21	1,170
7/31/2017	6	NCDEQ 3	ASR Well	0.5		
7/31/2017	6	NCDEQ 4	WB Well #1	0.5		
7/31/2017	6	NCDEQ 5	IP Raw	0.5		
7/31/2017	6	NCDEQ 6	IP Finished	0.5		
7/31/2017	6	NCDEQ 7	NW Nunswich Finished	0.5		
7/31/2017	6	NCDEQ 8	Pender 421 Finished	0.5		
7/31/2017	6	NCDEQ 9	WB Well #6	0.5		
7/31/2017	6	NCDEQ 10	CB Well #8	0.5		
7/31/2017	6	NCDEQ 11	CB Well#13	0.5		
7/31/2017	6		Outfall 24	0.5		
7/31/2017	6	Rep 1	Outfall 25	0.5		
7/31/2017	6	Rep 2	Outfall 25	0.5		
7/31/2017	6		Outfall 26	0.5		
7/31/2017	6		Outfall 27	0.5		
7/31/2017	6		Outfall 28	0.5		
8/8/2017	7	2	Sweeney WTP Finished	0.5		
8/8/2017	7	6	I P Finished	0.5		
8/8/2017	7	7	Brunswick WTP Finished	0.5		
8/8/2017	7	8	Pender 421 WTP Finished	0.5		
8/8/2017	7	7/31/2017	Pender 421 WTP Finished	0.5		
8/8/2017	7	7/31/2017	Chemour Outfall 002 7-31-17	0.5		
8/8/2017	7		Balden Bluff Finished Water	0.5		
8/8/2017	7	8/1/2017	Chemour 3 Outfall	0.5		
8/8/2017	7	8/2/2017	Chemour 5 Outfall 002	0.5		
8/8/2017	7	8/3/2017	Chemour Outfall 002	0.5		
8/8/2017	7	8/4/2017	Chemour Outfall 002	0.5		

Data from intensive sampling at Chemours plant

8/3/2017	NCDEQ Chemours FLtW-03 Hs PPT	0.5
8/3/2017	NCDEQ Chemours FG W 0817 Outfall	0.5
8/3/2017	NCDEQ Chemours FG W 0817 Intake	0.5
8/3/2017	NCDEQ Chemours FSMW -01 Has PPT	0.5
8/3/2017	NCDEQ Chemours FINSITO-1 Has PPT	0.5
8/3/2017	NCDEQ Chemours FLTW-02 Has PPT	0.5
8/3/2017	NCDEQ Chemours FSMW-12 Has PPT	0.5
8/3/2017	NCDEQ Chemours FLW-05 Has PPT	0.25

8/3/2017	NCDEQ Chemours FLTW-04 Has PPT	0.25
8/3/2017	NCDEQ Chemours FLTW-01 Has PPT	0.5
8/3/2017	NCDEQ Chemours FLTW-010 Has PPT	0.5
8/3/2017	NCDEQ Chemours FLTW-01-MS Has PPT	0.5
8/3/2017	NCDEQ Chemours FLTW-01 MSD Has PPT	0.5
8/3/2017	NCDEQ Chemours FSMW -11	0.5
8/3/2017	NCDEQ Chemours FSMW -09 PPT	0.5
8/3/2017	NCDEQ Chemours FEB-3	0.5
8/3/2017	NCDEQ Chemours FSMW-10 Has PPT	0.5
8/3/2017	NCDEQ Chemours FSMW-0-0 SP Has PPT	0.5
8/3/2017	NCDEQ Chemours FSMW-0-0 6B Has PPT	0.5
8/3/2017	NCDEQ Chemours FLTW 03	0.5
8/3/2017	NCDEQ Chemours FSMW 01	0.5
8/3/2017	NCDEQ Chemours FLTW02	0.5
8/3/2017	NCDEQ Chemours FSMW 12	0.5
8/3/2017	NCDEQ Chemours FLTW 05	1
8/3/2017	NCDEQ Chemours FLTW 09	1
8/3/2017	NCDEQ Chemours FLTW 01	0
8/3/2017	NCDEQ Chemours FLTW 01 D	0.5
8/3/2017	NCDEQ Chemours FLTW 01 MS	0.5
8/3/2017	NCDEQ Chemours FLTW 01 MSD	0.5
8/3/2017	NCDEQ Chemours FSMW-11	0.1
8/3/2017	NCDEQ Chemours FSMW-01	4
8/3/2017	NCDEQ Chemours FSMWOSP	0.5
8/3/2017	NCDEQ Chemours FSMW06B	1

s) into concentrations in methanol....

g/l (from August 31 report to NC DEQ)						
timated Water Sample Concentrations, ng/l (from August 31 report to NC DEQ)						
PFO3OA	**GenX**	**Total PFECAs**	**PFESA 1**	**PFEAS 2**	**Total PFESA**	**Total PFC**
109,000	21,800	**647,800**	2,900	29,500	**32,400**	**680,200**
		-			-	-
		-			-	-
3,130	726	**24,036**	53	1,640	**1,693**	**25,729**
		-			-	-
		-			-	-
		-			-	-
		-			-	-
		-			-	-
		-			-	-
2,480	100	**20,370**	143	4,320	**4,463**	**24,833**
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		-			-	-
		-			-	-
		-			-	-
		-			-	-
		-			-	-
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34,900	15,300	**248,500**	3,460	24,200	**27,660**	**276,160**
		-			-	-
		-			-	-
		-			-	-
		-			-	-
3,540	21,500	**74,440**	13,100	39,600	**52,700**	**127,140**

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641	81	**1,832**	120	2,360	**2,480**	**4,312**
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		-			-	-
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702	95	**1,934**	158	7,860	**8,018**	**9,952**
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778	70	**2,039**	72	4,670	**4,742**	**6,781**
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Study Plan Outline
Bioassays of Cape Fear River Water Samples – Testing Toxicity of PFAS Mixture

Goal – use high throughput bioassay tools for assessing toxicity of a water extract containing of a mixture of Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Perfluoroalkyl Ether Sulfonic Acids (PFESAs) sampled from the Cape Fear River, North Carolina.

Players and Roles in Designing and Conducting the Study

1. NERL (Tim Buckley, Mark Strynar, Andy Gillespie) – provide samples, contribute to study design, interpretation of results
2. NCCT (Kevin Crofton, Keith Houck) – Contribute to study design, conduct bioassay, report results, interpretation of results
3. Region 4 (Kevin Koporec, Brett Thomas) Contribute to study design, contribute to analysis and interpretation, communication of results
4. NC DEQ (Amy Risen) – Contribute to study design, contribute to analysis and interpretation, communication of results

Background:

- Chemical mixture in the samples includes varying quantities of
    - 4 PFECAs (GenX, PFMOAA, PFO2HxA, PFO3OA)
    - 2 unknown PFESAs (Nafion Byproduct1 and 2)

- Sampling took place at ~11 different locations along the Cape Fear river. Some locations had multiple sources (e.g. raw water vs finished water at DW treatment plants, duplicates at a few locations). See Figure 1 for approximate sample locations. Sample sites included

    - Upstream from the source, with presumably no contamination from the source
    - At the source (chemical plant outfall into the river)
    - At several locations downstream of the source
    - In DW plant source water as well as finished (treated) drinking water which used the river as source water

- Sampling started around 6/19/2017 and was repeated ~weekly for ~7 weeks. However not all locations were sampled in all weeks. See spreadsheet 'NCDEQ Cape Fear Water Samples.xls' for availability of sample by location by week, as well as some estimates of the concentrations by analytes for two locations.

- Samples have been analyzed and characterized through non targeted analytical chemistry (Mark Strynar/NERL). Non targeted analysis uses high resolution mass spectrometry to predict chemical constituents in the samples.
    - GenX is a known chemical, with standards available, so concentrations can be quantified – sample concentrations ranged over the 6 weeks of sampling from 21,760-102 ng/L a the Chemours outfall, and 726-70 ng/L range in finished drinking water at the Sweeney water treatment facility
    - The other analytes do not have standards available, so estimated concentrations are semi-quantitative and are expressed relative to GenX concentration based on integrated peak area from the chromatogram. Concentrations ranged over the 6 weeks of sampling from 383,000 to 86

ng/L at the Chemours outfall, and 11,300 to 21 ng/L in finished drinking water at the Sweeney water treatment facility

- The total concentration as well as the mixture of analytes changes over time, probably as a result of (1) Chemours attempting to respond to NC DEQ requests to reduce outflows of Gen X, and (2) other Chemours plant operational decisions relating to their commercial production.
    - Chemours reduced the outflow of GenX and the 3 PFECAs during this sampling period, after sample week 2 or 3, so the concentration of these chemicals declines over time for the downstream sites
    - No evidence to suggest that the plant reduced the PFESA Nafion byproducts over the measurement period, no trend in reduction in the byproducts over the sample period
    - Thus the total (PFECA plus PFESA) mixture concentration is highest at the start of the sampling sequence; the concentration of Gen X and PFECAs declines after ~ week 3, but the concentration of PFESAs is variable so the overall mixture changes in composition each week.

Questions of interest (in order?)

1. What is the bioassay response of the finished water?
    a. At the start of the sampling period?
    b. At the end of the sampling period?

2. Are there differences in the bioassay responses across sites (upstream to finished water)
    a. At the start of the measurement period (reflecting the baseline existing before the plant acted to reduce outflow of GenX and other compounds)
    b. At the end of the sampling period (after the reduction of GenX)

3. What is the similarity of bioactivity profiles to previously tested chemicals? If very similar, can we calculate bioactivity equivalent doses (to PFAAs with more extensive toxicity data)?

Study design questions/answers

- Do we want to test all possible sample combinations (13 locations x 6 dates = 78 combinations) or would a reduced set of combinations (say 6 locations x 3 sample dates = 18 combinations) suffice? What are the tradeoffs in time/cost vs. statistical power for making inferences?

    - Keith – I would favor the reduced set initially with an option to go to a full set if the initial data supported it. Of course, this could involve a new round of task orders which can take time
    - Once we know what is available, NCCT can decide on increasing replicates for some platforms.

- How many replicates are needed for each combination in order to get reliable results? What is a 'replicate', how much sample is needed per replicate? (NCCT)

    - Keith - This varies by platform. Our standard testing is on the low side for replicates. I suggest thinking about increasing for platforms where that is as all feasible and reps are limited. Generally, increasing the replicates does not significantly impact sample volume required, e.g. we typically send 100 ul and volume used in a single assay is 5-10 uL.

- How many replicates are possible for each combination given availability of samples? (NERL)
  - See spreadsheet with sample availability by week by site
  - Most available sample volumes range from 0.25 to 1.0 ml (250 to 1000 ul), so they should be adequate for sending to bioassay contractor.

DRAFT Sample design considerations and suggestions

Rational –

- Cover the whole range of reported concentrations, from maximum to minimum, to see if bioassay results vary with concentration
- Cover the start, middle and end of the sampling period in order to sample the variation in the mixture composition
- Not technically important to sample each DW treatment plant, as long as the ranges of concentrations for input and finished water are covered by the set of samples selected for bioassays.

Initial thoughts:

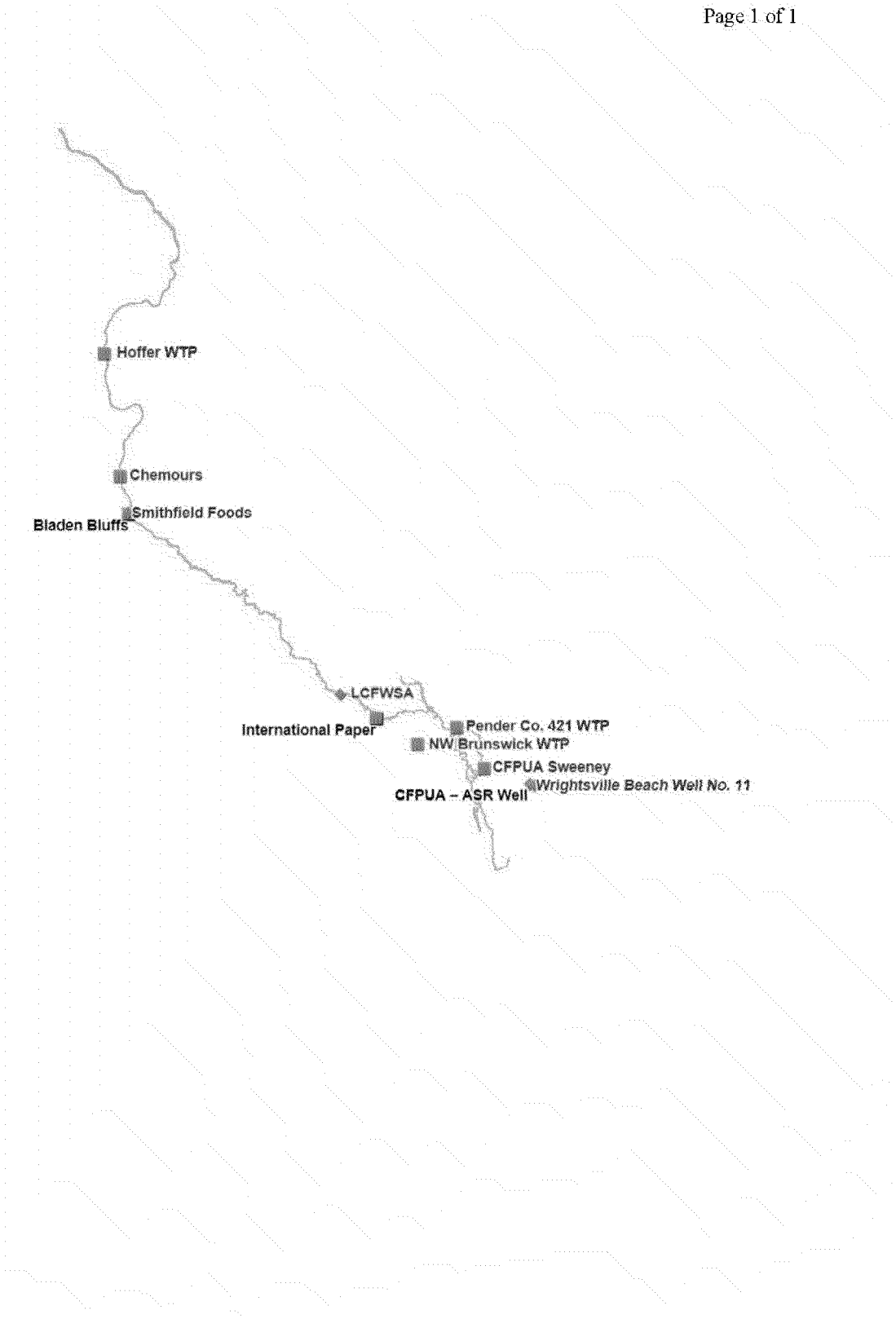
Sites – 6 sites, upstream to downstream including several finished DW treatment locations

Hoffer raw (upstream of Chemours, should be free of the source, serves as a baseline)
Chemours Outfall (the source – maximum PFC concentrations)
Bladen Finished – close downstream from Chemours, potential DW exposure
LCFWSA Raw – downstream, see effect of some dilution
CFPUA Sweeny Finished - potential DW exposure
Wrightsville Beach Well 11 – farthest downstream site, most diluted

Dates – 3 dates
6/19/2017 – before any change at Chemours
7/12/2017 – middle of study, after Chemours change
7/31/2017 – end of study period

6 x 3 = 18 combinations to test

Figure 1 - Approximate map of sample locations – upstream (Hoffer) to downstream (Wrightsville Beach)



https://ncdenr.maps.arcgis.com/apps/MapJournal/index.html?appid=b90192c13b534cfa94c... 9/12/2017

To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Holman, Sheila[sheila.holman@ncdenr.gov]; Lane, Bill F[Bill.Lane@ncdenr.gov]
From: Culpepper, Linda
Sent: Thur 11/9/2017 10:08:25 PM
Subject: FW: [External] Report 7: Lab Results Cape Fear River for NC DEQ
NCDEQ_Report7_11.9.17_signed.pdf

Thank you for the Report 7.

Linda Culpepper
Acting 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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, November 09, 2017 4:54 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Morris, Jeff <Morris.Jeff@epa.gov>; Behl, Betsy <Behl.Betsy@epa.gov>; Grevatt, Peter <Grevatt.Peter@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>
Subject: [External] Report 7: Lab Results Cape Fear River for NC DEQ

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

Linda,

Please find our latest report of PFAS in Cape Fear water samples that you collected and provided to us.

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

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; France, Danny[France.Danny@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Janovitz, Sara[Janovitz.Sara@epa.gov]; Lincoln, Larry[Lincoln.Larry@epa.gov]
From: Banister, Beverly
Sent: Thur 9/21/2017 8:08:35 PM
Subject: Re: State directs Chemours to provide residents with bottled water after GenX found in preliminary well

Thanks Linda for the update.
Beverly

Sent from my iPhone

On Sep 21, 2017, at 2:49 PM, Culpepper, Linda <linda.culpepper@ncdenr.gov> wrote:

Private wells impacted – press release below.

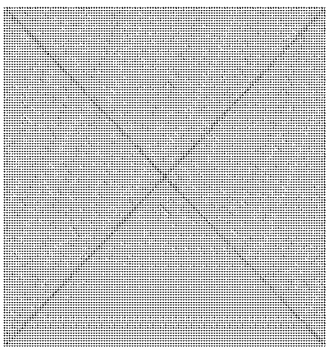
Linda Culpepper
Deputy Director
Division of Water Resources
North Carolina Department of Environmental Quality

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: Jamie Kritzer [mailto:jamie.kritzer@ncdenr.gov]
Sent: Thursday, September 21, 2017 1:38 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: State directs Chemours to provide residents with bottled water after GenX found in preliminary well

Roy Cooper, Governor



Michael Regan, Secretary

Release: IMMEDIATE

Contact: Laura J. Leonard; Jamie Kritzer

Date: Sept. 21, 2017

Phone: 919-707-8233; 919-707-8602

State directs Chemours to provide residents with bottled water after GenX found in preliminary well tests

RALEIGH – State officials have directed Chemours to provide bottled water to 11 homeowners near the company's Fayetteville Works after the company's preliminary test results showed GenX above state health goals in residential drinking wells.

The state Department of Environmental Quality and Chemours started testing residential wells near the facility after GenX was detected industrial, non-drinking water wells on the facility's property. Chemours is testing the private wells for GenX. DEQ is testing private wel

the facility also, but in addition to testing for GenX, the state agency is also testing for two other fluorinated compounds, PFOA and PFO state agency is testing for the three fluorinated compounds because they all have established health goals. The state expects its test results coming weeks.

To date, Chemours has received preliminary test results for 32 residential wells for people living near the facility. GenX was not detected residential wells. GenX concentrations were found below the state's provisional health goal of 140 parts per trillion for eight other resid wells. The 11 homeowners with GenX levels above the state's provisional public health goal were supplied with bottled water and hea information about GenX. Most of the 11 wells with elevated GenX levels are north of the facility.

The company's test results have not been validated. Out of an abundance of caution, the state directed the company to supply bottled wa residents after receiving word Friday of the first batch of preliminary test results, and then again on Tuesday when Chemours notified the of another batch of preliminary results.

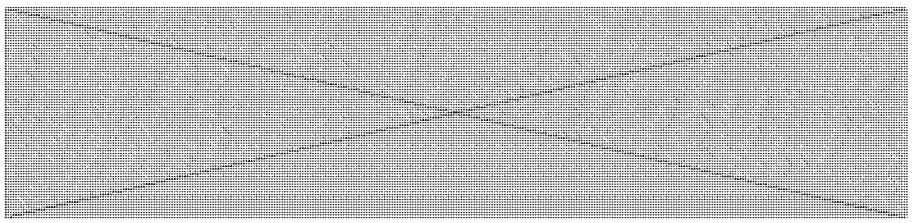
"We want to make sure people with elevated concentrations of GenX in their wells have an immediate alternative water source," said M Regan, secretary of the N.C. Department of Environmental Quality. "Making sure people have clean drinking water is our top priorit

This week, DEQ has continued collecting water samples for residential wells nearest the facility. As of Wednesday, DEQ had collected samples for 31 residential wells in Bladen and Cumberland counties. The state will send samples to Gel Laboratories in Charleston, S.C analysis and use the results of testing to determine if people need alternative sources of water and if GenX or the two other fluorinate compounds produced at the facility have moved into the surrounding community. If tests reveal levels of any of the fluorinated compounds established health goals, the state will direct Chemours to provide affected homes with alternative water and health information on tl compounds.

It's important to understand that the state's provisional health goal for GenX represents the concentration of GenX at which no adverse cancer health effects would be anticipated in the most sensitive populations over an entire lifetime of exposure.

Health-related information on GenX, PFOA and PFOS has been posted to DEQ's website at: https://deq.nc.gov/news/hot-topics/ger investigation/health-related-resources-about-genx-pfoa-and-pfas. Residents with questions about the health effects related to GenX, PF PFOS can contact the N.C. Department of Health and Human Services at 919-707-5900.

# # #



If you would rather not receive future communications from North Carolina Dept. of Environment and Natural Resources, let us know by clicking here.
North Carolina Dept. of Environment and Natural Resources, 217 W. Jones St., Raleigh, North Carolina 27699 United States

From: Matthews, Lisa

Location: Personal Matters / Ex. 6, cod Personal Matters / Ex. 6 please register for webinar below

Importance: Normal

Subject: EPA-ECOS PFAS Call (updated)

Start Time: Mon 8/7/2017 8:00:00 PM

End Time: Mon 8/7/2017 9:00:00 PM

Required Attendees: kristy.richardson@state.co.us; Nicole Lugli; robert.kaliszewski@ct.gov; kerri.malinowski@maine.gov; douglas.fine@state.ma.us; c.mark.smith@state.ma.us; delaneyr@michigan.gov; krukowskim@michigan.gov; remusm@michigan.gov; clark.freise@des.nh.gov; Brandon.kernen@des.nh.gov; Steve.Maybury@dep.nj.gov; eileen.murphy@dec.ny.gov; robert.schick@dec.ny.gov; jason.fagel@dec.ny.gov; Holman, Sheila; linda.culpepper@ncdenr.gov; craig.butler@epa.ohio.gov; nik.dzamov@epa.ohio.gov; susan.kessler@epa.ohio.gov; jenyfer.allen@epa.ohio.gov; MASTERSON.Kevin@deq.state.or.us; marz.nicole@deq.state.or.us; steven.jetter@state.or.us; Heidi.Hales@vermont.gov; Chuck Schwer; kzar461@ecy.wa.gov; janice.willey@navy.mil; aroberson@asdwa.org; chanson@ecos.org; slongsworth@ecos.org; Bowe, Patrick; Iwenofu, Samuel (ECY; Ottaway, William (DEC; betsey.wingfield@ct.gov; Gloria.Post@dep.nj.gov; elizabeth.lewis-michl@health.ny.gov

Optional Attendees: Kavlock, Robert; Impellitteri, Christopher; Caporale, Cynthia; Fitz-James, Schatzi; Raffaele, Kathleen; Flowers, Lynn; Sinks, Tom; Orme-Zavaleta, Jennifer; Watkins, Tim; Buckley, Timothy; Sonich-Mullin, Cynthia; Gilliland, Alice; McDonald, James; Gettle, Jeaneanne; Carter, Bobbi; Behl, Betsy; Strong, Jamie; Foster, Stiven; Deener, Kathleen; Barbery, Andrea; Scheuer, Amy; MARZ Nicole; Karoly, Cyndi; Mundrick, Doug; France, Danny; Walker, Mary; Zapata, Cesar; Allenbach, Becky; Heard, Anne; Lapierre, Kenneth; Shehee, Mina; Hall, Renea; Campbell-Dunbar, Shawneille; Mitchell, Ken; Jessica Godreau; Kemker, Carol; Dean, Glenda; Poolos, Ed; Harrison, Dennis; Hays, Lewis; Capp, James; Carnley, Keith; Booth, Elizabeth; Justin B. Green; Zimmerman, Jay; Kinard, Doug; Bird, Joel (ECY); Yaquian-Luna, Jose; Taylor, Dawn; Sassman, Hannah; Braverman, Carole; O'shea, Marie; Harris, Kimberly; Nwogu, Peter; Azzam, Nidal; Maddaloni, Mark; Cutt, Diana; Personal Email / Ex. 6 ecer, Gregg M (HEALTH); Leach, James F (HEALTH); Deming, Justin H (HEALTH); Parsons, Patrick J (HEALTH); Spink, David C (HEALTH); Wu, Qian (HEALTH); Gwinn, Maureen; Pociu, Shannon; Flaherty, Colleen; Hauchman, Fred; Malone, Kevin M (HEALTH)

PFAS Call notes May 22 2017.docx

PFAS_Overview presentation_Aug 7.pdf

ITRC PFAS Team_Aug 7.pdf

If you have not already done so, please register for today's webinar:
http://epawebconferencing.acms.com/augustpfascall/event/registration.html

Presentation materials attached.

EPA-ECOS PFAS Call
August 7, 2017
4:00-5:00 pm ET

Personal Phone / Ex. 6

The purpose of this call (every other month) is to share information on PFAS work, including analytical methods, toxicity and treatment.

Draft Agenda

Welcome and Introductions (Lisa Matthews, State Liaison, EPA ORD)

US EPA Cross-Agency Coordination of PFAS Activities (Bob Kavlock, Acting Assistant Administrator, EPA ORD)

Update on EPA PFAS Analytical Methods Workgroup (co-chairs: Chris Impellitteri, ORD; Cindy Caporale, Region 3; and Schatzi Fitz-James, OLEM)

Interstate Technology & Regulatory Council (ITRC) PFAS Team (Patricia Reyes, ITRC Director)

State Updates

Discussion (All)

Adjourn

Attachment:
May 22 call summary

Lisa Matthews
Senior Advisor and State Liaison
US EPA Office of Research and Development
202-564-6669 office
Personal Phone / Ex. 6

To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Kritzer, Jamie[jamie.kritzer@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]; Smith, Emily J.[Smith.Emily@epa.gov]
From: Culpepper, Linda
Sent: Tue 10/24/2017 5:58:30 PM
Subject: RE: [External] Chemours PFAS Process Line Report

We are posting all of the data from our sampling events on our website, so the EPA report would be included with the other results in the GenX Timeline https://deq.nc.gov/news/hot-topics/genx-investigation/genx-timeline , and a table of the results would be included in the GenX Sampling Site information: https://deq.nc.gov/news/hot-topics/genx-investigation/genx-sampling-sites .

I'm including Jamie so he can discuss further with Emily if needed.
Thank you,
linda

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: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Tuesday, October 24, 2017 9:55 AM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Smith, Emily J. <Smith.Emily@epa.gov>
Subject: [External] Chemours PFAS Process Line Report

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you verify that the attachment and content are safe. Send all suspicious email as an attachment to report.spam@nc.gov.

Linda,

This latest report and related desk statement is making its way through the Agency for approval. A question has been raised as to whether you will make this report public as you have done with prior reports. Can you let me know what your communication plans are for this report?

Thanks.

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

To: Flowers, Lynn[Flowers.Lynn@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]
Cc: Holman, Sheila[sheila.holman@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Martin, Lawrence[Martin.Lawrence@epa.gov]; Raffaele, Kathleen[raffaele.kathleen@epa.gov]; Foster, Stiven[Foster.Stiven@epa.gov]
From: Culpepper, Linda
Sent: Tue 8/29/2017 4:54:24 PM
Subject: RE: List of compounds
PFAS list_simple_August2017.xlsx

Thank you, Lynn. Sharing with Becky Allenbach, with R4, as well.

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: Flowers, Lynn [mailto:Flowers.Lynn@epa.gov]
Sent: Tuesday, August 29, 2017 12:52 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Martin, Lawrence <Martin.Lawrence@epa.gov>; Raffaele, Kathleen <raffaele.kathleen@epa.gov>; Foster, Stiven <Foster.Stiven@epa.gov>
Subject: RE: List of compounds

Linda: Please find the list attached. Note that we are not re-evaluating the potential toxicity of PFOA and PFOS – but include them here as we are gathering all data (including data from alternative toxicity testing) that could prove useful for comparison purposes when grouping various PFAS and/or evaluating potential toxicity through read-across.

Note that we have not released this list to the public – but it was discussed at several ECOS/ERIS meetings and has been shared with NTP and some other fed folks.
It's not a secret – but not public. We are working on that.
Lastly – it is a living list, i.e., not set in stone. Let me know if you have any questions.
Lynn

Lynn Flowers, PhD, DABT
Associate Director for Science
Office of Science Policy
US EPA
Washington, DC
202-564-6293

From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, August 28, 2017 3:49 PM
To: Flowers, Lynn <Flowers.Lynn@epa.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>
Subject: List of compounds

Lynn – following up on the discussion this morning. Appreciate your work and support. Can you provide us the list of 30 perfluorinated compounds under your research?

Thank you,
linda

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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To: Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Pritchett, Jamie R
Sent: Mon 11/27/2017 5:21:49 PM
Subject: RE: Request for PFAS data in the Cape Fear River

Hi Andy,

I just wanted to check in again to see if you had been able to pull together the full data sets used in the Nakayama et al. and Sun et al. papers per our phone conversation on October 23. We are hoping to get started with our public health evaluations soon but cannot move forward without the data.

Thanks again for all your help throughout this process!

Best,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5912 office
919 870 4807 fax
jamie.pritchett@dhhs.nc.gov

5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699

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Twitter YouTube
Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this e-mail in error, please notify the sender immediately and delete all records of this e-mail.

From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, September 28, 2017 3:52 PM
To: Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>; Pritchett, Jamie R <Jamie.Pritchett@dhhs.nc.gov>
Subject: FW: Request for PFAS data in the Cape Fear River
Importance: High

Mark and Andy,

See request below. I spoke briefly with Jamie about this request and he clarified that he is looking for data that underlies the more general findings reported in your Cape Fear publications. Do you have more detailed data from these studies that could be made available to support their health assessment? With respect to our recent reports to NC DEQ, I indicated to Jamie that we did not have any additional data that was any more detailed. I am copying Jamie so he will be a part of the conversation.

Thanks.

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: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Wednesday, September 20, 2017 12:01 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>
Subject: Request for PFAS data in the Cape Fear River
Importance: High

Dear Dr. Buckley,

I received your contact information from Dr. Amy Risen, a toxicologist in our department. I am a health assessor/toxicologist for the Health Assessment, Consultation & Education (HACE) program in the N.C. Division of Public Health. Beth Dittman (cc'ed) is the principal investigator and also a health assessor/toxicologist in the HACE program. Our program is funded through the CDC's Agency for Toxic Substances and Disease Registry (ATSDR) and our primary focus is evaluating public health impacts from exposure to hazardous waste.

The HACE program will be responsible for the public health assessment of exposure to PFAS in the Cape Fear River. We are working closely with our technical project team at ATSDR to get started on this assessment and would like to start organizing any potential data available. Dr. Risen indicated that your group would be the best to contact to obtain PFAS data for the Cape Fear River based on a conversation she had with Dr. Andy Lindstrom on August 3. We are writing to request any quantitative PFAS (legacy and emerging) data from the Cape Fear River you may have to assist in our public health assessment.

We realize that some of this data may be provided in a summarized format in the published literature. However, in order to provide the most accurate information on potential health risks, we will need the raw data to evaluate.

This includes the following potential data communicated to Dr. Risen by Dr. Lindstrom:

- 2007 and forward: General data on legacy PFAS, including data used for the Nakayama et al. (2007) paper.
- 2012/2013: PFECA data collected from the development of the analytical method for these chemicals.
- 2013/2014: Data published in Sun et al. in 2016 on legacy PFASs, GenX, and additional PFECAs.
- 2015 and forward: Additional PFECA data from improved analytical method.

We greatly appreciate your team's continued work on this issue. Please let Beth or I know if you have any questions about this request. I can be reached at (919) 707-5912 and Beth can be reached at (919) 707-5906. Thank you in advance for your time and attention.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

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To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Mort, Sandra L
Sent: Thur 9/21/2017 12:47:33 PM
Subject: RE: Questions re EPA-NERL PFAS data - Chemours GW

Thank you!

Sandy Mort, Ph.D., M.S.
Environmental Toxicologist / Risk Assessor
Division of Waste Management – Hazardous Waste & Brownfields
NC Department of Environmental Quality

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sandy.mort@ncdenr.gov

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Raleigh, NC 27699-1646

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, September 21, 2017 8:07 AM
To: Mort, Sandra L <sandy.mort@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Woosley, Julie <julie.woosley@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: RE: Questions re EPA-NERL PFAS data - Chemours GW

Sandy,

Thank you for these excellent questions. I forwarded them on to Mark Strynar who provided the following response. I am copying Linda Culpepper, Julie Woosley, and Becky Allenbach as I think they will also be interested.

Tim Buckley

1. Please provide the full chemical name for the PFESA Byproduct 2 listed in Table 2. The last portion of the chemical name was cut off in the final report.

The full name of this CAS # 749836-20-2 is (Ethanesulfonic acid, 2-[1-[difluoro(1,2,2,2-tetrafluoroethoxy)methyl]-1,2,2,2-tetrafluoroethoxy]-1,1,2,2-tetrafluoro-) It does not appear cutoff in the final report that I have.

2. Please verify the CASN for the PFESA (Nafion) Byproduct 1 listed in table 2. The CASN listed is 29311-67-9. I'm asking if it should be CASN 66796-30-3 based on prior information provided by your lab.

The CAS number in the final report (29311-67-9) for PFESA (Nafion) byproduct 1 is correct. In the EPA briefing slides which preceded the final report, and in Strynar et al., 2015 the CAS for the Nafion copolymer (CASN 66796-30-3) is shown. However, in Strynar et al., 2015 Table 1 there is a footnote "b" indicating this is for the Nafion copolymer.

3. The notes on Table 3 indicate the LOD = 10 ng/L. Please verify that this is for all analytes reported.

For the targeted analytes which include GenX and the Legacy PFAS the LOQ was 10 ng/L for the bottom end of the calibration

curve. For the non-targeted analysis analytes there is no calibration curve as we have no authentic standards for these analytes, thus we have no LOQ.

4. The Table 3 information notes include the sample dilutions. Do these dilutions apply both to the target analytes and the non-target analytes? Should the reporting limits for the target analytes reflect the 10 ng/L LOD times the noted sample dilution? Same question for the non-target analytes? (i.e., LOD x dilution = analyte reporting limit)

The dilutions apply to both the target as well as the non-target analytes. However, the lower reporting limits of the target analytes are 10 ng/L regardless of the dilutions. The dilutions were used to deal with samples that exceeded the calibration curves on the top end. If a sample did not have values that exceeded the calibration curve, that value was used. The lower LOQ remains unchanged. The values reported in Table 3 already include these calculations. With the exception of reported values flagged with "*" all diluted samples caused the analyte to fall within the calibration curve range.

5. In the Sun et al, EST (2016) paper the non-target analytes PFMOPrA, PFMOBA and PFO4DA were reported in the drinking water sourced from the Cape Fear River. Neither PFMOPrA, PFMOBA or PFO4DA were reported for the groundwater. Please clarify if this was because these 3 non-target analytes (NTAs) were not detected in the GW, or if the GW analysis did not include these 3 NTAs.

The analytes reported to NCDEQ in all samples did not include these compounds (PFMOPrA, PFMOBA and PFO4DA) as they were minor players in prior work. The analytes chosen for inclusion in the NCDEQ reports included GenX (PFPrOPrA), PFMOAA, PFO2HxA, and PFO3OA as they were suggested by NCDEQ to be included based on the Sun et al., 2016 findings. I am unable to confirm if these analytes are present in the GW samples, however I can confirm they were not included in the NTA we performed. If needed I can go back and check for the presence of these analytes.

6. The text indicates that there is a conservative order-of-magnitude uncertainty in the NTA concentrations reported. Please verify that the same level of uncertainty is estimated for both the NTA PFECA and PFESA since the NTA concentrations are generated relative to the PFECA GenX instrument response.

The conservative order of magnitude uncertainty applies to all the NTA analytes. Though the PFECA (GenX) is used to estimate the NTA PFECAs, we are unsure if the PFESAs respond any differently. As we have no authentic standard for the PFESAs thus far we have no way to tell if the PFECAs or PFESAs respond differerntly.

Timothy J. Buckley, PhD
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URL: http://www.epa.gov/heasd/staff/buckley.html
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From: Mort, Sandra L [mailto:sandy.mort@ncdenr.gov]
Sent: Wednesday, September 20, 2017 10:41 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: Questions re EPA-NERL PFAS data - Chemours GW

Dr. Buckley –
I am requesting the following clarifications / verification for the PFAS data generated by NERL on the August 2017 groundwater (GW) samples submitted by NC DEQ Division of Waste Management (see the attached report):

1. Please provide the full chemical name for the PFESA Byproduct 2 listed in Table 2. The last portion of the chemical name was cut off in the final report.

2. Please verify the CASN for the PFESA (Nafion) Byproduct 1 listed in table 2. The CASN listed is 29311-67-9. I'm asking if it should be CASN 66796-30-3 based on prior information provided by your lab.
3. The notes on Table 3 indicate the LOD = 10 ng/L. Please verify that this is for all analytes reported.
4. The Table 3 information notes include the sample dilutions. Do these dilutions apply both to the target analytes and the non-target analytes? Should the reporting limits for the target analytes reflect the 10 ng/L LOD times the noted sample dilution? Same question for the non-target analytes? (i.e., LOD x dilution = analyte reporting limit)
5. In the Sun et al, EST (2016) paper the non-target analytes PFMOPrA, PFMOBA and PFO4DA were reported in the drinking water sourced from the Cape Fear River. Neither PFMOPrA, PFMOBA or PFO4DA were reported for the groundwater. Please clarify if this was because these 3 non-target analytes (NTAs) were not detected in the GW, or if the GW analysis did not include these 3 NTAs.
6. The text indicates that there is a conservative order-of-magnitude uncertainty in the NTA concentrations reported. Please verify that the same level of uncertainty is estimated for both the NTA PFECA and PFESA since the NTA concentrations are generated relative to the PFECA GenX instrument response.

Thank you & your staff again for your efforts.
b/r
Sandy Mort

Sandy Mort, Ph.D., M.S.
Environmental Toxicologist / Risk Assessor
Division of Waste Management – Hazardous Waste & Brownfields
NC Department of Environmental Quality

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sandy.mort@ncdenr.gov

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Raleigh, NC 27699-1646

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To: Buckley, Timothy[Buckley.Timothy@epa.gov]; France, Danny[France.Danny@epa.gov]
From: Culpepper, Linda
Sent: Mon 10/23/2017 12:25:37 AM
Subject: FW: PFAS Analytes_draft_6Oct2017.pdf
PFAS Analytes_draft_6Oct2017.pdf

Dr. Moore has a much better table (attached) than I have been drafting.

Are the EPA NERL components captured correctly?

We will want to add the EPA Athens Lab analytes in another column.
If you and send me the analyte list, I'll get them added.

Thank you,
linda

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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Analyte	Abbreviation	CAS Number	EPA Method 537	Surface Water		On-Site Groundwater		
				Sun et al.	SGS Labs	GEL Labs	EPA NERL	TestAmerica
Perfluoroalkyl carboxylic acids (PFCAs)								
Perfluorobutanoic acid	PFBA	375-22-4		X	X	X	X	
Perfluoropentanoic acid	PFPeA	2706-90-3		X	X	X	X	X
Perfluorohexanoic acid	PFHxA	307-24-4	X	X	X	X	X	X
Perfluoroheptanoic acid	PFHpA	375-85-9	X	X	X	X	X	X
Perfluorooctanoic acid	PFOA	335-67-1	X	X	X	X	X	X
Perfluorononanoic acid	PFNA	375-95-1	X	X	X	X	X	X
Perfluorodecanoic acid	PFDA	335-76-2	X	X	X	X	X	X
Perfluoroundecanoic acid	PFUdA	2058-94-8	X		X	X	X	X
Perfluorododecanoic acid	PFDoA	307-55-1	X		X	X	X	X
Perfluorotridecanoic acid	PFTrDA	72629-94-8	X		X	X	X	X
Perfluorotetradecanoic acid	PFTeDA	376-06-7	X		X	X	X	X
Perfluoroalkyl sulfonic acids (PFSAs)								
Perfluorobutanesulfonate	PFBS	375-73-5	X	X	X	X	X	X
Perfluoropentanesulfonate	PFPeS	2706-91-4				X	X	
Perfluorohexanesulfonate	PFHxS	355-46-4	X	X	X	X	X	X
Perfluoroheptanesulfonate	PFHpS	375-92-8			X	X	X	
Perfluorooctanesulfonate	PFOS	1763-23-1	X	X	X	X	X	X
Perfluorononanesulfonate	PFNS	68259-12-1				X	X	
Perfluorodecanesulfonate	PFDS	335-77-3			X	X	X	
Perfluoroalkyl ether carboxylic acids (PFECAs)								
Perfluoro-1-methoxyacetic acid	PFMOAA	674-13-5		X			X	
Perfluoro-3-methoxypropanoic acid	PFMOPrA	377-73-1		X			X	
Perfluoro-4-methoxybutanoic acid	PFMOBA	863090-89-5		X			X	
Perfluoro-2-propoxypropanoic acid ("GenX")	PFPrOPrA	13252-13-6		X	X	X	X	X
Perfluoro(3,5-dioxahexanoic) acid	PFO2HxA	39492-88-1		X			X	
Perfluoro(3,5,7-trioxaoctanoic) acid	PFO3OA	39492-89-2		X			X	
Perfluoro(3,5,7,9-tetraoxadecanoic) acid	PFO4DA	39492-90-5		X			X	
Perfluoroalkyl ether sulfonic acids (PFESAs)								
$C_7HF_{13}O_5S$		66796-30-3					X	
$C_7H_2F_{14}O_5S$		749836-20-2					X	
Others								
Perfluorooctanesulfonamide	PFOSA	754-91-6				X	X	
N-methylperfluoro-1-octanesulfonamidoacetic acid	N-MeFOSAA	2355-31-9	X		X	X	X	X
N-ethylperfluoro-1-octanesulfonamidoacetic acid	N-EtFOSAA	2991-50-6	X		X	X	X	X

Analyte	Abbreviation	CAS Number	EPA Method 537	Surface Water		On-Site Groundwater		
				Sun et al.	SGS Labs	GEL Labs	EPA NERL	TestAmerica
Fluorotelomer sulfonate 4:2	4:2 FTS	757124-72-4				X	X	
Fluorotelomer sulfonate 6:2	6:2 FTS	27619-97-2			X	X	X	
Fluorotelomer sulfonate 8:2	8:2 FTS	39108-34-4			X	X	X	

DRAFT

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Holman, Sheila
Sent: Mon 10/30/2017 3:18:19 PM
Subject: FW: [External] slides for Oct 30 ECOS-EPA PFAS Call
ECOS_EPA PFAS Call Holman 10302017.pptx

Fyi – should have copied you on this last night.

Sheila Holman
Assistant Secretary for the Environment
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Raleigh, NC 27699-1601
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Sheila.holman@ncdenr.gov

From: Holman, Sheila
Sent: Sunday, October 29, 2017 8:05 PM
To: Matthews, Lisa <Matthews.Lisa@epa.gov>
Subject: Re: [External] slides for Oct 30 ECOS-EPA PFAS Call

Lisa,

Please find attached the presentation for tomorrow's call. I look forward to talking to you then.

Sheila

Sheila Holman
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From: Matthews, Lisa <Matthews.Lisa@epa.gov>
Sent: Thursday, October 26, 2017 2:06 PM
To: Morris, Jeff; Holman, Sheila; Buckley, Timothy; nik.dzamov@epa.ohio.gov; Flowers, Lynn
Cc: Cherepy, Andrea; Bonnie.Buthker@epa.ohio.gov; Impellitteri, Christopher; Scheuer, Amy
Subject: [External] slides for Oct 30 ECOS-EPA PFAS Call

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and content are safe. Send all suspicious email as an attachment to report.spam@nc.gov.

Good afternoon,

If you have not already done so, please send Amy Scheuer (scheuer.amy@epa.gov) and me your PowerPoint slides by Monday morning, October 30 to upload for the ECOS-EPA PFAS call in the afternoon.

If you prefer not to use slides, just let us know. Thanks so much, and we look forward to your presentations and updates.

Lisa

From: Matthews, Lisa
Sent: Friday, October 20, 2017 11:26 AM
To: 'kristy.richardson@state.co.us' <kristy.richardson@state.co.us>; 'Nicole.lugli@ct.gov' <Nicole.lugli@ct.gov>; robert.kaliszewski@ct.gov; 'kerri.malinowski@maine.gov' <kerri.malinowski@maine.gov>; douglas.fine@state.ma.us; c.mark.smith@state.ma.us; 'delaneyr@michigan.gov' <delaneyr@michigan.gov>; 'krukowskim@michigan.gov' <krukowskim@michigan.gov>; 'remusm@michigan.gov' <remusm@michigan.gov>; 'clark.freise@des.nh.gov' <clark.freise@des.nh.gov>; 'Brandon.kernen@des.nh.gov' <Brandon.kernen@des.nh.gov>; 'Steve.Maybury@dep.nj.gov' <Steve.Maybury@dep.nj.gov>; 'eileen.murphy@dec.ny.gov' <eileen.murphy@dec.ny.gov>; 'robert.schick@dec.ny.gov' <robert.schick@dec.ny.gov>; 'jason.fagel@dec.ny.gov' <jason.fagel@dec.ny.gov>; 'Holman, Sheila' <sheila.holman@ncdenr.gov>; 'linda.culpepper@ncdenr.gov' <linda.culpepper@ncdenr.gov>; 'craig.butler@epa.ohio.gov' <craig.butler@epa.ohio.gov>; 'nik.dzamov@epa.ohio.gov' <nik.dzamov@epa.ohio.gov>; 'susan.kessler@epa.ohio.gov' <susan.kessler@epa.ohio.gov>; 'jenyfer.allen@epa.ohio.gov' <jenyfer.allen@epa.ohio.gov>; MASTERSON.Kevin@deq.state.or.us; 'marz.nicole@deq.state.or.us' <marz.nicole@deq.state.or.us>; 'steven.jetter@state.or.us' <steven.jetter@state.or.us>; 'Heidi.Hales@vermont.gov' <Heidi.Hales@vermont.gov>; 'chuck.schwer@vermont.gov' <chuck.schwer@vermont.gov>; 'kzar461@ecy.wa.gov' <kzar461@ecy.wa.gov>; 'janice.willey@navy.mil' <janice.willey@navy.mil>; 'aroberson@asdwa.org' <aroberson@asdwa.org>; Carolyn Hanson <chanson@ecos.org>; 'slongsworth@ecos.org' <slongsworth@ecos.org>; 'Bowe, Patrick' <Patrick.Bowe@ct.gov>; 'Iwenofu, Samuel (ECY' <siwe461@ECY.WA.GOV>; 'Ottaway, William (DEC' <william.ottaway@dec.ny.gov>; betsey.wingfield@ct.gov; 'Gloria.Post@dep.nj.gov' <Gloria.Post@dep.nj.gov>; 'elizabeth.lewis-michl@health.ny.gov' <elizabeth.lewis-michl@health.ny.gov>; Impellitteri, Christopher <Impellitteri.Christopher@epa.gov>; Caporale, Cynthia <Caporale.Cynthia@epa.gov>; Fitz-James, Schatzi <Fitz-James.Schatzi@epa.gov>; Raffaele, Kathleen <raffaele.kathleen@epa.gov>; Flowers, Lynn <Flowers.Lynn@epa.gov>; Sinks, Tom <Sinks.Tom@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Sonich-Mullin, Cynthia <Sonich-Mullin.Cynthia@epa.gov>; Gilliland, Alice <Gilliland.Alice@epa.gov>; McDonald, James <McDonald.James@epa.gov>; Gettle, Jeaneanne <Gettle.Jeaneanne@epa.gov>; Carter, Bobbi <Carter.Bobbi@epa.gov>; Behl, Betsy <Behl.Betsy@epa.gov>; Strong, Jamie <Strong.Jamie@epa.gov>; Foster, Stiven <Foster.Stiven@epa.gov>; Deener, Kathleen <Deener.Kathleen@epa.gov>; Barbery, Andrea <Barbery.Andrea@epa.gov>; Scheuer, Amy <Scheuer.Amy@epa.gov>; 'MARZ Nicole' <nicole.marz@state.or.us>; 'Karoly, Cyndi' <cyndi.karoly@ncdenr.gov>; Mundrick, Doug <Mundrick.Doug@epa.gov>; France, Danny <France.Danny@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Zapata, Cesar <Zapata.Cesar@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Heard, Anne <Heard.Anne@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>; 'Shehee, Mina' <mina.shehee@dhhs.nc.gov>; Hall, Renea <Hall.Renea@epa.gov>; Campbell-Dunbar, Shawneille <Campbell-Dunbar.Shawneille@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; 'Godreau, Jessica' <jessica.godreau@ncdenr.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; 'Dean, Glenda' <GLD@adem.alabama.gov>; efp@adem.alabama.gov; 'Harrison, Dennis' <DDH@adem.alabama.gov>; 'Hays, Lewis' <Lewis.Hays@dnr.ga.gov>; 'Capp, James' <James.Capp@dnr.ga.gov>; 'Carnley, Keith' <keith.carnley@dnr.ga.gov>; 'Booth, Elizabeth' <Elizabeth.Booth@dnr.ga.gov>; 'Justin.B.Green@dep.state.fl.us' <Justin.B.Green@dep.state.fl.us>; 'Zimmerman, Jay' <jay.zimmerman@ncdenr.gov>; 'Kinard, Doug' <KINARDDB@dhec.sc.gov>; 'Bird, Joel (ECY' <jbir461@ECY.WA.GOV>; Yaquian-Luna, Jose <yaquian-

luna.josea@epa.gov>; Taylor, Dawn <Taylor.Dawn@epa.gov>; Sassman, Hannah <sassman.hannah@epa.gov>; Braverman, Carole <braverman.carole@epa.gov>; O'shea, Marie <OShea.Marie@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; 'Nwogu, Peter' <Peter.Nwogu@dnr.ga.gov>; Azzam, Nidal <Azzam.Nidal@epa.gov>; Maddaloni, Mark <Maddaloni.Mark@epa.gov>; Cutt, Diana <Cutt.Diana@epa.gov>; Personal Email / Ex. 6 Personal Email / Ex. 6 ; 'Recer, Gregg M (HEALTH' <gregg.recer@health.ny.gov>; 'Leach, James F (HEALTH' <james.leach@health.ny.gov>; 'Deming, Justin H (HEALTH' <justin.deming@health.ny.gov>; 'Parsons, Patrick J (HEALTH' <patrick.parsons@health.ny.gov>; 'Spink, David C (HEALTH' <david.spink@health.ny.gov>; 'Wu, Qian (HEALTH' <qian.wu@health.ny.gov>; Gwinn, Maureen <gwinn.maureen@epa.gov>; 'Pociu, Shannon' <Shannon.Pociu@ct.gov>; Flaherty, Colleen <Flaherty.Colleen@epa.gov>; Hauchman, Fred <hauchman.fred@epa.gov>; 'Malone, Kevin M (HEALTH' <kevin.malone@health.ny.gov>; 'Adam DeWeese' <Adam.DeWeese@wisconsin.gov>; 'Amy LaChance' <LACHANCEA1@michigan.gov>; 'Cathrine Wunderlich' <cathrine.wunderlich@wisconsin.gov>; 'David McMillan' <Dave.McMillan@illinois.gov>; 'Eric Oswald' <OswaldE1@michigan.gov>; 'Mary Hollingsworth' <mholling@idem.in.gov>; 'Matt Prater' <mprater@idem.in.gov>; 'Randy Ellingboe' <randy.ellingboe@state.mn.us>; 'Richard Benzier' <benzier@michigan.gov>; 'Rick Cobb' <rick.cobb@Illinois.gov>; 'Sara Pierson' <spierson@idem.in.gov>; 'Steve Elmore' <Steve.Elmore@Wisconsin.gov>; 'Suzanne Ruch' <RuchS@michigan.gov>; helen.goeden@state.mn.us; James.kelly@state.mn.us; Connie.Sullinger@illinois.gov; 'klemansd@michigan.gov' <klemansd@michigan.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; 'seidelt@michigan.gov' <seidelt@michigan.gov>; 'argiroffp@michigan.gov' <argiroffp@michigan.gov>; 'alexanderc2@michigan.gov' <alexanderc2@michigan.gov>; 'DebruynD@michigan.gov' <DebruynD@michigan.gov>; 'Johnson, Thomas B (HEALTH' <thomas.johnson@health.ny.gov>; Gaines, Linda <Gaines.Linda@epa.gov>; 'Snyder, Sandra' <snydersl@dhec.sc.gov>; Klasen, Matthew <Klasen.Matthew@epa.gov>; 'Bush, Christina Rose (DHHS' <BushC6@michigan.gov>; Morris, Jeff <Morris.Jeff@epa.gov>; Cherepy, Andrea <Cherepy.Andrea@epa.gov>; Burden, Susan <Burden.Susan@epa.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; Freeman, Bruce <BMF@adem.alabama.gov>; Lahne Mattas-Curry <Mattas-Curry.Lahne@epa.gov>; Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Menghrajani, jacquelyn <Menghrajani.Jacquelyn@epa.gov>; Zambrana, Jose <Zambrana.Jose@epa.gov>
Cc: Kavlock, Robert <Kavlock.Robert@epa.gov>; Robbins, Chris <Robbins.Chris@epa.gov>; Rodan, Bruce <rodan.bruce@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
Subject: agenda for Oct 30 ECOS-EPA PFAS Call

ECOS-EPA PFAS Call

October 30, 2017

4:00-5:00 pm ET

Call-in number: Personal Phone / Ex. 6

Webinar link: Personal Matters / Ex. 6

Agenda

1. Welcome and Introductions – Jennifer Orme-Zavaleta, EPA's Office of Research and Development (ORD) (5 mins)

2. Amended TSCA: How implementation could influence actions around PFAS – Jeff Morris, Director, EPA's Office of Pollution Prevention and Toxics (15 mins)

3. GenX in the Cape Fear River Basin
   - State update – Sheila Holman, NC DEQ Assistant Secretary for Environment (10 mins)
   - PFAS methods work to support NC – Tim Buckley, EPA ORD National Exposure Research Laboratory (5 mins)

4. Overview of the PFAS Investigation at Wright-Patterson AFB

- Including the sampling of a sentinel well network designed to detect contamination before it impacts the city of Dayton's downgradient wellfields – Bonnie Buthker, Chief, Southwest District Office, Ohio EPA (10 mins)

5. Ohio EPA Progress on Analytical Methods
   - Drinking water and direct injection method for other waters – Nik Dzamov, Chief, Division of Environmental Services, Ohio EPA (5 mins)

6. Updates from the EPA PFAS Workgroups
   - Methods Development – Chris Impellitteri, EPA ORD Co-Chair (5 mins)
   - Toxicity – Lynn Flowers, EPA ORD Co-Chair (5 mins)

7. Open forum to share info (states)

8. Wrap-up and Adjourn – Jennifer Orme-Zavaleta, EPA ORD

These calls are held every other month for states and EPA to share information on PFAS methods, toxicity and treatment work. Please send any suggestions for December agenda topics to Lisa Matthews (matthews.lisa@epa.gov) and Sarah Grace Longsworth (slongsworth@ecos.org). Thank you.

Lisa Matthews

Senior Advisor and State Liaison

US EPA Office of Research and Development

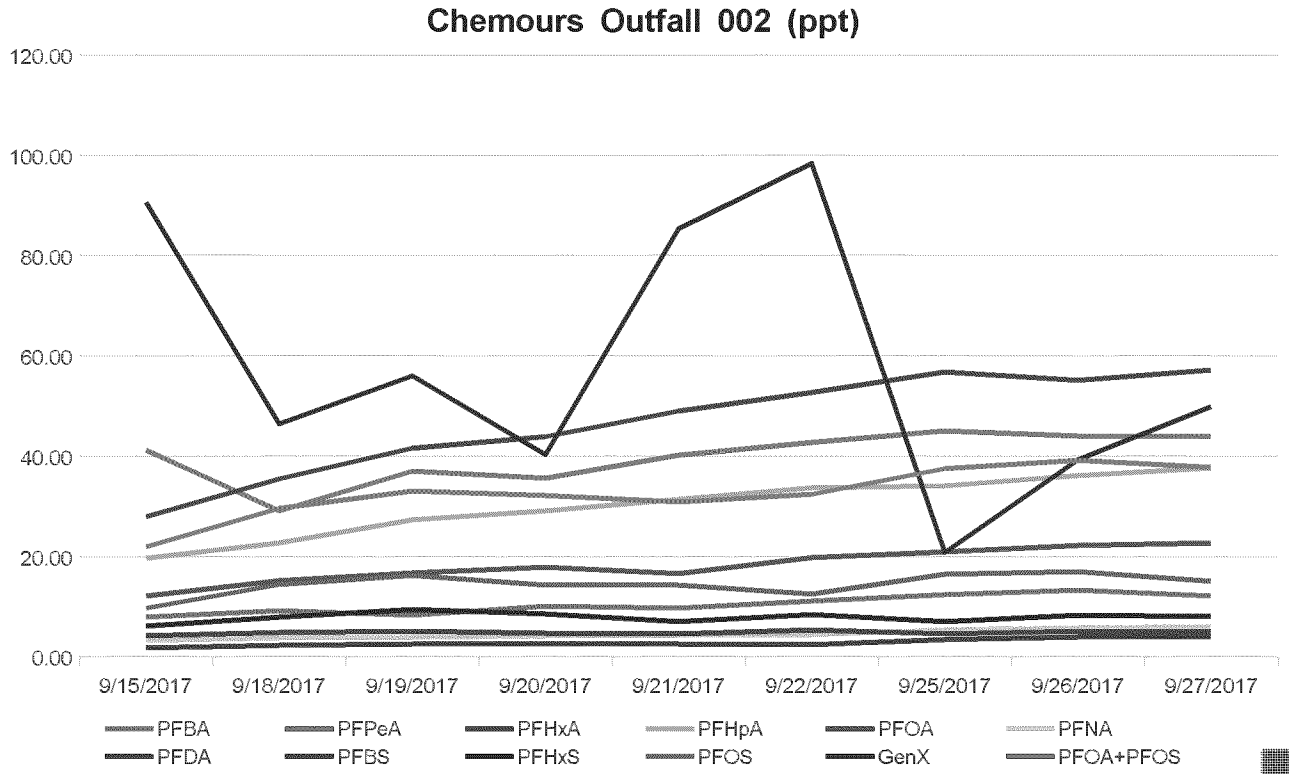
202-564-6669 office

Personal Phone / Ex. 6

Nothing Compares
NORTH CAROLINA

GenX in the Cape Fear River Basin
Presentation to ECOS – EPA PFAS Call
October 30, 2017

Latest Cape Fear River Sampling Data

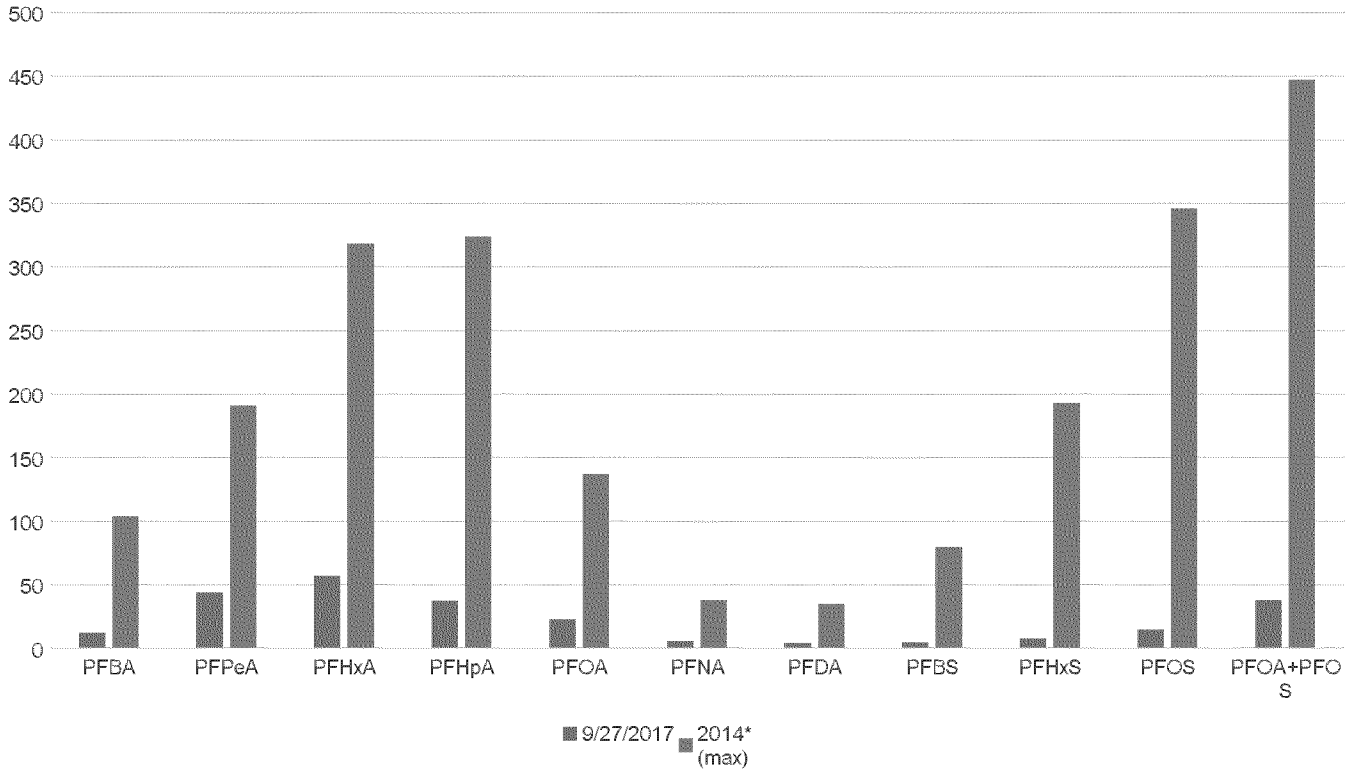


Drinking Water Samples

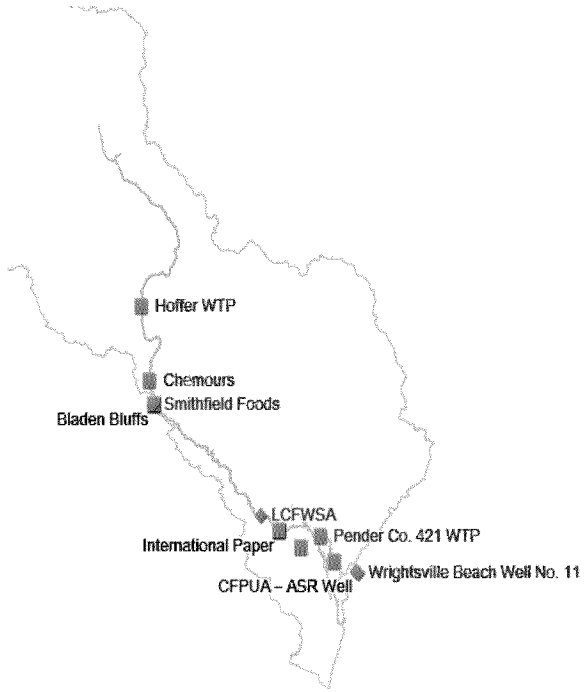
		Results (ppt)		
		9/14/2017	9/21/2017	9/28/2017
International Paper	**PFOA**	**3.65**	**2.97**	**3.74**
	PFOS	**1.64 (J)**	**1.21 (J)**	**1.40 (J)**
	PFOA+PFOS	5.29 (J)	4.18 (J)	5.14 (J)
	GenX	**30.2**	**33.4**	**35.3**
Cape Fear Public Utility	**PFOA**	**15.1**	**10.1**	**12.1**
	PFOS	**17.2**	**17.3**	**14.5**
	PFOA+PFOS	32.3	27.4	26.6
	GenX	**33.2**	**36.1**	**28.9**
Pender County	**PFOA**	**12.2**	**2.74**	**2.87**
	PFOS	**0.544 (J)**	**1.02 (J)**	**0.977 (J)**
	PFOA+PFOS	4.36 (J)	3.76 (J)	3.85 (J)
	GenX	**40.4**	**41.0**	**42.4**
NW Brunswick County	**PFOA**	**9.98**	**7.96**	**8.16**
	PFOS	**7.78**	**5.98**	**7.78**
	PFOA+PFOS	16.0	15.7	8.2
	GenX	**33.1**	**35.0**	**24.3**

ED_002003J_00022935-00003

Historic Comparison



DEQ Sampling



- Process area sampling at Chemours.
- Weekly composite sampling at the Chemours NPDES outfall 002.
- Weekly sampling of finished drinking downstream of the Chemours facility.

Private Well Sampling Results

Private wells sampled:	110
Total # wells with exceedance of the GenX NC DHHS provisional health goal:	40 (36%)
Total # wells reported as not-detected (ND):	36 (33%)
Total # wells with a GenX detection (includes those above the health goal):	74 (67%)
Total # wells with a GenX detection less than the health goal:	34 (31%)
The maximum detected GenX concentration is	1300 ng/L (ppt)

Chemours Sampling Map (Northern Area)

Chemours Sampling Map (Central Area)

Chemours Sampling Map (Southern Area)

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.

Stack Testing

- DAQ and Chemours discussing/evaluating appropriate methods
- No "off the shelf" method. Developing test methods that will capture and measure the contaminants of interest
- Chemours has indicated that they will test to better quantify air emissions as soon as measurement issues are resolved.

Ambient Air Quality Monitoring

- DAQ and EPA discussing/evaluating appropriate methods, equipment and lab capabilities
- Do the contaminants act as a gas or a particle?
- What analytical detection limits are possible?

RECAP ACTIVITIES

- Monitoring the Facility for surface water and groundwater and
- Air emissions modeling
- Continuing to delineate off-site groundwater contamination and its potential sources
- Reviewing private well water data from Chemours and DEQ for data analysis, data QC, HREs, planning and mapping
- Evaluating chemical pathways (chemicals created and transformed)
- Determine future sampling needs
- Continuing to host community meetings
- Engaging Federal/State and International partners

Questions?

Sheila Holman
Assistant Secretary
NC Department of Environmental Quality
919-707-8619

To: Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Culpepper, Linda
Sent: Thur 9/21/2017 1:08:46 AM
Subject: Re: Request for PFAS data in the Cape FearRiver

I've engaged Sheila to see if we can handle it via our weekly Friday call with DHHS or if she wants to handle it outside the call.

Will loop you in as soon as we have it addressed. I also appreciate the protocol to go through R4 for our program requests as well. Putting a weekly check in with Becky on my calendar to help with that aspect of coordination.

Thank you,

linda

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

(919) 707-9014 office
linda.culpepper@ncdenr.gov

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Wednesday, September 20, 2017 4:43 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Allenbach, Becky <Allenbach.Becky@epa.gov>
Subject: FW: Request for PFAS data in the Cape Fear River

Linda,

Here is the request from Jamie Pritchett. Can you let me know how you think best to handle?

Thanks.

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: Buckley, Timothy
Sent: Wednesday, September 20, 2017 12:49 PM
To: 'Pritchett, Jamie R' <Jamie.Pritchett@dhhs.nc.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>; Andrew Gillespie <Gillespie.Andrew@epa.gov>; Lindstrom, Andrew

<Lindstrom.Andrew@epa.gov>; Strynar, Mark <strynar.mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>
Subject: RE: Request for PFAS data in the Cape Fear River

Jamie,

Thank you for your interest and inquiry. We recognize your work in providing this health assessment as both incredibly important and challenging. We are happy to provide whatever supporting data/information that we can. I will circle back with the PIs for this work to identify what is available. It may be good for us to schedule a call to discuss what information you are seeking that cannot be obtained from Lindstrom's and Strynar's publications and the reports we have provided to NC DEQ.

Tim Buckley

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: Pritchett, Jamie R [mailto:Jamie.Pritchett@dhhs.nc.gov]
Sent: Wednesday, September 20, 2017 12:01 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Elizabeth Dittman <Beth.Dittman@dhhs.nc.gov>
Subject: Request for PFAS data in the Cape Fear River
Importance: High

Dear Dr. Buckley,

I received your contact information from Dr. Amy Risen, a toxicologist in our department. I am a health assessor/toxicologist for the Health Assessment, Consultation & Education (HACE) program in the N.C. Division of Public Health. Beth Dittman (cc'ed) is the principal investigator and also a health assessor/toxicologist in the HACE program. Our program is funded through the CDC's Agency for Toxic Substances and Disease Registry (ATSDR) and our primary focus is evaluating public health impacts from exposure to hazardous waste.

The HACE program will be responsible for the public health assessment of exposure to PFAS in the Cape Fear River. We are working closely with our technical project team at ATSDR to get started on this assessment and would like to start organizing any potential data available. Dr. Risen indicated that your group would be the best to contact to obtain PFAS data for the Cape Fear River based on a conversation she had with Dr. Andy Lindstrom on August 3. We are writing to request any quantitative PFAS (legacy and emerging) data from the Cape Fear River you may have to assist in our public health assessment.

We realize that some of this data may be provided in a summarized format in the published literature. However, in order to provide the most accurate information on potential health risks, we will need the raw data to evaluate.

This includes the following potential data communicated to Dr. Risen by Dr. Lindstrom:

- 2007 and forward: General data on legacy PFAS, including data used for the Nakayama et al. (2007) paper.
- 2012/2013: PFECA data collected from the development of the analytical method for these chemicals.
- 2013/2014: Data published in Sun et al. in 2016 on legacy PFASs, GenX, and additional PFECAs.
- 2015 and forward: Additional PFECA data from improved analytical method.

We greatly appreciate your team's continued work on this issue. Please let Beth or I know if you have any questions about this request. I can be reached at (919) 707-5912 and Beth can be reached at (919) 707-5906. Thank you in advance for your time and attention.

Thanks,
Jamie

Jamie Pritchett
Program Coordinator/Health Assessor/Toxicologist
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

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919 870 4807 fax
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5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699

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Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this email in error, please notify the sender immediately and delete all records of this email.

To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Johnson, Chris[chris.johnson@ncdenr.gov]
From: Culpepper, Linda
Sent: Fri 7/14/2017 3:37:46 PM
Subject: EPA Sample results
Data spread sheet June - July 2017 Analysis draft4 wEPA.xlsx

Just saw a note from Chris as I was going to hit the send button – thanks!

Tim- here's the spread sheet with both data sets. DHHS is working with the data for their health evaluations, and we are working towards releasing data to the Health Dirs. and then the public for this afternoon. Jamie Kritzer has contacted the EPA PIOs so they are in the loop on the language. Should we have a statement that we did not use EPA sample containers on the first week and no QA sample?

We've realized that we have not taken a sample for EPA's analysis at Bladen Bluffs' finished water and at the Smithfields Food well. We have data from Test America.

> DHHS's advisory is based on exposure to finished water, so we would like to have analysis for the Bladen Bluff finished water and the Smithfields Food well. Can we make that happen next week? If the answer is not on Monday, just sometime ASAP next week?

Thanks.

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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HFPO-DA (GenX) Analysis June - July 2017

Fayetteville Location	06/19/2017 results ppt		06/26/2017 results ppt		07/03/2017 results ppt		07/12/2017 results ppt		7/17/2017 ppt		7/24/2017 ppt		QA Comments[1, 2, 3]
	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	
Hoffer WTP Raw	N/A	N/A	N/A	N/A		4							**EPA 7/03**: Below Limit of Quantiation (LOQ) of 10 ppt
Chemours outfall 002	39000	21760	19000	15250		21530							**TestAmerica 6/19:** 50X dilution, DUPs 41000 and 36000 [13% RPD], SURR RECs 45 and 48%, MS DNR, IS Low for DUP and MS **EPA 6/19:** 20X dilution **TestAmerica 6/26:** 50X dilution, DUPs 18000 and 21000 [15.4% RPD], MS DNR **EPA 6/26:** 20X dilution **EPA 7/03**: 20X dilution
Bladen Bluffs Raw	570	501	36	31		168							**EPA 6/19:** 5X dilution **TestAmerica 6/26:** SURR REC 33%, IS Low
Bladen Bluffs Raw Duplicate	590		33										
Bladen Bluffs Finished	790		76										**TestAmerica 6/19:** 2X dilution, SURR REC 14%, IS Low
Smithfield Foods Well Field	<10		<10										**TestAmerica 6/19:** SURR REC 9%, IS Low
Chemours Field Blank	<10		<10										

Wilmington Location	06/22/2017 results ppt		06/29/2017 results ppt		07/06/2017 results ppt		7/13/2017 results ppt		7/20/2017 ppt		7/27/2107 ppt		QA Comments[1, 2, 3]
	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	Test America	EPA RTP, NC	
International Paper Raw	810	703	73	41		158							**TestAmerica 6/22:** DUPs 810 and 810 [0%RPD], MS 101% **EPA 6/22:** 5X dilution **TestAmerica 6/29**: SURR REC 20%, IS Low

International Paper Raw DUP						162							
International Paper Finished	690	523	140	111		80							**TestAmerica 6/22:** SURR REC 45%, IS Low **EPA 6/22:** 5X dilution **TestAmerica 6/29**: SURR REC 19%, IS Low
NW Brunswick WTP Finished	910	695	51	52		125							**EPA 6/22**: 5X dilution **TestAmerica 6/29:** SURR REC 24%, IS Low
Pender Co. 421 WTP Finished	340	269	160	112		68							**TestAmerica 6/22:** SURR REC 8%, IS Low **EPA 6/22:** 5X dilution **TestAmerica 6/29:** SURR REC 43%, IS Low
LCFWSA Raw	830	629	67	72		119							**TestAmerica 6/22:** IS Low **EPA 6/22:** 5X dilution **TestAmerica 6/29:** SURR REC 24%, IS Low
CFPUA Sweeney Finished	1100	726	110	100		87							**EPA 6/22:** 5X dilution **TestAmerica 6/29**: SURR REC 40%, IS Low
CFPUA – ASR Well	820	588	400	336		148							**EPA 6/22**: 5X dilution **TestAmerica 6/29:** SURR REC 25 %, MS 118% REC, IS Low **EPA 6/29:** 2X dilution
Wrightsville Beach Well No. 11	26	27	24	28		24							**TestAmerica 6/22**: DUPs 26 and 25 **TestAmerica 6/29**: SURR REC 34%, IS Low
International Paper Raw Site Blank	<10		N/A										
Wrightsville Beach Well No. 11 Blank	<10		N/A										
EPA Trip Spike High	N/A		270										**TestAmerica 6/29:** HNO3 preserved; adj w/10% NH_4OH, SURR REC 24%, IS Low, Spike nominal value 200 ppt, 135% REC
EPA Trip Spike Low	N/A		95										**TestAmerica 6/29:** HNO3 preserved; adj w/10% NH_4OH, SURR REC 23%, IS Low, Spike nominal value 70 ppt, 136% REC
EPA Trip Blank	N/A		<10										**TestAmerica 6/29:** HNO3 preserved; adj w/10% NH_4OH, SURR REC 9%, IS Low
Trip Blank 9	N/A		<10										

QA samples (Blanks, Duplicate & Spikes)

[1] The TestAmerica laboratory performs an isotope dilution methodology which employs internal standards which are arestable isotopically labeled analogs of the target analytes added to the sample prior to extraction. Physical and chemical properties of each labeled compound are virtually the same as its unlabeled native analog, thus any losses of the target compound that may occur during sample preparation or determinative steps will be mirrored by a simlar loss of the labeled standard. A recovery correction is then applied to sample results.

[2] Except where noted the associated MB, low-level LCS, mid-level LCS/LCSD and MS recoveries were in control for TestAmerica data. QC data not yet reported for EPA.

[3] The internal standard/surrogate is added to samples prior to the extraction step.

To: linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]; Watkins, Tim[Watkins.Tim@epa.gov]; Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]
From: Goode, Teresa
Sent: Thur 7/13/2017 7:18:18 PM
Subject: Laboratory Results for GenX (Rounds 1-3) NC DEQ Cape Fear Watershed Sampling
Laboratory Results for GenX (Rounds 1-3) Cape Fear Watershed Sampling 7.13.2017.pdf

Good Afternoon,

Please see the attached. Hardcopies will also be distributed.

Thank you.

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

OFFICE OF
RESEARCH AND DEVELOPMENT

July 13, 2017

MEMORANDUM

SUBJECT: Laboratory Results for GenX (Rounds 1-3) NC DEQ Cape Fear Watershed Sampling

FROM: Timothy J. Buckley, Director
Exposure Methods and Measurements Division

THRU: Jennifer Orme-Zavaleta, Director

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

Per your request of June 9, 2017, I am pleased to provide you with the laboratory analysis results for the concentration of GenX in water samples collected by NC DEQ. These results are for the first three weeks of sampling. Samples were received by our laboratory on June 23rd, June 30th, and July 7th for each of these three rounds of weekly sampling. It is our understanding that we will be receiving and analyzing samples from additional rounds of sampling. Results from these additional sampling rounds will be reported separately as they become available. We will also report semi-quantitative concentrations of additional PFAS analytes in a later report.

Each round of sampling consisted of a number of sites selected by NC DEQ that included a variety of water types: effluent, source, drinking, and well waters. Sampling rounds 2 and 3 also included field blanks and spikes that were provided by our laboratory for quality control purposes. It is our understanding that duplicate samples were collected at each site. One of the duplicates was provided to our laboratory with the second sample being provided to a contract laboratory, Test America (Denver, Colorado), for GenX analysis. In rounds 2 and 3, Test America was also provided with field blanks and spikes that were prepared by our laboratory (round 2) and by an independent lab within EPA (round 3). Results from these QC samples will provide the basis for comparing our results with Test America. Our laboratory methods for this analysis are described in Sun *et al.*, 2016[1] and Strynar *et al.*, 2015[2].

---

[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

The following provides a brief summary of results.

- GenX was observed above our detection limit of 10 ng/L in all but one sample.
- GenX concentrations ranged from 4 ng/L (DWR 3 PO Hoffer WTP Raw Water) to 21,759 ng/L (DWR #1-Chemours Outfall).
- Some samples exceeded our calibration curve (particularly week 1 where this was the case for all but one sample). These samples were diluted and the analysis was repeated. The dilution procedure introduces some additional uncertainty in our quantification. We have flagged results for samples that required dilution.
- Quality control samples (included in rounds 2 & 3 only) indicated no field or laboratory contamination and results accurate with about 5% of the expected values. Specifically, QC samples showed:
    - GenX was not detected in either of the two field blanks (round 2 & 3)
    - Spiked field samples (n=4; round 2 & 3) were measured with an accuracy that ranged from 96.7 to 106 percent.

  Hence, we have high confidence in the concentration results reported here.

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 Dr. Mark Strynar and his laboratory conducting the analysis, his Branch Chief, 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.

Attachment

CC: Becky B. Allenbach, Acting Deputy Director
Water Protection Division, EPA Region 4 – Atlanta

Concentration of GenX Measured in Cape Fear Watershed Samples

Week	Location / Sample Identifier	Conc. (ng/L)	Flag
1	DWR #1- Chemours Outfall	21,760	1
1	DWR #2 - Bladen Bluffs Raw water intake	501	2
1	NC DEQ #1- LCFWSA	629	2
1	NC DEQ #2 - CFPUA Sweeny	726	2
1	NC DEQ #3 - CFPUA ASR well	588	2
1	NC DEQ #5 - International Paper Raw	703	2
1	NC DEQ #6 - International Paper Finished	523	2
1	NC DEQ #7 - NW Brunswick WTP finished	695	2
1	NC DEQ #8 - Pender County 421 WTP Finished	269	2
1	NC DEQ #4 - Wrightville Beach Well 11	27	
2	DWR #1 Chemours Outfall 002	15,250	1
2	DWR #2 Bladen Bluffs Raw water	31	
2	NCDEQ 1 LCFWSA Raw water	72	
2	NCDEQ 2 Sweeny Finished	100	
2	NCDEQ 3 ASR well	336	3
2	NCDEQ 4 Wrightsville Beach Well #11	28	
2	NCDEQ 5 International Paper Raw water	41	
2	NCDEQ 6 International Paper Finished water	111	
2	NCDEQ 7 NW Brunswick WTP Finished	52	
2	NCDEQ 8 Pender WTP Finished	112	
3	DWR 1 Chemours Outfall 002	21,530	1
3	DWR 2 Bladen Bluffs Raw water	168	
3	DWR 3 PO Hoffer WTP Raw Water	4	4
3	NCDEQ 1 LCFWSA Raw	119	
3	NCDEQ 2 Sweeny Finished	87	
3	NCDEQ 3 ASR Well	148	
3	NCDEQ 4 Wrightsville Beach Well #11	24	
3	NCDEQ 5 International Paper Raw	158	
3	NCDEQ 5 International Paper Raw DUPLICATE	162	
3	NCDEQ 6 International Paper Finished	80	
3	NCDEQ 7 NW Brunswick WTP Finished	125	
3	NCDEQ 8 Pender CO 421 WTP Finished	68	

Flag

1 Sample diluted 20X; diluted sample still exceeded calibration
2 Sample diluted 5X
3 Sample diluted 2X
4 Below limit of quantitation

To: Buckley, Timothy[Buckley.Timothy@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]
Cc: Gregson, Jim[jim.gregson@ncdenr.gov]
From: Culpepper, Linda
Sent: Wed 7/12/2017 7:26:34 PM
Subject: FW: Sampling Results
Final282218_manual_11-JUL-17.pdf
Final_tmplt_537PPTGENX_manual_11-JUL-17.pdf
BCPUD COC.PDF
COC_OA_282218.pdf

Per our conversation.

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: John Nichols [mailto:John.Nichols@brunswickcountync.gov]
Sent: Tuesday, July 11, 2017 4:45 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Glenn Walker <Glenn.Walker@brunswickcountync.gov>; Ann Hardy <Ann.Hardy@brunswickcountync.gov>; Moore, Zack <zack.moore@dhhs.nc.gov>
Subject: Sampling Results

Linda,

This is to make you aware that we have received some sampling results from samples collected on June 29 (enclosed) and a press release will be forthcoming. I have recommended some verbiage to our PIO (below). Please do not hesitate to contact me regarding the results. We look forward to working with you as this issue moves forward. Thank you for all of your efforts in our behalf.

Regards,

John Nichols, PE, CPESC
Director
Brunswick County Public Utilities
PO Box 249
Bolivia, NC 28422

Utility Operations Center
250 Grey Water Road NE
Supply, NC 28462

910-253-2653 phone
910-253-5776 fax

Based on samples taken by Dr. Detlef Knappe and others in August 2014, but not published until November 2016, levels of a Perfluoroalkyl Ether Carboxylic Acid (PFECA) known as GENX and similar PFECAs were found in the Cape Fear River and in drinking water produced by the Cape Fear Public Utility Authority. Average levels of GENX found in the Cape Fear River on August 14, 2014 were 631 nanograms per Liter (631 parts per trillion). The median value was 304 nanograms per Liter. Additional testing of Cape Fear Public Utilities water within the treatment process indicated that there was not significant removal of GENX during the treatment process. Dr. Knappe's team did not test the Brunswick County treated water supply at that time so there was no confirmation of GENX within Brunswick County's treated water. Although the treatment process at Brunswick County's Northwest Water Treatment Plant varies significantly from Cape Fear Public Utilities Sweeney Water Treatment Plant, it is generally thought

that traditional water treatment methods will have only limited success in removing GENX.

The Division of Environmental Quality, in cooperation with various regional utilities, began testing raw water and finished water at multiple locations beginning the week of June 19, 2017 to determine the levels of GENX and other similar Perfluoroalkyl Ether Carboxylic Acids (PFECAs) and Perfluoroalkyl substances (PFAs). Additional information on this testing can be found at https://deq.nc.gov/deq-starting-water-quality-sampling-genx-cape-fear-river. Samples were taken at Brunswick County's Northwest Water Treatment Plant of both the raw water and the finished water on June 22, June 29th, and July 6th by DEQ staff. Additionally, in order to serve as additional sampling validation, Brunswick County staff took separate samples on June 29th and July 6th along with DEQ staff. The samples taken by Brunswick County staff were sent to a different laboratory than that used by DEQ staff.

Brunswick County has received the laboratory sample results from samples taken on June 29th. The levels of GENX found in the raw water were 36.8 Parts Per Trillion. The levels found in the finished water were 32.8 Parts Per Trillion. It is normal to see some variation in samples since they are two different volumes of water and due to the extreme level of analysis performed (parts per trillion). To provide a sense of how much a nanogram per Liter (Part Per Trillion) represents, some references indicate that a part per trillion is equivalent to one drop of water (0.05 mL) diluted into 20 olympic sized swimming pools (2500 m^3), or about three seconds out of every one hundred thousand years.

According to a release by the NC Department of Health and Human Services, "There are no U.S. regulatory guideline levels for GENX. However, as part of the European chemical registration, a 2-year chronic toxicity and cancer study with rats was performed. They reported a Derived No Effect Level (DNEL) of 0.01 mg/kg bw/day. Based on U.S. risk assessment calculations, this corresponds to a concentration in drinking water of 70,909 ng/L of GENX — more than 100 times greater than the mean value of 631 ng/L detected in the Cape Fear River. Based upon these data, the GENX levels detected in 2013-2014 would be expected to pose a low risk to human health." The average level of 32.8 Parts Per Trillion from Brunswick County's June 29, 2017 samples are 19 times lower than the August 2014 samples.

Officials from NC DHHS and the Department of Environmental Quality (DEQ) are working with the EPA to learn more, and it is expected that later this week or early next week the samples from DEQ will be available along with additional information on Health Risk Levels from the North Carolina Division of Health and Human Services.

The full listing of June 29, 2017 sampling results are included below. Sampling was performed in accordance with EPA Method 571.

Constituent	Raw Water Sample	Finished Water Sample	Percent Reduction
perfluorobutanesulfonic acid (PFBS)	ND	ND	-
perfluorohexanoic acid (PFHxA)	11.6	8.91	23%
perfluoro-2-propoxypropanoic acid (GenX)	36.8	32.8	11%
perfluoroheptanoic acid (PFHpA)	10.7	5.74	46%
perfluorohexanesulfonic acid (PFHxS)	4.68 *	ND	100%
perfluorooctanoic acid (PFOA)	9.99	4.88	51%
perfluorononanoic acid (PFNA)	2.22 *	ND	100%
perfluorooctanesulfonic acid (PFOS)	14.3	5.22 *	63%
perfluorodecanoic acid (PFDA)	1.56 *	ND	100%
perfluoroundecanoic acid (PFUnA)	ND	ND	-

perfluorododecanoic acid (PFDoA)	ND	ND	-
perfluorotridecanoic acid (PFTrDA)	ND	ND	-
perfluorotetradecanoic acid (PFTA)	ND	ND	-

* The known standard does not read this low but the result is above the minimum detection limit of the equipment

ND - Non Detectable

PPT - Parts Per Trillion = Nanograms per Liter

The combined Health Risk Advisory level for PFOS and PFOA is 70 Parts Per Trillion. The combined amount found in the finished water sample was 10.1 Parts Per Trillion. Brunswick County will provide additional information as it becomes available.

Analytical & Consulting Chemists

ENVIRONMENTAL CHEMISTS, INC

NCDENR: DWQ CERTIFICATION # 94 NCDHHS: DLS CERTIFICATION # 37729

6602 Windmill Way Wilmington, NC 28405
OFFICE: 910-392-0223 FAX 910-392-4424
info@environmentalchemists.com

COLLECTION AND CHAIN OF CUSTODY

CLIENT: Brunswick County PUD	PROJECT NAME: Gen X + Compounds	REPORT NO: 17-9264
ADDRESS: PO Box 249	CONTACT NAME: Glenn Walker	PO NO:
Bolivia, NC 28422	REPORT TO: Glenn Walker	PHONE/FAX: 910-371-3490
	COPY TO:	email: glenn.walker@brunswickcountync.gov

Sampled By: Glenn Walker

SAMPLE TYPE: I = Influent, E = Effluent, W = Well, ST = Stream, SO = Soil, SL = Sludge, Other:

Sample Identification	Collection Date	Collection Time	Collection Temp	Sample Type	Composite or Grab	Container (P or G)	Chlorine mg/L	LAB ID NUMBER	PRESERVATION NONE	HCL	H2SO4	HNO3	NAOH	THIO	OTHER	ANALYSIS REQUESTED
SO1	6/29/17	1100	26.2		C	P		22157							✓	EPA 537 + GenX
					G	G										
EO1	6/29/17	1100	26.2		C	P		22158							✓	EPA 537 + GenX
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										
					C	P										
					G	G										

Transfer	Relinquished By:	Date/Time	Received By:	Date/Time
1.	Glenn Walker	6/29/17 - 1159am		
2.				

Temperature when Received: 5°C Accepted: ✓ Rejected: Resample Requested:

Delivered By: Received By: Date: 6/29/17 Time: 12:00 p

Comments: TURNAROUND:

ED_002003J_00022954-00001

SAMPLE COLLECTION AND CHAIN OF CUSTODY RECORD

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue • Crandon, WI 54520-1298
Tel: (715) 478-2777 • Fax: (715) 478-3060

Wisconsin DNR cert ID
721026460 (Cran) / 268533760 (Wauk)
Wisconsin DATCP ID
105-000330 (Cran) / 105-000479 (Wauk)

CLIENT	Environmental Chemist
ADDRESS	6602 Windmill Way
CITY	Wilmington
STATE	NC
ZIP	28405
PROJECT DESCRIPTION / NO.	
QUOTATION NO.	
DNR FID #	
DNR LICENSE #	
CONTACT	
PHONE	
PURCHASE ORDER NO.	
FAX	

MATRIX:
SW = surface water
WW = waste water
GW = groundwater
DW = drinking water
TIS = tissue
AIR = air
SOIL = soil
SED = sediment
PROD = product
SL = sludge
OTHER

USE BOXES BELOW: Indicate Y or N if GW Sample is field filtered.
Indicate G or C if WW Sample is Grab or Composite.

ANALYZE PER ORDER OF ANALYSIS: EPA 537 Plus Gen X

NO. 192202

ITEM NO.	NLS LAB. NO.	SAMPLE ID	COLLECTION DATE	COLLECTION TIME	MATRIX (See above)	ANALYZE PER ORDER OF ANALYSIS	COLLECTION REMARKS (i.e. DNR Well ID #)
1.	1001475-76	17-22157	6/29/17	11:00	W		ONE REPORT
2.	1001477-78	17-22158	6/29/17	11:00	W		↓
3.		17-22146	6/28/17	13:05	W		seperate report
4.		17-22147	6/28/17	13:10	W		seperate report
5.		17-22145	6/28/17	13:00	W		seperate report
6.		17-21745 / 21757 (6/29/17 54)	6/27/17	9:00	W		seperate report
7.		17-21641	6/27/17	120:01	W		seperate report
8.							
9.							
10.							

COLLECTED BY (signature): Customers	CUSTODY SEAL NO. (IF ANY)	DATE/TIME
RELINQUISHED BY (signature): [signature]	RECEIVED BY (signature)	DATE/TIME
DISPATCHED BY (signature)	METHOD OF TRANSPORT: UPS	DATE/TIME

REPORT TO

INVOICE TO

RECEIVED AT NLS BY (signature): [signature]	DATE/TIME: 6/30/17 @ 1030	CONDITION: Good	TEMP.: 6.0 °C
COOLER #	REMARKS & OTHER INFORMATION		
	WDNR FACILITY NUMBER	E-MAIL ADDRESS	

PRESERVATIVE:
NP = no preservative
S = sulfuric acid
N = nitric acid
Z = zinc acetate
M = methanol
OH = sodium hydroxide
HA = hydrochloric & ascorbic acid
H = hydrochloric acid

IMPORTANT:
1. TO MEET REGULATORY REQUIREMENTS, THIS FORM **MUST** BE COMPLETED IN DETAIL AND INCLUDED IN THE COOLER CONTAINING THE SAMPLES DESCRIBED.
2. PLEASE USE ONE LINE PER SAMPLE, **NOT** PER BOTTLE.
3. RETURN THIS FORM WITH SAMPLES - CLIENT MAY KEEP YELLOW COPY.
4. PARTIES COLLECTING SAMPLE, LISTED AS **REPORT TO** AND LISTED AS **INVOICE TO** AGREE TO STANDARD TERMS & CONDITIONS ON REVERSE.

Rev. 7/20/15

ANALYTICAL RESULTS: Perfluorinated Chemicals by EPA 537 Rev 1.1 Safe Drinking Water Analysis
Customer: Environmental Chemists NLS Project: 282218
Project Description: PFCs with GenX
Project Title: 17-22157 & 17-22158 Template: 537PPTGENX Printed: 07/11/2017 13:04

Sample: 1001475 17-22157 Collected: 06/29/17 Analyzed: 07/07/17 - Analytes: 13

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	MCL	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt	1	6.6	21		
perfluorohexanoic acid (PFHxA)	11.6	ppt	1	1.3	4.0		
perfluoro-2-propoxypropanoic acid (GenX)	36.8	ppt	1	0.73	2.3		
perfluoroheptanoic acid (PFHpA)	10.7	ppt	1	0.80	2.6		
perfluorohexanesulfonic acid (PFHxS)	[4.68]	ppt	1	2.8	8.8		J
perfluorooctanoic acid (PFOA)	9.99	ppt	1	1.2	3.9		
perfluorononanoic acid (PFNA)	[2.22]	ppt	1	1.5	4.9		J
perfluorooctanesulfonic acid (PFOS)	14.3	ppt	1	1.7	5.3		
perfluorodecanoic acid (PFDA)	[1.56]	ppt	1	0.90	2.7		J
perfluoroundecanoic acid (PFUnA)	ND	ppt	1	1.0	3.0		
perfluorododecanoic acid (PFDoA)	ND	ppt	1	1.9	6.1		
perfluorotridecanoic acid (PFTrDA)	ND	ppt	1	3.2	10		
perfluorotetradecanoic acid (PFTA)	ND	ppt	1	2.8	8.9		
C13-PFHxA (SURR)	72.072%						S
C13-PFDA (SURR)	87.595%						S

NOTES APPLICABLE TO THIS ANALYSIS:
J = Result enclosed in brackets is between LOD and LOQ, a region of less certain quantitation.
S = This compound is a surrogate used to evaluate the quality control of a method.

Sample: 1001477 17-22158 Collected: 06/29/17 Analyzed: 07/05/17 - Analytes: 13

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	MCL	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt	1	6.6	21		
perfluorohexanoic acid (PFHxA)	8.91	ppt	1	1.3	4.0		
perfluoro-2-propoxypropanoic acid (GenX)	32.8	ppt	1	0.73	2.3		
perfluoroheptanoic acid (PFHpA)	5.74	ppt	1	0.80	2.6		
perfluorohexanesulfonic acid (PFHxS)	ND	ppt	1	2.8	8.8		
perfluorooctanoic acid (PFOA)	4.88	ppt	1	1.2	3.9		
perfluorononanoic acid (PFNA)	ND	ppt	1	1.5	4.9		
perfluorooctanesulfonic acid (PFOS)	[5.22]	ppt	1	1.7	5.3		J
perfluorodecanoic acid (PFDA)	ND	ppt	1	0.90	2.7		
perfluoroundecanoic acid (PFUnA)	ND	ppt	1	1.0	3.0		
perfluorododecanoic acid (PFDoA)	ND	ppt	1	1.9	6.1		
perfluorotridecanoic acid (PFTrDA)	ND	ppt	1	3.2	10		
perfluorotetradecanoic acid (PFTA)	ND	ppt	1	2.8	8.9		
C13-PFHxA (SURR)	79.032%						S
C13-PFDA (SURR)	87.733%						S

NOTES APPLICABLE TO THIS ANALYSIS:
J = Result enclosed in brackets is between LOD and LOQ, a region of less certain quantitation.
S = This compound is a surrogate used to evaluate the quality control of a method.

The PFOA branch isotope peak is included in the PFOA calculation per EPA directive.

ANALYTICAL RESULTS: Perfluorinated Chemicals by EPA 537 Rev 1.1 Safe Drinking Water Analysis
Customer: Environmental Chemists NLS Project: 282218
Project Description: PFCs with GenX
Project Title: 17-22157 & 17-22158 Template: 537PPTGENX Printed: 07/11/2017 13:04

Sample: 1001478 17-22158 FB Collected: 06/29/17 Analyzed: 07/07/17 - Analytes: 13

ANALYTE NAME	RESULT	UNITS WWB	DIL	LOD	LOQ	Note
perfluorobutanesulfonic acid (PFBS)	ND	ppt	1	6.6	21	
perfluorohexanoic acid (PFHxA)	ND	ppt	1	1.3	4.0	
perfluoro-2-propoxypropanoic acid (GenX)	ND	ppt	1	0.73	2.3	
perfluoroheptanoic acid (PFHpA)	ND	ppt	1	0.80	2.6	
perfluorohexanesulfonic acid (PFHxS)	ND	ppt	1	2.8	8.8	
perfluorooctanoic acid (PFOA)	ND	ppt	1	1.2	3.9	
perfluorononanoic acid (PFNA)	ND	ppt	1	1.5	4.9	
perfluorooctanesulfonic acid (PFOS)	ND	ppt	1	1.7	5.3	
perfluorodecanoic acid (PFDA)	ND	ppt	1	0.90	2.7	
perfluoroundecanoic acid (PFUnA)	ND	ppt	1	1.0	3.0	
perfluorododecanoic acid (PFDoA)	ND	ppt	1	1.9	6.1	
perfluorotridecanoic acid (PFTrDA)	ND	ppt	1	3.2	10	
perfluorotetradecanoic acid (PFTA)	ND	ppt	1	2.8	8.9	
C13-PFHxA (SURR)	101.218%					S
C13-PFDA (SURR)	116.432%					S

NOTES APPLICABLE TO THIS ANALYSIS:
S = This compound is a surrogate used to evaluate the quality control of a method.

NORTHERN LAKE SERVICE, INC.
Analytical Laboratory and Environmental Services
400 North Lake Avenue - Crandon, WI 54520
Ph: (715)-478-2777 Fax: (715)-478-3060

ANALYTICAL REPORT

WDNR Laboratory ID No. 721026460
WDATCP Laboratory Certification No. 105-330
EPA Laboratory ID No. WI00034

NLS Project: 282218
NLS Customer: 96259

Fax: 910 392 4424 Phone: 910 392 0223

Client: Environmental Chemists
Attn: Ray Porter
6602 Windmill Way
Wilmington, NC 28405

Project: PFCs with GenX 17-22157 & 17-22158

17-22157 NLS ID: 1001475
COC: 192202:1 Matrix: DW
Collected: 06/29/17 11:00 Received: 06/30/17

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Solid Phase Extraction by EPA Method 537	yes					07/04/17	EPA 537	721026460
GenX and PFCs by EPA 537	see attached					07/06/17	EPA 537	721026460

17-22157 FB NLS ID: 1001476
COC: 192202:1 Matrix: FB
Collected: 06/29/17 11:00 Received: 06/30/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Solid Phase Extraction by EPA Method 537	not analyzed					07/06/17	EPA 537	721026460
GenX and PFCs by EPA 537	not analyzed					07/06/17	EPA 537	721026460

17-22158 NLS ID: 1001477
COC: 192202:2 Matrix: DW
Collected: 06/29/17 11:00 Received: 06/30/17

Parameter	Result	Units	Dilution	LOD	LOQ/MCL	Analyzed	Method	Lab
Solid Phase Extraction by EPA Method 537	yes					07/04/17	EPA 537	721026460
GenX and PFCs by EPA 537	see attached					07/05/17	EPA 537	721026460

17-22158 FB NLS ID: 1001478
COC: 192202:3 Matrix: FB
Collected: 06/29/17 11:00 Received: 06/30/17

Parameter	Result	Units	Dilution	LOD	LOQ	Analyzed	Method	Lab
Solid Phase Extraction by EPA Method 537	yes					07/06/17	EPA 537	721026460
GenX and PFCs by EPA 537	see attached					07/07/17	EPA 537	721026460

Values in brackets represent results greater than or equal to the LOD but less than the LOQ and are within a region of "Less-Certain Quantitation". Results greater than or equal to the LOQ are considered to be in the region of "Certain Quantitation". LOD and/or LOQ tagged with an asterisk(*) are considered Reporting Limits. All LOD/LOQs adjusted to reflect dilution and/or solids content.

ND = Not Detected (< LOD) LOD = Limit of Detection LOQ = Limit of Quantitation NA = Not Applicable
DWB = Dry Weight Basis %DWB = (mg/kg DWB) / 10000 1000 ug/L = 1 mg/L
MCL = Maximum Contaminant Levels for Drinking Water Samples. Shaded results indicate >MCL.

Reviewed by:

Authorized by:
R. T. Krueger
President

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
From: Allenbach, Becky
Sent: Wed 7/12/2017 1:39:59 PM
Subject: FW: GenX Levels

This is the info I was referring to.....

Becky B. Allenbach, Acting Deputy Director
Water Protection Division
EPA Region 4 - Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

From: Hall, Renea
Sent: Wednesday, July 12, 2017 8:26 AM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>
Cc: Kemker, Carol <Kemker.Carol@epa.gov>; Lincoln, Larry <Lincoln.Larry@epa.gov>
Subject: GenX Levels

All,

I can't tell if you received this email by the way it was sent. If so, I apologize.

From: Jim Flechtner <jim.flechtner@cfpua.org>
Sent: Tuesday, July 11, 2017 5:56 PM
Subject: FW: GenX Levels

Below is information concerning CFPUA test results of GenX levels. We will put out a press release this evening. Thanks for your continued support and assistance.

Regards,

Jim

From: Jim Flechtner
Sent: Tuesday, July 11, 2017 4:41 PM
To: Board <Board@cfpua.org>
Cc: Department Heads (DepartmentHeads@cfpua.org) <DepartmentHeads@cfpua.org>; 'Linda Miles Firm (Personal Email / Ex. 6)' <Personal Email / Ex. 6>
Subject: GenX Levels

Board,

As you are aware, CFPUA has been sampling raw and finished water at the Sweeney plant to measure levels of GenX. This afternoon, we received the first batch of results, which are shown below.

6/26 Raw: 149 parts per trillion (ppt)
6/26 Finished: 156 ppt

6/28 Raw: 88 ppt
6/28 Finished: 120 ppt

6/30 Raw: 69 ppt
6/30 Finished: 90 ppt

7/3 Raw: 56 ppt
7/3 Finished: 55 ppt

7/5 Raw: 94 ppt
7/5 Finished: 87 ppt

It's useful to note that Chemours reported it stopped discharging GenX on June 21. Estimates are that streamflow from the Chemours plant to our intake is about 2 days with another day from Kings Bluff to Sweeney. The raw water numbers are substantially below the 631 ppt level reported in Dr Knappe's study. It's not unexpected to see levels bounce around as the river flushes GenX over the next months.

We should be careful not to compare raw and finished water levels since the samples were not an attempt to coordinate the timing of flow through the plant. Simply put, we didn't try to sample the same water slug going into the plant and coming out of the plant—the raw and finished samples were just taken on the same day.

The numbers are also below the current NCDHHS Derived No Effect Level of 70,909 ppt. Based upon discussions with DEQ and DHHS on Monday, DEQ anticipates having its first two weeks of sampling available for release to the public later this week and DHHS anticipates providing an updated health advisory for release to the public later this week

We are drafting a release so the public will also have these results. As DEQ and others provide results from their tests, we will forward that as well. Please let me know if you have questions or need more information. Thanks.

Jim

To: Allenbach, Becky[Allenbach.Becky@epa.gov]; Holman, Sheila[sheila.holman@ncdenr.gov]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]; Kavlock, Robert[Kavlock.Robert@epa.gov]
From: Orme-Zavaleta, Jennifer
Sent: Thur 6/29/2017 11:48:09 AM
Subject: FW: Forum on GenX and Water Quality

Morning!

Please see request below requesting that our led chemist on GenX participate on a panel. I wanted to check with you to see if you also received this request and whether you are comfortable with our participation on this.

Let me know and thanks!

jennifer

Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
USEPA Office of Research and Development
109 TW Alexander Dr MC 305-01
RTP, NC 27711

Personal Phone / Ex. 6
orme-zavaleta.jennifer@epa.gov

From: Tyler Wittkofsky [mailto:twittkofsky@h2goonline.com]
Sent: Wednesday, June 28, 2017 3:24 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>
Subject: Forum on GenX and Water Quality

Good afternoon Dr. Strynar,

My name is Tyler Wittkofsky. I am the Public Information Officer with Brunswick Regional Water and Sewer H2GO, a water provider that serves most of northern Brunswick County. Since the breaking news of GenX and other contaminates found in our drinking water supply (The Cape Fear River), there have been two forums on the issue of the quality of our drinking water in New Hanover County, however there have been none in Brunswick County. As a native of Brunswick County and an employee of a local water utility, I want to bring a forum to Brunswick County so that our residents can learn about it without having to travel across the bridge.

The reason for my email today is to see if you would be interested in participating in a forum to discuss the study and the water quality of our drinking water supply. I am only in the planning stages, but I want to gauge the interest of potential panelists. I want the panel to consists of experts and focus on the issue at hand and not turn political. I will be reaching out to potential panelists in the forthcoming days and when I have an idea of the interest of those willing to participate, I will be working on getting available dates for our venue and finding out the availabilities of the panelists according to the venues openings. I hope to fast-track this forum to come within a few weeks, if not sooner.

Please let me know your interest in participating at your earliest convenience and we will go from there.

Thank you for your time,

Tyler Wittkofsky, PIO
Brunswick Regional Water & Sewer H2GO
Office: 910-371-9949 ext. 108
Mobile: Personal Phone / Ex. 6
Web: www.h2goonline.com
Like us on Facebook!

Follow us on Twitter!
Link with us on LinkedIn!

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To: Johnson, Chris[chris.johnson@ncdenr.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Karoly, Cyndi[cyndi.karoly@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Tong-Argao, Sania
Sent: Wed 6/28/2017 4:18:16 PM
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

Hi Chris,

Thank you for sharing your field sampling SOP with us. Mark will be able to reference it in his QAPP. No problem about not having a project plan associated with the project. For any modifications made to the field sampling SOP (e.g., the augmentation that you may be doing based on what Andrew Lindstrom sent), just be sure to document those changes so it's clear how samples were collected.

A point of clarification, Mark will be writing a QAPP as per EPA policy using the Decatur, Alabama document as reference. I spoke with him this morning about it. I am not expecting a QAPP from NC DEQ. A QA project plan is documentation of a study's plan. Since sample collection has already commenced, what would be helpful to Mark would be documentation of the 'what' and 'how' of sample collection by NC DEQ. Any information that may speak to what samples were collected and how they were collected, sample integrity, site characteristics that may affect the samples, chain-of-custody procedures, etc. can be included. This isn't a QAPP, but documentation about the sample collection portion of the project that may or may not have an effect on sample analysis or sample analysis outcomes. I hope this clarification helps so there is no unnecessary duplication of efforts.

Thanks,
Sania
(919) 541-1397

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Wednesday, June 28, 2017 10:39 AM
To: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

The most recent field sampling SOP is attached. This is the basis for field sampling activities in the Intensive Survey Branch. We are augmenting with information in the documentation provided by Andrew Lindstrom. There is no project plan associated with this work to my knowledge. If someone in the Division office has access to this sort of documentation, perhaps Linda could provide information in that regard.

We are preparing to create a QAPP based on the Georgia document discussed during our conference call yesterday. I imagine that Mark is in transit back from the Athens lab and can provide info when he gets opportunity.

Thank you.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Tong-Argao, Sania [mailto:Tong-Argao.Sania@epa.gov]
Sent: Tuesday, June 27, 2017 3:29 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

Hello Chris - Thank you for your reply and thanks to Linda for the supplied information as well. Due the nature of this project having the urgent need to collect samples immediately and in a short timeframe, it is understood that a formal QA project plan will be developed as soon as practical. I will be helping Mark with this, and he will incorporate the fact that NC DEQ has an existing SOP that is being used for sample collection. A copy of the NC DEQ SOP used for sample collection will be appreciated when it's available. Can you provide the title of the SOP so that Mark can reference it? Also, although you don't have a formal project plan for this project, is there any project plan that you are following (even if it's not specific to this particular project)? If so, a reference (e.g., title and approval date) and copy of it would be great. Other than that, I believe Mark has the info needed for development of the QA documentation on EPA's end.

Mark – As discussed, we'll meet tomorrow to work on the QA planning documentation for this project. We should be able to walk through the QAPP elements and get something together so that you can move forward with the sample analyses in a timely manner.

Thanks,
Sania
541-1397

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Monday, June 26, 2017 2:03 PM
To: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

Sania, I am forwarding responses from Linda Culpepper below (in red) that will hopefully be of aid to Mark.

We do not have a formal project plan for this project. Our existing SOPs are used during our sampling events. I forwarded a copy of the EPA sampling plan, sent to me last week by Andrew Lindstrom, to the two regional offices when the EPA sampling kits were delivered. I also forwarded your bullet points regarding information to be included on the field sheets. The regional samplers were asked to follow the EPA plan as closely as possible during weeks two and three. We are putting together an outline of our sampling protocol at this time. David Huffman, the QA officer in the Water Quality Section is helping put this together and it will be forwarded to you when complete. We hope that this can suffice as an addendum to the existing QAPP for your laboratory. If insufficient, we can craft formal documentation based on these notes. If that is needed, it would be helpful to see the format that EPA uses for QAPPs. Our existing sampling SOP is many years old and is currently being updated by the new WQ QA officer. The procedure is unchanged in essence, but equipment brands, etc., are being edited and the SOP is currently in preliminary draft form.

If I've misunderstood any of your questions or haven't addressed them to your satisfaction, let me know and I will work on them further.

It was a pleasure to meet all of you on Friday and I hope to get back to the facility when there is less urgency of timing than was the case that day.

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: Tong-Argao, Sania [mailto:Tong-Argao.Sania@epa.gov]
Sent: Friday, June 23, 2017 2:11 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Hello Mark and Chris,

Thank you for bringing this to my attention and for reaching out to make sure that proper QA documentation is in place. Please see below for my thoughts and follow up questions.

- I agree with Mark that it's important to include the quality control (QC) samples such as trip blanks and spikes whenever possible.
- **Question from Chris**: *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?*

Sania's reply: I understand that the NC DEQ is responsible for sample collection whereas EPA is responsible for sample analysis.

Chris - *Can you please confirm that the 'standard sampling procedure' will be the standard operating procedure (SOP) used to collect samples? Also, is there a separate QAPP that outlines the other aspects of the particulars of this project (e.g., the who, what, when, where, and why of the project)? Please do send copy of both the NC DEQ standard sampling procedure as well as QAPP so that we may have a copy of the documentation that reflects the QA plan for the sample collection portion of the project.*

Note that the EPA requirement for QA project plans (QAPPs) is to have an approved QAPP in place prior to the start of sample collection and/or sample analysis. QAPPs are project specific so that the who, what, when, where, why, and how of a project can be documented as the plan to follow for a particular project. This doesn't mean that things won't or can't change. The key is to document the plan prior to the start of the project via an approved QAPP and to be sure to document any changes to the plan during the project.
In this case, the scope of EPA's work is with the sample analysis only. It is understood that NC DEQ is responsible for the sample collection and that NC DEQ has their own SOP and QAPP associated with the project (to be confirmed after receipt of these documents). *To help ensure QA documentation is complete on EPA's side of the house, I recommend an addendum to Mark's existing QAPP.* As Mark stated, the NC DEQ standard sampling procedure as well as existing QAPP can be referenced, and any detail that is unique to this project can also be outlined in the addendum for sample analysis such as reference to the specific analysis SOPs to be used.

Mark - To give you an idea of what info to include in the addendum, below is a brief list. Please let me know if you'd like to discuss what to include.

Why (Project Background) – Why is this project being conducted? Basically, what's the issue at hand and what do you want to accomplish (i.e., project goals/objectives)?

Project is being conducted to determine current values for GenX and related constituents in the Cape Fear River Basin sampling points as follow up to replicate analysis conducted by Sun et. al. reported in 2016 with Dr. Knappe and Mark Strynar. Sampling and analysis conducted in 2013-2014 indicated the presence of GenX thought to be released by the Chemours chemical manufacturing plant in Fayetteville, NC along with several other constituents. NC Department of Health and Human Services is in need of current data on the level of GenX 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 ether constituents will be used to compare past levels with current concentrations as health studies continue to be evaluated.
What/When/Where (Project Description) - Summarize work to be performed and expected products. What is the project schedule? Where are samples going to be collected, what types of samples are going to be collected, and how many samples do you plan to collect? You will want to specify NC DEQ's specific role and EPA's specific role in the project (i.e., EPA is receiving samples from NC DEQ who will follow their own protocols and QA plans.).

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. 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.

How (Sampling Methods/Sample Handling & Custody/Analytical Methods/Data Management) – Reference relevant SOPs.

Hope this helps,
Sania
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Sania W. Tong Argao
Quality Assurance Manager
Exposure Methods & Measurement Division (EMMD)
National Exposure Research Laboratory
U.S. EPA - Office of Research & Development

109 T.W. Alexander Drive, MD: E205-01
Research Triangle Park, NC 27711
Phone: (919) 541-1397 Fax: (919) 541-0239
E-mail: Tong-Argao.Sania@epa.gov
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

From: Strynar, Mark
Sent: Friday, June 23, 2017 7:08 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

I will let our QA staff answer that question for you. We have a QAPP that covers lab analysis. Also we have analysis SOPs referenced in our QAPP. I believe they would like to reference your QAPP, perhaps generic, and sampling SOP in our QAPP if it exists.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 9:47 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
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

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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

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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**

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Cc: King, Morella s[morella.sanchez-king@ncdenr.gov]; Brantley, Mark[mark.brantley@ncdenr.gov]
From: Johnson, Chris
Sent: Thur 6/22/2017 1:13:47 PM
Subject: RE: Wilmington GenX Sampling/Analysis

Added / updated list of participants from NC DEQ/DWR.

Mark Brantley / Fayetteville Regional Office
Morella King / Wilmington Regional Office
Nick Jones / DWR-WSS Laboratory QAQC Officer

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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- EPA/ORD/NERL: Tim Buckley; Mark Strynar; Myriam Medina-Vera; Andy Lindstrom

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- Mark Strynar and Tim Buckley will be visiting R4 Athens lab 6/26 & 27 to provide tech transfer on GenX analysis

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

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]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; Perez, Helen l[helen.perez@ncdenr.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Brantley, Mark[mark.brantley@ncdenr.gov]; King, Morella s[morella.sanchez-king@ncdenr.gov]
From: Jones, Nick
Sent: Thur 6/22/2017 1:01:03 PM
Subject: RE: Wilmington GenX Sampling/Analysis

Also, in attendance for NC DEQ was Morella King, Nick Jones, and that Mark ? is Mark Brantley.

Regards,

Nick Jones
Quality Assurance Officer
WW/GW Laboratory
North Carolina Department of Environmental Quality/Division of Water Resources

(919) 733-3908 ext. 232 office
nick.jones@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

From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Thursday, June 22, 2017 8:31 AM
To: 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>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Jones, Nick <nick.jones@ncdenr.gov>; Perez, Helen l <helen.perez@ncdenr.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
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Email: buckley.timothy@epa.gov
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From: Johnson, Chris
Sent: Thur 6/22/2017 12:52:41 PM
Subject: RE: Wilmington GenX Sampling/Analysis

Also, I am the point of contact for the DEQ/Division of Water Resources Laboratory. I do not have the authority to speak for NC DEQ as a whole.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Johnson, Chris
Sent: Thur 6/22/2017 12:51:27 PM
Subject: RE: Wilmington GenX Sampling/Analysis

I wanted to clarify Linda Culpepper's role. She is Deputy Director of our Division. The QAPP was being discussed by committee at the headquarters and I am unsure as to the contact person for that discussion. I believe this same group would have also been discussing the sampling plan along with regional personnel.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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Cc: Jones, Nick[nick.jones@ncdenr.gov]; Perez, Helen I[helen.perez@ncdenr.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]
From: Lindstrom, Andrew
Sent: Tue 6/20/2017 6:57:10 PM
Subject: RE: Discussion for sampling and analysis in Wilmington
Field Sample Collection EMAB-113-0.pdf

All,

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Please let us know if you have any questions.

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Sent: Tuesday, June 20, 2017 1:20 PM
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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**

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To: Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Ryan, Jeff[Ryan.Jeff@epa.gov]
From: Pjetraj, Michael
Sent: Fri 5/18/2018 8:06:38 PM
Subject: Conference call with EPA ORD on PFAS/GenX

Tim,
Thanks for the meeting earlier this week. I think that our agencies have a lot to offer each other on this topic & I really look forward to future communications.
I would like to suggest a conference call on 5/29 from 2-3pm. I've scanned our team's schedules and that time looks very good.

Please let me know your availability.

From there, we can schedule standing bi-weekly meetings & have one-off meetings as needed.

Thanks
Michael

Michael Pjetraj, P.E.
Deputy Director
Division of Air Quality
North Carolina Department of Environmental Quality

919-707-8497 office
michael.pjetraj@ncdenr.gov

217 West Jones Street
1641 Mail Service Center
Raleigh, NC 27699-1641

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: Michael Cramer[michael.cramer@carolinabeach.org]
Cc: Holman, Sheila[sheila.holman@ncdenr.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Watkins, Tim[Watkins.Tim@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Grimm, Ann[Grimm.Ann@epa.gov]; Gil DuBois[gil.dubois@carolinabeach.org]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Orme-Zavaleta, Jennifer
Sent: Mon 7/24/2017 5:21:59 PM
Subject: RE: Confidential: GenX tests

Great, glad we can help
Please coordinate with Myriam Medina-Vera cc'd above. Her staff will be conducting the analyses.

Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
USEPA Office of Research and Development
109 TW Alexander Dr MC 305-01
RTP, NC 27711

Personal Phone / Ex. 6

orme-zavaleta.jennifer@epa.gov

From: Michael Cramer [mailto:michael.cramer@carolinabeach.org]
Sent: Monday, July 24, 2017 12:47 PM
To: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Grimm, Ann <Grimm.Ann@epa.gov>; Gil DuBois <gil.dubois@carolinabeach.org>
Subject: RE: Confidential: GenX tests

Jennifer,
Thank you. This is the first communication I have received regarding this issue. I appreciate your willingness to help. I have contracted with two outside testing labs to test for GenX in two of our wells. I really appreciate the EPA being willing to test also. That will make our data consistent with the other sites. Please let me know who I should coordinate with.
Thanks,
Michael

Michael Cramer
Town Manager
Town of Carolina Beach
Phone: (910) 458-2994
Email: Michael.cramer@carolinabeach.org

From: Orme-Zavaleta, Jennifer [mailto:Orme-Zavaleta.Jennifer@epa.gov]
Sent: Monday, July 24, 2017 12:38 PM
To: Michael Cramer <michael.cramer@carolinabeach.org>
Cc: Holman, Sheila <sheila.holman@ncdenr.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Grimm, Ann <Grimm.Ann@epa.gov>
Subject: RE: Confidential: GenX tests

Dear Michael,
After checking with our staff we will be able to help you with these analyses from the two locations. If I understand correctly, the sampling will be coordinated through NCDEQ and that they will deliver the samples to EPA here in RTP.

Please let me know if the process has changed, otherwise we'll go ahead with this plan.

Let me know if you have any questions. Thanks

jennifer

Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
USEPA Office of Research and Development
109 TW Alexander Dr MC 305-01
RTP, NC 27711

Personal Phone / Ex. 6

orme-zavaleta.jennifer@epa.gov

From: Michael Cramer [mailto:michael.cramer@carolinabeach.org]
Sent: Thursday, July 20, 2017 9:15 AM
To: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Subject: Confidential: GenX tests

Dear Jennifer Orme-Zavaleta, PhD,
I hope this email finds you well. I am the Town Manager for the Town of Carolina Beach North Carolina and I would like to request your help with some sampling and tests. I was given your name by the NC DEQ-DWR regarding testing you have been performing for the GenX issue in the Wilmington Area. Previously the State indicated to us that the Pee Dee aquifer had not tested positive for the GenX compound. However, recently Wrightsville Beach receive a positive test result of 24 to 28 ppt of GenX at Well # 11 that draws water from the Pee Dee Aquifer. Carolina Beach is approximately 8 miles from the Cape Fear Public Utility Authority's ASR Well and the Wrightsville Well # 11 and we too draw water from the Pee Dee aquifer. My council and their constituents are very concerned about the possibility of the Pee Dee Aquifer having GenX and potentially effecting our wells. We would like to participate in the current study sampling run through the EPA lab in Raleigh regarding this issue. We believe that our results could be used by the EPA as a control site for this issue. We are formally requesting to be a part of this study or if that is not possible, we would like to pay the EPA to perform tests on two samples from our wells. We intend on paying two other firms to also test these samples. This way we can have confirmation from different lab of the results. Please let me know if you are willing to help us with our efforts. I look forward to hearing from you.
Sincerely,
Michael

Michael Cramer
Town Manager
Town of Carolina Beach
Phone: (910) 458-2994
Email: Michael.cramer@carolinabeach.org

To: Strynar, Mark[Strynar.Mark@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]
Cc: Satterwhite, Dana[dana.satterwhite@ncdenr.gov]
From: Johnson, Chris
Sent: Fri 7/21/2017 9:40:23 PM
Subject: RE: health advisory

Thanks.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Strynar, Mark [mailto:Strynar.Mark@epa.gov]
Sent: Friday, July 21, 2017 5:23 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: RE: health advisory

This is ONLY for PFOS and PFOA in concert or individually. Does not apply to GenX.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Friday, July 21, 2017 4:41 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Cc: Satterwhite, Dana <dana.satterwhite@ncdenr.gov>
Subject: FW: health advisory

Can you offer any insight on the health advisory listed in the report linked below? Would this apply to GenX (for PFOA and PFOS)?

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: Satterwhite, Dana
Sent: Friday, July 21, 2017 4:00 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>
Subject: health advisory

https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisories-pfoa-and-pfos
see second paragraph – am I crazy?

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: Woosley, Julie[julie.woosley@ncdenr.gov]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Biales, Adam[Biales.Adam@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]; Lindstrom, Andrew[Lindstrom.Andrew@epa.gov]; Scott, Michael[michael.scott@ncdenr.gov]; Ghiold, Joe[joe.ghiold@ncdenr.gov]; Mort, Sandra L[sandy.mort@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Orme-Zavaleta, Jennifer
Sent: Fri 7/21/2017 3:13:36 PM
Subject: Re: Request for EPA NERL PFAS analytical services

Thank you Julie. Adding in Becky Allenbach from EPA's Region 4 water division.

We are receiving many requests and will be evaluating our capacity across EPA's Office of Research and Development

I will be in touch Monday once i have explored this further

Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
USEPA
RTP, NC
Personal Phone / Ex. 6

On Jul 21, 2017, at 11:01 AM, Woosley, Julie <julie.woosley@ncdenr.gov> wrote:

Dr. Jennifer Orme-Zavaleta -

The NC DEQ Division of Waste Management is requesting analytical support from the EPA NERL RTP to analyze split samples of groundwater and river water collected at the Chemours-Fayetteville NC facility for Method 537 PFAS compounds and GenX (CASN 13252-13-6). We anticipate 14-20 samples to be collected by the facility the week of July 31, 2017. Chemours staff will be collecting the samples and DEQ staff will observe the sampling collections and accept the splits for analysis.

The Chemours-Fayetteville facility is a RCRA-regulated facility and the DEQ Hazardous Waste Section would like a comprehensive PFAS characterization of the groundwater at the facility. PFOA and PFPeA (perfluoropentanoic acid) have been previously detected in the facility groundwater at ppb levels. The Hazardous Waste Section is asking EPA to share the full set of laboratory results with us as soon as possible once the analysis and QC are complete.

I would be happy to speak with you by phone to answer any questions you have, or to arrange a conference call for interested parties to further discuss. I know this is a short lead time, but we consider this data to be of utmost importance to the public of North Carolina and would like to work with you to ensure that the data we produce is of the highest possible quality. We appreciate your consideration.

DEQ Contacts for this request:
Julie Woosley, Hazardous Waste Section Chief, julie.woosley@ncdenr.gov, 919.707.8203
Joe Ghiold, Chemours-Fayetteville Project Manager, joe.ghiold@ncdenr.gov, 919.707.8375
Sandy Mort, PhD, HWS Toxicologist, sandy.mort@ncdenr.gov, 919.707.8217

Kind Regards,

Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

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

To: Tong-Argao, Sania[Tong-Argao.Sania@epa.gov]; Strynar, Mark[Strynar.Mark@epa.gov]
Cc: Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Buckley, Timothy[Buckley.Timothy@epa.gov]; Satterwhite, Dana[dana.satterwhite@ncdenr.gov]; Huffman, David J[david.huffman@ncdenr.gov]; Karoly, Cyndi[cyndi.karoly@ncdenr.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Johnson, Chris
Sent: Wed 6/28/2017 2:38:52 PM
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville
ISB SOP Version2.1 FINAL Dec 2013 (003).docx

The most recent field sampling SOP is attached. This is the basis for field sampling activities in the Intensive Survey Branch. We are augmenting with information in the documentation provided by Andrew Lindstrom. There is no project plan associated with this work to my knowledge. If someone in the Division office has access to this sort of documentation, perhaps Linda could provide information in that regard.

We are preparing to create a QAPP based on the Georgia document discussed during our conference call yesterday. I imagine that Mark is in transit back from the Athens lab and can provide info when he gets opportunity.

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: Tong-Argao, Sania [mailto:Tong-Argao.Sania@epa.gov]
Sent: Tuesday, June 27, 2017 3:29 PM
To: Johnson, Chris <chris.johnson@ncdenr.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

Hello Chris - Thank you for your reply and thanks to Linda for the supplied information as well. Due the nature of this project having the urgent need to collect samples immediately and in a short timeframe, it is understood that a formal QA project plan will be developed as soon as practical. I will be helping Mark with this, and he will incorporate the fact that NC DEQ has an existing SOP that is being used for sample collection. A copy of the NC DEQ SOP used for sample collection will be appreciated when it's available. Can you provide the title of the SOP so that Mark can reference it? Also, although you don't have a formal project plan for this project, is there any project plan that you are following (even if it's not specific to this particular project)? If so, a reference (e.g., title and approval date) and copy of it would be great. Other than that, I believe Mark has the info needed for development of the QA documentation on EPA's end.

Mark – As discussed, we'll meet tomorrow to work on the QA planning documentation for this project. We should be able to walk through the QAPP elements and get something together so that you can move forward with the sample analyses in a timely manner.

Thanks,
Sania
541-1397

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Monday, June 26, 2017 2:03 PM
To: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>
Cc: Strynar, Mark <Strynar.Mark@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Satterwhite, Dana <dana.satterwhite@ncdenr.gov>; Huffman, David J <david.huffman@ncdenr.gov>; Karoly, Cyndi <cyndi.karoly@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington & Fayetteville

Sania, I am forwarding responses from Linda Culpepper below (in red) that will hopefully be of aid to Mark.

We do not have a formal project plan for this project. Our existing SOPs are used during our sampling events. I forwarded a copy of the EPA sampling plan, sent to me last week by Andrew Lindstrom, to the two regional offices when the EPA sampling kits were delivered. I also forwarded your bullet points regarding information to be included on the field sheets. The regional samplers were asked to follow the EPA plan as closely as possible during weeks two and three. We are putting together an outline of our sampling protocol at this time. David Huffman, the QA officer in the Water Quality Section is helping put this together and it will be forwarded to you when complete. We hope that this can suffice as an addendum to the existing QAPP for your laboratory. If insufficient, we can craft formal documentation based on these notes. If that is needed, it would be helpful to see the format that EPA uses for QAPPs. Our existing sampling SOP is many years old and is currently being updated by the new WQ QA officer. The procedure is unchanged in essence, but equipment brands, etc., are being edited and the SOP is currently in preliminary draft form.

If I've misunderstood any of your questions or haven't addressed them to your satisfaction, let me know and I will work on them further.

It was a pleasure to meet all of you on Friday and I hope to get back to the facility when there is less urgency of timing than was the case that day.

Chris Johnson
NC DEQ-DWR
Water Sciences Section

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From: Tong-Argao, Sania [mailto:Tong-Argao.Sania@epa.gov]
Sent: Friday, June 23, 2017 2:11 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Johnson, Chris <chris.johnson@ncdenr.gov>
Cc: Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Hello Mark and Chris,

Thank you for bringing this to my attention and for reaching out to make sure that proper QA documentation is in place. Please see below for my thoughts and follow up questions.

- I agree with Mark that it's important to include the quality control (QC) samples such as trip blanks and spikes whenever possible.
- **Question from Chris**: *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?*

Sania's reply: I understand that the NC DEQ is responsible for sample collection whereas EPA is responsible for sample analysis.

Chris - *Can you please confirm that the 'standard sampling procedure' will be the standard operating procedure (SOP) used to collect samples? Also, is there a separate QAPP that outlines the other aspects of the particulars of this project (e.g., the who, what, when, where, and why of the project)? Please do send copy of both the NC DEQ standard sampling procedure as well as QAPP so that we may have a copy of the documentation that reflects the QA plan for the sample collection portion of the project.*

Note that the EPA requirement for QA project plans (QAPPs) is to have an approved QAPP in place prior to the start of sample collection and/or sample analysis. QAPPs are project specific so that the who, what, when, where, why, and how of a project can be documented as the plan to follow for a particular project. This doesn't mean that things won't or can't change. The key is to document the plan prior to the start of the project via an approved QAPP and to be sure to document any changes to the plan during the project.
In this case, the scope of EPA's work is with the sample analysis only. It is understood that NC DEQ is responsible for the sample collection and that NC DEQ has their own SOP and QAPP associated with the project (to be confirmed after receipt of these documents). *To help ensure QA documentation is complete on EPA's side of the house, I recommend an addendum to Mark's existing QAPP.* As Mark stated, the NC DEQ standard sampling procedure as well as existing QAPP can be referenced, and any detail that is unique to this project can also be outlined in the addendum for sample analysis such as

reference to the specific analysis SOPs to be used.

Mark - To give you an idea of what info to include in the addendum, below is a brief list. Please let me know if you'd like to discuss what to include.

Why (Project Background) – Why is this project being conducted? Basically, what's the issue at hand and what do you want to accomplish (i.e., project goals/objectives)?

Project is being conducted to determine current values for GenX and related constituents in the Cape Fear River Basin sampling points as follow up to replicate analysis conducted by Sun et. al. reported in 2016 with Dr. Knappe and Mark Strynar. Sampling and analysis conducted in 2013-2014 indicated the presence of GenX thought to be released by the Chemours chemical manufacturing plant in Fayetteville, NC along with several other constituents. NC Department of Health and Human Services is in need of current data on the level of GenX 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 ether constituents will be used to compare past levels with current concentrations as health studies continue to be evaluated.

What/When/Where (Project Description) - Summarize work to be performed and expected products. What is the project schedule? Where are samples going to be collected, what types of samples are going to be collected, and how many samples do you plan to collect? You will want to specify NC DEQ's specific role and EPA's specific role in the project (i.e., EPA is receiving samples from NC DEQ who will follow their own protocols and QA plans.).

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. 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.

How (Sampling Methods/Sample Handling & Custody/Analytical Methods/Data Management) – Reference relevant SOPs.

Hope this helps,
Sania
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Sania W. Tong Argao
Quality Assurance Manager
Exposure Methods & Measurement Division (EMMD)
National Exposure Research Laboratory
U.S. EPA - Office of Research & Development

109 T.W. Alexander Drive, MD: E205-01
Research Triangle Park, NC 27711
Phone: (919) 541-1397 Fax: (919) 541-0239
E-mail: Tong-Argao.Sania@epa.gov
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

From: Strynar, Mark
Sent: Friday, June 23, 2017 7:08 AM
To: Johnson, Chris <chris.johnson@ncdenr.gov>

Cc: Tong-Argao, Sania <Tong-Argao.Sania@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Discussion for sampling and analysis in Wilmington

Chris,

I will let our QA staff answer that question for you. We have a QAPP that covers lab analysis. Also we have analysis SOPs referenced in our QAPP. I believe they would like to reference your QAPP, perhaps generic, and sampling SOP in our QAPP if it exists.

Mark

From: Johnson, Chris [mailto:chris.johnson@ncdenr.gov]
Sent: Thursday, June 22, 2017 9:47 AM
To: Strynar, Mark <Strynar.Mark@epa.gov>
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

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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?

INTENSIVE SURVEY BRANCH
STANDARD OPERATING PROCEDURES MANUAL:
PHYSICAL AND CHEMICAL MONITORING

Version 2.1

December 2013

This document has been approved for release by:

Jason Green Date
Supervisor, Intensive Survey Branch

Dianne M. Reid Date
Chief, Environmental Sciences Section

N.C. DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

DIVISION OF WATER RESOURCES

ENVIRONMENTAL SCIENCES SECTION

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INTRODUCTION

This manual contains the standard operating procedures (SOP) employed by the North Carolina Division of Water Resources (DWR) to evaluate water quality. It is intended to encompass all aspects of routine physical and chemical water quality monitoring with the occasional sediment samples. Therefore, this manual is to be considered a working, dynamic guideline for DWR personnel. Efforts to improve current procedures will continue, and the manual will be revised periodically, as needs dictate.

The primary goal of the manual is to promote the use of procedures that are consistent and reliable during field operations. All employees of the DWR staff are expected to be familiar with and to utilize these procedures as appropriate tools for water quality data collection. Because the procedures have been presented to cover a broad range of applications encountered in water quality monitoring, modifications may be necessary for specific conditions. Deviations from the procedures outlined in this manual, however, should be documented at time of collection.

These standard operating procedures apply to surface water, waste water, and sediment. The manual details procedures for sample collection and handling, as well as methods for parameters that must be measured in situ.

Procedures are referenced at the end of each section. In addition, all references are compiled in Section XIII. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the Division of Water Resources.

These standard operating procedures will assist the Division of Water Resources in its efforts to monitor the waters of the state with increased accuracy and confidence.

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INTENSIVE SURVEY BRANCH PROCEDURES DOCUMENT REVIEW LOG

SOP Name: **Intensive Survey Branch Standard Operating Procedures Manual: Physical and Chemical Monitoring**

Version: 2.1

Revised: December 10, 2013

Jason Green — 12/10/2013
Prepared By: Date

Jason Green — 12/10/2013
Branch Approval By: Date

Dianne M. Reid — 12/11/2013
Section Approval By: Date

Completed hard copy & signed original maintained by ISB Supervisor

DOCUMENT READ BY:			
Name (print):	Date Read:	Version Read:	Signature:

Completed hard copy maintained by ISB Supervisor

INTENSIVE SURVEY BRANCH SOP REVISION LOG

Date	Version Edited	Chapter	Changes	Name
12-10-13	Ver 2.0	Cover page	Updated document date & version to Decemberr 2013 and Version 2.1	Jason Green
12-10-13	Ver 2.0	Cover page & Review Log	Updated Section Chief to Dianne M. Reid	Jason Green
12-10-13	Ver 2.0	Entire	Division of Water Quality (DWQ) changed to Division of Water Resources (DWR). Intensive Survey Unit (ISU) changed to Intensive Survey Branch (ISB). Updated all headers, footers, and hyperlinks.	Jason Green
12-10-13	Ver 2.0	I. 3.3	Addition of method for use of churn splitter for sampling	Jason Green
12-10-13	Ver 2.0	II. 1.2	Updated Figure 6. – Lab sheet	Joanna Gmyr
12-10-13	Ver 2.0	II. 3.2	Updated Figure 9. – Chain of Custody Form	Joanna Gmyr
12-10-13	Ver 2.0	II. 4	Updated Figure 10. – Meter Calibration Sheet	Joanna Gmyr
12-10-13	Ver 2.0	III. 6.1	Edited Secchi Depth method to include average value & updated Figure 11 to match method	Jason Green
12-10-13	Ver 2.0	IV. 1	Addition of sample temperature blank and sample viability upon delivery	Jason Green
12-10-13	Ver 2.0	VIII. 4.1.1.g	Added Field Sheet reference to Appendix 7	Jason Green
12-10-13	Ver 2.0	Appendix	Added Appendix 7 – Flow Measurement Field Sheet	Jason Green
4-11-11	Ver 1.3	Appendix	Updated DWR guidance sheets for YSI 85, Accumet, Hydrolab, YSI Pro Plus, & YSI 6920 meters. Inserted Appendix 5 - Uncorrected DO Table	Joanna Gmyr
4-11-11	Ver 1.3	II.4 and III.1 -5	Updated field meter and calibration procedures.	Joanna Gmyr
7-15-11	Ver 1.3	1	Moved sections	Danielle Mir
10-2011	Ver 1.3	Entire	Made multiple review edits	Danielle Mir
10-2011	Ver 1.3	Entire	Removed Sediment Tox draft methods	Danielle Mir
11-2011	Ver 1.3	Entire	Updated pictures and figures	Danielle Mir
11-4-11	Ver 1.3	11	Added profile depth information, directions	Danielle Mir
11-10-11	Ver 1.3	Entire	Reformatted bullets and lists	Danielle Mir
02-11-09	Ver 8/2003	8 & 9	Put Chapter 9 as section in chapter 8	Danielle Mir
03-10-08	Ver 8/2003	Entire	Re-formatted entire document	Danielle Mir
03-10-08	Ver 8/2003	2	Updated and changed all calibration/ added QA guidance documents and current equipment type	Danielle Mir
03-10-08	Ver 8/2003	3	Changed parameter holding times & sample methods	Danielle Mir
03-10-08	Ver 8/2003	1	Added additional information on sampling types	Danielle Mir
03-10-08	Ver 8/2003	15	Removed Chapter- conductivity standards must be from certified lab	Danielle Mir
03-10-08	Ver 8/2003	5	Added methods for sediment toxicity samples	Danielle Mir
08-19-08	Ver 8/2003	2 & 11	Put chapter 11 as a section in chapter 2	Danielle Mir

12-10-08	Ver 8/2003	Entire	Changed all Figure numbers	Danielle Mir

I. CONSIDERATIONS FOR WATER QUALITY SAMPLING

The purpose for collecting water samples is to obtain a representative portion of the material or medium being evaluated. Valid results depend upon:

- Ensuring that the sample obtained is a true representative of the material or medium being evaluated;
- Employing proper sampling, handling, and preservation techniques;
- Properly identifying the collected samples and documenting their collection in permanent field records;
- Maintaining sample chain-of-custody procedures, if necessary;
- Protecting the collected samples by properly packing and transporting (shipping) them to the appropriate laboratory for analysis.

1. GENERAL WATER QUALITY SAMPLING CONSIDERATIONS

The following factors and procedures shall be considered and/or implemented in planning and conducting all water quality sampling operations. All of these factors and procedures should be considered in view of the specific objectives and scope of each individual field investigation. It is advisable to discuss sampling with the DWR Chemistry Lab during the planning process to verify and coordinate methodologies, analytical capabilities and timing of sample submittal.

1.1. Selection of parameters to be measured

The parameters to be measured are usually dictated by the purpose of an investigation and should be selected based upon required monitoring conditions (NPDES permits for example) or upon the investigator's knowledge of the problem.

1.2. Dissolved and particulate sample fractions

A sample is generally composed of dissolved and particulate fractions. When it is necessary to analyze samples for individual fractions, it is necessary to filter the sample in the field (i.e. dissolved phosphorous).

1.3. Required sample volumes

The volume of sample obtained should be sufficient to perform all the required analyses with an additional amount collected to provide for any quality control needs such as split samples or repeat examinations. DWR Laboratory sample submitting guidance document can be found at: http://portal.ncdenr.org/c/document_library/get_file?uuid=92a278e5-f75a-4e42-9be5-282ac0216b2a&groupId=38364.

1.4. Sample handling

After collection, all samples should be handled as little as possible. All personnel should use extreme care to ensure that samples are not contaminated. If samples are placed in an ice chest, personnel should ensure that the ice does not submerge the sample containers, thereby preventing cross-contamination. This is extremely important, especially if the samples are to be used in an enforcement action. Alternatives that can be used to prevent contamination include the use of frozen water

containers instead of ice or double wrapping the sample containers in trash bags surrounded with ice.

1.5. Special precautions for sampling trace amounts of contaminants

Most contaminant compounds are detected in the range of parts per billion or parts per trillion; therefore, extreme care must be taken to prevent contamination of samples. The following precautions shall be taken when trace contaminants are of concern:

1.5.1. When sampling surface waters, the aqueous sample should always be collected prior to any sediment sample collection. Sample collection should always be performed using cleaned equipment and proper collection technique.

1.5.2. Sample collection activities should proceed progressively from the least contaminated area to the most contaminated area (if this fact is known).

1.5.3. When possible, samples should be collected facing upstream to avoid contamination from sampling activities.

1.6. Procedures for identifying potentially hazardous samples.

1.6.1. Samples that are either **known** or **thought** to be **hazardous** should be identified **clearly** on both the sample tag and field sample sheet.

1.6.2. Information explaining the hazard, i.e., corrosive, flammable, poison, etc., shall also be listed.

1.6.3. If a sampling hazard is identified, only continue if a properly trained staff member is present and if appropriate safety equipment are available.

1.6.4. Follow procedures found on the ESS Fish Kill web page when sampling fish kill events: http://portal.ncdenr.org/web/wq/ess/fishkills

1.7. Collection of auxiliary data

All auxiliary data, such as flow measurements, photographs of sampling sites, meteorological conditions, and other observations, shall be entered into field records at the time samples are collected.

1.8. Time records

All records of time shall be kept utilizing local time in the military (2400 hour) time format and shall be recorded to the nearest five (5) minutes unless more precise measurements are dictated.

1.9. Transporting and shipping of samples

Samples may be hand delivered to the appropriate laboratory, or they may be shipped by common carrier. Chain of custody may be necessary during and after sample collection (Chapter II.3). All personnel must be aware that certain samples could be classified as hazardous materials and as such, could be regulated by the U.S. Department of Transportation under the Transportation Safety Act of l974. These regulations are contained in Title 49, CFR, Parts ll0-ll9 (An example would be concentrated acid, azide, etc.). A copy of these regulations is available online at: http://www.gpoaccess.gov/cfr/index.html.

2. SURFACE WATER SAMPLE SITE SELECTION

Selection of a surface water sampling location for water quality studies is based on many factors. These include but are not limited to, study objective, water use, point source discharges, non point source discharges, tributaries, changes in stream characteristics, types of stream bed, stream depth, turbulence, presence of structures (weirs, dams), accessibility, safety concerns, and personnel. When such sampling locations are located in estuarine systems, tidal effects must be considered when determining sampling locations.

Before sampling is conducted, a site assessment should be conducted to locate suitable sampling locations. Bridges and piers are normally good choices as they provide ready access and permit water sampling at any point across the width of the water body. When sampling from bridges, samples should be taken from the upstream side; however, this may alter the nature of water flow and cause sediment deposition. Additionally, bridges and piers are not always located in desirable locations with reference to waste sources, tributaries, etc. Wading for water samples is not recommended in lakes, ponds, and slow-moving rivers and streams. However, when wading for sample collections in slow-moving water bodies, it is best to work from downstream stations to upstream sampling points, especially when samples are taken in close proximity. In slow-moving or deep water, a boat is usually required for sample collections and sampling should allow for the possible presence of stratification.

3. SAMPLE COLLECTION TYPES

3.1. Grab sample

A grab sample is a sample collected over a period of time not exceeding 15 minutes. A grab sample is normally associated with water or wastewater sampling. However, soil, sediment, liquid hazardous waste samples, etc., may also be considered grab samples; no particular time limit would apply for the collection of such samples. These samples are used to characterize the medium at a particular point in time; and are generally associated with instantaneous water or wastewater flow data.

3.1.1. *Conditions when a grab sample is conducted*

a. Water or wastewater stream is not continuous (e.g., batch discharges or intermittent flow);
b. Characteristics of the water or waste stream are known to be constant;
c. Sample is to be analyzed for parameters whose characteristics are likely to change significantly with time (i.e., dissolved gases, bacteria, etc.);
d. Sample is to be collected for analysis of a parameter such as oil and grease where the compositing process could significantly affect the observed concentrations;
e. Data on maximum/minimum concentration are desired for a continuous water or wastewater stream;
f. When NPDES permit effluent monitoring specifies grab collections.

3.1.2 *Grab sample collection methods*

A grab sampler is collected at 0.15 m below the water surface. Gloves should be warn for personal safety and to prevent sample contamination.

a. Direct- A sample bottle is placed 0.15 m below the water surface while pointing the bottle mouth up current or towards the bow of a boat when lake sampling.

b. Intermediate Grab Sampling Device- These devices are any type of sampling device that holds the sample prior to pouring it into a sample bottle, and are used when sampling from a bridge or area that the water cannot be reached. The collection end is placed 0.15 m below the water's surface with the open end facing upstream or up current. An example is a Polyethylene Dipper (Figure 1) or other custom-made devices.

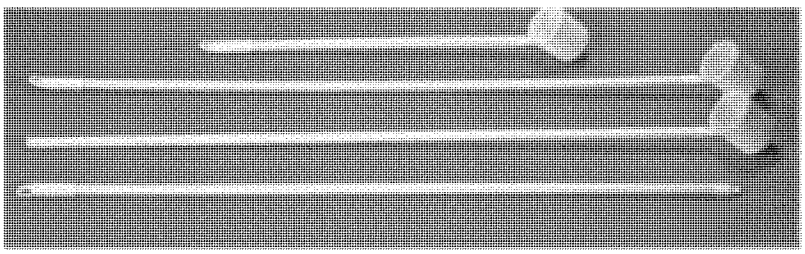

Figure 1. Polyethylene dipper typically used by DWR.

3.1.3. *Parameters that are always grab samples:*

metals	phenol
sulfide	oil and grease
volatile organics	bacterial
chlorine residual	other dissolved gases

3.2. Composite sample

Composite samples are used when average concentrations are of interest and are associated with average flow data (where appropriate). Composite sampling is employed when the water or wastewater stream is continuous or it is necessary to calculate mass/unit time loadings or when analytical capabilities are limited.

3.2.1. *Timed integrated*

A timed integrated composite sample contains discrete samples taken at equal time intervals over the compositing period. A timed composite may be collected continuously. A timed composite is collected continuously or with constant sample volume and a constant time interval between samples.

3.2.2. *Flow proportional integrated*

A flow proportional composite contains discrete samples, taken proportional to the flow rate over the compositing period. Proportional composites are collected with constant sample volume and constant time interval between samples proportional to stream flow.

3.2.3 *Area Integrated*

Area integrated composite samples are collected over a predetermined area of a waterbody, usually from the same depth. Samples are collected then composited into one representative sample.

3.2.4. *Vertical spatial composite (Photic Zone Sampling)*

Vertical spatial samples are composite samples (a.k.a. photo zone, depth-intergraded samples) taken within the photic zone. The photic zone is found between the surface and twice the secchi reading (Chapter III.6). Samples are collected by lowering and raising an integrated depth sampling device such as a Labline water sampler (Figure 2) at a steady speed to obtain a representative water sample within the photic zone. Prior to sampling, the Labline should be rinsed 3 times with station water to avoid sample contamination.

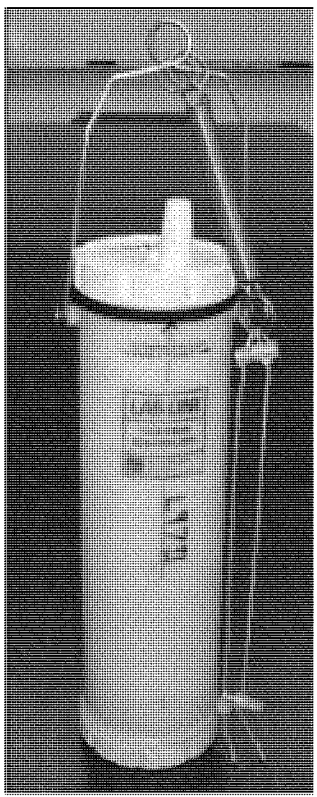

Figure 2. Labline sampler for photic zone (vertical spatial) composites.

3.3. Split sample

A split sample is a sample that has been portioned into two or more containers from a single collection device. Portioning assumes adequate mixing to assure the split samples are, for all practical purposes, identical. Devices such as churn splitters should be rinsed with ambient site water prior to field use for composite split samples, cleaned with phosphorous free cleaner after use and rinsed with deionized water before storage. Composite sample volume in the splitter should allow for ¾ of the total aliquot to be split with ¼ remainder. This prevents aeration of the sample during dispensing. Sample agitation should be performed for 2 minutes prior to sample split to ensure homogeneity of the composite. The spigot or valve should be purged prior to dispensing the first sample. As the composite volume in the churn is reduced, churning rate should increase.

3.4. Duplicate sample

Duplicate samples are collected simultaneously from the same source, under identical conditions but in separate containers.

3.5. Control sample

A control sample is collected upstream or upgrade from a source or site to isolate the effects of the source or site on the particular ambient medium being evaluated according to the study plan for that particular project.

3.6. Background sample

A background sample is collected from an area, water body, or site similar to the one being studied but located in an area known or thought to be free from the pollutants of concern. Background samples should be taken from well-mixed areas, not necessarily midstream to represent normal conditions.

3.7. Sample aliquot

A sample aliquot is a portion of a sample that is representative of the entire sample.

3.8. Scoop sample

A scoop sample is one that is taken in a non-quantitative way for identification only, such as a surface skim, a filamentous clump or rock scrape. All aquatic macrophyte samples are taken as scoop samples.

3.9. Physical Water Quality Measurements (In-Situ Field Measurements)

Physical parameter measurements recorded by a field meter such as a Hydrolab or YSI. Parameters that are considered physical water quality samples or parameters are:

Depth (m)	Temperature (°C)
Salinity (ppt)	Conductivity (us)
pH	Dissolved Oxygen (mg/L)

These may be measured at various depths depending on the water body and needs of the study being performed.

4. AUTOMATIC SAMPLERS

The Instrumentation Specialties Company (ISCO) model 2700 (Figure 3) and model 3700 wastewater samplers are portable devices designed to collect up to 24 separate sequential samples or can be programmed for composite sampling.

More complex sampling such as multiplexing, storm spaced sampling, interfacing with a variety of equipment such as flow meters, field printers, and lap top computers can also be accomplished with the 3700 model. Both sampler models must be supplied with 12 VDC power from one of four sources: an ISCO AC power pack, an ISCO nickel-cadmium battery pack, an ISCO sealed lead acid battery, or an external 12 V direct current source (such as an automotive or marine battery).

Refer to the ISCO 2700 and 3700 instruction manuals for detailed description of operating procedures. **It is important to verify the configuration of these samplers prior to placing them in the field** (Instrument Specialties Company 1988, 1991).

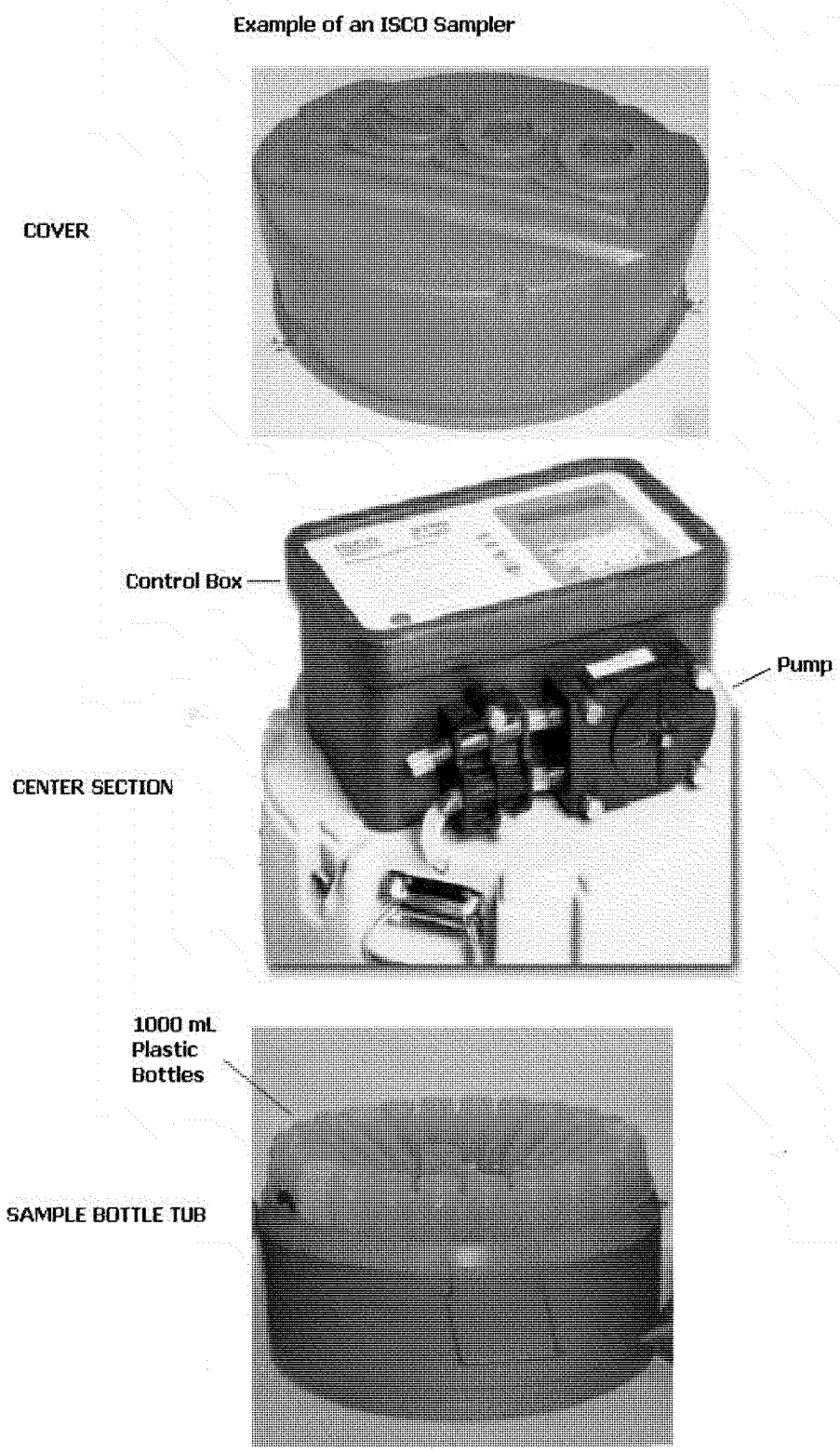

Figure 3. ISCO automated samplers.

5. MANUAL SAMPLING

Manual sampling is usually employed when collecting grab samples and immediate *in-situ* field analyses samples. However, it may also be used, in lieu of automatic - equipment, over extended periods of time for composite sampling.

5.1. Manual Sampling Technique:

The best method to manually collect a sample is to use the actual sample container. This eliminates the possibility of contaminating the sample with an intermediate collection container. **The actual sample container must always be used for collecting oil and grease and bacterial samples**.

5.1.1. If the water or wastewater stream cannot be physically reached, an approved intermediate sampling device may be used. Approved intermediate sampling devices include Labline samplers or Van Dorn type samplers. When a sample collected needs to be collected in the sample container such as grease or oil, a cage sampler can be used of the out-of-reach locations (Figure 4).

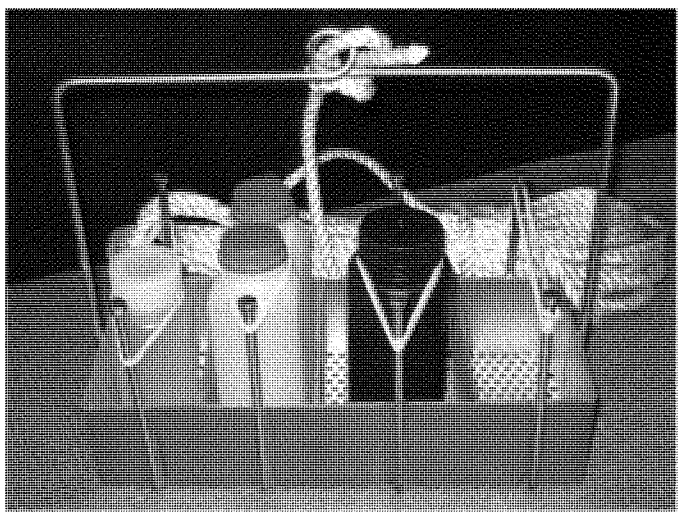

Figure 4. Cage sampler used in the DWR Ambient Monitoring Program

5.1.2. Collect the sample by lowering a properly cleaned collection vessel (bottle or intermediate sampling devise) into the water or wastewater stream. If an intermediate sampling device is used, the container employed to collect the initial sample must be rinsed three times with sample water and must be constructed of a material that meets requirements of the parameter(s) being investigated. The collection vessel may be lowered by hand or attached to a pole or rope and then lowered into the stream.

5.1.3. Some types of analyses require the use of a pump when sampling. If a pump is used, it is imperative that it be pre-purged and all components of the pump that come into contact with the liquid be properly cleaned to ensure the integrity of the sample.

5.1.4. Tip the collection container into the water or wastewater stream so that the mouth of the container faces upstream.

5.1.5. Rinse out the container via this procedure at least twice before the sample is collected (exceptions to this rinsing procedure may exist if preservatives are present in the sampling container and for certain analyses such as oil and grease).

6. SPECIAL SAMPLE COLLECTION PROCEDURES

6.1. Priority pollutants

6.1.1. Priority pollutant detection limits are usually in the range of parts per billion, thus extreme care must be exercised to ensure sample integrity.

6.1.2. All containers, composite bottles, tubing, etc., used in priority pollutant sample collection should be cleaned as described in Chapter VI.

6.1.3. When possible, the sample should be collected directly into the appropriate sample container. If the material to be sampled cannot be physically reached, an intermediate collection device may be used. This device should be a Teflon, glass or stainless steel vessel or Teflon tubing via a peristaltic type pump. The device should be cleaned as described in Chapter VI.

6.1.4. When an automatic sampler is employed for priority pollutant collection, the procedures described in Chapter I concerning collection of organic and metal samples with automatic samplers should be used.

6.2. Bacterial sampling

Samples for bacterial analysis should always be collected directly into the prepared glass or plastic sample container. Everything possible must be done to avoid contamination through physical contact with the inside of the cap or bottle and mouth of the bottle.

6.2.1. Hold the bottle near the base.

6.2.2. With cap still on, plunge the bottle, neck downward, below the surface and turn until the neck points slightly upward. The mouth should be directed toward the current.

6.2.3. Uncap the bottle and fill to within one inch of the top without rinsing

6.2.4. Recap immediately while underwater.

6.3. Immiscible liquids/oil and grease

Oil and grease may be present in wastewater as a surface film, an emulsion, a solution, or as a combination of these forms. **The designated sample container must always be used for collecting oil and grease samples.**

As it is very difficult to collect a representative oil and grease sample, the inspector must carefully evaluate the location of the sampling point. The

most desirable sampling location is the point where greatest mixing occurs. Quiescent areas should be avoided. Because losses of oil and grease will occur onto the sampling equipment, the collection of a composite sample is impractical. Individual portions collected at prescribed time intervals must be analyzed separately to obtain the average concentrations over an extended period.

6.4. Volatile Organics Analyses (VOA)

Samples to be analyzed for volatile organics should be stored in the appropriate vials to prevent contamination and loss of sample. To verify proper sample container requirements, consult the DWR Chemistry Laboratory website (http://portal.ncdenr.org/web/wq/lab/staffinfo). The current methodology calls for 40 ml screw cap septum vials with a Teflon-silicone disk in the cap. The disks should be placed in the caps (Teflon side down) in the laboratory prior to the initiation of the sampling activities. Extra disks should be carried during field sampling in case of loss of the disks previously placed in the caps.

When there is no chlorine present in the sampled waterbody a 40ml VOA vial pre-preserved with 1:1 HCL by the Central Laboratory should be used for collection. A VOA sample should be preserved with ascorbic acid and 1:1 HCL whenever there is chlorine present or if it is not known if chlorine is present. Chapter 4 section 3.3.2 describes collection method used.

7. WASTEWATER SAMPLING

7.1 General considerations

Important procedures for obtaining a representative wastewater sample include:

a. Collecting the sample at a location where the wastewater is mixed. Therefore, the sample should be collected near the center of the flow channel, at a depth between 0.4 - 0.6 m total depth, where the turbulence is at a maximum and the possibility of solids settling is minimized. Skimming the water surface or dragging the channel bottom should be avoided.

b. Doing cross-sectional sampling when sampling from wide conduits or within a mixing zone. Dye may be used as an aid in determining the most representative sampling point(s).

c. If manually compositing a sample, thoroughly mix individual samples before pouring the individual aliquots into the composite container.

7.1.1. Site selection

Where applicable, wastewater samples should be collected at the location specified in the NPDES permit.

a. Influent - Influent wastewaters are preferably sampled at points of highly turbulent flow in order to ensure adequate mixing.

b. Effluent - Effluent samples should be collected at the site specified in the permit, or if no site is specified, below all treatment units including post aeration.

c. Pond and lagoon sampling - Generally, composite samples should be employed for the collection of wastewater samples from ponds and lagoons. Even if the ponds and lagoons have a long retention time, composite sampling is necessary because of the tendency of ponds and lagoons to short circuit. However, if dye studies or past experience indicate a homogenous discharge, a grab sample may be taken as representative of the waste stream; but in all cases, sampling should be consistent with permit requirements.

7.1.2 Sampling techniques

All techniques are covered in Section IV ISB Standard Operating Procedures and in the NPDES Compliance Sampling Inspection Manual.
http://www.epa.gov/compliance/resources/publications/monitoring/cwa/inspections/npdesinspect/npdesmanual.html

II. FIELD MONITORING

1. DATA SHEETS

There are two types of sheets needed for sample collection. A Field Sheet is used to document sample location and field parameters such as dissolved oxygen, temperature, pH, and secchi depth. A Lab Form is used to submit a sample(s) to the DWR Chemistry Laboratory.

1.1. Field Data Sheets (Figure 5)

These sheets have spaces for the information that identifies the station (station number, station name, date, and comments), sampler, lake observation (wind direction, rain, percent as well as providing spaces for conducting a depth profile by parameter. Data sheets can be found with the project manager (*i.e.* Ambient Lakes Coordinator).

a. Use a pen to mark on the sheets. Make sure that whatever is used is waterproof.
b. Write legibly and within the allotted space.
c. These forms are retained by the sampler for use in writing up the results or may be filed for later use.

1.2. Lab Sheets (Figure 6)

a. These forms are obtained by accessing the DWR's Chemistry Lab website:
http://portal.ncdenr.org/web/wq/lab/staffinfo/samplesubmit/forms
b. A separate form is used for sediment, soil and tissue. Access the DWR Chemistry website to acquire the appropriate lab form. Contract labs will have their own; consult lab prior to sampling for any special requirements.
c. Lab sheets have spaces for all the information that identifies the station and sampler as well as boxes to check indicating the types of analyses to be conducted on the samples from the station.
d. The sample number used on the tags should be entered into the matching Lab Sheet. There is only one sample number per station – it should be recorded on the Lab Sheet and all the samples related to that Lab Sheet. There is only one lab sheet per station.
e. Be sure to secure lab sheets(s) in a watertight container before shipping.
f. After analysis is complete and the information is transcribed to the lab sheet, it will be returned to the sampler.

WATERBODY: _____

COLLECTORS: _____

METER USED : _____
(Sonde SN)

WEATHER CONDITIONS:

Wind Direction: _____

Air Temperature	Wind Velocity	Rainfall (last 48 hrs)
___ < 60°	___ < 10 mph	___ None
___ 60° - 75°	___ 10 - 20 mph	___ < 1/4 inch
___ 75° - 90°	___ > 20 mph	___ 1/4 - 1 inch
___ > 90		___ > 1 inch

STRATIFIED FIELD DATA

STATION NUMBER	DATE YY	DATE MM	DATE DD	TIME (24 hour)	DEPTH (meters) X.XX	TEMP. (°C) X.X	DO (mg/L) X.X	%DO Sat X.X	pH (s.u.) X.X	COND. (umhos/cm) X	SECCHI (meters) X.X	Cloud Cover %	COMMENTS (i.e., water color, algae bloom, sedimentation, lake level fish kill or distress, macrophytes, land disturbance , etc.)

rev.4 April 2, 2012

Figure 5. Stratified Field Data Sheet

DIVISION OF WATER RESOURCES
Surface Water Fieldsheet

COUNTY :
RIVER BASIN :
REPORT TO : Regional Office
Other :
COLLECTOR(S) :

PRIORITY
☐ AMBIENT ☐ QA
☐ COMPLIANCE ☐ CHAIN OF CUSTODY
☐ EMERGENCY VISIT ID

☐ SAMPLE TYPE
☐ STREAM ☐ EFFLUENT
☐ LAKE ☐ INFLUENT
☐ ESTUARY

Lab Number :
Date Received :
Time Received :
Received By :
Data Released :
Date Reported :

Estimated BOD Range:
Station Location:
Seed: Chlorinated: Remarks:

Station #/Location Code	Date Begin (yy/mm/dd)	Date End (yy/mm/dd)	Time Begin	Time End	Depth - DM, DB, DBM	Value Type - A, H, L	Composite-T, S, B	Sample Type

	BOD 310	mg/L		Chloride 940	mg/L		NH3 as N 610	mg/L		Li-Lithium 1132	ug/L
	COD High 340	mg/L					TKN as N 625	mg/L		Mg- Magnesium 927	mg/L
	COD Low 335	mg/L		Chlorophyll a EPA 445.0 modified option	ug/L		NO2 plus NO3 as N 630	mg/L		Mn-Manganese 1055	ug/L
	Coliform: MF Fecal 31616	/100ml					P: Total as P 665	mg/L		Na- Sodium 929	mg/L
	Coliform: MF Total 31504	/100ml		Color: True 80	c.u.		PO4 as P 70507	mg/L		Arsenic:Total 1002	ug/L
	Coliform: tube Fecal 31615	/100ml		Color: (pH) 83 pH=	c.u.		P: Dissolved as P 666	mg/L		Se- Selenium 1147	ug/L
	Coliform: Fecal Strep 31673	/100ml		Color: pH 7.6 82	c.u.		K-Potassium	mg/L		Hg- Mercury 71900	ug/L
	Residue: Total 500	mg/L		Cyanide 720	mg/L		Cd- Cadmium 1027	ug/L		Ba-Barium	ug/L
	Volatile 505	mg/L		Fluoride 951	mg/L		Cr-Chromium:Total 1034	ug/L		Organochlorine Pesticides	
	Fixed 510	mg/L		Formaldehyde 71880	mg/L		Cu- Copper 1042	ug/L		Organophosphorus Pesticides	
	Residue: Suspended 530	mg/L		Grease and Oils 556	mg/L		Ni-Nickel 1067	ug/L		Organonitrogen Pesticides	
	Volatile 535	mg/L		Hardness Total 900	mg/L		Pb- Lead 1051	ug/L		Acid Herbicides	
	Fixed 540	mg/L		Specific Cond. 95	umhos/cm		Zn- Zinc 1092	ug/L			
	pH 403	units		MBAS 38260	mg/L		V-Vanadium	ug/L		Base/Neutral&Acid Extractable Organics	
	Acidity to pH 4.5 436	mg/L		Phenols 32730	ug/L		Ag- Silver 1077	ug/L		TPH Diesel Range	
	Acidity to pH 8.3 435	mg/L		Sulfate 945	mg/L		Al- Aluminum 1105	ug/L			
	Alkalinity to pH 8.3 415	mg/L		Sulfide 745	mg/L		Be- Berylliun 1012	ug/L		Purgeable Organics (VOA bottle req'd)	
	Alkalinity to pH 4.5 410	mg/L		Boron			Ca- Calcium 916	mg/L		TPH Gasoline Range	
	TOC 680	mg/L		Tannin & Lignin	ug/L		Co- Cobalt 1037	ug/L		TPH/BTEX Gasoline Range	
	Turbidity 76	NTU		Hexavalent Chromium	ug/L		Fe- Iron 1045	ug/L		Phytoplankton	
	Coliform Total Tube	/100 ml		Bicarbonate	mg/L		Mo-Molybdenum	ug/L			
				Carbonate	mg/L		Sb-Antimony	ug/L			
				Total Dissolved Solids	mg/L		Sn-Tin	ug/L			
							Tl-Thallium	ug/L			
							Ti-Titanium	ug/L			
							Hg-1631	ng/L		Temperature on arrival (°C):	

COMMENTS :

Revision: 08/23/13

Figure 6. Surface Water Lab Sheet

2. SAMPLE TAGS

A sample tag is used for most samples returned to the laboratory for analysis (Figure 7). These tags are usually attached to the sample container by a rubber band. In some cases, particularly with biological samples, the sample tag may be included with or wrapped around the sample. Sample tags should be of material that is waterproof and should be written on with indelible ink. It is very important that these tags are legible.

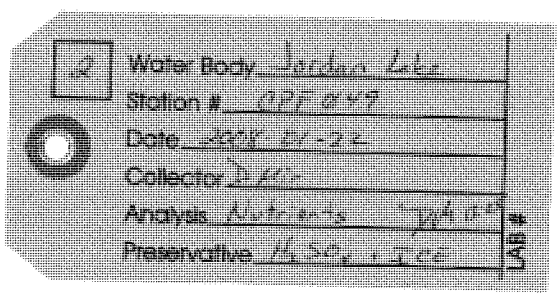

Figure 7. Completed Sample Tag

2.1 Information included on a sample tag:

- Sample number - determined based on number of stations to be sampled that day – All samples from a station will have the same sample number. Figure 7 shows the sample number for the tag as 2.
- Water Body
- Station number
- Date(s) & time(s)
- Name of the person collecting the sample
- Types of analyses to be conducted (such as Nutrients)
- Types of preservatives used
- Sampler initial after preserving with acid

2.2 Responsibility of project leader or field investigator

The project leader or field investigator assigns the station number to be used for that location. If previous sampling has occurred at a site, that station number should be used again. This number is ordinarily a numeric code, designed for a particular study, inspection, or investigation. Ambient stations have a special numbering system. New ambient stations are identified by the Ambient Monitoring Coordinator.

The project leader or field investigator must exercise due caution to ensure that duplicate station numbers are not used during the same study. The project leader or field investigator will also always specify the type of sample collected since the same station number is used when a water and sediment sample is collected at the same location. The exact description of all stations associated with field identification or sample station numbers is documented on the field sheet.

If a sample is split with a facility, state regulatory agency, or other party, sample tags with identical information are to be attached to each of the sample containers; the facility, state regulatory agency, etc., tag shall be marked facility (actual name), state regulatory agency (actual name), etc.

3. CHAIN-OF-CUSTODY PROCEDURES

This procedure is used for samples collected as part of an investigation for legal proceedings or where it is required under the study plan. The possession of samples or other evidence shall be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings.

3.1. Sample Custody

A sample or other physical evidence is under custody if it is in:

- The field investigator's actual possession, or
- The field investigator's view, after being in his/her physical possession, or

- The field investigator's physical possession and then he/she secures it to prevent tampering, or
- A designated secure area.

To simplify the chain-of-custody record and eliminate future litigation problems, as few people as possible should handle the samples or physical evidence. The field investigator is responsible for the care and custody of the samples collected until they are properly transferred to another person or facility.

3.2 Field Custody Procedures

3.2.1 *Security Seal*

a. Complete sample tags for each sample.
b. Place the lab sheets and chain of custody sheets in a Zip-loc bag and place in a cooler along with the samples.
c. Seal the coolers with filament tape and a DWR custody seal similar to the one shown in Figure 8.
d. The field investigator writes the date and their name on the seal. This requirement shall be waived if the field investigator keeps the samples in his custody from the time of collection until they are delivered to the laboratory.

3.2.2 *Chain of Custody Form*

a. Record all samples on the field form or in field logbooks and using the Chain of Custody Record (Figure 9.) available from the DWR Chemistry Lab:
http://portal.ncdenr.org/web/wq/lab/staffinfo/samplesubmit/forms
b. For documents received during investigations, place them in large envelopes, seal with a DWR seal such that the envelopes cannot be open without breaking the seal and note the contents on the envelope. If at any time the DWR seal is broken, that fact and the reason should be noted on the chain-of-custody record and a new seal affixed. The information on the seal should include the field investigator's signature, as well as the date and time of sealing.
c. Place other physical evidence such as videotapes or other small items in zip-lock bags and affix a DWR seal so that the bag cannot be opened without breaking the seal. A chain-of-custody record should be kept with the items in the bag. Any time the seal is broken, note reason on the chain of custody record and affix a new seal.
d. Personnel shall not accept samples from other sources unless the sample collection procedures used are known to be legally defensible, can be documented, and the sample chain-of-custody can be established. If such samples are accepted, a sample tag and a DWR form, containing all relevant information and the chain-of-custody record, shall be completed for each sample.

Figure 8. DNA Chain of Custody Security Seal

Report to: _____ **SURFACE WATER SECTION** **Page** _____ **of** _____

CHAIN OF CUSTODY (COC) RECORD

NC DENR/DWR LABORATORY (check one): [ ] CENTRAL [ ] ARO

For Investigation of:

Sample collector (print name) and DM-1 forms completed by: _____ Sample collector's signature: _____

Field storage conditions and location (when applicable):

Lab Use Only LAB NO.	STATION NO.	STATION LOCATION	DATE SAMPLED	TIME SAMPLED	NUMBER OF CONTAINERS

Relinquished by (signature):	Date	Time	Received by (signature):	Date	Time
Relinquished by (signature):	Date	Time	Received by (signature):	Date	Time
Relinquished by (signature):	Date	Time	Received by (signature):	Date	Time

Method of Shipment (circle one): State Courier Hand-delivered Federal Express UPS Other: _____

Security Type and Conditions:	Sealed by:	Broken by:

INTRALABORATORY CHAIN OF CUSTODY - Lab Use Only

LAB NUMBERS FROM	THROUGH	NUMBER BOTTLES	ANALYSES REQUESTED	RELINQUISHED BY:	RECEIVED BY:	DATE	TIME

QA\Forms\Sample Receiving\COC form WR 4/10/01 dbs Revised: 8/23/2013 ntg

Figure 9. Surface Water Section Chain of Custody Form

3.3 Transfer of Custody and Shipment

3.3.1. When transferring the possession of chain of custody samples, the individuals receiving the samples shall sign, date, and note the time that they received the samples on the field form or in the field log book. This action documents transfer of custody of samples from the field investigator to another person (e.g. to the laboratory).

3.3.2. After properly packing samples for shipment to the appropriate laboratory for analysis, secure the shipping containers using nylon strapping tape and custody seals. The seal shall be placed under the point on the tape where the ends are located and wrapped over the top of it. The seal shall be signed, dated, and the time recorded by the field investigator.

3.3.3. Samples split with a facility, state regulatory agency, or other government agency must be signed for on the Chain of Custody Form by the facility, state regulatory agency, or other government agency representative receiving the samples.

3.3.4. All samples shipped shall be accompanied by the DWR chain-of-custody form(s). The original and one copy of the form will be placed in a plastic bag inside the secured shipping container. One copy of the form will be retained by the field investigator or project leader. The original of the form will be transmitted to the field investigator or project leader after samples are accepted by the laboratory.

3.3.5. If sent by mail, the package shall be registered with return receipt requested. If sent by common carrier, a government bill of lading or air bill should be used. Receipts from post offices, copies of bills of lading, and air bills shall be retained as part of the documentation of the chain-of-custody.

4. FIELD INSTRUMENTS

Intensive Survey Branch uses a wide array of instrumentation for recording in-situ water quality parameters. Currently, Hydrolab (Hach Environmental) and YSI (Yellow Springs Instrument Co.) are the main manufacturer's used. Instructions for use, calibration, and maintenance as written by the manufacturer should always be followed. Manufacturers' manuals for all meters can be found in the ESS Calibration Lab. DWR produced a guidance sheet that outlines basic calibration, maintenance, and acceptance criteria for meters commonly used by DWR (Appendices 1-4). **All meter guidelines and guidance sheets found in this document are supplementary to and not a replacement for the manufacturer's directions.**

4.1. All field meters should be calibrated before and checked after sampling activities daily. Calibration data should be documented on a Water Quality Monitoring Field Meter Calibration Sheet (Figure 10).

4.2 In-*situ* field parameter measurements

4.2.1. *Parameters typically measured:*

a. **Conductivity** (µS/cm @ 25 °C)
b. **Dissolved Oxygen** (DO- mg/L)
c. **pH** (Standard Units)
d. **Temperature** (°C)
e. Light Attenuation (µE/m^2/s)

Additional Calibrations and Use of multiparameter Meters

4.2.2. *Battery Voltage*

a. Use the correct battery source for the particular instrument in use.
b. Battery voltage must be in an acceptable range before calibrating and using the meter (see respective manual).
c. Record both initial and terminal battery voltage on the Meter Calibration sheet (Figure 10).

4.2.3. *Depth*

a. Some meters can be calibrated to read depth by entering the number zero on the keypad while the sonde sensors are at the surface during field measurements.
b. Record all field depth measurements to the nearest tenth of a meter (if needed).

4.3 Calibrated Backup Field Meters

Although meters are maintained, failure can occur at anytime. Calibrated backup meters, meter manuals, batteries and calibration buffers/ standards are required during sampling. Inability to collect data due to a meter failure is unacceptable. See Appendices 1 – 4 for detailed guidance on using, maintaining, and storage field meters commonly used by DWR.

Water Quality Monitoring Field Meter Calibration Sheet

Collector(s):
Study:
Sampling Location:
Meter Model:
Meter / Sonde Serial No:

	Date yy/mm/dd	Time 24hr hh:mm	Initials
Pre-Sampling Calibration			
Post-Sampling Check			

Miscellaneous (Does not apply to YSI or Accumet Meters)

	Battery Level (V)		Stirrer Working?
Pre-Sampling Calibration			Y / N
Post-Sampling Check			Y / N

Battery Ranges = Surveyor: internal- 7.2-7.5V, external- 11-13V; Quanta: 4.0-4.5V

Barometer Calibration (mmHg)
**YSI Pro Plus Meters Only*

Initial Reading	Calibrated Value

Dissolved Oxygen (mg/L)

	Temp. °C	Initial % Saturation	Barometric Pressure (mmHg)	Altitude (ft.)	D.O. Table Value	Initial Meter Reading (mg/L)	Calibrated Meter Reading (mg/L)	Calibrated % Saturation
Pre-Sampling Calibration								
Post-Sampling Check								
					Within ± 0.5 ? Y / N			

Specific Conductance (µS/cm at 25°C)

	Dry Air[1,2] Zero (0)		Lot #: Conductivity Standard[3] Value: _____		Lot #: Calibration Check Value: _____
	Initial Meter Reading	Calibrated[4] Meter Reading	Initial Meter Reading	Calibrated[4] Meter Reading	Initial Meter Reading
Pre-Sampling Calibration					
Post-Sampling Check					
	Within ± 2? Y / N		Within ±10%? Y / N		Within ±10% Y / N

±10% Ranges for Sp. Cond.

Standard	Range
100	90 to 110
500	450 to 550
1,000	900 to 1,100
10,000	9,000 to 11,000
15,000	13,500 to 16,500
50,000	45,000 to 55,000

NOTE: Quanta reads in mS/cm; move decimal 3 places right for µS/cm.
[1] Dry Air CALIBRATIONS are conducted for 4a and MS5 Hydrolabs only.
[2] Dry Air CHECKS (confirmation of zero in dry air) are conducted for YSI 85, YSI 6920, YSI Pro Plus & Quanta meters.
[3] Conductivity standards are used to CHECK the YSI 85 meter and to CALIBRATE all Hydrolab meters and the YSI 6920 & YSI Pro Plus.
[4] Does not apply to Dry Air CHECKS or Conductivity Standard CHECKS (leave blank).

pH (SU)

	Lot #: Buffer #1 7.0 Buffer Temp: _____		Lot #: Buffer #2 4.0 / 10.0 Buffer Temp: _____		Slope Efficiency[5]	Confirmation Buffer 7.0
	Initial Meter Reading	Calibrated Meter Reading	Initial Meter Reading	Calibrated Meter Reading		Meter Reading
Pre-Sampling Calibration						
Post-Sampling Check						Within ± 0.1? Y / N
	Within ± 0.2? Y / N		Within ± 0.2? Y / N			

[5] Slope efficiency applies to Accumet meters only (does not apply to Hydrolab or YSI meters).

Comments:

Keep original on file for 5 years Ver. 06/05/2012

Figure 10. Meter Calibration Sheet

III. FIELD PARAMETER MEASUREMENTS

1. WATER TEMPERATURE

Temperature measurements are taken by a multiparameter meter (Hydrolab or YSI) or dial Celsius-thermometer or a thermister. Below are some general considerations while collecting water temperature data.

- The meter should have a scale marked for every 0.1°C.
- Make readings with the mulitparameter meter or thermometer in water long enough to permit equilibrium.
- Temperature sensors on the Hydrolab and YSI meters are factory set and do not require recalibration.
- At least once a year check the meter thermometer against a precision thermometer certified by the National Institute of Standards and Technology (NIST).
- Temperature readings must be record as degrees Centigrade (°C) to the nearest tenth of a degree. During field use, the temperature readings should always be read when they are stable and before the other parameters are read to ensure stable readings for all parameters.

2. AIR TEMPERATURE

Refer to previous procedure, except measure the ambient air temperature above the water surface to be sampled. Do not use immersion thermometers to measure air temperature.

3. DISSOLVED OXYGEN

Dissolved oxygen analysis measures the amount of gaseous oxygen dissolved in an aqueous solution. Dissolved oxygen may be measured by electrometric methods (e.g. Hydrolab or YSI) or by chemical methods (Winkler Method).

Testing must be done immediately at the sampling location, as a grab sample, which is why electrometric methods are favored.

See Appendices 1 – 4 for detailed guidance on using, maintaining, and storage of meters and probes commonly used by DWR. **This SOP and the attached meter guidance sheets are supplementary to and not a replacement for the manufacturer's instructions manual.** Manufacturer's operations manuals for all meters are kept in the ESS Calibration Lab.

3.1 Electrometric Method Calibration

All field meters should be calibrated before and checked after sampling activities (at least daily). The calibration data should be entered on a meter calibration sheet (Figure 10). Detailed guidance for calibrating dissolved oxygen is provided in Appendices 1 – 4.

3.1.1 Acceptance Criteria For DO calibration

- Calibrated meters should be compared to the DO table to ensure calibration was done correctly.
- Appendix 5 describes the calculations needed to correct for elevation and a table used at sea-level.
- Dissolved oxygen concentrations need to be calibrated within 0.5mg/L of the elevation corrected table concentration for a given temperature.

3.2. Winkler Method - azide modification (Standard Methods, 18th edition)

The azide modification effectively removes interference caused by nitrite, which is the most common interference in biologically treated effluents and incubated BOD samples. The azide modification is not applicable under the following conditions:

- Samples containing sulfite, thiosulfate, polythionate, appreciable quantities of free chlorine or hypochlorite;
- Samples high in suspended solids;
- Samples containing organic substances which are readily oxidized in a highly alkaline solution or which are oxidized by free iodine in an acid solution;
- Untreated domestic sewage;
- Biological flocs;
- Where sample color interferes with endpoint detection.

In instances where the azide modification is not applicable, electrometric methods should be employed.

Below are some general considerations while collecting dissolved oxygen data using the Winkler Method:

- Collect surface water samples in narrow-mouth glass-stoppered BOD bottles of 300 ml capacity with tapered and pointed ground-glass stoppers and flared mouths. Once analysis is complete and the information is transcribed to the lab sheet, it will be returned to the sampler.
- Avoid entrapping or dissolving atmospheric oxygen. Do not allow the sample to remain in contact with air or be agitated, because either condition may result in a change to its gaseous content.

- Where samples are collected from shallow depths (less than 5 feet) use of an APHA-type sampler is recommended. Use of a Kemmerer type sampler is recommended for samples from depths greater than 5 feet. Bleed sample from bottom of samplers through a tube extending to the bottom of a BOD bottle. Fill bottle to overflowing.
- Record sample temperature to nearest degree Celsius or more precisely.
- Reagents
  - Manganous sulfate solution
  - Alkaline iodide-sodium azide solution.
  - Sulfuric acid (H_2SO_4) concentration
  - Sodium thiosulfate solution 0.025 N
  - Starch solution
- Analysis Steps:
  1. Add 2 mL of manganous sulfate solution to sample container by holding the tip of the pipette below the surface of the liquid.
  2. Add 2 mL of alkaline iodide-sodium azide solution by holding the tip of the pipette below the surface of the liquid.
  3. Replace BOD bottle stopper, avoid trapping air bubbles, and shake well by inversion.
  4. When the precipitate settles, leaving a clear supernatant above the manganese hydroxide floc, shake again.
  5. Allow floc to settle again, at least 200 mL of clear supernate should be above the floc.
  6. Remove the stopper and add 2 mL of concentrated sulfuric acid by holding the pipette above the surface of the liquid and allowing the acid to run down the neck of the bottle, re-stopper, and mix by inversion until no floc is visible.
  7. Withdraw 203 mL of the solution into an Erlenmeyer flask.
  8. Titrate with 0.025 N sodium thiosulfate solution to a pale straw color.
  9. Add 1 mL of starch solution and continue titration to the first disappearance of blue color.
  10. Record the # of mL of thiosulfate used; where 1 mL thiosulfate = 1 mg/L DO.

4. pH (ELECTROMETRIC METHOD)

4.1. Information on pH

4.1.1. *Precision and accuracy:* ±0.2 pH unit represents the limit of accuracy under normal conditions for measurements of water and poorly buffered solutions. For this reason, report pH values to the nearest 0.1 pH unit. Calibrate instrument within 0.2 pH units of the standard pH buffer value.

4.1.2. *Calibration Reagents* - Calibrate the electrode system against standard buffer solutions of known pH. Always use fresh commercially made buffers to calibrate field meters. Buffer solution and samples should be stored in polyethylene bottles. Never pour decanted or used buffer solution back into the original bottle.

4.1.3 *Procedure* - Always follow the manufacturer's instructions for pH meter storage and preparation of electrodes. Recommended short-term storage of electrodes varies with type of electrode and manufacturer. See Appendices 1 – 4 for detailed guidance on using, maintaining, and storage of pH meters and probes commonly used by ISB. Never store probes in DI water; tap water or pH buffer 4.0 is preferred.

Note: All field meters should be calibrated before and checked after sampling activities daily. The calibration data should be entered on a meter calibration sheet (Figure 10).

4.2. Multiparameter YSI or Hydrolab Meters

The Hydrolab and YSI meters used by ISB all have the same basic method for calibration. A training outline for each meter used by ISB is listed in Appendices 1 - 4. Copies of the manufacturer's instruction manual are located in the ISB calibration room.

4.3. Accumet AP Series (Fisher Scientific) Handheld pH Meters

The Accumet handheld pH meter is a stand-alone pH meter (it does not measure any other parameters beyond pH). See Appendix 2 for detailed guidance on using, maintaining, and storage of the Accumet AP61 pH meter which is typically used in conjunction with the YSI 85 meter. A copy of the manufacturer's instruction manual is located in the ISB calibration room.

5. SPECIFIC CONDUCTIVITY/SALINITY

The specific conductance (conductivity) of a solution is a measure of its ability to carry an electrical current. This ability depends on the presence of ions, their total concentration, mobility, valence, and relative concentrations, and on the temperature of measurement. Specific conductance is the conductance afforded by 1 cc (ml) of a solution of electrolyte and is reported in micromhos per centimeter (µmhos/cm). Specific conductance measurements are used in water analysis to obtain a rapid estimate of the dissolved solids content of a water sample.

5.1 Specific Conductivity Meter Calibration - Detailed meter guidelines for calibrations are listed in Appendices 1 - 4. Copies of manufacturer's instruction manuals are found in the ISB calibration room.

Note: All field meters should be calibrated before and checked after sampling activities daily. The calibration data should be entered on a meter calibration sheet (Figure 10).

5.2 Additional Calibration Information

- *Acceptance Criteria:* Calibrate instrument within ±10% of the calibration standard's true value.
- Always calibrate with fresh, certified conductivity standards.

6. SECCHI DISK TRANSPARENCY

A measurement of water transparency obtained by observing a specially marked, circular disk which is lowered through the water column until it is not visible. This measure of the point at which the disk is non-visible is considered the secchi depth.

6.1. Secchi disk use (Figure 11)

6.1.1. *Conditions for secchi disk readings*

a. Shaded, protected side of boat.
b. Minimal waves or ripples, if possible.
c. Do not wear sunglasses while taking the secchi depth reading.

NOTE: Any departure from these conditions should be specifically stated on the field sheet.

6.1.2. *Method*

a. Rope should be accurately graduated in meters, 0.1 meter graduations for the first meter, 0.5 m graduations thereafter. At a minimum of annually verification of correct graduation is necessary as rope may stretch with continued use.
b. Observer's eye should be 1 meter above the water surface.
c. Lower the disk into the water to the depth at which the disk disappears.
d. Lift the disk and record the depth at which it just reappears.
e. Record the average reading from previous 2 steps on field sheet as Secchi depth reading to the nearest tenth of a meter.

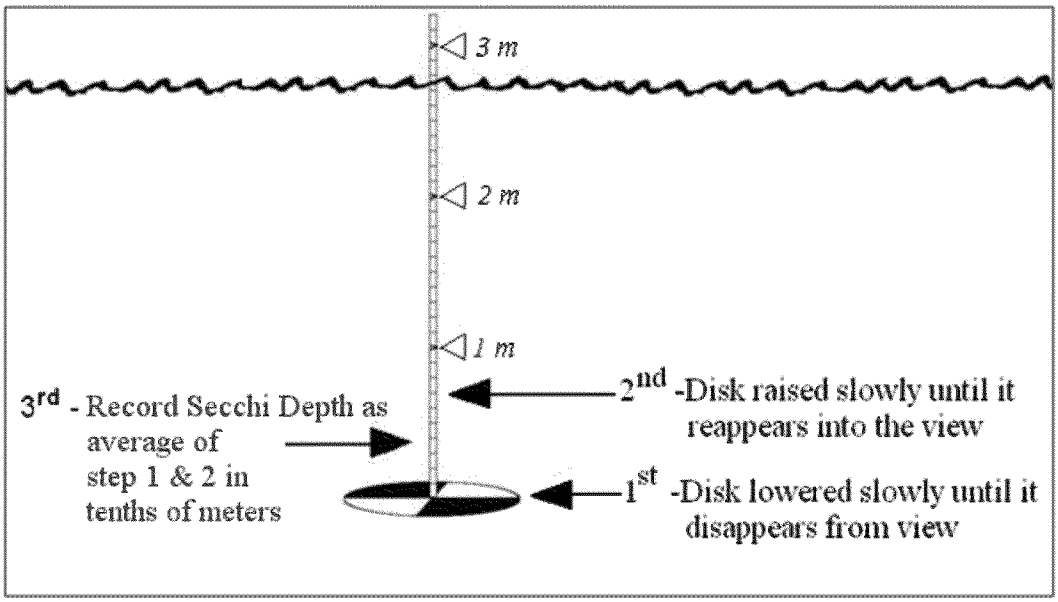

Figure 11. Secchi Disk

7. LIGHT ATTENUATION

The measurement of the decrease in light intensity through the water column as depth increases due to absorption and scattering effects of water molecules.

7.1. Light Attenuation is calculated by obtaining a vertical profile of light, using a PAR (photosynthetically active radiation) meter.

7.1.1. *PAR Meter Preparation*

a. Obtain an independent datalogger such as LI-COR LI-1400.

b. Connect a deck sensor and an underwater sensor to the LI-1400. Make sure the correct calibration factors are entered for each probe. All calibration factors are supplied by the manufacturer.

c. Place the deck sensor on the boat where it will not be shaded.

7.1.2. *Methods*

a. Lower the underwater sensor on the SUNNY, not shaded, side of the boat to a depth about 10 cm to represent the surface.

b. Once readings stabilize, record the values from both sensors ($\mu E/m^2/s$), along with the water depth of the underwater sensor. Log the values in the datalogger.

c. Lower the underwater sensor to 0.5 m (6″), allow the values to stabilize and record the values from both sensors, along with the water depth of the underwater surface.

d. Repeat at the following schedule:
   - Shallow Sites (≤ 2 m) – Every 0.5 m interval;
   - Nominal depths (>2 <10 m) – Every 0.5 m (near surface) and very 1 m interval to near bottom (0.5 m off-bottom)
   - Deep Sites (>10 m) – 0.5 m (near-surface) and every 1 m interval to 10 m, than at 5 m intervals, thereafter, to near-bottom (0.5 m off-bottom)

   NOTE: Follow schedule, unless specified differently for the individual sampling project.

e. If the meter impacts the bottom, allow 2-3 minutes for the disturbed conditions to settle before take the reading.

f. If the light measurements become negative before reaching the bottom, terminate the profile readings at that depth.

8. REFERENCE POINT-TAPE-DOWN MEASUREMENT

Reference point-tape-down is a procedure for determining relative vertical distance between fixed bridge points and stage of a water body below the bridge structure.

8.1. Procedure for Reference Point-Tape-Down

a. Use a weight-tape gage consisting of a graduated (0.1 ft) steel tape to which is fastened a small cylindrical weight (dimwap) of known length.

b. Locate reference point (RP) as documented on the station location sheet. They are often located on the outer edge of bridge railings.

c. Measure by suspending the weight-tape from the reference point (measuring) to the water surface.

d. The reference point value is indicated by direct reading of the suspended tape where it intercepts the fixed reference point. Read from the top of the bevel if the reference point is beveled.

e. Record measurement and add on the length of the weight.

9. STAGE MEASUREMENTS

These procedures are for use at U.S. Geological Survey permanent stream gauging stations.

9.1 Obtaining Stage Measurements

Follow instructions in the USGS publication Stage Measurements at Gauging Stations, Book 3, Chapter A7, United States Department of the Interior, Geological Survey, 1968. http://pubs.usgs.gov/tm/tm3-a7/pdf/tm3-a7.pdf

9.1.1 *Prior to Sampling*

a. Obtain permission from the USGS district chief to read the stage measuring devices in the instrument shelters.
b. Obtain on the job training by USGS personnel as to how to read the stage measuring devices.

9.1.2 *Stage Measuring Devices*

- Staff gage
- Wire weight gage
- Electric-tape instrument
- Automatic digital recorder
- Graphic recorder (bubble meters)

IV. WATER SAMPLE COLLECTION AND PRESERVATION

1. BOTTLES AND PRESERVATION

Surface water, soil or sludge samples for submittal to the DWR Chemistry Laboratory (the Lab) must be collected using Lab and EPA approved containers, and in accordance with approved collection, preservation and holding times. The Lab maintains a website with links to the approved preservation and holding times for all parameters for which the laboratory analyzes: http://portal.ncdenr.org/c/document_library/get_file?uuid=719b475c-c4a7-44c7-86a7-1804bbd432c9&groupId=38364. Field staff are responsible for being familiar with the Lab's procedures and following them accordingly. Preservatives can be added by pipette or pre-measured vials depending on the sensitivity of parameter being measured. If a parameter is not on the Lab's website, speak with the appropriate lab staff to determine how to proceed. Any samples submitted to the Lab must be accompanied by a Lab Sheet (Chapter 2-Figure 6). Immediately after sampling, labeling, and chemical preservation, samples are placed in coolers on ice, along with a temperature blank. Once samples arrive at the laboratory, support staff check the temperature blank (included in each cooler) to ensure that they are in appropriate temperature range (4 ± 2ºC), assign lab tracking numbers, and distribute them to the appropriate analytical units. Any samples not meeting temperature, holding time, or preservation requirements or are otherwise not submitted in accordance with the SOP are subject to rejection as per Section 13: *Corrective Actions* of the Laboratory Section QAM. Laboratory staff will attempt to contact collector by phone or email before rejecting. If conditionally accepted, the laboratory will document the anomaly with a Sample Condition Upon Receipt (SCUR) and/or Sample Anomaly Report (SAR) form and include copies with the final analytical report. Results from anomalous samples will be reported using the appropriate qualification code(s).

2. COLLECTION METHODS FOR CONVENTIONAL PARAMETERS

Collection for majority of the conventional parameters can be done by the multiple methods introduced in Chapter 1, "Sample Collection Types". The following section is an overview of the types of parameters collected by DWR along with the required sample size, bottle type, preservative method and holding time.

Note: There are some parameters that can ONLY be collected as a surface grab at 0.15 m below the surface and will be stated in the collection method statement. Although, holding times vary from hours to days, **all samples collected should be submitted to the laboratory as soon as possible.**

2.1. BOD 5 – Day (Biochemical Oxygen Demand) - This test determines the amount of organic material in wastewater and surface waters by measuring the oxygen consumed by microorganisms in decomposing organic constituents. The test consists of the determination of dissolved oxygen prior to and following 5-day incubation of the sample at 20°C, thus establishing the amount of oxygen used.

2.1.1 *Collection method*:

a. Collect sample in a 1-liter plastic bottle.
b. Deliver within 48 hours
c. Cool to 4°C
d. For WWTP effluents, collect the sample ahead of disinfection when possible.

2.2. COD (Chemical Oxygen Demand) - measures pollution strength (Sawyer & McCarty, 1967). It is a measure of the amount of oxygen required to oxidize organic and oxidizable inorganic compounds in wastewater and surface waters.

2.2.1 *Collection method:*

a. Collect sample in a 200 ml plastic bottle
b. Acidified the sample with H_2SO_4 to pH <2.
c. Cool the sample to 4°C
d. There is a 28 day holding period.

2.3. Coliform - Fecal coliform bacteria are superior to total coliforms as indicators of possible pathogenic contamination of water. The total coliform group includes organisms, principally of the aerogenes group, that are not necessarily of fecal origin. The aerogenes may be a considerable portion of the total coliforms on occasion. They may have no sanitary significance since they can come from soils and vegetation especially grains. Essentially all fecal coliforms, on the other hand, are of fecal origin and therefore potentially are accompanied by pathogens.

2.3.1. *General Collection Methods*

a. Collect sample with a 250 ml wide-mouth sterile plastic bottle supplied by the DWR Laboratory. These bottles must contain sodium thiosulfate and EDTA reagents.
b. Coliform sample is always collected as a surface grab sample. In no case should composite samples be collected for microbiological examination.
c. Do not rinse bottle with sample, but fill it directly to within 1-2 inches from the top to allow mixing of the sample before analysis.
d. Use caution to avoid contaminating the sample with fingers, gloves, or other materials.
e. Cool to 4°C and return to lab **in less than 6 hours** from time of collection. The DWR Lab will analyze any coliform samples that are received in less than 24 hours; however, the data may not be acceptable for some uses due to extended holding time.

2.3.2. *Surface Sampling By-Hand*

a. Grab sample should be collected directly into the sample bottle.
b. Remove the bottle top to protect bottle and cap from contamination; avoid touching the inside of the bottle and cap.
c. Grasp the bottle securely near the base with one hand and plunge the bottle mouth down into the water to avoid surface scum. Position the bottle towards the current flow and away from the hand of the collector, the shore, the side of the sampling platform, or boat. The sampling depth should be 0.15m below the water surface.
d. If the water body is static, create an artificial current by moving the bottle away from the sampler while tipping the bottle slightly to allow water to enter.
e. Tip the bottle slightly upwards to allow air to exit and the bottle. Fill the bottle to within 1-2 inches of the top.
f. After removal of the bottle from the stream, tightly stopper and label the bottle.

2.3.3. *Surface Sampling by Weighted/Cage Bottle Frame* (Figure 4, pg. 19)

a. Remove the cover and lower the device to the water.
b. It is preferable to use nylon rope which does not absorb water and will not rot.
c. Swing the sampling device downstream and then allow it to drop into the water while pulling on the rope so as to direct the bottle upstream.
d. Pull the sample device rapidly upstream and out of the water, simulating the scooping motion of grab sampling.
e. Take care not to dislodge dirt or other material from the sampling platform.

2.4. Residue (Solids) - Residue refers to solid matter suspended or dissolved in water or wastewater.

2.4.1. *Residue Types*

a. Total Residue - is the term applied to the material left after evaporation of a water sample, and its subsequent drying in an oven at a defined temperature. Total residue includes nonfilterable residue and filterable residue. Also known as Total Solids.
b. Nonfilterable Residue (Suspended) - the portion of total residue retained by a filter. The concentration of other water quality parameters is related to suspended solids since the solid structure may contain biochemical and chemical oxygen demand materials, trace metals, nutrients, pesticides, and toxic or hazardous materials absorbed on the surface. Also, known as Total Suspended Solids.

c. Filterable Residue (Dissolved) - the portion of total residue that passes through the filter. Dissolved solids consist mainly of inorganic salts, small amounts of organic matter, and dissolved gasses. Also called Total Dissolved Solids.

d. Volatile and Fixed Residue - the residue remaining after ignition for 1 hour at 550°C represents the ash or fixed solids, and the weight loss incurred is a reasonably accurate measure of organic matter or volatile solids.

2.4.2. *Collection method*: Use a 500 ml plastic bottle to collect **each** type of residue sample and cool to 4°C. The sample has a holding time of 7 days.

2.5. Alkalinity/Acidity - Alkalinity is a measure of the buffering capacity of water - the power of the water to neutralize hydrogen ions - and it is expressed in terms of an equivalent amount of calcium carbonate. Alkalinity is caused by the presence of carbonates, bicarbonates, and hydroxides. Acidity is the power of the water to neutralize hydroxy ions - and it is expressed in terms of an equivalent amount of calcium carbonate. Acidity is a result of the presence of free carbon dioxide, strong mineral acids, weakly dissociated acids, salts of strong acids, and weak bases.

2.5.1 *Collection method:* Collect sample with a 200 ml (for each parameter) plastic bottle, cool to 4°C. Holding time is 14 days.

2.6. TOC (Total Organic Carbon) - Measures the organic carbon present in water. When an empirical relationship can be established between TOC, BOD, and COD, the TOC provides a quick and convenient way of estimating the other parameters that express the degree of organic contamination.

2.6.1 *Collection method:* Collect sample with a 200 ml plastic bottle, add H3PO4 to pH <2 and cool to 4°C. Holding time is 28 days.

2.7. Turbidity (Clarity of Water) – measured in Nephelometric Turbidity Units (NTU). Turbidity is an expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines. Turbidity in waters is a result of suspended matter such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, and plankton and other microscopic organisms.

2.7.1 *Collection method*: Collect sample in a 200 ml plastic bottle, cool to 4°C. The sample should be protected from light. The sample must be received by the lab in **less than 48 hours**.

2.8. Chloride - Chlorides are found in most natural waters. They may be of natural mineral origin or artificially introduced. Chloride concentrations are higher in wastewater than in raw water because sodium chloride (NaCl) is a common article of diet and passes unchanged through the digestive system (American Public Health Association, 1992). Industrial processes also increase chlorides in wastewater effluents.

2.8.1. *Collection method:* Collect sample in a 500 ml plastic bottle, typically collected directly from the water body as a surface grab (0.15m deep). Cool to 4°C. Holding time is 28 days.

2.9. Chlorophyll *a* and Algal Biomass

2.9.1. *Chlorophyll a* - Chlorophyll *a* is the photosynthetic green, photosynthetic pigment contained in plants. The measurement of this pigment provides an estimate of algal biomass.

Collection method: Use a 500 ml wide-mouth opaque plastic bottle to collect the sample. Cool to 4°C. Sample **must** be received by the laboratory in **less than 24 hours**.

2.9.2. *Algae* - Algae are used as biological indicators of water quality. By determining the types and quantity of algae present in a water body and utilizing physical and chemical data collected at the same time, inferences can be made concerning the trophic state of a water body. Algae are sampled from the water column (phytoplankton), attached to rocks and debris (periphyton), and from floating mats (filamentous/nuisance growths). The primary type sampled by DWR is phytoplankton, although all forms of algae can be sent to the Ecosystems Branch Laboratory of the Environmental Sciences Section for analyses.

Collection method: Samples for phytoplankton should be taken with an integrated depth sampling device (Labline water sampler).

a) This device should be lowered to twice the secchi depth (approximately 1% light penetration) and slowly raised to the surface.

b) Pour sample into a 500 ml plastic disposable bottle and preserve with approximately 2.5ml of modified Lugol's solution or until a dark straw color is reached.

c) If a Labline is unavailable, a surface grab sample can be taken.

d) Scoop samples are taken only when no quantitative methods are possible or as an additional sample for ease in identification. Live samples are taken as above (Labline preferred) but are not preserved. Cool to 4°C. Send to the Lab or EU lab in **less than 24 hours**.

2.9.3. *Chlorophyll a and Algal Sample Submittal Procedure*

a. Samples should then be sent to the Central Laboratory along with nutrient and chemical samples.

b. Bloom samples should include one preserved and one unpreserved (live) phytoplankton sample along with chlorophyll *a* and nutrient samples and a completed bloom form. Bloom forms and modified Lugol's solution (for preservation) are obtained from the Ecosystems Branch in Raleigh.

c. After samples are logged in at the Central Lab and with the Ecosystems Group, they are analyzed per the Ecosystems Branch's SOP manual.

2.9.4. *Parameters collected in conjunction with phytoplankton samples.*

a. Physical Parameters- Are measured at the surface and at every meter or half meter from the surface to bottom according to depth. Parameters include:

1. Temperature
2. Dissolved Oxygen
3. pH
4. Secchi Depth
5. Conductivity
6. Salinity should be taken where appropriate.

b. Chemical samples- Include ammonia/ammonium, nitrate/nitrite, total Kjeldahl nitrogen, orthophosphate, total phosphorous, and chlorophyll *a* are required to accompany phytoplankton samples.

NOTE: Check with the lab prior to sampling for orthophosphate to ensure analysis capabilities.

c. Map showing the location of the sampling site and/ or GPS coordinates.

2.10. Color - Color in water may result from the presence of natural metallic ions (iron and manganese), humus and peat materials, plankton, weeds, and industrial wastes. True color is the color of water from which turbidity has been removed by filtration or centrifugation. The term apparent color includes not only color due to substances in solution, but also that due to suspended matter. Apparent color is determined on the original sample without filtration or centrifugation. In stream samples, unaffected by industrial wastes, usually only true color is analyzed. In some highly colored industrial wastewaters, color is contributed principally by colloidal or suspended material. Therefore, apparent color may be a more appropriate measure for samples related to industrial wastewaters.

The color value of water is extremely pH dependent and increases as the pH of the water is raised. Therefore, always measure in-*situ* pH and specify the pH at which the color is determined.

2.10.1. *Accepted Methods to Determine Color*

There are three accepted methods to determine color (USEPA, 1994): Platinum-cobalt, spectrophotometric and ADMI. Each of these methods yields different information. Their proper uses and interpretations must be reviewed to determine the appropriate test based on the purpose of the sampling.

2.10.2 *Collection method:* Use a 200 ml plastic bottle to collect a surface grab sample. Cool sample to 4°C. Sample must be submitted to the lab in **less than 48 hours**.

2.11. Chromium, Hexavalent [Cr^{+6}] - The principal chromium emissions into surface waters are from metal-finishing processes such as electroplating, pickling, and bright dipping. Uncontrolled emissions have great potential for contaminating the fresh waters with the relatively toxic form, Cr (+6). Other smaller discharges of Cr^{+6} are from the additive in circulating cooling waters, laundry chemicals, and animal glue manufacture.

2.11.1 *Collection method*: Collect sample in a 200 ml plastic disposable bottle and cool to 4°C. Sample must be submitted to the lab in **less than 24 hours**.

NOTE : Lab should be notified that this sample will be submitted for analysis prior to sample collection.

2.12. Cyanide (CN-) - Cyanides occur in the effluents from gas works and coke ovens, from the scrubbing of gases at steel plants, from metal cleaning and electroplating processes, and from chemical industries. Most of the cyanide in water is in the form of HCN (hydrogen cyanide). Toxicities may vary markedly with pH and a given concentration that is innocuous at pH 8 may become detrimental if the pH is lowered to 6 or less. In natural streams, cyanides deteriorate or are decomposed by bacterial action, so that excessive concentrations may be expected to diminish with time.

2.12.1 *Collection method:*

a. Use two 1 liter plastic bottles collect a surface grab sample directly from the water body.
b. Add NaOH to pH>12 and 0.6g of ascorbic acid if sample contains residual chlorine.
c. Cool sample to 4°C.
d. Sample has a holding time of 14 days.

2.13. Fluoride (F-) - Fluoride at 0.8 to 1.5 mg/l in drinking water aids in the reduction of dental decay, especially among children. Fluorides in high concentrations are not a common constituent of natural surface waters, but they may occur in detrimental concentrations in ground water. Fluorides are used as insecticides, for disinfecting brewery apparatus, as a flux in the manufacture of steel, for preserving wood and mucilage, for the manufacture of glass and enamels, in chemical industries, and water treatment. While not normally found in industrial wastes, they may be present in traces, or in higher concentrations resulting from spillage.

2.13.1 *Collection method*:

a. Use a 500 ml plastic bottle to collect a surface grab sample directly from the water body.
b. Sample must be cooled to 4°C.
c. Holding time is 28 days.

2.14. Formaldehyde - (HCHO) formaldehyde is a colorless gas with a pungent odor. It is usually stored and transported as an aqueous solution containing 37-50% formaldehyde by weight and 1-15% methanol. Formaldehyde is used in the production of urea-formaldehyde and phenol-formaldehyde resins. These resins are used in the production of plywood, particleboard, foam insulation, and a wide variety of molded or extruded plastic items. Formaldehyde is intensely irritating to mucous membranes and the National Institute for Occupational Safety and Health recommends that formaldehyde be handled as a potential occupational carcinogen. Formaldehyde is used for preserving biological specimens.

2.14.1 *Collection method*:

a. Collect surface grab sample in a 500 ml disposable plastic bottle
b. Sample must be cooled to 4°C.
c. Although no holding time is specified for this sample, it should be submitted to the lab as soon as possible.

2.15. HEM: Grease and Oil - For the grease and oil analysis; groups of substances with similar physical characteristics are determined quantitatively on the basis of their common solubility in trichlorotrifluoroethane (Freon). Grease and oils, either vegetable oil and animal fats or mineral hydrocarbons, when introduced to surface waters, are found floating on the surface, emulsified or solubilized in the water column, or settled on the bottom as a sludge. Potential contributors to oil pollution are all agencies engaged in productions, transportation, handling, and use of oil. Also, ships, railroads, civic dumps, salvage dumps, machining operations, and the most notable - garages and filling stations. Grease from animal and vegetable oils enters waterways from food processors and restaurants. Surface waters are at all times to be kept virtually free from oil or grease, not only for esthetic reasons and taste and odor problems for domestic water supply, but evidence has demonstrated both acute lethal toxicity and long term sublethal toxicity of oils to aquatic organisms.

2.15.1 *Collection method:*

a. Collect 2 liters (two 1 liter glass wide mouth mason jars, Teflon-lined caps) of sample.
b. A surface grab sample at 0.15 m deep is the only collection method.
c. Acidify the sample with HCL or H2SO4 to pH <2.
d. Sample must be cooled to 4°C Holding time for this sample is 28 days.

2.16. Total Hardness - Hard waters are generally considered to be those waters that require considerable amounts of soap to produce a foam or lather and that also produce scale in hot water pipes, heaters, boilers, and other units in which the temperature of water is increased materially. In general, surface waters are softer than ground waters. The hardness of water reflects the nature of the geological formations with which it has been in contact. Natural sources of hardness principally are limestone that are dissolved by percolating rainwater made acid by dissolved carbon dioxide. Industrial and industrially related sources include the inorganic chemical industry and discharges from operating and abandoned mines.

Classification of water by hardness content (Conc., mg/l CaCO3) (USEPA, 1976).

Soft	0 - 75
Moderately Hard	75 - 150
Hard	150 - 300
Very Hard	300 and Up

The constituents that impart hardness to water are polyvalent cations, chiefly calcium (Ca++) and magnesium (Mg++). These form insoluble complexes with a variety of anions (HCO3-, SO4-, Cl-, NO3-, SiO3-). By convention, hardness is reported on the basis of equivalence as mg/l calcium carbonate (CaCO3).

The DWR Lab is no longer analyzing samples for Total Hardness, therefore, when a total hardness sample is required, a nitric acid (HNO_3)-preserved sample must be submitted for Ca and Mg (see section 2.23). Once the Ca and Mg results are received from the lab, total hardness is calculated using the following formula:

Total Hardness, mg/L = 2.497[Ca, mg/L] + 4.118[Mg, mg/L]

2.16.1. *Collection method:*

a. Sample must be collected as a surface grab (0.15 m from the surface) in a 500 ml plastic bottle.
b. Acidify the sample with HNO3 to pH <2 and cool to 4°C.
c. Holding time is 6 months.

2.17. Specific conductance (Specific Electrical Conductance) - The specific conductance (conductivity) of a solution is a measure of its ability to carry an electrical current. This ability depends on the presence of ions, their total concentration, mobility, valence, and relative concentrations, and on the temperature of measurement. Specific conductance is the conductance afforded by 1 cc (ml) of a solution of electrolyte and is reported in micromhos per centimeter (µmhos/cm). Specific conductance measurements are used in water analysis to obtain a rapid estimate of the dissolved solids content of a water sample. This measurement is normally made using a field meter; however, the following procedure can be used if necessary.

2.17.1. *Collection method*:

a. Use a 200 ml plastic bottle collected as a surface grab (0.15 m from the surface).
b. Sample should be cooled to 4°C.
c. Holding time is 28 days.

2.18 MBAS - Methylene-Blue-Active Substances - This test determines surfactants with no specificity, so the materials determined are designated as MBAS. This method depends on the formation of a blue salt or ion pair when methylene blue, a cationic dye, reacts with anionic surfactants. Surfactants are organic materials, which have the property of being surface active in aqueous solution. All surfactants have rather large polar molecules. One end of the molecule is particularly soluble in water and the other is readily soluble in oils. The surfactants include soaps, detergents, emulsifiers, wetting agents, and penetrants. Of these substances, the synthetic detergents are most important and are used in the greatest amounts. Presently, about 80 percent of all synthetic detergents are of the anionic type, and the MBAS method determines the presence of these surfactants. The most widely used anionic surfactant is linear alkylbenzene sulfonate (LAS). The detergent manufacturing industry changed to the production of LAS because it is more readily biodegradable than the older ABS (alkyl benzene sulfonates).

2.18.1 *Collection method*:

a. **The lab must be notified that this sample will be collected and submitted for analy**sis.
b. Use a 500 ml plastic bottle to collect a surface grab sample (0.15 m from the surface).and cool to 4°C.
c. Sample must be returned to the lab in **less than 48 hours**.

2.19. Phenols (C_6H_5OH) - An aromatic compound known as carbolic acid. In concentrated solution, phenol is quite toxic to bacteria and is widely used as a germicide. Phenol is obtained from coal tar and manufactured synthetically. It is used extensively in the synthesis of organic products, particularly phenolic-type resins. Phenolic wastes arise from the distillation of wood, from gas works, coke ovens, oil refineries, chemical plants, and from human and animal refuse.

2.19.1. *Collection method*:

a. Use two- 1 liter glass (phenol bottles) bottles to collect a surface grab (0.15 m from the surface)
b. Acidified the sample with H_2SO_4 to pH <2.
c. Cool the sample to 4°C
d. There is a 28 day holding period.

2.20. Sulfate (SO_4) - The sulfate ion is one of the major anions occurring in natural waters. Sulfates occur as the final oxidized state of sulfides, sulfites, and thiosulfates. Sulfates may also occur as the oxidized stage of organic matter in the sulfur cycle. Sulfates may be discharged in numerous industrial wastes, tanneries, sulfate-pulp mills, textile mills, and

other plants that use sulfates or sulfuric acid. Sulfate is important to public water supplies because of its cathartic effect upon humans when it is present in excessive amounts (upper limit-250 mg/l U.S.P.H.S.). Sulfates are of considerable concern to wastewater treatment plants because of odor and sewer corrosion problems resulting from the reduction of sulfates to hydrogen sulfide (H_2S or hydrosulfuric acid in an aqueous solution).

2.20.1. *Collection method*:

a. Sample should only be collected as a surface grab sample.
b. Collect a surface grab (0.15 m from the surface) in a 500 ml plastic bottle
c. Cool the sample to 4°C.
d. Sample has a hold time of 28 days

2.21. Sulfide (S-) - Sulfides are constituents of many industrial wastes tanneries, paper mills, chemical plants, and gas works. Sulfides are also generated in sewage and some natural waters by the anaerobic decomposition of organic matter. Sulfides react with hydrogen ions to form HS- or H_2S. The toxicity of sulfides derives primarily from H_2S rather than from the hydrosulfide (HS-) or sulfide (S^{-2}) ions. H_2S is very toxic and has claimed the lives of numerous workmen in sewers, but owing to the unpleasant taste and odor (rotten eggs), most persons or animals avoid consuming a harmful dose.

2.21.1. *Collection method:*

a. Samples should only be collect as a surface grab.
b. Collect three- 40 ml glass VOA vials with Teflon-lined septum directly as a surface grab (0.15 m from the surface)
c. Allow the sample to overflow the vial.
d. Add 0.1 ml of 2N zinc acetate plus 6N NaOH to pH >9.
e. cap the vial when sample is overflowing ,leaving no air space
f. Cool the sample to 4°
g. Holding time is 7 days.

2.22. Phosphorous and Nitrogen (Nutrients) - Phosphorus occurs in natural waters and in wastewater almost solely as phosphates. Evidence indicates that high phosphorus concentrations are associated with accelerated eutrophication of waters when other growth promoting factors are present, and aquatic plant problems develop in reservoirs and other standing waters at phosphorus values lower than those critical in flowing streams.

Nitrogen is one of the fertilizing elements essential to the growth of algae. Such growth is often stimulated to an undesirable extent in bodies of water that receive excess inputs of nitrogen from either point or nonpoint sources.

2.22.1 *Nutrient Types*

a. NH_3 (Ammonia) - In surface or ground waters, ammonia results from the decomposition of nitrogenous organic matter. It may also result from the discharge of industrial wastes from chemical or gas plants, from ice plants, or from scouring and cleaning operations where ammonia water is used. The conversion of ammonia to nitrites and nitrates by bacteria requires oxygen, and so the discharge of ammonia nitrogen and its subsequent oxidation can seriously reduce the dissolved oxygen levels in rivers and estuaries.

b. TKN (Total Kjeldahl Nitrogen) - Analytically, organic nitrogen and ammonia can be determined together and are referred to as Kjeldahl nitrogen, a term that reflects the technique used in their determination.

c. NO_2 + NO_3 (Nitrites + Nitrates) - Nitrites are quickly oxidized to nitrates. Nitrates are the end product of the aerobic stabilization of organic nitrogen. Nitrates also occur in percolating ground waters as a result of excessive application of fertilizer or leaching from septic tanks. Nitrates are seldom abundant in natural surface waters because of uptake by plants.

d. Total P (Phosphorus) - Phosphorus occurs in natural waters and in wastewater almost solely as phosphates. High phosphorus concentrations are associated with accelerated eutrophication of waters when other growth promoting factors are present.

e. PO_4 (Orthophosphate) - Orthophosphate is used as fertilizer and is applied to agricultural and residential cultivated land where it is carried into surface waters with storm runoff.

2.22.2 *Collection Methods for Unfiltered Nutrients* (NH_3, TKN, NO_2+NO_3, and Total P)

a. Use a 500 ml plastic disposable bottle for sample collected.
b. Acidify the sample with H_2SO_4 to pH<2 (to 500 ml sample add 2.0 ml 25% H_2SO_4 **Note**: Addition of an excessive amount of acid will interfere with the sample analysis
c. Cool the sample to 4°C.
d. Holding time is 28 days.

2.22.3. *Collection Method for PO_4 and Dissolved P (Filtered Nutrients)*

This water sample must be filtered in the field. A detailed Standard Operating Procedure for field filtering using a vacuum pump can be found in Appendix 6. Be careful- **do not** allow filter residue to touch filter apparatus or forceps.

a. Use a 200 ml plastic bottle for each sample.
b. **Dissolved P sample is acidized to pH <2 by adding 25% H_2SO_4.**
c. Dissolved P and PO_4 samples must be cooled to 4°C
d. **Holding time for PO_4 is less than 48 hours**
e. The holding time for Dissolved P is 28 days.

NOTE: For Turbid Samples - change filters during process.

2.23. METALS- The following metal parameters are collected in one bottle: Cd, Cr, Cu, Ni, Pb, Zn, Ag, Al, Be, Ca, Co, Fe, Li, Mg, Mn, Na, K, Ba, As, Se, Hg.

Whenever metal samples are collected the collection of field pH is essential. Metals are always collected as a surface grab

Collection method:

a. Collect 500 ml of sample in a plastic disposable bottle directly from the water body as a surface grab (0.15 from the surface).
b. Add HNO_3 to pH <2.
c. Cool the sample to 4°C.
d. Metals have a 6 month holding time with the exception of Mercury (Hg) which is 28 days.

2.23.1. *Cadmium (Cd)* - In the elemental form, cadmium is insoluble in water. It occurs in nature largely as the sulfide salt, greenockite or cadmium blend, often as an impurity in zinc-lead ores. Cadmium is used in metallurgy to alloy with copper, lead, silver, aluminum, and nickel. It is also used in electroplating, ceramics, pigmentation, photography, and nuclear reactors. Cadmium salts are sometimes employed as insecticides and antihelminthics. Cadmium salts may be found in wastes from electroplating plants, pigment works, textile printing, lead mines, and chemical industries. Cadmium has been shown to be toxic to man when ingested or inhaled.

2.23.2. *Chromium (Total Cr)* - The principal chromium emissions into surface waters are from metal finishing processes such as electroplating, pickling, and bright dipping. Other smaller discharges of chromium are from the additive in circulating cooling waters, laundry chemicals and animal glue manufacture, leather tanning, and textile dyeing. Chromium is one of the least toxic of the trace elements. Chromium is not acutely toxic to humans.

2.23.3. *Copper (Cu)* - Copper salts in natural waters are generally the result of pollution attributable to the corrosive action of water on copper and brass tubing, to industrial effluents, and algaecide. Copper salts are used in textile processes, pigmentation, tanning, photography, engraving, electroplating, insecticides, and fungicides. Because copper in concentrations high enough to be dangerous to human beings renders water disagreeable to taste, it is believed that copper is probably not a hazard in domestic water supplies. However, copper in water may be disadvantageous or detrimental for certain industrial uses. In trace amounts, copper may be beneficial or even essential for the growth of living organisms. In excessive quantities it has been found toxic to a wide variety of aquatic forms, from bacteria to fish.

2.23.4. *Nickel (Ni)* - Nickel toxicity to man is believed to be very low. Systemic poisoning of human beings by nickel or nickel salts is almost unknown. Nickel does not merit serious consideration as a water pollutant, but nickel ions may be detrimental to beneficial uses. Nickel is toxic to some plants. Nickel is used in metal plating, batteries, as a catalyst in the preparation of edible oils, and in solar energy equipment.

2.23.5. *Lead (Pb)* - Lead is a cumulative poison. The poisoning usually results from the cumulative toxic effects of lead after continuous, long-term consumption rather than from occasional small doses. Lead exists in nature mainly as the sulfide (galena). Some natural waters contain lead in solution where mountain limestone and galena are found. Lead may also be introduced into water as a constituent of various industrial and mining effluents or as a result of the action of the water on lead in pipes. Atmospheric fallout and rainout of particulate lead are considered the most significant sources of lead input into natural surface waters, especially in urban areas. Storm runoff originating in urban areas will tend to be high in lead concentration. The low solubility of lead in the aqueous phase of natural systems and the formation of stable complexes with organic matter are manifested in the low uptake by some plants and animals. There are extremely low concentrations of lead in natural bodies of water in proportion to the concentration in the beds of lakes and streams. The net effect of these sluggish dynamics is a high degree of accumulation with prolonged exposure.

2.23.6. *Zinc (Zn)* - Zinc is used extensively for galvanizing, in alloys, for electrical purposes, in printing plates, for dye manufacture, and dyeing processes. Zinc salts are used in paint pigments, cosmetics, pharmaceutics, dyes, and insecticides. Zinc is found in high concentrations in natural waters in zinc mining areas and in effluents from metal plating works. In most surface and ground waters it is present only in trace amounts. There is some evidence that zinc ions are absorbed strongly and permanently on silt with a resultant inactivation of the zinc. Zinc has no known adverse physiological effects upon man except at very high concentrations. For esthetic considerations, high concentrations of zinc in domestic water are undesirable. At 30 mg/l, zinc gives water a milky appearance and causes a greasy film on boiling. It is toward fish and aquatic organisms that zinc exhibits its greatest toxicity at much lower concentrations.

2.23.7. *Silver (Ag)* - Silver metal is used in jewelry and silverware, in alloys, for electroplating, and in the processing of food and beverages. Silver nitrate is used in photography, ink manufacture, electroplating, coloring porcelain, and as an antiseptic. Traces of silver can be expected to reach natural waters from such sources. Silver is bactericidal and toxic at low concentrations.

2.23.8. *Aluminum (Al)* - Aluminum is the third most abundant element of the earth's crust. Aluminum occurs in many rocks and ores and clays, but never as a pure metal in nature. The metal itself is insoluble, but many of its salts are readily soluble. Aluminum is not likely to occur for long in surface waters because it precipitates and settles, or is absorbed as aluminum hydroxide or aluminum carbonate. In streams the presence of aluminum ions may result from industrial wastes or more likely from wash water containing alum from water treatment plants.

2.23.9. *Beryllium (Be)* - A relatively rare element, found chiefly in the mineral beryl, this substance is not likely to occur in natural waters. Although the chloride and nitrate forms are very soluble in water and the sulfate form moderately so, the carbonate and hydroxide forms are almost insoluble in cold water. Beryllium is used primarily in metallurgy to produce special alloys, in the manufacture of X-ray diffraction tubes and electrodes for neon signs, and in nuclear reactors. Beryllium is not harmful when taken internally through the digestive tract but has been incriminated in pulmonary ailments of workers exposed to beryllium dusts.

2.23.10. *Calcium (Ca)* - Calcium is the most abundant dissolved cationic constituent of natural fresh waters. This element is widely distributed in the minerals of rocks and soils. Calcium carbonate is frequently found as a cementing agent between mineral particles of sandstone and other detrital rocks. Calcium is one of the constituents of hard water and is a scale former in hot water systems. Prevention of corrosion of cast iron water distribution systems may be obtained through controlled precipitation of calcium carbonate. Lime (CaOH2), and dolomite [CaMg(CO3)2] are frequently employed as neutralizing agents in water and wastewater treatment.

2.23.11. *Cobalt (Co)* - Cobalt and its salts are used for making alloys, in nuclear technology, as pigment in the china and glass industry, and as binders in the tungsten-carbide tool industry. Cobalt has a relatively low toxicity to man, and traces of cobalt are essential to nutrition.

2.23.12. *Iron (Fe)* - Iron interferes with laundering operations, imparts objectionable stains to porcelain fixtures, and causes difficulties in distribution systems by supporting growths of iron bacteria. Iron also imparts a taste to water, which is detectable at very low concentrations. In addition to corrosion products, natural waters may be polluted by iron-bearing ground water.

2.23.13. *Lithium (Li)* - An alkali metal, it is not widely distributed in nature, being found in a few minerals and in certain spring waters. Lithium is used in metallurgy, medicinal waters, some types of glass, and, as lithium hydroxide, in storage batteries. Lithium is toxic at high concentrations.

2.23.14. *Magnesium (Mg)* - Magnesium ions are of particular importance in that they occur in significant concentration in natural waters, and along with calcium, form the bulk of the hardness reaction. Magnesium is considered relatively non-toxic to man and not a public health hazard because, before toxic concentrations are reached in water, the taste becomes quite unpleasant. At high concentrations, magnesium salts have a laxative effect, particularly upon new users, although the human body can develop a tolerance to magnesium over a period of time.

2.23.15. *Manganese (Mn)* - Manganese is essential for the nutrition of both plants and animals. Manganese is undesirable in domestic water supplies because it causes an unpleasant taste, deposits on food during cooking, stains, and discolors laundry and plumbing fixtures, and fosters the growth of some microorganisms in reservoirs, filters, and distribution systems. Manganese frequently appears in surface waters as the result of decaying vegetation, in waters with acid pH values, and acidic waters from coal mine drainage. In ground water subject to reducing conditions, manganese can be leached from the soil and occur in high concentrations.

2.23.16. *Sodium (Na)* - Sodium salts are extremely soluble in water; any sodium that is leached from soil or discharged to streams by industrial wastes will remain in solution. Sodium is the cation of many salts used in industry and as such is one of the most common ions in process wastes. Sodium in drinking water may be harmful to persons suffering from cardiac, renal, and circulatory diseases.

2.23.17. *Potassium (K)* - One of the more common elements, potassium is one of the most active metals, and for that reason it is not found free in nature but only in the ionized or molecular form. Potassium is used for fertilizers and some varieties of glass. It is an essential nutritional element, but in excessive quantities it acts as a cathartic.

2.23.18. *Barium (Ba)* - Barium ions are not normally present in natural surface or ground waters in measurable concentrations although they have been detected in a few springs and in effluents from areas where barytes, BaSO4, or witherite, BaCO3, are mined. Barium and its salts are used in the metallurgical industry for special alloys, in the paint industry, in cements designed to withstand salt water, and in the ceramic and glass industries. Because of possible toxic effects on the heart, blood vessels and nerves a surface water supply standard of 1.0 mg/l was established.

2.23.19. *Arsenic (As)* - Arsenic may occur in water as a result of mineral dissolution, industrial discharges, or the application of insecticides. Arsenic is toxic to humans and accumulates in the body.

2.23.20. *Selenium (Se)* - Elemental selenium is practically nontoxic, but hydrogen selenide and other selenium compounds are extremely toxic and resemble arsenic in their physiological reactions. Selenium poisoning occurs mostly among livestock, and the toxic effects appear to be associated with the consumption of high concentrations of selenium in food, such as locoweed or grains grown in soils with high concentrations of selenium, rather than from water consumption. Selenium occurs in sulfur deposits, sulfides of metals, volcanic emissions, sedimentary rocks, organic-rich soils, and coal. Selenium is used in the electronics industry, xerographic copying machines, photoelectric cells, glass and ceramics, pigment manufacture to color plastics, paints, enamels, inks, and rubber. It is also used as a component of plating solutions. It can also be found in discharges from coal-fired power plants.

2.23.21. *Mercury (Hg)* - Mercury and mercuric salts are considered to be highly toxic to humans and aquatic life. Elemental mercury is inert chemically and insoluble in water, and is not likely to occur as a water pollutant. Mercuric salts occur in nature chiefly as the sulfide HgS, known as cinnabar, but numerous synthetic organic and inorganic salts of mercury are used commercially and industrially. They are used in medicinal products, disinfectants, detonators,

pigments, and photoengraving. Many of the mercuric and mercurous salts are highly soluble in water.

3. PESTICIDES AND ORGANICS

3.1. Pesticides - Pesticides are any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating insects, rodents, fungi, viruses, or weeds, and other forms of plant or animal life considered to be pests. Pesticides are categorized into three groups:

- Inorganic - arsenicals, mercurials, borates, and fluorides
- Synthetic organic - chlorinated hydrocarbons, organic phosphates, and thiocarbamates
- Natural organic - rotenone, pyrethrum, and nicotine

Pesticides may also be classified by their biological usefulness as algaecides, acaricides, fungicides, and herbicides.

3.2. Organics - All organic compounds contain carbon in combination with one or more elements.

3.3. Collection Methods

3.3.1. *Pesticides, semivolatile organics, and acid herbicides*

a. Collect each sample (Pesticides, semivolatile organic & acid herbicides) into a separate 1 gallon amber glass jug with a Teflon-lined cap.

b. The sample is collected directly from the water body as a surface grab (0.15m deep).

c. Add sodium thiosulfate and cool to 4°C.

d. Holding time is 7 days.

3.3.2. *Purgeable Organics (VOA)*

a. Collect sample into three-40 ml Teflon vials, remove cap underwater.

b. When collecting in waters with no chlorine, use vials pre-preserved by the Central Laboratory with sodium bisulfate ($NaHSO_4$).

c. The vial should be filled and capped underwater (0.15m deep) with no air space in the vial. While keeping lid and bottle under water gently rock the lid and bottle to remove air bubbles (unless bottle is pre-preserved). The volatile organics vials should be completely filled to prevent volatilization, and extreme caution should be exercised when filling a vial to avoid any turbulence that could also produce volatilization.

d. When collecting in waters where chlorine is present, first preserve an empty vial with 0.6 g of ascorbic acid before filling and capping the vial underwater. After capping the vial, remove the vial above water, uncap, and add 0.25 g of sodium bisulfate leaving no air space before recapping the vial.

e. The three vials should be placed in a Ziploc bag in the cooler. A trip blank is also required. This is a vial filled at the laboratory with appropriate bottled water and placed in a Ziploc bag in the same cooler with the other VOA vials.
f. A separate laboratory sheet is filled out for the trip blank and this sample is used to determine if any contamination has occurred of the VOA samples.
h. Cool to 4°C.

3.3. Instructions for requesting a pesticide or organic analysis

When a particular pesticide or organic is suspected or known to be present in a sample, its name should be entered on the laboratory form. With this information, the laboratory can focus immediately on the analytical methodology for determining the presence and concentration of the suspected pollutant and as a result possibly decrease the analysis time. A list of specific pesticides and organics currently analyzed at the Laboratory is available online: http://portal.ncdenr.org/web/wq/lab/ops/org

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V. SEDIMENT COLLECTION AND PRESERVATION

1. COLLECTING SUSPENDED SEDIMENT

1.1. Samplers and Applications

For more descriptive information about these samplers see references (Inter-Agency Committee on Water Resources 1965).

1.1.1. *U.S. DH-48 – When in wadable streams*

1.1.2. *U.S. DH-59 [Equal Width Increment Method (E.W.I.)]*

1.1.2.1 Used When

a. Too deep for wading but less than 15 feet deep.
b. From low bridges.
c. Velocities less than approximately 5 ft/ sec.

1.1.2.2 Sampling Tips

a. Set out safety equipment (cones, high visibility vests, etc.) as necessary and assemble sampling equipment. Note: Prior to using any sampler, it should be thoroughly cleaned and inspected.
b. Rinse sampler with distilled water before the first station and between stations to wash away any contaminants.
c. Use the upstream side of bridges if possible.
d. Go to midstream or the area where most of the flow is occurring. First sampling point must be made where the flow is greatest.
e. Lower and raise the sampler at a consistent rate with the nozzle oriented upstream to the bottom, immediately reverse it and raise to above the water surface. Repeat until jar is filled within approximately 3 inches of the top of the jar (350-440 cc). Rate must not exceed 0.4 times the mean velocity and must be fast enough to keep from overfilling.
f. If bottle overfills - discard sample, rinse bottle, and collect again. Use a smaller nozzle or a faster transit rate.
g. Raise the sampler and pour contents into a cleaned sample splitter. For cleaning instructions see USGS references. The sample splitter should be rinsed with distilled water before the first station and between stations.
h. Sample at the next sampling point and place contents into a mixing churn.

i. Ideally try for 3 sampling points, midstream and quarter points, but the situation might indicate otherwise (if maximum flow is not midstream). Sampling points should be equally spaced.

j. If more sample is needed for the churn, take a second set of samples at the same transit rate at all verticals.

k. Churn sample at a uniform rate of about nine inches per second. Disc should touch the bottom of the tank on every stroke and the stroke length should be as long as possible without breaking the water surface.

l. After churning for about l0 strokes, withdraw sub-samples and place in ½ liter bottles. As sub-samples are withdrawn, maintain churning rate. If there is a break in withdrawals, the stirring rate must be re-established before withdrawals can continue.

1.2. Variations on Suspended Sediment Sampling

1.2.1. When suspended materials in the stream are uniformly distributed, a representative sample can be obtained by sampling vertically at one location near the center of the flow.

1.2.2. Use surface or dip sampling instead of depth integrated sampling when:

- Stream velocity is too high.
- Large floating and moving submerged debris is in the stream.
- A depth-integrated sampler is not available.
- The depth of the stream is very shallow.

2. COLLECTING BOTTOM SEDIMENT

2.1. Containers and Volumes

2.1.1. *Sample Containers*

a. Use certified jars for sediment samples or as indicated by Chemistry Laboratory.
b. Use Teflon lid or parafilm between jar and lid for nutrients and all metals.
c. Tin foil can be used between jar and lid for all metals except aluminum.
d. Use Teflon lid or tinfoil for pesticides.

2.1.2 *Required volume*

- One pint of sample must be obtained for analyses of metals, nutrients, and organics.

3. BOTTOM SEDIMENT SAMPLERS, APPLICATIONS, AND PROCEDURES

For more descriptive information about these samplers see references.

3.1. Ekman grab (Figure 12)

3.1.1. *Locations Suitable for Use*:

a. Use in soft finely divided littoral bottoms of lakes, ponds, and streams that are free from vegetation (sticks, partially decayed leaves, etc.) as well as intermixtures of sand, stones, and other coarse debris.

b. Calm waters.

c. Low velocity streams.

d. Low bridges (messenger can damage spring mechanism if used from high bridges)

3.1.2. *Sampling Tips:*

a. Make sure grab is operating correctly. The grab can cause severe injury. Do not activate unit while holding.

b. If sampling from a low bridge, it may be advisable on wide streams to take 3 samples (midstream and quarter sections) and composite them to form I sample in a Nalgene mixing tub.

c. Set in open position by locking open the spring operated jaws.

d. Operating procedures are similar to those of the Petersen grab starting at step 5.2.6.

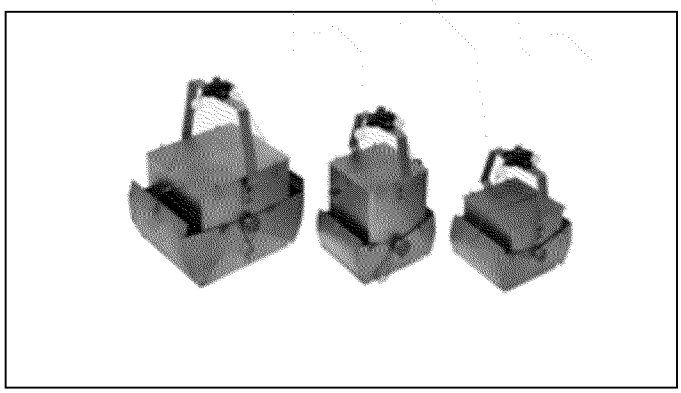


Figure 12. Ekman Grab Samplers

3.2. Petersen grab (Figure 13)

3.2.1. *Locations Suitable for Use:*

a. Hard bottoms (sand, gravel, marl, clay, etc.).
b. Strong velocities.
c. Very deep water

3.2.2. *Sampling Method and Tips*

a. Use with hoist because of its weight.
b. Make sure grab is operating correctly and rinse in water at first station and between stations.
c. Move jaws to open position, bring free end of horizontal locking bar into position in the locking notch on upper bar, insert safety pin lock.
d. Swing grab over side, remove safety pin lock, and lower slowly to bottom.
e. When grab is at the bottom, allow a moment for it to sink into the bottom then slack off on the line.
f. Resume tension on the line to close grab.
g. Pull grab to surface, swing inboard over a tub and discharge sample.
h. Place sample in jar. Approximately one pint of sample is needed.
i. If jaws of grab are jammed due to a stick, rock, or other hard object, discard sample, clean grab and sample again.

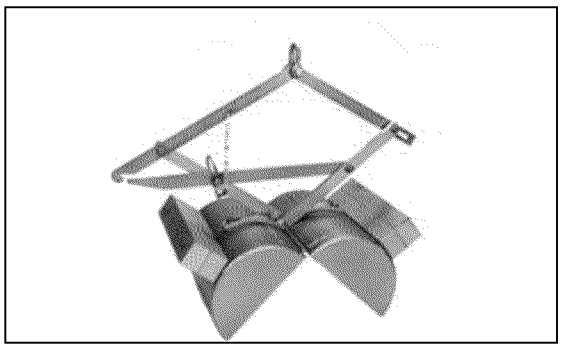


Figure 13. Peterson Grab Sampler

3.3. Ponar grab (Figure 14)

3.3.1. *Locations Suitable for Use:*

a. All types of bottoms except the hardest clays.
b. Strong velocities.
c. Very deep water

3.3.2. *Sampling Method and Tips*

a. Use with hoist because of its weight.
b. Make sure grab is operating correctly and rinse in water at first station and between stations.
c. Move jaws to open position, bring free end of the horizontal locking bar into position in locking notch on upper bar and insert safety pin lock.
d. Remove safety pin lock and lower sampler slowly.
e. When the grab is at the bottom, wait a minute to allow it to sink, and then slack off the cable.
f. Lift the sample maintaining tension and raise steadily and slowly to surface.
g. Swing inboard and open sampler over a tub to discharge sample.
h. Place sample in jar. Approximately one pint of sample is needed.
i. If an object is wedged between the jaws, discard sample, clean sampler, and sample again.
j. At the conclusion of sampling, replace the safety pin lock.

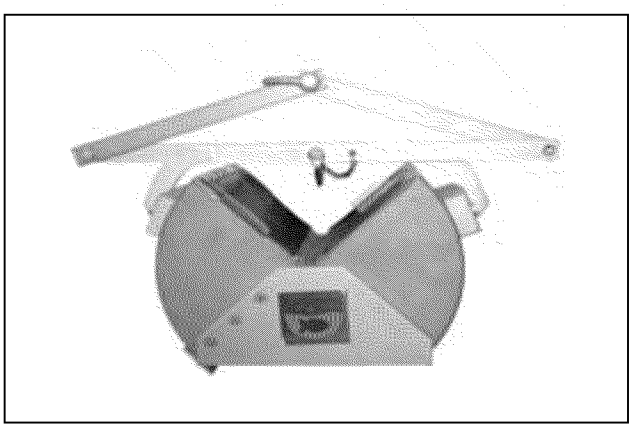


Figure 14. Ponar Grab Sampler

4. BOTTOM CORE SAMPLERS, APPLICATIONS, AND PROCEDURES

4.1. Phleger core sampler (Figure 15.)

4.1.1. *Locations Suitable for Use:*

a. Use with hoist because of its weight.
b. Use where water is too deep to use hand coring devices.
c. Sampling soft, sandy or semi-compacted sediments.

4.1.2. *Phleger Core Sampler Methods*

a. Make sure sampler and core tubes are clean and operating properly, rinse corer at first station and between stations.
b. Lower sampler to bottom, then raise off the bottom approximately one to two meters.
c. Drop sampler again to collect core.
d. Swing sampler inboard over a Nalgene tub.
e. Remove tube and core, measure out top two inches of core.
f. Place this portion of core into jar.
g. Repeat sampling until approximately one pint of sample is obtained.

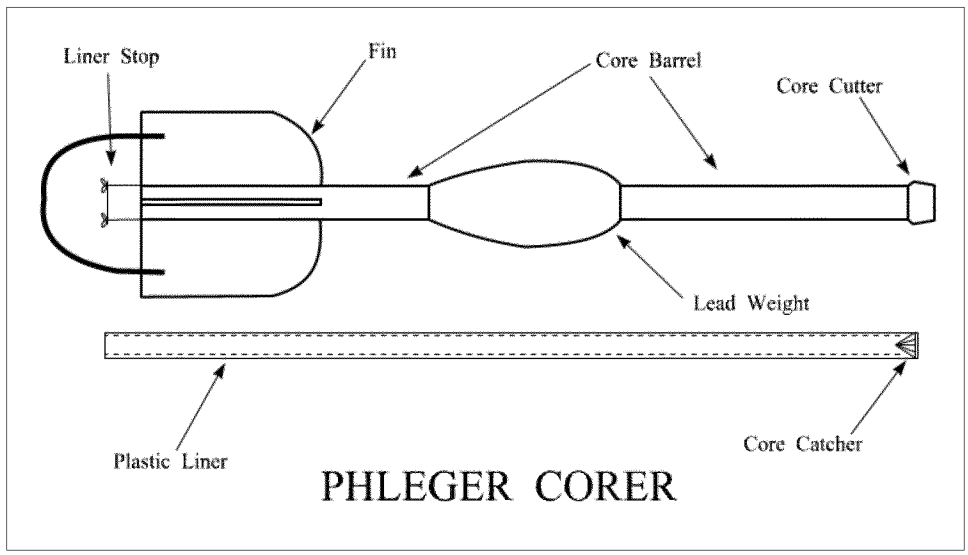


Figure 15. Phleger Corer Diagram

4.2. Wildco Light Duty Model 2414 Core Sampler

4.2.1. *Locations Suitable for Use:*

a. Use by hand or on the end of a line.
b. Where sediment is relatively soft.

4.2.2. *Wildco Light Duty Model 2414 Core Sampler Methods*

a. Make sure sampler and core tubes are clean and operating properly, rinse corer at first station and between stations.
b. Lower sampler to bottom, raise again and drop if necessary to take sample.
c. Remove plastic core, measure out top two inches of core.
d. Place this portion of core into jar.
e. Repeat sampling until approximately one pint of sample is obtained.

4.3. Hand coring device– for shallow water use.

4.3.1 *Procedure for hand coring device:*

a. Make sure sampler is clean before using. Rinse before first station and between stations.
b. Take sample by turning sampler into sediment.
c. Remove sampler and core.
d. Measure out top two inches of core.
e. Place this into jar.
f. Repeat sampling until approximately one pint of sample is obtained.

4.4. Hand Sampling Method

a. Face upstream in shallow, wadable streams.
b. Make sure that spoon or scoop has been thoroughly cleaned.
c. Scoop the sample directly into the jar and get a representative sample. It may be advisable to take several samples and consolidate (midstream and quarter points).

VI. STANDARD CLEANING PROCEDURES

1. GENERAL

The procedures outlined in this section are to be used by all personnel to clean sampling equipment and sample containers prior to field use. These procedures assure the standard operating procedures (SOP) for the Section; any deviation from them must be documented in field records and investigative reports.

All equipment and sample containers that are cleaned using these procedures will be tagged, labeled or marked with the following information:

- Name of person cleaning equipment or containers
- Date equipment or containers were cleaned
- Any deviation from SOP that was employed

All equipment and reusable sample containers used to collect samples will be identified at the conclusion of sampling activities. Any problems encountered with the equipment or needed repairs will also be noted. Equipment or reusable sample containers needing cleaning or repairs should not be stored with clean equipment, sample tubing or sample containers. Equipment, reusable sample containers, disposable sample containers, and sample tubing that are not used during the course of an investigation may not be replaced in storage without being re-cleaned if these materials are transported to a facility or study site where herbicides, pesticides, organic or other toxic materials are present or suspected of being present. All portions of unused coils of tubing that are returned shall be re-cleaned before being restocked. If these materials are transported to a facility in connection with a routine inspection or study where toxic or organic materials are not known or not suspected of being present, they may be placed back in storage without being cleaned.

Sufficiently clean equipment and sample containers should be transported to the field so that an entire study can be conducted without the need for cleaning equipment in the field. However, this will not always be possible when using coring equipment, dredges, buckets, water samplers, pumps and other such equipment. Field cleaning procedures are included to cover these special problems. Emergency field sample container cleaning procedures are also included; however, they should not be used unless absolutely necessary. Specific cleaning procedures are included in the following paragraphs.

2. AUTOMATIC SAMPLING EQUIPMENT

2.1. General Cleaning

2.1.1. *For All Automatic Samplers*

a. The exterior and accessible interior (excluding the waterproof timing mechanism) portions of automatic samplers will be washed with phosphate free laboratory detergent and rinsed with tap water.

b. The face of the timing case mechanism will be cleaned with a damp cloth.

c. All sample intake tubing will be discarded after use. Pump tubing should be cleaned with pesticide grade solvents.

d. New pre-cleaned, silicone pump tubing (see section on cleaning tubing) will be installed with the aluminum or Teflon tubing caps intact.

f. When using the samplers for collecting samples for metals and/or organic samples, the metal distributor tubes should not be used for this purpose.

g. The automatic samplers should not be used for collecting samples for organic analyses in the individual bottle mode since there is no way to properly clean the distributor plate to remove any residual organic compounds. The sample tubing headers may not be used to collect samples for organic analyses for the same reason.

2.2. ISCO Specific Cleaning Procedures

2.2.1. *Automatic sampler rotary funnel, distributor and metal tube*

a. Use only for non-organic sample collection using individual sequential bottles.

b. Clean with hot water, phosphate free laboratory detergent and a brush.

c. Rinse thoroughly with hot tap water.

d. Rinse thoroughly with distilled water.

e. Replace in sampler.

2.2.2. *Automatic sampler headers*

a. Rinse entire header with hot water, a bottle brush, and phosphate free laboratory detergent.

b. Disassemble header and rinse thoroughly with hot tap water, using a brush to remove particulate matter and surface films.

c. Rinse plastic portion of the header with 20 percent nitric acid. Do not use acid on metal parts.

d. Rinse thoroughly with tap water.

e. Reassemble header and rinse with distilled water.

f. Let dry thoroughly and wrap with aluminum foil.

g. Headers may not be used when collecting samples for organic analyses.

2.2.3. *Glass reusable composite containers (2 ½, 3 and 5 gallon capacities)*

a. After using, rinse with water in the field, seal with aluminum foil to keep the interior of the container wet and return to the laboratory.
b. Wash thoroughly with hot tap water and phosphate free laboratory detergent, using a bottle brush to remove particulate matter and surface film.
c. Rinse thoroughly with hot tap water.
d. Wash with 10 percent nitric acid.
e. Rinse thoroughly with tap water (at least 3 times).
f. Rinse thoroughly with distilled water (at least 3 times).
g. Rinse thoroughly with acetone (pesticide grade). Caution: Acetone must be removed before using. Residual acetone will interfere with certain analyses.
h. Rinse twice with distilled H_20. Allow to air dry,
i. Cap with aluminum foil or Teflon film.
j. Do not use composite containers used to collect samples at facilities manufacturing pesticides, herbicides or other toxic or noxious compounds. These are to be properly disposed of at the DWR Chemistry Laboratory.
k. Glass composite containers used to collect in-process wastewater samples at industrial facilities will be discarded after sampling.
l. Any bottles that have a visible film scale or discoloration remaining after this cleaning procedure are to be discarded.

2.2.4. *Glass sequential sample bottles (automatic sampler base for sequential mode)*

a. Rinse bottles in the field after using with tap water and seal with aluminum foil or cap for return to laboratory.
b. Rinse thoroughly with hot tap water.
c. Wash with 20 percent nitric acid.
d. Rinse thoroughly with tap water.
e. Place in dishwasher - phosphate free detergent cycle followed by tap and distilled water rinse cycles.
f. Replace in covered, automatic sampler base; cover with aluminum foil for storage.

2.2.5. *Bottle siphons*

a. Use a new siphon for each sampling location.
b. Pre-rinse the 3/8 inch Teflon tubing (used to make siphons for organic analyses) as in Teflon tubing cleaning instructions.
c. Flush the PVC 3/8 inch tubing used for samples other than those collected for organic analyses with sample before use.

2.2.6. *Teflon composite mixer rods*

- Use the sample cleaning procedure outlined for glass reusable composite containers above.

2.2.7. *Automatic sampler rubber pump tubing*

- Only new pre-rinsed tubing should be used for each automatic sampler set up

a. Rinse tubing with hot tap water for five minutes.
b. Rinse outside of tubing with hexane.
c. Install in automatic sampler.
d. Cap both ends of tubing with aluminum foil or Teflon film.

2.2.8. *Teflon sampler tubing (pure Teflon or Teflon lined)*

a. If required length is known pre-cut Teflon tubing or clean I00 feet coil intact.
b. Rinse outside of tubing with hexane.
c. Flush interior of tubing with hexane.
d. Air dry.
e. Cap each end of tubing with aluminum foil or Teflon tape and completely wrap the coil of Teflon tubing with aluminum foil to prevent contamination.

2.2.9. *Polyvinyl chloride sample (PVC) tubing (1/18, I/I4, or 3/8 Inch)*

a. Use only new tubing.
b. Use in selective sampling where organics are not of concern.
c. Flush the tube with sample immediately after the sampler is set up at the sampling site to remove any residues from the manufacturing or extruding process.
d. Store tubing in original container and do not removed from this container until needed.

2.2.10. *Stainless steel tubing*

Tubing will be flushed in the field with tap water after use and cleaned as follows upon return to the laboratory:

a. Wash with phosphate free laboratory detergent and a long bottle brush.
b. Rinse with hot water for 5 minutes.
c. Rinse with acetone.
d. Rinse with distilled water for one minute.
e. Air dry.
f. Rinse with hexane.
g. Completely wrap tubing, including ends, with aluminum foil to prevent contamination during storage.

3. MISCELLANEOUS SAMPLING AND FLOW MEASURING EQUIPMENT

Miscellaneous flow measuring and sampling equipment should be washed with phosphate free laboratory detergent and rinsed with hot tap water before being stored. For Lablines, rinse at least three times with distilled deionized water and cover the top of the Labline with foil to prevent contamination and to show that the Labline has been cleaned.

A different procedure is used for any equipment utilized in organic or toxics sampling.

4. STAINLESS STEEL SAMPLING EQUIPMENT

For collecting samples for organic analyses:

4.1. Follow the procedures given in the Automatic Sampler Section, Glass Reusable Composite Containers, but omit acid rinse.

4.2. Wrap equipment completely in aluminum foil to prevent contamination during storage.

5. OTHER FIELD INSTRUMENTATION

NOTE: Where available, always follow the manufacturer's recommendations for cleaning the device (see Appendices 1-4).

The exterior of sealed, watertight equipment such as Labline Samplers and field meters should be washed with a mild detergent (liquid dishwashing detergent, for example) and rinsed with tap water before storage. The interior of such equipment may be wiped with a damp cloth if necessary. Other field instrumentation should be wiped with a damp cloth. Probes for pH, conductivity, DO, etc. should be rinsed with distilled water before storage. The desiccant in flow meters and other equipment should be checked and replaced if necessary each time the equipment is cleaned.

Keep meters clean and in good operating condition. Probes should be rinsed at the end of each sampling day, properly stored and cleaned on a regular basis.

6. ICE CHESTS AND SHIPPING CONTAINERS

All ice chests and reusable shipping containers will be washed with a mild detergent (interior and exterior) and rinsed with tap water and air dried before storage.

7. FIELD CLEANING PROCEDURES

For routine operations involving classic parameter analyses, water quality sampling equipment such as Kemmerers, buckets, DO dunkers, dredges, etc. may be cleaned with sample or tap water between sampling locations. A brush may be used to remove deposits of material or sediment if necessary. Flow measuring equipment such as weirs, staff gages, velocity meters, and other stream gauging equipment should be cleaned with tap water after use and between measuring locations. When sampling equipment (not tubing) is to be utilized for collecting organic or toxic samples, the following cleaning procedure is to be used between sampling locations:

- Clean with tap water and brush if necessary.
- Rinse with pesticide grade acetone.
- Rinse thoroughly with tap water (if available).
- Rinse with distilled water.

It must be emphasized that these procedures are only to be used in the field. All equipment will be cleaned before storage at the laboratory utilizing the procedures previously outlined.

8. VEHICLES

All vehicles used by staff should be washed on a routine basis. This routine maintenance should minimize any chance of contamination of equipment or samples due to contamination of vehicles. When vehicles are used in conjunction with hazardous waste site inspections, or on studies where pesticides, herbicides, organic materials or other toxic matter are known or suspected to be present, a thorough interior and exterior cleaning is mandatory at the conclusion of such investigations. All vehicles shall be equipped with trash bags and/or trash containers to facilitate vehicle cleaning. All contaminated trash and equipment must be kept separate from ordinary trash and must be disposed of properly on-site or on return to the facility.

9. DISPOSABLE SAMPLE CONTAINERS

All disposable sample containers will be stored in their original packing containers in a clean, dust free environment. When any packing container is opened, all disposable sample containers inside should be immediately capped if they are found uncapped.

VII. TIME-OF-TRAVEL & DYE TRACING

1. FLUORESCENT DYE

The preferred dye for use in time-of travel studies by the North Carolina Division of Water Resources is Rhodamine W. T. (20%) solution. This is a red fluorescent dye which mixes well with water and is easily detected through visual means under high concentrations and through the use of a fluorometer for concentrations to as low as 0.01 parts per billion. Rhodamine WT has properties essential for water tracing studies. Rhodamine WT is:

- water soluble,
- highly detectable-strongly fluorescent,
- fluorescent in a part of the spectrum not common to materials generally found in water, thereby reducing the problem of background fluorescence,
- harmless in low concentrations,
- inexpensive, and
- reasonably stable in a normal water environment (Wilson, Cobb & Kilpatrick, 1986).

Rhodamine dye can also be used to determine such things as short-circuiting in wastewater treatment plants, outlets from storm drains, septic tank leakage, etc.

Most of ISB's dye studies are performed as part of a waste-load allocation model. This model requires that a stream be segmented into different reaches based upon predicted stream velocities, stream morphology, total distance of the study area, and major inputs from dischargers and tributaries. A dye sampling station is required in each of these reaches.

1.1. <u>Safety</u>

(MSDS is kept with dye container)

1.1.1. *Personal Protection*

a. Latex or vinyl gloves (in lab and field).
b. Goggles
c. Ventilated room
d. Apron

1.1.2. *Emergency and First Aid Procedure*

a. Inhalation:
- move to fresh air.
- Give oxygen and medical help if breathing is difficult.

b. Eye contact:
- Flush eyes with flowing water for at least 15 minutes, holding eyelids apart to irrigate thoroughly.
- Get medical attention right away.

c. Skin contact:
- Wash affected skin areas thoroughly with soap and water.
- If irritation develops, consult a physician.

d. Ingestion:
- If swallowed, dilute with water and induce vomiting.
- Get immediate medical attention.
- Never give fluids or induce vomiting if patient is unconscious or has convulsions.

1.2. Equipment - Fluorometer

1.2.1. Turner Designs Model 110 - reads dye concentrations directly in ppb. Operating instructions are contained in the Turner Designs Model 10 Operators manual, section 3-operations.

1.2.2. Turner Model 10-AU - reads dye concentrations in ppb. Operating instructions are contained in the Turner Designs Model 10-AU operating manual.

2. PRE-SURVEY

2.1. Surface Water Supplies

2.1.1. Identify all surface water supplies in or downstream from the study area.

2.1.2. Notify each water supply operator that may be affected in the study area, the DENR - Division of Water Resources regional water quality supervisor that a dye study is scheduled to be performed. Explain the reason for the study and inform the water treatment operator that DWR personnel will monitor dye concentrations at their water intake. If dye concentrations in the river exceed 10 ppb, the facility will be informed to shutdown their operation until river dye concentrations fall below 10 ppb. All efforts should be made to calculate a dye dosage that will result in a dye concentration at a water supply significantly below the 10 ppb.

2.2. Field Reconnaissance

1. Select dye sampling stations. Stations are selected based upon access, distance from the dose, and model requirements.
2. Locate all USGS gage stations in the study area or sites at which flows can be performed.
3. Determine if any dam structures that can regulate flow exist in the study area. If there is such a dam structure, a station is usually set up just upstream of the dam and an additional dose is made below the dam.

3. DYE REQUIREMENTS (ESTIMATING DOSAGE)

For Rhodamine WT 20 percent dye the dosage formula is:

$$V = 3.4 \cdot 10^{-4} \cdot [(Qm * L)/Vm]^{0.93} \cdot Cp$$

Where:

V is the volume of dye, in liters
Qm is the maximum discharge in the reach, in cfs
L is the distance from injection to sampling point, in miles
Vm is the mean velocity, in fps
Cp is the peak concentrations desired in µg/l

The volume of Rhodamine WT 20 percent dye required to produce a peak concentration of 1 µg/l (ppb) can be determined from the nomograph in Figure 16 for a range of flow-reach conditions.

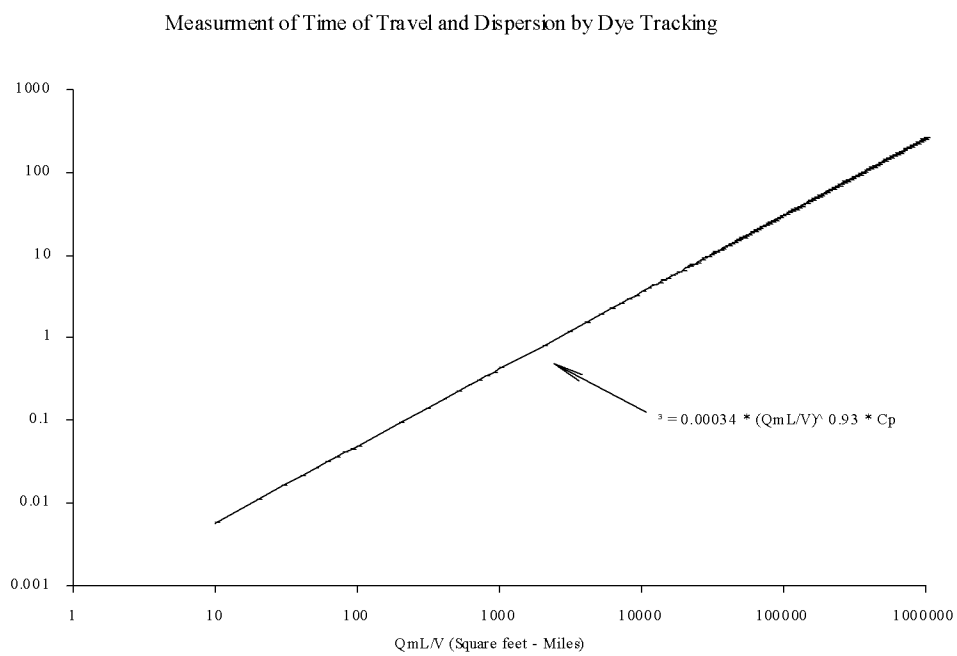


Figure 16. Nomograph for determining volume of dye necessary to produce peak concentration

4. INJECTION OF DYE

4.1. Injection Types

4.1.1. *Single Slug Injection*

a. A single slug injection of dye is usually made in the center of the thread of flow.

b. The desired quantity of dye as calculated in part 3 (above) can be poured into the stream from a container.

4.1.2. *Continuous injection*

a. The desired quantity of dye is pumped into the water column at a fixed rate for a fixed time using an ISCO sampler or a peristaltic pump. Tubing is run from the pump to the desired dye injection point. Contaminated pump lines are first flushed with stream water and then placed in plastic bags for shipment back to the lab.

5. COLLECTION OF WATER SAMPLES

Samples should be taken in pre-numbered glass bottles by a hand sampler or by ISCO samplers. Care should be taken to collect samples in the peak concentration of the dye cloud, i.e. do not sample midstream if the dye cloud is along one stream bank.

5.1. Dye Sample Collection

5.1.1. *Data recorded on field sheets* (Figure 17)

a. Station Location-Sampling Point
b. Date
c. Sample Bottle Number
d. Time
e. Name of Sampler

5.1.2. *Methods and Guidance*

a. At least one background sample is needed for measurement of background fluorescence at each site in the study reach before the dye arrives.

b. Sampling should begin early enough to determine the true dye peak.

c. Sampling should continue until a peak has been determined; and until a decreasing trend has been clearly established.

5.5.1. *Sampling Schedule*

a. The schedule for collecting samples at each sampling site is the most uncertain aspect of the plan.

b. Estimates of the time to begin sampling, time intervals between samples, and the duration of sampling must be made, which will ensure adequate definition of the dye cloud passing each site. It is better to start with more frequent sampling and decrease frequency based on sampling results when travel times are unknown.

c. An estimate of the time-of-travel between sampling sites is usually based on the cloud's movement to the first sampling site downstream of the injection site.

WATER QUALITY SECTION
INTENSIVE SURVEY
DYE TRACER STUDIES

SUB-BASIN: ___________

STREAM: ______________________________ LOCATION: ___________________________________

SAMP. NO	SAMP Point	DATE	TIME	G. H. OR RP-WS	FIELD READINGS				LABORATORY READINGS				CONC (ppb)
					1X	3X	10X	30X	1X	3X	10X	30X	

COMMENTS:

Figure 17. Dye Tracer Study Field Sheet

ED_002003J_00022989-00077

5.6. Sample Collection Methods

5.6.1. *Hand Sampling*

a. Grab sample by hand dipping a bottle or by using a dye sampler.

b. Depth integrated sample a Labline sampler is needed.

5.6.2. *Automatic Samples (ISCO Sampler)*

a. Samples can be analyzed directly from the ISCO bottles, however, if the ISCO bottles are needed to continue sampling the samples can be transferred to numbered glass bottles.

b. Label bottle racks.

c. To reuse ISCO bottle, rinse three times using tap water or if tap water is unavailable uncontaminated stream water can be used.

6. FLUOROMETER USE

Refer to fluorometer manufacturer's operating instructions for specific procedures and service instructions. The Turner Designs Model 10 Fluorometer has two main scales; an X1 and an X100. When the fluorometer is in the X1 position, the sensitivity of the instrument is as indicated by the range lights. When the fluorometer is in the X100 position, the sensitivity of the instrument is 100 times that indicated by the range lights.

The scale for the Turner Designs Model 10 Fluorometer is:

Scale	Range	Concentration (ppb)
X100	X10	0-1
X100	minimum sensitivity	1-10
X1	X10	10-100
X1	minimum sensitivity	100-1000

6.1. <u>Fluorometer Usage</u>

6.1.1. *Calibration-*

(Fluorometric Procedures for Dye Tracing, Book 3, Chapter A12, Revised 1986.)

a. Use a range of dye concentrations (ex. 1 µg/l, 10 µg/l, 50 µg/l, 100 µg/l with µg/l=ppb) to calibrate the fluorometer prior to a dye study.

b. Calibrate all fluorometer at 1 ppb – DWR preference.

c. Calibrate fluorometer prior to taking out in the field, before running samples in the field, and before running samples in the lab

6.1.2. *Sample Collection*

a. Prepare solution standards- Dye standards of known concentrations should be prepared in accordance with the U. S. Geological Survey's dye tracing procedures contained in Turn the fluorometer on and allow it to stabilize for at least 10 minutes.
b. Use a distilled water blank to zero the instrument.
c. Rinse the cuvette with water from the sample bottle before running that sample. Wipe off moisture from the outside of the cuvette.
d. Run samples.
e. Record measurements on the field sheet.
f. Keep samples for future analysis, especially if peak concentration is questionable.

VIII. FLOW MEASUREMENT

1. INTRODUCTION

Stream-flow or discharge is defined as the volume rate of flow of the water including any sediment or other solids that may be mixed with it (Buchanan and Somers 1968). Stream-flow is usually expressed in cubic feet per second (cfs) and discharge flow in million gallons per day (MGD).

Several methods of determining flow are used by DWR. Most consist of wading into the stream with a top-setting flow rod and a vertical axis type flow meter shown as a propeller in Figure 18.

Other methods of determining flows (usually small, low-velocity flows) are:

- Volumetric method
- V-notched weir method
- Estimating flow mathematically method

The USGS maintains many gauging stations across the state and their stream-flow information is available in hardcopy and on-line. Discharge measurements using current meters are based on the equation:

Q=AV, where Q=Discharge, A=Area, V=Velocity

It is as important to get good depth readings as it is to get good velocity readings.

How to Calculate Flow

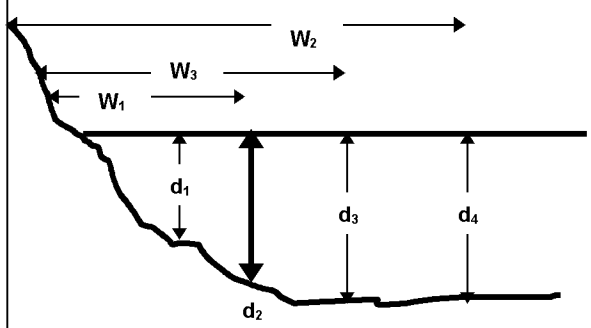
Calculating discharge from each of the width intervals:

$q_2 = v_2 d_2 (w_3 - w_1)/2$

where: q_2 = *discharge at width interval 2 (cfs)*
v_2 = *velocity measure at width interval 2 (ft/sec)*
d_2 = *depth at interval 2 (ft)*
w_3 = *distance from the bank or initial measuring point to the point following interval 2 (ft)*
w_1 = *distance from the bank or initial measuring point to the point preceding interval 2 (ft)*

Calculate the total discharge (flow) as the sum of each of the partial discharges:

$Q = q_1 + q_2 + q_3 + q_4 \ldots q_i$



DWR uses several different current meters and example is shown on Figure 18. The Price meter and the pygmy meter are vertical axis type meters, which use the number of revolutions over a period of time to calculate the water velocity. The Marsh McBirney meter works on the electromagnetics of the water passing by the meter.

Depth-measuring devices are used by DWR include two types of wading rods and a cable-winch bridge board. The top-setting wading rod easily sets the current meter at the proper height. With the other type of wading rod, the depth of the current meter must be calculated and set. The bridge board is used from a bridge handrail or the gunwale of a boat in streams and rivers where the water is too deep or the current is so strong that wading is dangerous or impossible. The winch has a depth-indicating gage.

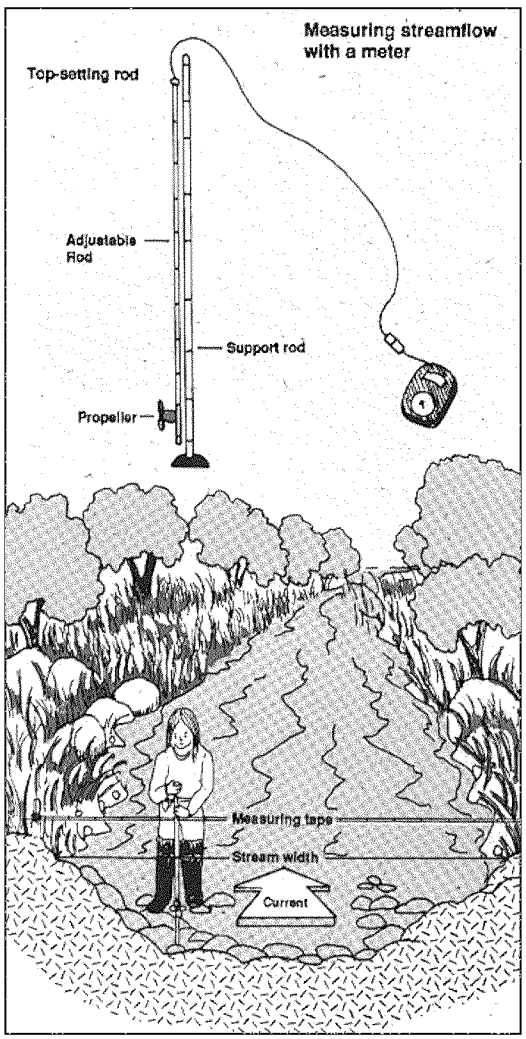


Figure 18. Instream Flow Measurement

2. ESTABLISHING AND USING A REFERENCE POINT

Before measuring any flow a stage reference point (RP) should be found or established. This point can be located on any stationary object over the water surface. Measure the distance from that point to the water surface. It is important to measure this distance before and after doing the flow measurement, as this will indicate any changes in the water level that occurred during the flow measurement.

Many bridges already have an established RP located somewhere on the bridge. These RPs have been established by the USGS and should be used if they can be located. If the RP on the bridge is not located, establish one. Make a mark on a structure over a deep pool near where the flow measurement is made. Clearly identify the mark so that others may use it also.

If many flows are to be done at a station, then a good reference point needs to be used. Each time a flow measurement is performed, record the tape down elevation. As multiple flows are compiled, a relationship between stage and flow can be graphed; eventually allowing flow estimates to be made by measuring the reference point. Occasional flows still need to be performed to make sure the tape down/flow relationship remains constant.

Use a metal tape and dimwap (weight) when measuring the tape down. Stand at the reference point. Let the tape feed out until it barely skims the water surface. Put the tape to the reference point and record the measurement. Be sure to add the length of the dimwap in the measurement.

The reference elevation should be measured to the top of the bolt, the top of the nail head, or to the top of the bridge rail (even if it is beveled). It is important to make your measurements from the exact same point each time.

3. FLOW EQUIPMENT

Price AA current meter
Price pygmy meter
Top-setting wading rod
Headset or beeper box
Stopwatch
100 foot tape measure (in 1/10 ft)
Chaining pins
Stage tape measure with dingwap
Clipboard
Flow sheets
Pencil
Cleaning cloth
Oil
Flagging
Small flathead screwdriver
Hammer and nail
Spray paint (international orange)
Torpedo weights (15 lb., 30 lb.)
Bridge board
Hand calculator

4. FLOW MEASUREMENT PROCEDURE

4.1. Flow Measurement Method

4.1.1. *Pre-Sampling:*

a. Maintain all flow equipment in good working order. Refer to USGS publication, Discharge Measurements at Gauging Stations (Buchanan and Somers 1969).

Note: The spin test is a good indicator of flow equipment readiness.

a. Check condition of flow equipment before leaving the office. An equipment checklist is helpful.

b. Gather all equipment necessary to do the flow, see list in section 3 of this chapter.

c. Select a reach of stream containing the following characteristics:

- A straight reach with the threads of velocity parallel to each other
- A stable stream bed free of large rocks, weeds, and protruding obstructions such as piers, which would create turbulence
- A flat stream bed profile to eliminate vertical components of velocity.
- Wait 15 minutes after moving rocks and vegetation prior to beginning flow measurements to allow stabilization of the stream flow.

d. Establish a stage reference point (RP) (procedure described in following pages).

e. Measure and record the starting stage.

f. Install the current meter on the wading rod, attach the headphones - try a spin test (USGS publication, Smoot & Novak, 1968). Do the headphones click once for every revolution of the current meter? Make adjustments as necessary.

g. Record pertinent information on the flow sheet (See Appendix 7). Include: stream name, date, time start, stage start, location of RP, person doing flow, person recording information, stream conditions.

h. Determine the width of the stream. String a measuring tape across the stream perpendicular to the direction of the flow. Secure the tape on each bank with the chaining pins.

i. Determine how many measurements are necessary to give an accurate total discharge. Measuring velocity at 20-30 equidistant points across the width of the stream is recommended. More measurement points should be chosen in areas of significant depth or velocity change. Example:

More measurements should be made in the area where the flow hugs one stream bank. A rule of thumb is that no area (point) being measured should contain more than 5% of the total flow of the stream.

j. Looking upstream, record from which bank (right or left) the measurements are starting. Record the location on the tape of the starting bank. Example: The left bank starts at 1.5 feet on the tape.

4.1.2. Sampling Techniques

a. Stand downstream and to the side so as not to obstruct the flow of the water to meter.

b. Record the tape measure reading of the point.

c. Measure the depth by placing the wading rod in the stream so that the base plate rests on the streambed. The depth is read from the graduated main rod and is estimated to the hundredth of a foot. Record depth readings on the flow sheet.

d. Use the upper scale of the top setting rod to set the depth of the current meter. At depths of 2.5 feet and less, the average velocity is best measured at a point 0.6 of the depth from the water surface. Using the scale at the top of the wading rod automatically sets the current meter at the desired depth. To set the depth, press the rubber button on the flow rod. This releases the smaller rod. Move the smaller rod until the foot mark on it matches the appropriate tenth marker on the zero to ten scale at the top of the larger rod.

e. At depths greater than 2.5 feet measure the velocity at 0.2 and 0.8 of the water depth (the average of these two velocities will later be recorded as a single value). The top-setting flow rod makes setting these two depths easy. Adjust the top scale readings to one half of the actual depth (this is the 0.8 reading) and to double the actual depth for the 0.2 reading.

f. Start the stopwatch and count the number of revolutions (clicks on the headphones) for at least 40 seconds. Start the stopwatch on count number 0 and stop the watch exactly on a count, not a certain number of seconds.

g. The pygmy meter is rated so that one revolution per second equals to one fps velocity. The Price meter rating is found in the top of the meter box. To use the Price meter table - count a certain number of revolutions: 1, 3, 5, 7, 10, 15, 20, 25, 30, 40 & 50. Compare to the time interval and read the velocity from the rating table. The Price meter also has a connection for measuring very high velocities where a signal is emitted from the meter for every 5 rotations instead of every single rotation.
h. Record the number of revolutions and the time (to the nearest second) on the flow sheet.
i. Move to the next point and repeat steps "a"-"f "until velocities in at least 20 cross sections have been measured.
j. After the final measurement has been made, record the tape reading of the finishing bank.
k. Measure and record the ending stage.
l. Record the finishing clock time.
m. Replace the current meter pivot with the traveling pin and return meter to box to prevent damage while traveling.

5. BRIDGE BOARD METHOD

5.1. Bridge Board Sampling Techniques and Supplies

5.1.1. *Equipment Needs*

- Clipboard with flow sheet and pencil
- Measuring tapes
- Duct tape
- Stage tape and dimwap
- Traffic safety cones and vests
- Bridge board assembly
- Price AA current meter (with tailpiece)
- Torpedo sounding weights (15 lb., 30 lb.)
- Headphones
- Stopwatch

5.1.2. *Bridge Pre-Sampling Setup*

(Refer to Buchanan & Somers, 1969, USGS publication)

a. Assemble bridge board equipment. This involves attaching the assembled Price AA current meter and the appropriate torpedo sounding weight to the hanger end of the winch cable. The current meter's position on the hanger is dependent upon which torpedo weight is used.
b. Attach the headphone jacks to the output terminals of the winch.
c. Do a spin test to ensure that current meter is working properly.

d. Determine the width of the stream and secure the measuring tape to the upstream handrail of the bridge with duct tape. More than one 100-foot tape may be necessary.

e. Determine the distance interval of the 20 - 30 points necessary to make an accurate measurement. Example: Measure velocity every 2 feet on a 50-foot wide stream. Be ready to change the interval if velocity or depth changes significantly. Remember, no more than 5% of the flow in any one interval.

f. Fill out flow sheet information (refer to step in section 4.1.1- "h") of the current meter procedure).

5.1.3 *Bridge Sampling Techniques*

a. Measure the tape down from the reference point.

b. Record the tape reading from the starting stream bank.

c. Move to the first point to measure velocity. The bridge board rests on the handrail (guardrail) of the bridge.

d. Zero the winch depth indicator by lowering the current meter until the cups of the meter are half in the water. Pull the zeroing armature out and rotate until the depth indicator reads zero. Because most bridge handrails are not level, make sure to zero the winch depth indicator at each point that a velocity measurement is made.

e. Measure the depth of the water. To do this, lower the current meter until the cable goes slack. This indicates that the torpedo weight has hit something. Raise and lower the meter a couple of times to get a consistent depth reading for the bottom.

f. Add 0.5 foot to the reading to get the actual depth of the water. This accounts for the torpedo weight that hangs 0.5 foot below the current meter (which was zeroed at the cups). Record the actual depth.

g. At depths less than 2.5 feet, measure the velocity at 0.6 of the water depth (measured from the surface).

h. At depths greater than 2.5 feet, measure the velocities at 0.2 and 0.8 of the water depth.

i. Lower the current meter to the calculated depth.

j. Measure the velocity by counting clicks (revolutions) for at least 40 seconds. Refer to velocity measurements using the Price AA current meter.

k. Move to the next point and repeat steps "d"-"k".

l. After the last velocity is measured, record the measurement of the finishing stream bank.

m. Record the finish time.
n. Measure and record the ending stage.
o. Store all flow equipment properly.
p. Compute the total discharge.

6. BOAT FLOW MEASUREMENT METHOD

Due to the danger because of boat traffic, extreme care should be taken when setting up for boat measurements. Locations where boat traffic is minimal should be chosen and any boats in the area should be warned off.

6.1. Boat Flow Sampling Techniques and Supplies

6.1.1. *Equipment Needs*

- Boat
- Rope (> width of stream)
- Bridge board assembly
- Headphones
- Stopwatch
- Clipboard with flow sheet and pencil
- Hand calculator
- Measuring tape - 100 foot
- Duct tape
- Stage tape and dingwap
- Cross piece assembly

6.1.2 *Boat Flow Pre-Sampling Setup*

(Refer to Buchanan & Somers, 1969, USGS publication Stations for more detailed instructions)

a. Assemble bridge board equipment.
b. Make a spin test.
c. Prepare the boat for work. It takes a minimum of two people in the boat, one to operate the bridge board and one to calculate the meter depths and record the flow information. The cross piece attaches to the bow and holds the boat in position on the rope.
d. Stretch and secure the rope across the stream channel, just over the water surface and perpendicular to the flow direction. Use duct tape to attach the measuring tape to the rope (an alternative is to use a rope marked at regular intervals).
e. Fill out flow sheet information.
f. Determine the interval of sampling points.

6.1.3 *Boat Flow Sampling Techniques*

a. Record the tape measure reading at the starting stream bank.
b. Measure the velocity at first point using the following steps. The bridge board rests on the gunwale of the boat.
   - Zero the winch depth indicator.
   - Lower the current meter until slack in the cable indicates the bottom.
   - Add 0.5 foot to the reading (to correct for the weight that hangs 0.5 foot below the meter).
   - Calculate the depths to set the current meter at 0.2, 0.8 (see step section in 4.1.1- "h") of current meter procedure).
   - Set the depth indicator at the proper depth.
   - Record the number of revolutions and the time interval at each depth.
   - Move boat to next point.
   - Repeat the steps under 6.9 until the entire stream has been measured.
c. Record the tape measure reading of the finishing stream bank.
d. Record the finish time.
e. Compute the total discharge.

7. V-NOTCH WEIR METHOD

7.1. V-Notch Sampling Techniques and Supplies

7.1.1. *Equipment Needs*

- V-notch weir (> stream channel width)
- Vertical staff gage
- Carpenter's level
- Hammers (3 lb., 8 lb. sledge)
- Straight edge
- Graduated container
- Stopwatch

7.1.2. V-Notch Flow Pre-Sampling Setup

a. Determine a good location for the weir plate. Avoid hard rock or loose sandy stream bottoms. Also avoid riffle areas where faster velocities erode the weir plate.
b. Set up the vertical staff gage. The gage should be located in the upstream pool formed behind the weir. Use the carpenter's level to make sure that all faces of the gage are level. Because of the effect of drawdown, the gage should not be located too close to the weir plate.

c. Use the sledge hammer to pound the weir plate into both banks so that the plate dams up all flow in the channel. Use the carpenter's level on all faces of the plate, it must be level. Make sure also that there is no water flowing around or under the weir plate.

7.1.3. V-Notch Flow Sampling Procedures

a. Determine the zero point of the weir (very important reading):

- Use the straight edge and level to measure a level line from the base of the angle on the weir plate back to the staff gage. Or if the distance from the top of the weir plate to the base of the angle is predetermined; then a level line is measured from the top of the plate to the gage and the distance subtracted.
- Read the water level on the staff gage just at the point where the water starts to flow through the notch in the plate.
- Let the water flowing through the V-notch stabilize.

b. Read the staff gage.

c. Determine the difference between the zero point on the staff gage and the water level flowing through the weir plate (read as the water level on the staff gage). This difference is known as head.

d. Look at the flow table for the V-notch weir. Look up the corresponding flow for the particular head height. An alternative to using the flow table is the volumetric method (procedure described in following pages).

e. Periodically clean the weir to prevent the buildup of sediments or solids around the notch. This buildup will affect the accuracy of the weir. Leaves are a problem to a V-notch weir. A leaf stuck at the base of the weir angle can cause a significant rise in water level.

8. VOLUMETRIC METHOD

8.1. Volumetric Sampling Techniques and Supplies

8.1.1. *Equipment Needs*

- Graduated container
- Stopwatch

8.1.2. *Volumetric Flow Procedure.*

a. Mark the container to a known volume (examples: 1 gallon, 1 liter).
b. Place the container under the discharge, collecting all flow.
c. Time the interval needed to fill container to the volume mark.
d. Empty the container.
e. Repeat steps "b"-"d" several times.
f. Average timed results.
g. Calculate the flow rate as flow volume/time. Example: 1 gallon in 15 seconds.
h. Convert flow to cfs or MGD.

9. MARSH MCBIRNEY MODEL 201 CURRENT METER

The principles of using the Marsh McBirney current meter are the same as using other current meters. The meter employs the velocity/area method of flow measurement. The sensor probe detects water velocity. The panel meter reads velocity in feet per second. The procedure for using the Marsh McBirney meter is the same as that described in Section 4 (Flow Measurement Procedure) but no calculations are needed as the flow is directly read on the instrument's screen.

This meter is used to measure small flows/low velocities. Because the probe has no moving parts, debris in the water has little effect on the reading. Another advantage is that the sensor probe attaches to the top-setting flow rod.

10. FLOW SHEET CALCULATIONS

10.1 Data Form

10.1.1. *Data to be Recorded on Data Sheet*

- Distance from the initial point
- Depth
- Time (in seconds)
- Revolution

10.1.2. *Calculations*

a. Columns titled, velocity (mean in vertical), area, width, and discharge are calculated values.
b. Calculate the width of each cross section. The width of the section is the sum of one-half the distance from the point of measurement to each adjacent point. Example: In the first section the width is one-half the distance to the adjacent point plus one half the distance to the stream bank.

c. Calculate the velocity in each cross section. In depths of greater than 2.5 feet, two velocity measurements are taken in each cross section (0.2, 0.8). Average the two readings and record in column. This depends on the current meter in use:
   - The Price pygmy meter - the number of revolutions divided by the seconds.
   - The Price AA meter - The velocity is taken directly from the meter rating table. Not all Price AA meters use the same rating table-be sure that you have the correct table for the meter you are using.
   - The Marsh McBirney meter - The velocity is read from the panel as feet per second.
d. Calculate the cross-sectional area. Multiply the width times the depth.
e. Calculate the discharge of each cross section. Multiply the cross-sectional area by its velocity.
f. Calculate the total discharge of the stream. Add all the cross-sectional discharges together.
g. Record the average velocity of the stream. Divide the total discharge by the total area.

11. OPEN CHANNEL FLOW MEASUREMNT METHOD

11.1 Introduction

The following section provides a brief overview of methods for determining flow in an open channel. For more detailed information regarding open channel flow measurements, refer to the references section.

Open channel flow can be defined as flow in any channel in which liquid flows with a free surface. Open channels are generally used in moving fluids at most municipal treatment facilities, industrial waste treatment operations and in most irrigation applications. An open channel can also be a stream or a ditch. Open channel flow is typically measured by the use of a calibrated restriction device placed in the channel that affects the surface level of the liquid as it moves past the restriction. This type of open channel measuring device is referred to as a "primary" device. The known dimensions and physical characteristics of the restriction device are used to correlate a relationship between water surface level and flow. After the water level/flow relationship has been established, the flow in the open channel can be easily measured by manually sighting the height of the liquid's surface level against a calibrated scale (staff) and then referring to the appropriate rating curve or table.

The following are the most commonly used types of "primary" open channel flow measuring devices, (restriction devices):

11.1.1 Weir: a dam constructed across an open channel, over which liquid flows through an opening or notch. The most commonly used types are rectangular, trapezoidal and triangular.

11.1.2. Flume: a specially shaped open channel, designed to change the channel area or slope, resulting in an increase velocity and surface level of the liquid flowing through it. The most commonly used types are: Parshall and Palmer-Bowlus

11.2 Flow Meter

a. A flow meter is a mechanical device used to measure the liquid level in the channel and convert the level into a corresponding flow rate

b. A stage recorder is a mechanical device used to record the surface level of the liquid over a period of time

Note: Measuring flow in an open channel by means of a weir or flume is a simple function of surface level and is the most basic and inexpensive method available. However, if continuous stage or flow recording is required, then the use of a stage recorder and/or a flow meter in conjunction with the primary device may be necessary. Some of the more commonly used methods employed by these devices to determine the surface level of a liquid are floats, dipping probes, ultrasonic sensors, and bubblers.

IX. BATHYMETRY

1. PROCEDURES

Recording fathometers are used to provide bathymetric traces of water depths. Since water depths are time dependent (especially in tidal areas) the date and time of all traces should be noted. Operating manuals provide operation and calibration procedures to be followed. In particular, tide and draft adjustments provide calibration in regard to the respective tidal amplitude and sensor probe depth. All traces should be noted with transect description, chart speed, direction of travel, and pertinent reference points and then indexed to a site map. When working in tidal areas, a water stage recorder should be positioned to provide a histogram of water levels to correlate with the bathymetric trace.

During the initial setup of each survey, the fathometer calibration should be checked against a field measurement of water depth made using a graduated sounding line.

2. EQUIPMENT AVAILABLE

The following equipment is available for bathymetric surveys:

- Water level recorder and/or referenced gauging stations(s)
- Depth gauge
- Calibrated sounding line(s)

3. SPECIFIC EQUIPMENT QUALITY CONTROL PROCEDURES

Number all equipment and keep a record of maintenance and calibration procedures. Use the following steps to maintain and calibrate bathymetric measurement equipment:

3.1. Recording fathometers:

3.1.1. Calibrate and maintain according to the manufacturer's instructions before use. The chart speed should be checked against a reliable time source before the instrument is sent to the field.

3.1.2. Check daily in the field against a field measurement of water depth using a calibrated sounding line.

3.1.3. Clean daily after use and before storing.

3.2. Sounding lines are to be calibrated against steel surveyor's chain and shall be accurate to 0.1 foot.

X. WATER QUALITY VESSEL OPERATION

Water quality investigations frequently require DWR personnel to work in locations that are accessible only by boat. This necessitates that field staff be thoroughly trained in the safe operation of those boats and become familiar with the general maintenance and the particular operation of each vessel. This boating SOP provides a general operating guide to ensure that all boating and trailering activities are carried out in a safe manner and that all boats and motors are operated in a manner that reduces the frequency of repair. All field personnel should read and thoroughly understand this SOP prior to operating any DWR boat.

1. BOAT SAFETY

1.1. Supplies Needed On-Board

1. ***Fire Extinguishers*** - before operating boat, familiarize yourself with where the fire extinguisher is located. Check to make sure that it is fully charged.
2. ***Sound Producing Devices*** - boats should be equipped with a can type air horn or a manually operated whistle.
3. ***Paddles or Oars*** - all boats should be equipped with oars or paddles.
4. ***Visual Distress Signals*** - when operating boats in coastal waters, the boat must be equipped with a flare kit. The kit should include hand held flares and a flare gun for aerial type flares.
5. ***PFD's (Personal Floatation Devices)*** - **all DWR employees are required to wear life preservers at all times while on board DWR boats.** Boats will be equipped with a type 1, 2, or 3 PFD of suitable size for each person on board and a throw-able floatation device (throw cushion, flotation ring).
6. ***Lights*** - when operating a boat at night, the boat must display the front green and red navigational light and the rear beacon light. If planning to operate at night, the lights should be checked before leaving the loading area.

1.2 Safety Check

1. ***Weather*** - check weather reports before leaving shore and remain watchful for signs of bad weather. Tune into the National Weather Service Report, on a Marine radio, periodically to check weather conditions, small craft advisories, gale warnings, etc. Do not go out on the water during lightning storms.
2. ***Care and Maintenance*** - all equipment and supplies should be properly secured. Keep decks and other spaces clean, free of clutter and trash. The vessel should be free of fire hazards with clean bilges and in good condition. Inspection and required maintenance on a regular schedule will ensure the hull and superstructure remain sound. Ensure all repairs are made properly and with marine rated parts. Always carry a toolbox and know how to make minor repairs.

3. ***Communications*** - when operating in remote areas it is always a good idea to bring along a cellular phone for cases in which assistance may be needed. Two-way radios should be used when operating with two or more boats. When operating in coastal waters always bring along either a hand-held portable marine radio or a fixed mounted marine radio.

2. FIXED MOUNT/CONSOLE TYPE BOATS

2.1. Trailering

2.1.1. *Pre-Trip Check and Preparation*

a. Install 1 ⅞ or 2" trailer ball to trailer hitch depending on the trailer.
b. Unscrew clamping mechanism on boat trailer tongue.
c. Back vehicle up to boat trailer, with trailer tongue directly over the center of the trailer ball.
d. Lower trailer jack so that the trailer tongue fits over the trailer ball.
e. Screw down, or tighten, the clamping mechanism (all the way) onto the trailer ball. Lock with a 2640 Master Lock.
f. Hook up both safety chains by crossing the chains and hooking to holes on the trailer hitch. Do not tow boat without safety chains.
h. Hook up brake line cable to eye bolt attached to the vehicle.
i. Plug in trailer lights and check the lights for proper operation.
j. Secure gunwhale boat strap.
k. Check the bow eye to make sure safety chain is hooked up and winch is locked down securely.
l. Periodically check the clamping mechanism on the trailer tongue to assure that it is screwed down all the way.
m. Conduct an inspection walk around the boat and trailer:
    1) Test to see if the boat motor starts before traveling.
    2) Check level of the engine oil on 4-cycle boat motors.
    3) Check the trailer tire pressure and adjust if necessary.
    4) Check the condition of the axel grease. Add grease as needed.
n. When traveling, stop and check the trailer and boat; retighten boat straps as needed. Feel the trailer bearings to see if they are hot. If hot, they probably need to be greased or replaced.
o. Trailer slowly over speed bumps and holes.

p. When backing into parking areas, do not let back of trailer come in contact with curb to avoid damaging license plate bracket or trailer lights.

2.2. Boat Launching

2.2.1. *Unloading*

a. Upon arrival at the boat ramp check the ramp to make sure it is suitable for launching including checking that the water level is high enough for proper launching.
b. **Install all the boat plugs**; check inside the bilge to make sure that the plug is installed.
c. Remove the boat strap.
d. Load the boat with equipment.
e. Unplug trailer lights
f. Make sure the motor is in the "up" position before launching the boat.
g. Keep winch "locked" until boat is in the water.
h. When the boat is in the water lower the motor and then start the motor (see motor operating instructions).
i. While one person is operating the boat another person should be manning the trailer winch.
j. Unhook winch cable from bow eye, but do not remove safety chain until the boat is running and idling.
k. If needed, back the vehicle up slightly and press the brake to bump the boat off the trailer.
l. When boat is clear from the trailer, pull the vehicle out of the ramp **slowly** and park it.

2.2.2. *Loading*

a. Slowly back the trailer into the water so that the center "guide roller" is visible above water.
b. Line up the boat with the trailer and **very slowly** ease the bow of the boat onto the center roller. If boat is off center of the trailer, back up and try again.
c. **Do not** approach trailer at a speed that will damage the boat hull or trailer if the center roller is missed!
d. The person manning the trailer winch should signal the boat operator to go left or right, or to tell the boat driver to back off if they are going to miss the center roller.
e. Once the bow is on the center roller, slowly advance the boat up onto the trailer as far as it will go. If it does not reach the stanchion then hold the boat in position until the person manning the winch can get out enough cable to hook to the bow eye.
f. Once the cable is hooked and tension is maintained then power down the motor and cut it off.

g. Winch the boat onto the trailer until the bow is snug against the stanchion.
h. Lock down the winch gear.
i. Raise the motor to the "up" position and flip down the tilt lock bar, then lower the motor until it presses against the tilt lock bar.
j. **Slowly** drive out of the boat ramp to the parking lot.
k. Remove the boat plugs.
l. Unload the boat.
m. Hook up boat strap.
n. Plug in trailer lights.
o. Make sure that all aerials and/or bimini tops are down.
p. Walk around trailer and **double check everything!**

2.3. Boat Operation

2.3.1. *Fueling*

a. Fill oil reservoir to required fill level with appropriate motor oil.
b. When fueling boats with 2 cycle outboard motors without an oil reservoir add one pint of 2 cycle outboard motor oil to the gas tank for every six gallons of gasoline. Use marine fuel stabilizer in all fuel tanks.
c. Fill tanks to their maximum fill level.

2.3.2. *Motor Operation*

a. Switch the battery "PERKO" switch to the "ALL" position.
b. Pump the gas primer ball until it is tight.
c. Lower motor into the water using hydraulic trim switch on the throttle lever.
d. When starting "cold" the choke must be engaged. To engage choke, push the ignition key in as far as it will go, then turn the key clockwise until the motor starts. If motor does not start within five seconds **do not** continue to engage the starter. Re-pump the primer ball and try again.
e. Once the motor starts disengage the choke and let the motor idle.
f. Once the motor has been given ample time to warm up, back the boat off the trailer.
g. Let motor idle down before changing from reverse to forward. Between forward and reverse, make a brief stop in neutral.
h. If working in open water with ample depth for boat running, advance the throttle to plane out the boat, adjusting the trim if necessary.
i. Once proper plane is achieved, throttle the boat back to 3/4 (approximately 4200 rpm) throttle. **Do not run the boat at full throttle.**

3. SMALL BOATS WITH PORTABLE MOTORS

3.1. Trailering

For the most part the same rules apply that were covered in the previous section with a few exceptions:

a. Install appropriate sized trailer ball to trailer hitch.
b. Flip down locking switch on trailer tongue and lock with a 2640 Master padlock.

3.2. Boat Operation

3.2.1. *Fueling*

a. Obtain gas tank from storage cabinet.
b. Make sure the tank selected is equipped with the proper fuel line connections for the motor you will be using.
c. Most of the fuel tanks have a capacity of 6.6 gallons. Leave some head space in the fuel tanks - **do not overfill**.
d. Add one pint of 2 cycle outboard motor oil for every six gallons of gasoline unless motor requires different oil and ratio.

3.2.2. *Motor Operation*

a. Select the proper motor for the boat that is to be used.
   - 5 hp for Jon boat and 12' Alumacraft,
   - 15 or 25 hp for 14' Alumacrafts.
b. Place outboard motor in the **center of the transom** and completely tighten the clamping screws on the outboard motor.
c. Place tank in boat and connect to motor to assure proper fitting.
d. Run a chain through the gas tank handle, then through the handle on the outboard motor, and then through the hole in the boat and lock with a pad lock.
e. Secure the motor to one side with a bungee cord to keep motor from swaying back and forth while going down the road.
f. To run: connect fuel line to motor, and pump primer ball.
g. Pull choke knob if motor is "cold".
h. Turn tiller throttle lever to "start" position.
i. Pull starter cord. If motor does not start after one or two pulls then pump the primer ball and try again.
j. Once motor starts push choke lever in and let run for about a minute then idle down with throttle lever.
k. To put motor in gear, make sure motor is idling low and pull the gear lever forward to go in a forward direction. To go in reverse, push gear lever backward to reverse position with a brief stop in neutral.

l. Once motor is in gear then throttle up the motor, once the boat is planned out back off of the throttle about 1/4 turn.

m. **Do not run the motor at full throttle, run at 3/4 throttle.**

n. To turn the motor off, press the red kill button located next to the choke lever. On some motors the kill button is located on the end of the tiller.

4. TROUBLESHOOTING: FOR ALL BOATS

4.1. Problem - **No power to starter**

a. Check to see if "PERKO" switch is on the "ALL" position.

b. Check to see if throttle lever is in neutral.

c. Check battery terminal connections.

d. Check main fuse in outboard motor.

e. Check fuses inside console.

4.2. Problem - **Motor is Turning Over But Will Not "Fire" or Start**

a. Check to see if gas line is connected to motor.

b. Check to see that primer ball has been pumped until tight.

c. Check to make sure "deadman's" or kill button is clipped.

d. Make sure air vent screw is open on gas can.

e. Check spark plug wires, replace spark plugs (they may be fouled)

4.3. Problem - **No Water is Coming Out of Flow Hole**

a. **Do not** continue running motor. Shut down and attempt to unclog flow hole with a coat hanger or similar object.

b. If problem persists, do not use boat. If out on the water when this occurs, get towed back to boat ramp.

4.4. Problem - **Extreme Cavitations or "Porpoising"**

a. Adjust trim with up and down button on throttle lever.

b. Make sure there is not an excessive amount of water in bilge.

c. Adjust the weight distribution of equipment and personnel in the boat (trim the boat up and shift weight).

XI. LAKES SAMPLING

Field data collection procedures for reservoirs and lakes differ from that of streams and rivers due to the differences in water depth and hydrology. This section focuses on procedures specific to physical and chemical water quality sampling of lakes.

1. FIELD PREPARATION

1.1. Pre-Sample Preparation

a. Preparation of the lake sampling packet.
   1. Sample tags and lab sheets must be legibly hand written with permanent black ink. Adhesive labels for the sample tags may be prepared on a laser printer.
   2. Include maps showing the locations of the sampling stations. Electronic copies of lake maps are on the ISB shared drive (Lake Maps folder).
   3. Include a copy of the Field Observation form (Figure 19).
   4. Include special instructions and point-of-contact information as needed.

b. Contact responsible parties at all publicly owned lakes several days in advance of sampling. Contact names are in the particular lakes file or in the Lakes Database. Changes in contact information will be noted and provided to the Lakes Database Administrator so that the database can be updated.

c. Confirm availability and working condition of boats, motors, vehicles, and Hydrolab/YSI.

d. Verify the lake stations on the map with the station numbers on the lab sheets and tags.

e. Always include extra bottles in case of accidents, defective bottles, and/or discovery of algal blooms or other environmental conditions that justify additional samples.

1.2. Field Equipment Needed

Aquatic Plant & Algal Bloom Report Forms	Cooler(s) with ice
Field Observation & Stratified Data Forms	Lab Sheets and Tags in sealed bag
Preservatives- Lugols solution, H2SO4, HNO3	Hydrolab/YSI Meters
Labline with Rope	Camera
Sample Bottles	Calibrated backup meters
Pens and Pencils	Maps
Life Jackets	Boat Oars
Gas Tank for boat	Boat Plug & Anchor
Winter- cold weather suit (as needed)	First aid/safety box

Electric motor & 2 fully charged batteries (if needed)
Secchi Disc with line marked in 1 centimeter increments
Calibration Materials-(*e.g. Calibration and D.O. sheets, pH and conductivity standards, meter manuals).*

1.3. Field Sheets

a. *Stratified Field Sheets*: Make sure that stratified field sheets (Figure 5, page 25) are carried to the lake stations along with pens or any non-erasable ink for writing and a clipboard. Clearly write the station number, date, time, depth, dissolved oxygen, temperature, pH, conductivity, and secchi are recorded on the field sheet. At the top of the field sheet record, the name of the water body, which meter is used, and the names of the field samplers is also recorded.

b. *Field Observation* Form: In addition, a separate form is to be filled out for all of the ambient lakes (Figure 19). This form requests information about the use support status, restoration activities, weather conditions, the watershed, and lake water quality.

c. After sampling, both of these forms are filed in the current lake files in the Intensive Survey Branch. Data are entered into the lakes database within 72 hours of the lake trip.

FIELD OBSERVATION FORM Lake Name _____
Page 1 of 2 Samplers' Name: _____Date: _____

WEATHER CONDITIONS

Air Temperature	% Cloud Cover	Wind Direction (from)	Wind Velocity	Rainfall (last 48 hrs)
__ <60º	__ 0-25%	_____	__ <10 mph	__ None
__ 60-70º	__ 25-50%		__ 10-20 mph	__ < ¼ inch
__ 75-90º	__ 50-75%		__ >20 mph	__ ¼ - 1 inch
__ 90º	__ 75-100%			__ >1 inch

SHORELINE AND WATERSHED OBSERVATIONS
Please describe *development* around the lake shore:

Type of Development	Density/Intensity	% of Shoreline Developed
__ Residential/Urban	__ Slight	__ 0-25%
__ Commercial/Industrial	__ Moderate	__ 25-50%
	__ heavy	__ 50-75%
		__ 75-100%

Please check *land uses* observed in the watershed:
__ Agriculture (specify if possible)
__ Crop production
__ Pasture land
__ Feedlots/Animal production
__ Forest
__ Wetlands
__ Urban/Residential
__ Commercial/Industrial

LAKE QUALITY
Please check the one statement that best describes the *physical condition* of the lake water today:
__ Crystal clear water.
__ Not quite crystal clear, a little algae/suspended sediment visible.
__ Definite algal greenness, yellowness, or brownness apparent.
__ High algal/sediment levels with one or more of the following: floating scums on lake or washed up on shore; strong foul odor; or fish kill.

Please check the one statement that best describes the *aquatic macrophyte* community:
__ None observed
__ Small amount of vegetation evident along shoreline and/or headwaters of the lake; <25% of the lake's total surface area covered.
__ Macrophytes extend out from shoreline well into the lake; 25-50% of the surface area covered.
__ Dense growths of several species cover more than 50% of the surface area.
__ Nuisance levels of a singe species cover more than 50% of the surface area.

Please check the one statement that best describes your *opinion* of how suitable the lake water is for recreation and aesthetic enjoyment today:
__ Beautiful, could not be nicer.
__ Very minor aesthetic problems; excellent for swimming, boating, enjoyment.
__ Swimming and aesthetic enjoyment slightly impaired because of levels of algae/sediment/or weeds (please indicate which).
__ Desire to swim and level of enjoyment of the lake substantially reduced because of algae/sediment/or weeds (please indicate which).
__ Swimming and aesthetic enjoyment of the lake nearly impossible because of algae/sediment/or weeds (please indicate which).

Figure 19. Field Observations Form

LAKE NAME: _____
Page 2 of 2

Designated Use Classification: _____

_____

Supplemental Classification: _____

USE SUPPORT STATUS
Designated uses appear to be:
__ Fully supported.
__ Fully supported, but threatened (impairment could result if pollution controls are not implemented).
__ Partially supported
__ Not supported

If uses are not fully supported, what pollutants or conditions are *causing* impairment (check all that apply):
__ Nutrients __ Noxious aquatic plants __ Other (please specify)
__ Situation __ Organic enrichment/low DO
__ Flow alteration __ Thermal modification
__ Suspended solids __ Filling and draining

If uses are not fully supported, what *sources* of pollutants contribute to use impairment:
POINT SOURCES
__ Industrial
__ Municipal
__ Municipal pretreatment
__ Other point sources (specify)

NONPOINT SOURCES
__ Agriculture (specify if possible)
__ Crop production
__ Pasture land
__ Feedlots
__ Aquaculture
__ Other (specify)
__ Silviculture
__ Construction/Land development
__ Urban runoff
__ Mining/resource extraction
__ Land disposal of waste (e.g. landfills, wastewater and sludge application, on-site septic tanks, etc.)
__ Hydrologic/habitat modification (e.g. canalization, dredging, flow regulation, etc.)
__ In-place contaminants
__ Recreational activities (e.g. motor boating)
__ Other nonpoint sources (please specify):

__ Source of impairment unknown

RESTORATION ACTIVITIES
Please describe any lake restoration or water quality management activities that have taken place:
_____
_____
_____
_____

Figure 19. Field Observations Form (continued)

2. LAKE DATA COLLECTION

XI. LAKES SAMPLING

2.1 Lake Physical Data Collection Methods

a. Secchi depth measurement is taken as described in Chapter III, Section 6.

b. Dissolved oxygen, water temperature, conductivity and pH are measured with a multiprobe (Hydrolab) meter beginning at the surface of the lake (0.15 meters from the surface).

c. From the surface to either the bottom of the lake or to a depth of 10 meters, physical measurements are recorded at 1- meter increments

d. Below ten meters, physical measurements are recorded at 5-meter increments until the bottom of the lake is reached

2.2. Lake Water Sample Collection

2.2.1 *Description*

a. Samples will be collected at the surface, photic zone, or at the bottom, which are described below and in detail in Chapter I.

b. If "SUR" is part of the station number, the sample is to be collected at the surface. If 'BOT" is part of the station number, the sample is collected one foot above the bottom. If "SUR" or "BOT" doesn't accompany the station number, the sample is collected in the photic zone.

c. As with all samples for laboratory analysis, a lab sheet must be completed as described in Chapter II,Section 1 of this SOP.

d. Detailed definitions of these parameters and methods of collection found in Chapter I, Section 3.

2.2.2. *Types of Typical Lake Samples*

a. **Surface Grab** samples (chloride, hardness, fecal coliform bacteria, and metals) are collected 0.15 meters below the water's surface and this can be done by hand dipping the bottle. The bottle top and bottle opening should be protected from contamination. Grasp the bottle near the base and plunge it mouth down into the water, avoiding surface scum. Position the bottle away from the hand of the collector, the shore, the side of the sampling platform, or boat.

b. **Photic Zone** – the photic zone is defined as the column of water in the lake from the surface down to a depth equal to twice the secchi depth measurement. Photic zone samples (residue, turbidity, chlorophyll *a*, nutrients, and phytoplankton) are collected by raising and lowering the Labline at a steady speed within the photic zone until it is full. A description of this procedure is given in this SOP in Chapter I, Section 3.2.3.

c. **Bottom sampling** (nutrients) is accomplished by inserting the two plugs in the top of the Labline and lowering it just above the bottom of the lake. This needs to be done gently as not to stir up sediments on the bottom. The plugs can be released by firmly jerking the rope on the Labline. Wait until the Labline if full before bringing it back to the surface. This can be determined by observing air bubbles from the sampler rising to the lake surface, the stopping or feeling the weight of the Labline at the end of the rope.

2.2.3 *Field Records and Information*

a. **Photographs** are to be taken of various locations on each sampled lake to record the shoreline and lake characteristics. In particular, an unusual shoreline/ watershed activity, aquatic plants, algal blooms, or other water quality issues are to be photographed (photo number and brief description and location of where picture was taken) must be made. This information along with the camera, are to be returned to the Lakes Database Administrator upon return to ISB.

b. **Comments and questions** from citizens, lake managers, water treatment plant supervisors, etc. are to be recorded (written) along with contact information and individual's name and title (if any). This information will be submitted to the the Lakes Database Administrator upon return to ISB.

2.3. Typical Lake Sampling Parameters

Below is a list of typical lake water sample types. Descriptions on how samples are preserved and collected are found in Chapter I, section 3, section water samples as well as more detailed descriptions can be found in this SOP in the Sample Collection Section (Chapter IV).

2.3.1. *Physical Parameters include*

Conductivity	Dissolved Oxygen (mg/L)
pH	Temperature (°C)
Secchi Depth	

2.3.2. *Chemical Parameters include*

Nutrients	Residue
Turbidity	Chloride
Magnesium	Calcium
Metals	Chlorophyll *a*

*Additional parameters may be collected based on specific lake conditions and/ or requests

2.3.3. *Biological Parameters*

a. Fecal coliform bacteria: Water samples are collected at the surface of the lake.

b. Phytoplankton: Water samples are generally collected as a photic zone sample. Bloom samples may be collected at the surface of the lake, as needed.

c. Aquatic Plants: Use the Aquatic Plant Report Form supplied by the Ecosystems Branch of the Environmental Sciences Branch and submit it along with a specimen if there appears to be problematic aquatic plants or for identification. Refer to the Aquatic Plant Report Form for collection and preservation of aquatic weeds. Include a map of the location showing where the plant specimen(s) were collected.

d. AGPT (Algal Growth Potential Test): These samples are collected after consultation with EPA since they perform the tests. The bottles (1 liter) are furnished by EPA as are the tags and coolers. The samples are collected in the photic zone and no preservative is used. The samples are shipped back to the EPA Athens, GA laboratory for analysis. The address and telephone number is: Bob Quinn, U.S. EPA, Region IV, Environmental Services Division, Athens, Georgia 30613, (706) 546-2420.

2.3.4 Lab and Field Sheets: All lab and field sheets should be **legibly** filled out with applicable dates, times, depths, etc.

a. The same time is recorded on both field and lab sheets for the same station. A field observation sheet should also be filled out and any other notable features recorded.

b. Any notes of unusual observations of lake water quality or shoreline activities that could impact water quality should also be submitted.

c. Field sheets and filed observations sheets along with camera are to be submitted to the Lakes Database Manager upon return from the field.

3. LAKE DATA MANAGEMENT

3.1 Data specific to the Intensive Survey Branch Lake Monitoring Program are warehoused in the Lakes Database. This database is maintained by the Lake Database Administrator. The responsibility of the Lake Database Administrator includes entry of data, verification data entry accuracy and reporting issues related to the functioning of the database to the ESS IT staff.

a. Physical field data are entered into the ISB's Lakes Database within 24 hours of receipt from the field sampling team.

b. Chemistry results from the DWR laboratory are entered into the Lakes Database within 72 hours of receipt from the laboratory.

c. Lake data which have been entered into the Lakes Database but not checked for input accuracy and/or completeness are designated 'P' for 'Provisional'.

d. Lake data which has been reviewed and verified for input accuracy and completeness are indicated with the designation 'A' for 'Accepted'.

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XII. SEDIMENT OXYGEN DEMAND

1. GENERAL DESCRIPTION OF SOD TEST

Sediment Oxygen Demand (SOD) is one of the more significant variables in water quality modeling evaluations for determining stream assimilative capacity. SOD data are primarily used for waste-load allocation purposes in the evaluation of receiving waters.

The SOD test involves placing an SOD chamber on the bottom sediment, securing it to prevent water infiltration and monitoring oxygen change within the chamber. A dissolved oxygen sensor inside the chamber measures the rate of decrease in oxygen that is used by organic materials in the bottom sediments over a given period of time. A standard SOD test includes seven SOD chambers of which two are water column control (blank) chambers and five are replicate SOD chambers (Figure 20). The blank chambers, used to determine water column respiration rate, have bottom plates that prevent bottom sediment from contacting the water in the chamber. The SOD replicate chambers have open bottoms allowing the internal water to circulate over the bottom sediment. The rate of oxygen change in the replicate SOD chambers minus the water column respiration of the blank chambers equals the SOD rate.

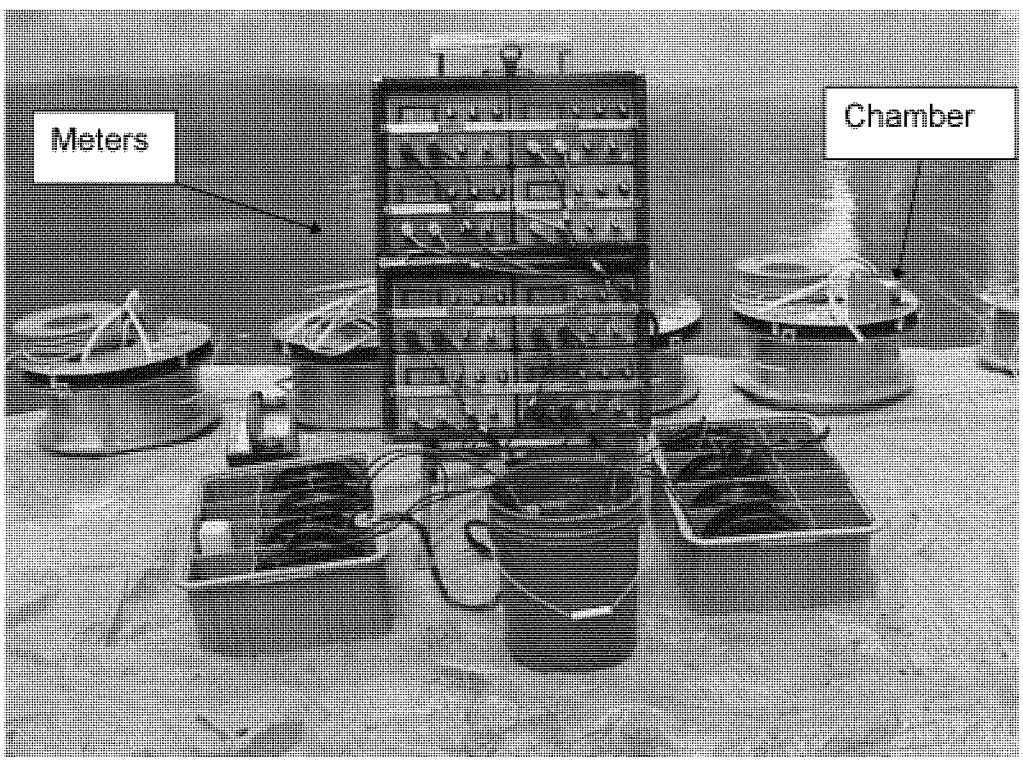


Figure 20. SOD Equipment

1.1. <u>SOD Rate Formula:</u>

The SOD rate for any study location is then calculated by using the SOD rate formula:

$$ß \times (K \times V) \div A = gr\ 0_2/m^2/hr.$$

where: ß = rate of change in D.O. as mg 0_2/L/min.

V = chamber volume in liters

A = chamber area in meters square

K = 0.06 (constant) converts liters to square meters

SOD rates are dependent on benthic metabolic processes, sediment particle size, stream velocity and other factors. SOD rates from 77 in-situ tests performed at locations with various substrate compositions are presented in Sediment Oxygen Demand, Processes, Modeling and Measurement (Murphy and Hicks, 1986, p. 318). An example SOD Excel Worksheet is provided at the end of this section for reference.

1.2. SOD Equipment List – Due to the amount of gear and equipment necessary to successfully complete SOD tests, a checklist is recommended when preparing for testing. See Figure 21.

1.3. Site Evaluation – Each site should be visited and checked out to determine if sediment is suitable in the area under investigation. Figure 22 is the SOD Site Evaluation Form that should be completed for each location.

2. FIELD CALIBRATION DISSOLVED OXYGEN METERS

An initial calibration is performed on the YSI 58 meters prior to the SOD test and a terminal calibration is performed on the meters after the test is completed. All calibration data is recorded on the SOD Calibration Forms (Figure 23). The need for accuracy is paramount for SOD evaluations due to the extremely small increments of change in D.O. measured during the test (+/- 0.01 mg/L). Because of the number of meters being calibrated on site and the extreme accuracy required for SOD testing, initial and terminal calibration procedures in this section vary from other D.O. meter calibration methods in this document. SOD meters are calibrated using the Modified Winkler Azide method as opposed to saturated air calibration methods.

Figure 21. SOD Equipment List:

CHAMBERS:
____FIVE REP CHAMBERS ALUM
____TWO BLANK CHAMBERS ALUM
____ONE CLEAR BLANK CHAMBER
____TUBES ON CHAMBERS
____FLOW RESTRICTORS IN TUBES
____SPACERS ON CHAMBER
____BATTERY CLIPS ON DC LEADS
____RUBBER SEALS OK
____SILICON SEALS OK
____TEST PUMPS
____CHAMBER COLLARS
____3 BATTERIES MINIMUM (CHARGED)
____CHAMBER HARNESS AND FLOATS
____STOPPERS -#1 & #11½

METERS:
____DO METERS
____NEW MEMBRANES ON PROBES
____CONDO METER
____MEMBRANES & ELECTROLITE KIT
____100' CABLES WITH PROBES
____EXTRA 50' CABLE AND PROBE
____CALIBRATION & SOD FIELD SHEETS
____COPPER BATTERY BARS
____STAND FOR METERS (BOAT OR BANK)
____"C" CLAMPS (LARGE) - BOAT METER STAND
____BUNGIES FOR METER STAND
____BOARD FOR METER STAND MOUNT

WINKLER
____WINKLER KIT (CHECKED OUT)
____EXTRA CHEMICALS
____BURET AND GLASSWARE
____EXTRA BURET AND GLASSWARE
____BUCKET FOR CALIBRATION
____WATER CALIBRATION
____BURET STAND
____BURET WIRE
____STARCH

PERSONAL EQUIPMENT
____RAIN GEAR
____BOOTS
____WATCH
____COOLER AND ICE
____WASH WATER/SOAP
____INSECT REPELLANT
____SUN SCREEN
____HAT
____SUN GLASSES
____FOOD/DRINKS/WATER

MISC. EQUIPMENT
____CAMERA AND ACCESSORIES
____SEDIMENT JARS AND TAGS
____SOD TOOL BOX
____MAPS
____CALCULATOR/PENCILS
____TARPS
____FIRST AID KIT
____MACH, SHOVEL
____CHAIRS, BOX
____ROPES FOR BANK OR BOAT
____CELL PHONE
____COLORED TAPE
____BATTERY TESTER

____"C" CLAMPS (SMALL) FOR REP LIDS
____FIELD LOG FOR SOD TEST
____PLASTIC CRATES

SOD SITE EVALUATION

Site Location - _____
_____

Date: _____ Time: _____

Site Description - _____
_____
_____
_____

Topo Map # _____ % From Right Bank (facing US)_____

Weather - _____
_____

Bank Description - _____
_____

Depth - _____ Velocity (fps) -_____

Sediment Description - _____
_____

Bottom Topography - _____

Water Description (turbid, clear, etc.)_____
_____

Site Schematic:

Figure 22. SOD SITE EVALUATION FORM

All meters are to be air calibrated prior to field operations (and on-site calibration) to assure all meters are functioning properly and stabilized.

The procedures are as follows:

2.1. Calibration Procedures

2.1.1 *INITIAL CALIBRATION Method*

a. Turn off all electronics (cellular phones, depth finders, etc.) prior to reading and calibrating meters.

b. Connect the D.O. probe to the probe receptacle of the YSI 58 meter and screw the retaining ring finger tight.

c. Connect the D.O. stirrer to the stirrer receptacle of the YSI 58 meter and screw the retaining ring finger tight. Check the stirrer battery condition by turning the stirrer switch to its spring-loaded battery check position. The warning LOBAT will indicate when approximately 5 hours of battery life remain.

d. Zero the instrument. Set the function switch to ZERO and adjust the display to read 0.00 with the O2 ZERO control.

e. Switch to the 0.01 mg/l position and wait at least 60 minutes for the probe to polarize. Allowing additional time to re-polarize the probe is necessary whenever the meter has been turned off or the probe has been disconnected.

f. After the 60 minute wait, turn the function switch to ZERO and readjust the O2 ZERO control to 0.00 if necessary. The meter is now ready to calibrate.

g. Calibration - Meters are calibrated using the Winkler azide method as described in this SOP in the Field Measurements Chapter III - section 3.2.

h. The D.O. probes are placed in a container of tap water with a relatively stable temperature. A minimum of four Winkler tests are then performed on the tap water. Three of the four resulting Winkler values must be within a 0.1 mg/l range. If the values are not in the 0.1 mg/l range, the Winkler tests should be repeated until the values are within the + or - 0.1 range. The three Winkler values are then averaged to provide an initial calibration value.

i. After the probes have stabilized in the container of tap water, the function switch is set to 0.01 mg/l, the meters are then adjusted to the initial calibration value by turning the O2 CALIB control. The meters are now calibrated.

j. Leave the instrument on throughout the test to avoid re-polarizing the probe. Reactivate the stirrer approximately 2 minutes before each reading and turned off after the reading.

k. Obtain a bottom salinity reading using a YSI Model 33 S-C-T Meter. If salinity is present, the SALINITY knob on the YSI Model 58 D.O. Meter is adjusted accordingly.

l. Upon completion of the SOD test, perform a terminal calibration on all YSI 58 D.O. meters used. All terminal calibration data is recorded on the SOD terminal calibration form (Figure 23).

Note: If SOD tests are performed in coastal areas where tidal influence may cause salinity values to fluctuate during the test, salinity readings should be taken frequently and salinity adjustments made to the YSI 58 D.O. meters.

2.1.2 *TERMINAL CALIBRATION Method*

a. The D.O. probes are placed in a container of tap water with a relatively stable temperature and allowed to stabilize. A minimum of 4 Winkler tests are then performed on the tap water. The resulting Winkler values must be within a 0.1 mg/l range. If three of the four values are not in the 0.1 mg/l range, the Winkler tests should be repeated until the values are within the range. The Winkler values are then averaged to provide a terminal calibration value.

b. After the Winkler bottles have been filled with the tap water, turn on the stirrers, wait one minute and then record the D.O. and temperature readings.

c. Each D.O. reading should be within a 0.1 mg/l range from the average Winkler calibration value.

3. QUALITY ASSURANCE

3.1. Procedure

a. Complete the Pre-Sampling Calibration, Post-Sampling Calibration Check, and SOD Worksheets (Figure 23) on-site during each SOD test.

b. Perform Winkler tests per this SOP – Chapter III- section 3.1 – azide modification.

c. Perform a minimum of three Winkler titrations for Initial Calibration and Terminal Calibration.

d. Winkler values must be within a 0.1 mg/l range. If any value is outside the 0.1 mg/l range, then additional Winkler tests are performed until the values are within the range.

e. The terminal YSI 58 D.O. Meter reading should be within a 0.1 mg/l range from the average terminal Winkler calibration value.

f. A minimum ambient bottom D.O. of 2.0 mg/l is required to perform an SOD test (Murphy and Hicks, 1986).

g. Chamber velocities must be in a 0.08 to 0.12 ft/sec. range (Howard, 1988).
h. Take detailed field notes during the SOD test including a site description.
i. Conduct a pre-check to each SOD study to provide information on the study feasibility and station characteristics. During the -check sediment samples are generally collected to determine bottom characteristics.

Figure 23. Sediment Oxygen Demand Calibration Worksheet

SEDIMENT OXYGEN DEMAND CALIBRATION WORKSHEET

STUDY AREA	STATION
DATE	STAFF ON SITE

ALL METERS ZERO PRIOR TO CALIBRATION (YES NO)	CALIBRATION NOTES:
MEMBRANES VISUALLY CHECKED PRIOR TO CALIBRATION (YES NO)	
MEMBRANES LAST REPLACED	
BATTERIES LAST REPLACED	
CALIBRATOIN METHOD (SATURATED AIR WINKLER)	
CALIBRATION PERFORMED BY	
SALINITY	

INITIAL CALIBRATION

TIME OF INITIAL CALIBRATION
WINKLER READINGS: (A) (B) (C) (AVERAGE)

METER	AMB	BLANK O	BLANK OO	CLEAR	1	2	3	4	5	A	B	C
READINGS BEFORE CAL												
WINKLER												
DIFFERENCE												
ADJUSTED												

TERMINAL CALIBRATION

TIME OF INITIAL CALIBRATION
WINKLER READINGS: (A) (B) (C) (AVERAGE)

METER	AMB	BLANK O	BLANK OO	CLEAR	1	2	3	4	5	A	B	C
READINGS BEFORE CAL												
WINKLER												
DIFFERENCE												

4. CHAMBER DEPLOYMENT

After the D.O. meter calibration procedure is complete, the SOD chambers are prepared for the test. All chambers are prepared as follows prior to being placed into the water (Lawhorn, 1988).

4.1. Setting up Chambers

4.1.1. *Chamber Preparation*

a. Place the lids on replicate chambers in the up position with spacers located between the lid and lid companion ring. Wing nuts should be tight enough to hold the spacers in place but not so tight as to hamper removal after the chamber has been set in place on the bottom.

b. Insert the water sampling port stoppers on each chamber lid (size #1, two on each lid).

c. Open the monitoring probe port on all chamber lids (no stoppers).

d. Inspect the replicate chamber lid gaskets for damage or debris that could prevent a watertight seal.

e. Inspect the seals on the blank chambers for damage.

f. Clip the harness ropes to each chamber.

g. Open the water intake ports located on the bottom of the blank chambers (no stoppers).

h. Disconnect the return pump tubing from the chamber lid male connectors.

4.2. *Boat operation only:*

a. Hang the chambers in sequential order along the gunwale with the chamber lids several inches below the surface of the water.

b. Tie the chamber harness to a gunwale cleat.

c. Situate the boat over the bottom where the chambers will be placed.

d. Do not allow the chambers to disturb the bottom sediment.

4.3. *Land operation*:

Chambers are placed on the stream bank in the order that they will be deployed. This will prevent harness ropes, pump cables and probe cables from becoming tangled during the chamber deployment and the SOD test.

4.4. *Chamber deployment:*

a. Blank chambers are deployed first because sufficient time is required to replace surface water trapped inside the chamber with ambient bottom water prior to initiating the SOD test.

b. When deploying blank chambers in soft sediment, place the chambers in an area away from the area that the replicate chambers will be deployed in order to avoid stirred up sediments from being drawn into the chamber through the open probe port.

c. One clear polycarbonate and acrylic blank chamber is used in addition to the conventional aluminum blank chambers to provide an indication of whether or not photosynthesis is occurring in the water column. The mechanical functions and the deployment procedure for the clear blank chamber are identical to that of the aluminum blank chambers. In cases of high flow a weighted band should be placed around the clear chamber to prevent it from being washed away.

d. Each blank chamber must be filled with surface water that enters through the two filling ports located on the bottom plate of the chamber.

e. After the blank chamber is filled at the surface and prior to lowering the chamber, two #11½ stoppers must be inserted into the filling ports. Surface water is used to fill the blank chamber to create negative buoyancy so the chamber can be lowered to the bottom.

f. After the filling port stoppers are in place, the chamber is agitated to dislodge any air that is trapped under the lid. The trapped air will exit through the probe port.

g. The chamber is then lowered to the bottom.

h. When the blank chamber is on the bottom, the pump is turned on. Unlike the replicate chambers, the lid and bottom of the blank chambers are permanently sealed thus no water exchange occurs when the chamber is lowered to the bottom. Surface water must be purged from the chambers by operating the pump with the tubing disconnected from the male adapters on the lid while the chamber is on the bottom. Bottom water is drawn into the chamber through the open probe port while the surface water is purged through the disconnected return tubing. With the two return pump tubes disconnected, the chamber will purge surface water and draw in bottom water.

i. A light tapping on the pump housing and tubing will dislodge air bubbles trapped in the pump system.

j. The pump is then allowed to run while the other chambers are being deployed.

k. This procedure is repeated for each blank chamber.

4.5. *Replicate Chamber Deployment*

a. After the blank chambers are deployed, each replicate chamber is slowly lowered to the bottom substrate prior to setting the chamber.

b. Set the replicate chambers out in downstream to upstream order to prevent sediment disturbance and any silt that may have been disturbed from settling on areas where other chambers will be placed.

c. If the chamber location is unsatisfactory because of debris, or other bottom characteristics that would prevent the chamber from sealing then the chamber is carefully relocated. In addition, if the chamber location is atypical of the general stream area, the chamber or possibly the station should be relocated.

d. After the replicate chamber is placed in a satisfactory location on the bottom, carefully examine the sediment/flange seal and the sediment/inner core seal to assure that ambient water infiltration will not occur during the test.

e. The replicate chamber lid is then lowered by loosening the four wing nuts and removing the PVC spacers. The lid must be lowered very slowly as not to create a pressure wave and stir up silt inside the chamber. If silting occurs in the chamber, initial D.O. readings will be erratic and a longer period will be required for SOD rate stabilization (see: Section 5. Procedure for Recording SOD Data).

f. Replace the spacers between the companion ring and stainless steel washers. The wing nuts are then tightened and the gasket forms a watertight seal.

g. Activate the pump and lightly tap the pump housing and tubing to dislodge air trapped in the pump system.

h. Turn off the pump and allow any silt that may have been suspended to resettle before starting the test.

i. Reconnect the return tubing.

j. Repeat this process until all replicate chambers are deployed.

4.6. Once all replicate chambers are in place, insert DO probes into the probe ports beginning with the first blank chamber deployed and ending with the final replicate chamber.

4.7. During the D.O. probe installation, replicate chamber pumps can be turned on and a final check of the chamber and pump tubing can be performed.

4.8. In addition to the D.O. probes located inside the SOD chambers, one D.O. probe is placed on the outside of a chamber to record ambient D.O. values.

4.9. When an SOD test has been completed, chambers can usually be lifted from the bottom using the harness ropes.

5. RECORDING SOD FIELD DATA.

5.1. After SOD Chambers and Probes are installed

5.1.1 Readings

a. Stirrers are activated approximately 2 minutes prior to reading meters and turned off after the data is recorded.

b. All meters (including the ambient meter) are read at 15 minute intervals. For each chamber, D.O., temperature, and the change in D.O. per 15 minute time period is recorded on the SOD field sheet form (Figure 24).

c. D.O. readings from the replicate chambers will usually decrease at a relatively similar rate. Typically, if relatively uniform decreases in D.O. are observed in the replicate chambers after stabilization, a sufficient SOD rate can be calculated from approximately 2 hours of testing (Murphy and Hicks, 1986).

d. A minimum oxygen reduction of 0.4 mg/l is required before an SOD test should be terminated. This situation is not typically encountered and would provide an extremely low SOD rate indicating little organic content in the sediment.

e. SOD tests with very slow oxygen uptake rates may be less reliable due to an extremely small amount of oxygen depletion over a greater period of time. Since longer tests are necessary when slow oxygen uptake is occurring, the potential for meter calibration drift increases.

f. See Figure 25 for an example of completed SOD worksheet.

5.2 Recording Errors

5.2.1 *Erratic D.O. Readings Troubleshooting*

If observed in replicate chambers the following are possible problems:

a. Initial D.O. readings may be erratic if sediment was disturbed during chamber placement on the bottom. This problem occurs often at stations where sediment consists of soft mud or a silt-like composition and is usually observed in all of the replicate chambers. For this reason, several of the initial D.O. readings may be omitted from the SOD rate calculations. The readings will usually stabilize as the suspended particles in the chamber settle out, (generally about 15 to 30 minutes, 1 to 2 readings).

b. If D.O. readings from all chambers do not stabilize after 30 minutes, it may indicate that the chambers are sinking into the soft sediment causing the circulation diffusers to become close to the sediment and continually disturbing the silt. If this occurs, the chambers must be reset on the bottom and a

chamber collar must be placed around the bottom chamber flange to prevent the chambers from sinking. Chamber collars are flat, thin pieces of material, that increases the surface area of the chamber flange and prevent the chamber from sinking into soft sediment.

c. If D.O. readings from a replicate chamber do not stabilize and begin to decrease after the other chambers have stabilized, it may indicate that the chamber was not initially sealed and ambient bottom water is leaking into the chamber via the ports, gasket seal, pump tubes or the sediment flange seal. The chamber must be reset and the seal integrity reconfirmed.

d. On occasion, ambient water will begin leaking into a chamber. Chamber leaks (blowouts) are the most frequent problem encountered in SOD tests. This problem is easily recognized when D.O. values in a chamber that have been steadily decreasing suddenly begin to rise rapidly. However, if the chamber leak is small, the rate of decrease in D.O. may only be slowed, resulting in an unrealistically low rate for the chamber. For these reasons, the rate of D.O. change in each chamber must be carefully evaluated and recorded for each 15 minute time period during the SOD test.

   If a chamber leak is detected the following options may be considered:

   - Stop the leak and restart the test for <u>that</u> chamber; or
   - Delete the data from that chamber from the SOD test; or
   - Terminate entire test, if sufficient data has been recorded to establish a reliable linear regression.

e. If the D.O. in a chamber <u>falls</u> much more rapidly than in the other chambers, it may indicate that the chamber has been inadvertently placed on organic debris such as decaying leaves or other organically rich deposits that may be uncharacteristic of the area. The chambers must be placed on sediment that is typical for the station area. If this problem is encountered, the chamber should be relocated or the data deleted from the SOD test.

   The validity of SOD test data is dependent on locating the test site at an area that is typical of the water body being studied. If the chamber location is atypical of the general stream area then the chamber or possibly the station should be relocated.

f. When other obvious D.O. or temperature problems occur during the SOD test, it is usually the result of meter or probe malfunction and can be detected by the terminal calibration results.

6. METER AND PROBE PREPARATION

6.1. Procedure

a. Check all D.O. meters, cables and probes to assure proper functioning **before** the survey.

b. Evaluate the YSI 58 instrument batteries and replaced if necessary. Stirrer batteries should be checked to assure that batteries are adequate to complete SOD test.

c. Replace all D.O. probe membranes prior to each SOD survey. After the membrane has been changed, a minimum of 24 hours should be allowed for the probe to equilibrate before it is used for an SOD test. YSI Standard Membranes should be used.

7. SOD CHAMBER VELOCITY TEST

SOD rates are directly related to the sediment/water interface velocity, therefore specific and consistent velocities must be maintained in all chambers for accurate SOD testing. EPA recommends a constant chamber velocity of 0.1 ft/sec and an acceptable range of 0.08 to 0.12 ft/sec (Howard 1988). To maintain this velocity range, DWR uses a flow restrictor placed in the chamber pump tubing to reduce pumping velocity. The restrictor is 1" long, made from brass stock, and has a 7/64" opening in the center to allow a desired velocity of water.

All SOD chambers are periodically tested in the lab to ensure that velocities remain constant after repeated field use and pump wear. Velocity tests are performed using a Marsh McBirney Magnetic Flow Meter Model 201. The Marsh McBirney meter is factory calibrated. Chamber velocity tests procedures are as follows:

7.1. Velocity test procedures for replicate chambers:

a. Insert a # 11½ stopper in the monitoring probe port and two # 1 stoppers in water sampling ports. All pump tubing should be connected and the chamber lid must be tight against the chamber companion ring.

b. Place the chamber upside-down on a support in a manner that will allow access to the monitoring probe port. The support should not touch the pump tubing or alter the pump flow in any manner. (The chamber and support should be located over a sink or other acceptable area where the test water can be easily drained).

c. Fill the chamber with water to the cutting ring flange (normal water/sediment interface).

d. Turn the pump on. It may be necessary to add more water to fill pump and pump tubing after the pump is turned on and to tap the pump and tubing to dislodge trapped air. Place the Marsh McBirney probe 2 inches below the surface of the

water halfway between the outer and inner chamber wall. Allow the water circulation in the chamber to reach the maximum velocity (approximately 15 minutes).

e. Read the Marsh McBirney Meter. The velocity in the chamber should be within a range of 0.08 to 0.12 ft/sec.

f. If the velocity is not constant or out of the acceptable range, check the following:
   - Probe orientation or placement in the chamber.
   - Restrictions in pump tubing (7/64" brass restrictor may be blocked).
   - Air bubbles could be locking the pump or altering flow.
   - Pump may be damaged and not pumping maximum flow.
   - Check pump battery voltage output (12 volt)
   - Check velocity meter calibration.

7.2. Velocity Tests for Blank Chambers:

a. Insert two # 11½ stoppers into the filling ports on the bottom of the blank chamber. All pump tubing should be connected.

b. Place chamber right side up on a support in a manner that will allow access to the filling ports.

c. Fill the chamber completely with water.

d. Turn the pump on . It will be necessary to add more water to fill pump and pump tubing after the pump is turned on and to tap the pump and tubing to dislodge trapped air. Place the Marsh McBirney probe through the D.O. probe monitoring port at a depth of 2 inches. Allow the water circulation in the chamber to reach the maximum velocity (approximately 15 minutes).

e. Read the Marsh McBirney Meter.

f. Use the same trouble shooting procedures as with the replicate chambers if problems are encountered.

8. LEAK TEST FOR SOD CHAMBERS

SOD chambers must remain watertight during the SOD test to prevent ambient bottom water from entering the chamber and invalidating the test. The exchange of ambient bottom water and chamber water can occur by two means, by leaking between the sediment and chamber cutting edge or by leaking through any of the normally sealed chamber gaskets, stoppers, fittings and tube connections. Chamber leaks at the sediment/chamber interface generally occur as a result of sediment or sand washing out from around the chamber due to scouring and are usually detected during the test. Leaks through chamber seals, other than the sediment/chamber interface can be detected during the Chamber Velocity Test (Section 7). Note: leak test is under worst case conditions because chamber water (inside/outside) is equalized during the test. Procedures for leak testing SOD chambers are as follows:

1. Insert a # 11½ stopper in the monitoring probe port and # 1 stoppers in water sampling ports. All pump tubing should be connected and the chamber lid must be tight against the chamber companion ring.
2. Place the chamber upside-down on a support in a manner that will allow access to the monitoring probe port. The support should not touch the pump tubing or alter the pump flow in any manner. The chamber and support should be located over a sink or other acceptable area where the test water can be easily drained.
3. Fill the chamber with water to the cutting ring flange (normal water/sediment interface for replicate chambers and to bottom plate on blank chambers).
4. Turn the pump on.
5. If water leaks out, repair or replace the seal and repeat the leak test.

9. THREE POINT ANCHOR TECHNIQUE

If a boat operation is necessary to perform a SOD test, care must be taken to provide maximum stability and minimize wave action and horizontal swing over the bottom. Movement of the boat by wave action or swing on a single anchor line will result in chambers being lifted and the SOD test terminated. This problem can be avoided by using the following three-point anchor technique:

1. After the boat is on station, align the bow into the current.
2. Set bow anchor on SOD boat allowing a minimum scope of 3 times depth. More scope may be necessary if strong current or winds are present.
3. Use support boat to set aft port and aft starboard anchors (minimum scope 3 times depth).
4. Anchors should be oriented in a 3-point (tripod like) pattern with the SOD boat in the center.
5. After all anchors are set, the lines should be tightened as much as possible and cleated to provide maximum stability and minimize horizontal movement of the SOD boat.
6. While anchoring, care should be taken not to disturb the sediment where the SOD test is to be performed.
7. It is potentially dangerous to anchor with the stern of the boat facing upstream if current, waves or bad weather exists. The 3-point anchor method should not be used in areas affected by strong tidal current unless the test can be completed prior to the turning of the tide.

Figure 24. SOD Field Sheet

STUDY AREA				
STATION LOCATION				
DATE	SEDIMENT TYPE	DEPTH	CHAMBERS DIVER DEPLOYED? YES/NO	VELOCITY FT/SEC (at bottom)
PERSON(S) READING METERS		STAFF ON SITE		BOAT SOD/BANK SOD

TIME	MIN.	AMB		BLANK O		BLANK OO		BLANK CLEAR		REP 1		REP 2		REP 3		REP 4		REP 5		BACK-UP
		DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO	TEMP	DO
	START																			
	15																			
	30																			
	45																			
	60																			
	75																			
	90																			
	105																			
	120																			
	135																			
	150																			
	165																			
	180																			
	195																			
	210																			
	225																			
	240																			
	255																			
	270																			

TIME	MIN.	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO	Change in DO
	START										
	15										
	30										
	45										
	60										
	75										
	90										
	105										
	120										
	135										
	150										
	165										
	180										
	195										
	210										
	225										
	240										
	255										

Figure 25. Example of SOD Excel Worksheet for Determining Average SOD Rates.

Rocky River near Aquadale
STATION LOCATION: Rocky River at Hwy 52
SUB-BASIN 03 07 13 COUNTY - Stanley

STAFF ON SITE: QUIDLEY, WILLIAMS, FISHER, MEDLIN
DEPTH AT SITE: 2 feet
BOTTOM SEDIMENT: SAND

TEST CONDUCTED FROM RIGHT BANK
AVERAGE AMBIENT WATER TEMP 24.4°C
SOD TEST FOR SOD CALIBRATION

		BLANK CHAMBERS		REPLICATE CHAMBERS					
	AMB	BLANK 0	BLANK OO	REP 1	REP 2	REP 3	REP 4	REP 5	Extra Chamber not used
NOTES									
AVERAGE T°C	24.3	24.3	24.4	24.4	24.3	24.4	24.3	24.4	
D.O. Range	7.81 - 8.02	7.79 - 7.86	7.87 - 7.97	6.34 - 7.80	6.61 - 7.63	6.78 - 7.80	6.69 - 7.60	6.61 - 7.47	
Test Time in min.									
0	7.99	7.86	7.97	7.80	7.63	7.80	7.60	7.47	
15	8.02	7.85	7.96	7.63	7.49	7.68	7.48	7.35	
30	8.00	7.84	7.95	7.47	7.37	7.56	7.37	7.23	
45	7.94	7.83	7.94	7.30	7.24	7.45	7.26	7.10	
60	7.83	7.82	7.93	7.14	7.12	7.34	7.17	7.02	
75	7.81	7.82	7.93	6.98	7.02	7.23	7.07	6.95	
90	7.90	7.81	7.91	6.83	6.91	7.12	6.98	6.87	
105	7.91	7.80	7.89	6.67	6.81	7.01	6.88	6.77	
120	7.93	7.80	7.88	6.50	6.71	6.89	6.78	6.68	
135	7.90	7.79	7.87	6.34	6.61	6.78	6.69	6.61	
RATE OF WATER COL (ß) mg/L/min		-0.0005	-0.0007						
RATE OF REPLICATE (ß) mg/L/min				-0.0108	-0.0073	-0.0075	-0.0067	-0.0063	
AVG. RATE OF WATER COL (ß) mg/L/min		-0.0006		-0.0006	-0.0006	-0.0006	-0.0006	-0.0006	
REPLICATE RATE (-) AVG WATER COL RATE mg/L/min				-0.0102	-0.0067	-0.0069	-0.0061	-0.0057	
SOD RATE gr/m2/hr				-0.1113	-0.0734	-0.0756	-0.0664	-0.0620	
gr/m2/day				-2.6713	-1.7624	-1.8147	-1.5937	-1.4884	

RATE CALCULATION

ß x (K x V) ÷ A = gr O2/m2/hr
ß = Rate of change in D.O. as mg O2/L/min
v = Chamber volume in liters
A = Chamber area in meters square
K = .06 (Constant)

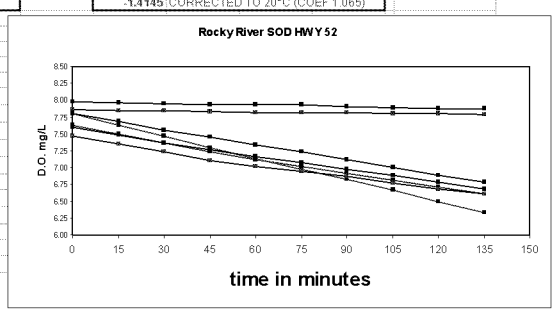
AVERAGE SEDIMENT OXYGEN DEMAND (rate calculated for 3 hours)

-0.0778 gr/m2/hr
-1.8661 gr/m2/day AT AMB. TEMP 24.4°C
-1.4145 CORRECTED TO 20°C (COEF 1.065)
-0.0072 gr/ft2/hr
-0.1734 gr/ft2/day

FIELD STAFF :

CALCULATIONS PERFORMED BY:
Harold Quidley

CALCULATIONS CHECKED BY:
Ed Williams



XIII. REFERENCES

American Public Health Association. 1992. Standard Methods for the Examination of Water and Wastewater, 18th edition. Washington, D.C.

Buchanan, T.J., and W.P. Somers. 1969. Stage Measurement at Gauging Stations. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 3, Chapter A7. United States Geological Survey.

------. 1973. Discharge Measurements at Gauging Stations. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 3, Chapter A8. United States Geological Survey.

Howard, H., 1988. U.S. Environmental Protection Agency, Region IV, Athens Ga. personal communication.

Hutchinson, G.E. 1975. A Treatise on Limnology. John Wiley and Sons, Inc., New York.

Instrument Specialties Company. 1988. Instruction Manual Model 2700 Sampler. Lincoln, Nebraska.

Instrument Specialties Company. 1991. 3700 Portable Sampler. Instruction Manual. Lincoln, Nebraska.

Inter-Agency Committee on Water Resources. 1965. Instructions for sampling with depth integrating suspended-sediment samplers, US DH-48 and DH-59. Measurement and Analysis of Sediment Loads in Streams, Report J. St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minnesota.

Kittrell, F.W. 1969. A Practical Guide to Water Quality Studies of Streams. United States Department of the Interior. Federal Water Pollution Control Administration. 135 pp.

Lawhorn, D., 1988. U.S. Environmental Protection Agency, Region IV, Athens Ga. personal communication.

Murphy, P. J. , Hicks D. B., 1986. In-Situ Method for Measuring Sediment Oxygen Demand. Pages 307-322. Sediment Oxygen Demand. Processes, Modeling and Measurement. Institute of Natural Resources, University of Georgia.

Sawyer, Clair N. and Perry L. McCarty. 1967. Chemistry for Sanitary Engineers. McGraw Hill, New York. 518 pp.

Smoot, G. F., and C. E. Novak. 1968. Calibration and maintenance of vertical-axis type current meters. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 8, Chapter B2. United States Geological Survey.

United States Environmental Protection Agency. 1976. Quality Criteria for Water. Washington, D.C. 256 pp.

------. 1980. Standard Operating Procedures and Quality Assurance Manual. Athens, Georgia.

------. 1994. Federal Register. Volume 59, No. 20. 40 CFR Part 136. Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water

Act; Technical Amendments.

United States Geological Survey. 1977. National Handbook of Recommended Methods for Water-Data Acquisition. Reston, Virginia.

------. 1992. Selected Water Quality and Biological Characteristics of Streams in Some Forested Basins of North Carolina, 1985-88, United States Geological Survey Water-Resources Investigations Report 92-4129. Raleigh, N.C.

Wilson, Jr., James F. 1968. Fluorometric Procedures for Dye Tracing. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 3, Chapter A12. United States Geological Survey.

XIV. ADDITIONAL RESOURCES

American Fisheries Society, Water Quality Section. 1979. A Review of the E.P.A. Red Book: Quality Criteria for Water. Bethesda, Maryland. 313 pp.

Arthur H. Thomas Co. 1981. Scientific Apparatus Catalog. Philadelphia, Pennsylvania. 1544 pp.

Babbitt, Harold E., James J. Doland and John L. Cleasby. 1967. Water Supply Engineering. McGraw Hill, New York. 672 pp.

California State University. 1991. Operation of Wastewater Treatment Plants - A Field Study Training Program, 3rd Edition. Sacramento, CA. 666 pp.

Corning Glass Works. 1979. pH/Temp Meter 4 Instruction Manual. Medfield, Massachusetts.

Grant, Douglas M. 1978. Isco Open Channel Flow Measurement Handbook, 1st edition. Instrument Specialties Company. Lincoln, Nebraska. 221 pp.

Guy, Harold P. and Vernon W. Norman. 1970. Field Methods for Measurement of Fluvial Sediment. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 3, Chapter C2. United States Geological Survey.

Hydrolab Corporation. 1984. Operation and Maintenance Manual for Hydrolab Surveyor II. Austin Texas.

------. 1991. H20 Multiparameter Water Quality Data System Operating Manual. Austin, Texas.

------. 1991. Scout 2 Multiparameter Water Quality Data Transmitter Operating Manual. Austin, Texas.

Kahl Scientific Instrument Corporation. 1980. Catalog. El Cajon, California.

Leupold & Stevens, Inc. 1974. Stevens Water Resources Data Book, 2nd Edition. Beaverton, Oregon. 200 pp.

Marsh-McBirney, Inc. Instruction Manual Model 201 Portable Water Current Meter. Gaithersburg, Maryland. 15pp.

McKee, Jack E. and Harold W. Wolf, eds. 1963. Water Quality Criteria. California State Water Resources Control Board, Publication 3-A. 548 pp.

New York State Department of Health. Manual of Instruction for Sewage Treatment Plant Operators. Health Education Service, Albany, New York. 243 pp.

North Carolina Division of Environmental Management. 1986. Administrative Code Section: 15NCAC2B .0100-Procedures for Assignment of Water Quality Standards, 15NCAC 2B:0200-Classifications and Water Quality Standards Applicable to Surface Waters of North Carolina. Raleigh, N.C.

Simmons, Clyde E. 1981. Quality Assurance Plan for Water Quality Activities of the North Carolina District. United States Geological Survey. Reston, Virginia. 53 pp.

Simmons, Clyde E. and Ralph C. Heath. 1979. Water Quality Characteristics of Streams in Forested and Rural Areas of North Carolina. U.S. Geological Survey

Water Resources Investigations 79-108. United States Geological Survey.

Smoot, George F. and Charles E. Novak. 1968. Calibration and Maintenance of Vertical-Axis Type Current Meters. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 8, Chapter B2. United States Geological Survey.

United States Environmental Protection Agency. 1974. Methods for Chemical Analysis of Water and Wastes. Cincinatti, Ohio. 312 pp.

------. 1989. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Second Edition. EPA/600/4-89/001. 249 pp.

------. 1991. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms. Fourth Edition. EPA/600/4-90/027. 216pp.

United States Geological Survey. 1982. Water Quality of North Carolina Streams, United States Geological Survey Water-Supply Paper 2185 A-D. Washington, D.C.

Water Pollution Control Federation. 1970. Operation of Wastewater Treatment Plants. Lancaster Press, Inc., Lancaster, PA. 193 pp.

------. 1971. Simplified Laboratory Procedures for Wastewater Examination. WPCF Publication No. 18.

Welch, P.S. 1948. Limnological Methods. McGraw Hill, New York. 381 pp.

Wildco. Petersen and Ponar Bottom Samplers. Trippensee Publishing Co., Saginaw, Michigan. 19 pp.

------. Wildco-Eckman Bottom Samplers. Trippensee Publishing Co., Saginaw, Michigan. 15 pp.

------. 1974. Wildco Instruments and Aquatic Sampling Supplies, Catalog No. 77. Saginaw, Michigan. 110 pp.

Wilson, James F., Ernest D. Cobb, and Frederick A, Kilpatrick . 1986. Fluorometric Procedures for Dye Tracing. Techniques of Water-Resources Investigations of the United States Geological Survey, Book 3, Chapter A12. United States Geological Survey.

Yellow Springs Instrument Co., Inc. 1982. Instruction Manual YSI Model 58 Dissolved Oxygen Meter. Yellow Springs, Ohio. 28 pp.

------. 1983. Instructions for YSI Model 33 and 33M S-C-T Meters. Yellow Springs, Ohio. 16 pp.

APPENDICES

Appendix 1: DWR's Hydrolab Mulitparameter Guidance Sheet

DISSOLVED OXYGEN

HYDROLAB with CLARK CELL D.O. SENSOR
(DOES NOT APPLY TO LDO SENSORS)

CALIBRATION

Clark Cell Dissolved Oxygen (D.O.) Calibration for Hydrolab Meters:

(% AIR CALIBRATION IN WATER-SATURATED AIR)

1) Secure probe to work surface and inspect membrane for tears and debris.
2) Rinse calibration cup with deionized water and attach to probe.
3) Fill calibration cup with tap water until water is just level with the O-ring used to secure the D.O. membrane. Do not cover the membrane.
4) Remove any water droplets from D.O. membrane with the corner of a chem-wipe or a lint-free cloth.
5) Place inverted lid (concave upward) on top of calibration cup. The lid should not completely seal or cover the cup (lid should be slightly tilted inwards on top of the cup, leaving a small gap or opening).
6) Wait 5 to 10 minutes for readings to stabilize.
7) Once readings are stable, record the following values on the calibration sheet: "Temperature", "Initial % Saturation", and "Initial Meter Reading (mg/L)".
8) Record "Barometric Pressure" and "Altitude" on the calibration sheet.
   These values are available on the *Dissolved Oxygen Table* for your corresponding regional office. All calibrations should be performed in a controlled environment (field calibrations are not recommended).
9) Use the *Dissolved Oxygen Table* for your location to find the "D.O. Table Value" (based on the temperature displayed on the meter), and record value on calibration sheet.
10) Follow menu prompts to calibrate for Dissolved Oxygen, Percent Saturation, which is displayed as "DO%:SAT".
    * **NOTE: Dissolved oxygen should always be calibrated using % saturation.**
      Calibrations based on "mg/l" require a water sample with a known D.O. concentration (Winkler titration must be performed).
11) When prompted, enter the barometric pressure for your location in millimeters of Mercury (mmHg). The unit should display "CALIBRATION SUCCESSFUL!"
12) On the calibration sheet, record the displayed mg/L value as "Calibrated Meter Reading" and the % SAT value as the "Calibrated % Saturation" value.
    * **NOTE: "D.O. Table Value" and "Calibrated Meter Reading" value should be within ±0.5 mg/L of each other.**

Terminal Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 9.
b. The post-sampling "D.O. Table Value" and the post-sampling "Initial Meter Reading" should be within ±0.5 mg/L of each other.

MAINTENANCE

Sonde Storage - Calibration/Storage Cup:
Store sonde and sensors in the Calibration/Storage Cup filled with pH 4 buffer solution.

Clark Cell D.O. Membrane Replacement:

D.O. membrane should be replaced when calibration is impossible, if calibration drift occurs quickly or frequently, or if membrane is dry or damaged.

1) Remove O-ring and shake out old electrolyte.
2) Rinse sensor cavity with deionized water.
3) If gold cathode appears tarnished, dry and lightly buff with a pencil eraser or Kimwipe until gold is bright.
4) Refill with fresh D.O. electrolyte (2M KCl) until a meniscus forms. Remove any bubbles trapped in electrolyte.
5) Replace membrane and secure with O-ring. Inspect O-ring for any tears or breaks; replace as needed.
6) Trim excess membrane.
7) Allow membrane to soak overnight in tap water before calibrating.

D.O. Circulator Maintenance (Remove dirt and debris build-up from inside circulator impeller shaft):

1) Use a flat-head screwdriver to remove impeller screw.
2) Clean dirt and debris from the screw, impeller, and inside the impeller shaft.
3) Replace screw and re-attach impeller to circulator with flat-head screwdriver.

Frequency of cleaning will depend on use and environment.

DISSOLVED OXYGEN

HYDROLAB with LUMINESCENCE D.O. (LDO) SENSOR
(DOES NOT APPLY TO CLARK CELL SENSORS)

CALIBRATION

Hach Luminescence Dissolved Oxygen (LDO) Calibration for Hydrolab Meters:

(% AIR CALIBRATION IN AIR-SATURATED WATER)

1) Fill a 1-liter bottle half-full of tap water. Water bottle should remain open (no cap or seal) for at least 12 hours (overnight) to allow water to equilibrate to ambient temperature and atmospheric pressure.
2) After 12 hours have passed, use a thermometer to confirm that the water in the bottle is close to room temperature.
3) Seal/cap bottle and shake it very vigorously for 40 seconds to saturate the water with air.
4) With sonde positioned with sensors facing upward, pour the water into the calibration cup such that the LDO sensor cap and the temperature sensor are completely submersed (water should come close to the top of the calibration cup).
5) Completely cover the top of calibration cup with the inverted lid (do not tightly seal the cup).
6) Wait 10 minutes for readings to stabilize. If temperature changes more than ±0.5 °C during calibration, recalibration of the sensor is recommended.
7) Once readings are stable, record the following values on the calibration sheet: "Temperature", "Initial % Saturation", and "Initial Meter Reading (mg/L)".
8) Record "Barometric Pressure" and "Altitude" on the calibration sheet.
   These values are available on the *Dissolved Oxygen Table* for your corresponding regional office. All calibrations should be performed in a controlled environment (field calibrations are not recommended).
9) Use the *Dissolved Oxygen Table* for your location to find the "D.O. Table Value" (based on the temperature displayed on the meter), and record value on calibration sheet.
10) Follow menu prompts to calibrate for Dissolved Oxygen, Percent Saturation, which is displayed as "LDO%:SAT".
    * **NOTE: Dissolved oxygen should always be calibrated using % saturation.**
      Calibrations based on "mg/l" require a water sample with a known D.O. concentration (Winkler titration must be performed).
11) When prompted, enter the barometric pressure for your location in millimeters of Mercury (mmHg). The unit should display "CALIBRATION SUCCESSFUL!"
12) On the calibration sheet, record the displayed mg/L value as "Calibrated Meter Reading" and the % SAT value as the "Calibrated % Saturation" value.
    * **NOTE: "D.O. Table" value and "Calibrated Meter Reading" value should be within ±0.5 mg/L of each other.**

Terminal Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 10.
b. The post-sampling "D.O. Table Value" and the post-sampling "Initial Meter Reading" should be within ±0.5 mg/L of each other.

MAINTENANCE

Sonde Storage - Calibration/Storage Cup:
Store sonde and sensors in the Calibration/Storage Cup filled with pH 4 buffer solution.

Hach LDO Sensor Cap Replacement:

Replace once a year or when cap is damaged.

1) Unscrew old sensor cap from end of probe.
2) Carefully dry clear plastic window at the end of probe with cotton swab.
3) Place cap seal and o-ring on the probe tip.
4) Screw new sensor cap onto probe so that the o-ring seal is compressed. Do not over-tighten cap.
   No water or moisture should be present between sensor cap and clear plastic window at top of probe.
5) Do NOT use alcohol or any organic solvent solutions to clean the Hach LDO sensor. These solvents will damage the plastic sensor cap.

SPECIFIC CONDUCTANCE	HYDROLAB

CALIBRATION

THREE-STEP SPECIFIC CONDUCTIVITY PROCEDURE:

I. "Dry Air" (ALWAYS ZERO):

The "Dry Air" step is a **check** for the Quanta meters only, and a **calibration** for the Hydrolab 4a and MS5 meters.

1) Attach calibration cup to probe. Fill calibration cup half-full with deionized water and seal with lid. Shake probe to rinse. Repeat.
2) Secure probe to work surface, and remove calibration cup.
3) Dry the inside of conductivity sensor slot thoroughly.
4) Record displayed value as "Initial Meter Reading" in the "Dry Air" section of the calibration sheet.
   If the reading is not within ± 2, follow cleaning procedure, and repeat calibration procedure.

If using a Quanta, proceed to step 8.

Steps 5-7 are for Hydrolab 4a and MS5 meters only:

5) Follow menu prompts to calibrate for specific conductance.
6) When prompted, enter "0" (zero) as specific conductance standard. Display should read "CALIBRATION SUCCESSFUL!"
7) Record displayed value as "Calibrated Meter Reading" in the "Dry Air" section of the calibration sheet.

II. Conductivity Standard:

Calibrations should be performed using **fresh, certified** conductivity standards that bracket the range of measurements to be taken that day. Record the standard's "true value" (found on the certificate of analysis or bottle label) and lot number (also called analysis number) on the calibration sheet. Traceable® Certificate of Analysis for Conductivity Solution sheets (one certificate for each lot number) should be retained and stored in a notebook.

8) Re-attach calibration cup to probe. Fill cup half-full with deionized water. Seal cup with lid and shake probe to rinse. Repeat.
9) Rinse sensors with small amount of fresh conductivity standard. Discard rinse.
10) Fill calibration cup with conductivity standard to within a centimeter of the top of the Calibration Cup. (Pour standard down the interior side of the cup to avoid trapping bubbles.)
11) Wait approximately 1 to 3 minutes for readings to stabilize.
12) Record displayed value as "Initial Meter Reading" in the "Conductivity Standard" section of the calibration sheet.
13) Follow menu prompts to calibrate for Specific Conductance. When prompted, enter the value of the standard. Unit will display "CALIBRATION SUCCESSFUL!"
14) Record displayed value as "Calibrated Meter Reading" in the "Conductivity Standard" section on the calibration sheet.

III. Calibration Check:

15) Rinse with deionized water and wipe dry with a chem-wipe or a lint-free cloth. Confirm that the meter display is reading 0 (zero) µS before going to the next step.
16) Repeat steps 9-11 with a fresh conductivity standard with a value different from the one used in the previous steps. Choose a standard that will give the best range of values for the anticipated conductivity of the samples to be collected.
17) Record displayed value as "Initial Meter Reading" in the "Calibration Check" section of the calibration sheet.

Terminal Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 4, and record value in the "Dry Air" section on the calibration sheet.
   For the "Dry Air" check, displayed value should be between –2 and 2 µS.
b. Repeat calibration steps 8 thru 12, and record value in the "Conductivity Standard" section on the calibration sheet.
   "Conductivity Standard" value should be within ±10% of the standard.
c. Repeat step 15 thru 17, and record value in the "Calibration Check" section on the calibration sheet.
   "Calibration Check", value should be within ±10% of the standard.

MAINTENANCE

Cleaning Conductivity Sensor:

Conductivity cell should be cleaned frequently (in addition to rinsing with DI water after field use).
A clean cell is imperative for accurate readings.

1) Use a cotton swab and mild soap to remove any films or deposits on the sensor.
2) Rinse sensor with deionized water.

pH

HYDROLAB

CALIBRATION

TWO-POINT PH CALIBRATION REQUIRED:

1st Calibration Point (always start with 7 buffer):

1) Attach calibration cup to probe. Fill cup half-full with deionized water. Seal cup with lid and shake probe to rinse. Repeat.
2) Rinse sensors with small amount of 7 pH buffer. Discard buffer rinse.
3) Secure probe to work surface.
4) Fill calibration cup with **fresh** 7.0 buffer to within a centimeter of the top of the calibration cup. Wait at least 2 minutes for stabilization.
5) Record displayed value as the "Initial Meter Reading" under Buffer # 1 on the calibration sheet.
6) Follow menu prompts to calibrate for pH. When prompted, enter "7.0" as the value of your standard. Unit will display "CALIBRATION SUCCESSFUL!"
7) Record the displayed value as "Calibrated Meter Reading" for Buffer #1 on the calibration sheet.

2nd Calibration Point:

8) Rinse sensors with deionized water.
9) Rinse sensors with small amount of a pH buffer that is similar to the anticipated pH of the samples to be collected. Discard buffer rinse.
10) Fill calibration cup with **fresh** buffer to within a centimeter of the top of the calibration cup. Wait 1 to 3 minutes for solution to stabilize.
11) Record displayed value as the "Initial Meter Reading" for Buffer # 2 on the calibration sheet.
12) Follow menu prompts to calibrate for pH. When prompted, enter the value of Buffer #2 (also called the slope buffer value).
    Unit will display "CALIBRATION SUCCESSFUL!"
13) Record the displayed value as "Calibrated Meter Reading" for Buffer #2 on the calibration sheet.

Confirmation Buffer:

14) Rinse sensors and calibration cup with deionized water.
15) Rinse sensors with small amount of 7 buffer. Discard buffer rinse.
16) Fill calibration cup with 7 buffer to within a centimeter of the top of the calibration cup. Wait 1 to 3 minutes for solution to stabilize.
17) Record the displayed value as the "Meter Reading" under "Confirmation Buffer 7.0" on the calibration sheet
18) Confirm that the "Meter Reading" value is within ± 0.1 of the buffer value (between 6.9 and 7.1).

Terminal Check (Post-Sampling Meter Check)

a. Repeat steps 1 thru 5 (for 7 buffer); record displayed value on the calibration sheet.
   This value should be within ±0.2 of 7 (for 7 buffer).
b. Repeat steps 8 thru 11 for Buffer #2. Record value on calibration sheet.
   Value should be within ±0.2 of Buffer #2.

The "Confirmation Buffer" step is not required for post-sampling meter checks.

pH	HYDROLAB
MAINTENANCE	

Indicators that maintenance is needed include:

- Unable to calibrate
- Slow response
- Erratic readings
- Clogged reference junction
- Black reference junction
- Coated glass bulb

Maintain as directed below. The pH electrolyte should be changed at least 3 to 4 times a year, or as needed.

pH Reference Electrode Maintenance: (pg 45 - Hydrolab MS 5 User Manual, Feb 2006 ed. 3)

Check the reference electrode regularly to confirm flow through the Teflon junction. To test for flow through the junction, press lightly on the top of the reference electrode. A bead of electrolyte should wet the Teflon junction. Maintain as directed below.

1) Remove the pH reference sleeve, and discard old electrolyte.
2) Drop two KCL salt pellets into reference sleeve. Refill the sleeve (to the top) with electrolyte, which is provided in the maintenance kit (3M KCl, saturated with AgCl).
3) With the sensors pointed down, gently push the reference sleeve back onto its mount, until the sleeve just covers the O-ring located on the mount.
4) Turn probe so that the sensors point up and push the sleeve the rest of the way onto its mount.
   Air and electrolyte should flow through the Teflon junction.
   If it does not, repeat steps 1-4.
   If the second attempt fails, replace the old junction.
5) Rinse with tap water.

Cleaning pH Glass Electrode:

Check the glass bulb regularly for a dirty film or scratches. Clean as directed below.

1) Wet a cotton swab with a mild soap solution.
2) Gently swab the pH glass electrode.
3) Rinse electrode with tap water.

Appendix 2: DWR's YSI 85 and Accumet Guidance Sheet

APPENDIX 1 – DWR GUIDANCE SHEET FOR HYDROLAB METERS

DISSOLVED OXYGEN — **YSI 85**

CALIBRATION

D.O. Calibration for YSI-85 Meters:

(% AIR CALIBRATION IN WATER-SATURATED AIR)

1) Inspect membrane. Membrane should be taut, flat, and free of tears and debris.
2) Confirm that sponge in the calibration/storage chamber is moist (not soaking wet). Dry the probe and sides of calibration chamber with a lens cloth.
3) Insert probe into the calibration/storage chamber. Make sure there are no water droplets on the membrane.
4) Turn meter "ON" and press "MODE" until dissolved oxygen is displayed in "%".
5) Wait approximately **15 to 30** minutes for readings to stabilize.
6) Once readings are stable, record the following displayed values on the calibration sheet: "Temperature", "Initial % Saturation", and "Initial Meter Reading (mg/L)" (press mode to switch from % Saturation to mg/L). Then press mode until % Saturation is again displayed on the screen.
7) Record "Altitude" and "Barometric Pressure" on the calibration sheet.
   These values are available on the *Dissolved Oxygen Table* for your corresponding regional office. All calibrations should be performed in a controlled environment (field calibrations are not recommended).
8) Use the *Dissolved Oxygen Table* for your location to find the "D.O. Table Value" (based on the temperature displayed on the meter); record value on calibration sheet.
9) Press and release the "Up" and "Down" arrow buttons at the same time.
10) Use the arrow buttons to find the local altitude (to the nearest 100 ft) and press "ENTER".
11) "CAL" will be visible in the lower left of the display. The current % reading should be visible on the main display. Press "ENTER".
12) "SAVE" will be displayed, and the unit will automatically return to the Normal Operation Mode. % Saturation will be displayed in the main screen. Record value as "Calibrated % Saturation".
13) Press mode until mg/L is displayed. Record the displayed value as the "Calibrated Meter Reading (mg/L)" on the calibration sheet.
    NOTE: "D.O. Table Value" and "Calibrated Meter Reading" value should be within ±0.5 mg/L of each other.

Once calibrated, the YSI-85 should remain "ON" until terminal calibration checks are completed at the end of the sampling day; otherwise, meter calibrations may be compromised.

Terminal D.O. Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 8.

b. The post-sampling "D.O. Table Value" and the post-sampling "Initial Meter Reading" should be within ±0.5 mg/L.

MAINTENANCE

Probe Storage - Calibration/Storage Chamber:

Store probe in the Calibration/Storage Chamber filled with a small, moist, clean sponge.

D.O. Membrane Replacement:

Replace membrane if: calibration is impossible; readings are erratic; or membrane is damaged.

1) Remove the probe sensor guard.
2) Remove and discard old membrane cap.
3) Rinse the sensor tip with distilled or deionized water.
4) Prepare electrolyte solution (Na_2SO_4, KCl) according to the directions on the bottle (included in Membrane Cap Kit).
   When a new electrolyte solution is prepared, record the preparation date (in permanent ink) on the side of the solution bottle. Discard electrolyte solutions 12 months after the recorded preparation date.
5) Fill new membrane cap half-full with electrolyte solution.
6) Screw membrane cap onto the probe (small amount of electrolyte should overflow).
7) Re-attach the probe sensor guard.

Cleaning Dirty, Tarnished Silver Anode and Gold Cathode:

1) Remove membrane and soak probe overnight in 3% ammonium hydroxide (NH_4OH).
2) Rinse sensor tip with deionized water.
3) Use 400 or 600 grit wet/dry sandpaper to clean and polish the anode and cathode.
4) Rinse with deionized water.
5) Install new membrane.
6) Turn meter "ON" and allow unit to stabilize for at least 30 minutes to 3 hours before calibrating.

It may take several hours for the meter to stabilize.

APPENDIX 2 – DWR GUIDANCE SHEET FOR YSI 85 AND ACCUMET METERS

SPECIFIC CONDUCTANCE — **YSI 85**

CALIBRATION CHECK

"Dry Air" Check (Zero):

1) Turn meter "ON".
2) Press "MODE" to advance to Specific Conductance.
   "°C" should be flashing on the display.
3) The displayed value should be within ± 2 µS of zero. Record displayed value as "Initial Meter Reading" in the "Dry Air" section of the calibration sheet. If the displayed value is not within the range of -2 to 2 µS, clean, rinse and thoroughly dry the conductivity cell.

Note (YSI 85 Meters): You are only <u>checking</u> the meter's calibration (as opposed to actually calibrating the meter); therefore, no value should be recorded as the "Calibrated Meter Reading" on the calibration sheet.

Check using Conductivity Standard:

Conductivity calibrations should be checked using a standard that is similar to the anticipated measurements to be collected in the field that day. Record the standard's "true value" (found on the certificate of analysis or bottle label) and lot number (also called analysis number) on the calibration sheet. Traceable® Certificate of Analysis for Conductivity Solution sheets (1 certificate for each lot number) should be retained and stored in a notebook.

4) Rinse probe with distilled or deionized water and wipe dry with a chem-wipe or a lint-free cloth.
5) Rinse probe with a small amount of conductivity standard (make sure some of the standard rinse goes into the oval-shaped hole on the side of the probe).
6) Insert probe into a vessel containing the standard such that the conductivity cell is completely submersed.
   Do not rest the probe on the bottom of the container (probe should be approximately ¼ inch from the bottom).
   Move the probe from side to side to dislodge any bubbles; wait for readings to stabilize.
7) Record the displayed value as the "Initial Meter Reading" in the "Conductivity Standard" section of the calibration sheet. This value must be ± 10% of the standard value.
8) If the displayed value is not within ±10% of the standard value, clean probe and repeat calibration check with a **FRESH** standard.

Calibration Confirmation:

9) Rinse probe with distilled or deionized water and wipe dry with a chem-wipe or a lint-free cloth. Confirm that the meter display is reading 0 (zero) µS before moving to the next step.
10) Repeat steps 5 thru 8 with a second standard that has a different specific conductance value. Record value in the "Calibration Check" section of the calibration sheet.

<u>Terminal Conductivity Calibration Check (Post-Sampling Meter Check)</u>

a. Repeat steps 1 thru 10, and record values on the calibration sheet.
b. For the "Dry Air" check, displayed value should be between –2 and 2 µS.
c. For "Conductivity Standard" and "Calibration Check", values should be within ±10% of the standard.

MAINTENANCE

Cleaning Conductivity Cell:

1) Dip the conductivity cell (oval-shaped hole on the side of the probe) in alcohol or a mild detergent and agitate for 2 to 3 minutes. Remove from cleaning solution.
2) Use a soft nylon brush to remove any contaminants from the inside of the electrode chamber.
3) Repeat steps 1 and 2 until the cell is clean.
4) Rinse cell with deionized water.
5) Dry cell thoroughly, and verify that the unit reads between -2 to 2 µS in dry air.

If the above cleaning procedure does not restore the meter, repeat steps 1-5 using 1:1 isopropyl alcohol and 1 N HCl. This more extensive cleaning is rarely required.

Conductivity Cell Check:

If having difficulty calibrating or readings are erratic, check the conductivity cell constant:

1) Turn meter "ON". The unit will go through a self-test procedure.
2) A value will be displayed, along with "CEL". The displayed value should be between 4.8 and 5.2.

If the displayed value is not within the specified range, clean the cell, and recalibrate the meter (see Meter Manual for calibration instructions; re-calibration is RARELY required).

pH

ACCUMET AP61

CALIBRATION

Two-point pH Calibration Required:

Clear Previous Slope Efficiency

1) Turn meter on.
2) Press "SETUP" to view the electrode efficiency (as percent slope) stored in the meter. In most cases, you do NOT want to accept this existing efficiency and should clear it.
3) Press "SETUP" again to access the clear buffers option.
4) "Clr" will be displayed on the unit. Press "ENTER" to clear the existing buffers and return to the Measure screen.

1st Calibration Point (start with 7 Buffer):

5) Open fill hole on probe.
6) Rinse sensors with distilled or deionized water and blot dry.
7) Rinse sensors with small amount of 7 buffer. Discard buffer rinse.
8) If the meter is not in the pH Mode, press "MODE" until the display indicates the pH mode.
9) Immerse the end of the probe into 7 buffer. Wait for reading to stabilize.
10) Record buffer temperature. Record displayed value as the "Initial Meter Reading" for Buffer # 1 on the calibration sheet.
11) Press "std" to access the Standardize Screen. The buffer group used by the meter will be displayed briefly, and the prompt "PRESS std TO STANDARDIZE" will flash.
12) Press "std" again to initiate standardization. The meter will automatically recognize the buffer and display the value on the screen.
13) Record the displayed value as "Calibrated Meter Reading" for Buffer #1 on the calibration sheet.

2nd Calibration Point (4 or 10 Buffer):

14) Repeat steps 5 thru 12 using a pH buffer similar to the anticipated pH of the samples to be measured.
15) Record values as instructed above for Buffer #2 on the calibration sheet.

Slope Efficiency Check:

16) When the meter accepts the second buffer, the unit will briefly display the efficiency (as the percent slope) of the electrode's performance.
17) Record displayed value as "Slope Efficiency" on the calibration sheet.

    The "Slope Efficiency" should be ≥ 95%.

    If the menu changes before the displayed value can be recorded, the slope efficiency can be accessed by pressing "SETUP".

Confirmation Buffer (7.0)

18) Rinse sensors with distilled or deionized water and blot dry.
19) Rinse sensors with small amount of 7 buffer. Discard buffer rinse.
20) Immerse the probe into 7 buffer again to confirm the calibration.
21) Record the displayed value as the "Meter Reading" under "Confirmation Buffer" on the calibration sheet. Confirm that the "Meter Reading" value is within ± 0.1 of the buffer value (between 6.9 and 7.1).

Terminal pH Check (Post-Sampling Meter Check)

a. Repeat calibration steps 5 thru 10 (for 7 buffer) and record displayed value on the calibration sheet. This value should be within ±0.2 of 7 (for 7 buffer).
b. Repeat procedure for the other buffer (Buffer #2) that was used to calibrate meter. Record value on calibration sheet Value should be within ±0.2 of Buffer #2.

pH

ACCUMET AP61

MAINTENANCE

Electrolyte Level

Check the electrolyte level frequently. The electrolyte level should be within ¼ inch of the cap. Fill as needed.

Refilling Electrolyte:

1) Open the fill hole on the cap ring.
2) Hold probe such that sensors are facing downwards.
3) Insert the tip of the electrolyte-dispensing bottle into the fill hole and press firmly to make an airtight seal. Squeeze the dispensing bottle for approximately 30 seconds or until adequately filled.
4) Remove dispensing bottle from fill hole.

Cleaning pH Glass Electrode:

1) Wet a cotton swab with alcohol.
2) Gently swab the pH glass electrode.
3) Rinse electrode with deionized water

Cleaning the pH reference electrode:

If crystal residue forms on electrode junction or inside the electrolyte reservoir:

1) Empty filling solution from reservoir by shaking it out through the fill holes.
2) Rinse electrolyte reservoir repeatedly with distilled or deionized water until all crystals are dissolved. Warm tap water can be used as a preliminary step to quickly dissolve crystals.
3) Refill reservoir with the electrolyte (4M KCl saturated with AgCl).

Installing and Filling pH Reference Electrode:

1) Carefully remove new probe from packaging.
   Be careful when handling the probe; even a small scratch on the glass bulb can cause irreparable damage.
2) Rinse electrode and sensors with distilled or deionized water to remove crystal residue that may have formed on the surface during storage.
3) Open the fill hole on the cap ring.
4) Check the electrolyte level. If level is low, add electrolyte (4M KCl saturated with AgCl) as described above. Electrolyte solution is included with each new electrode.
5) Connect new probe to the display unit.
   Soak new probe in pH 4 buffer for 10 minutes prior to standardization.

Probe Storage:

When not in use, store the probe in pH 4 buffer and confirm that the fill hole is closed.
Never store probe in distilled or deionized water!

Appendix 3: DWR's YSI 6920 Multiparameter Guidance Sheet

APPENDIX 2 – DWR GUIDANCE SHEET FOR YSI 85 AND ACCUMET METERS

DISSOLVED OXYGEN

YSI 6920 with ROX (OPTICAL D.O.) SENSOR

CALIBRATION

D.O. Calibration for YSI Meters with ROX (Optical D.O.) Sensor:

(% AIR CALIBRATION IN WATER-SATURATED AIR)

1) Remove calibration storage cup from sonde, and confirm that optical D.O. probe has been stored in moist environment. Place calibration cup on work surface with the uncapped end facing upward.
2) Use lens tissue to carefully dry all sensors. The temperature and optical D.O. sensors must be completely dry.
3) Pour a small amount of tap water into the calibration cup (just enough to completely cover the bottom of the calibration chamber and create a 100% humid environment). Temperature and optical D.O. sensors CANNOT be in contact with water during calibration.
4) Place probes (pointing downward) into calibration cup carefully so that no water droplets get on the temperature sensor or optical D.O. sensor.
5) Twist the calibration cup onto the sonde no more than one or two threads, so that the cup is vented to the atmosphere.
6) Wait approximately 15 minutes to guarantee thermal equilibration between the temperature and optical D.O. sensors. To observe readings during this time, place the sonde in `Run Mode`:

   `650 Main Menu ⇨ Sonde run`

7) Access the **D.O. Calibration Menu**:

   `650 Main Menu ⇨ Sonde Menu ⇨ Calibrate ⇨ Optic-T Dissolved Oxy ⇨ ODOsat % ⇨ 1 point`

   NOTE: Dissolved oxygen should always be calibrated using % saturation.
   Calibrations based on "mg/l" require a water sample with a known D.O. concentration (requires Winkler titration).
8) Enter Barometric Pressure in mmHg. Record "Barometric Pressure" and "Altitude" on calibration sheet.
   These values are available on the *Dissolved Oxygen Table* for your corresponding regional office. All calibrations should be performed in a controlled environment (field calibrations are not recommended).
9) Real-time values will be displayed for all active parameters. When readings are stable for 30 seconds, record the following values on the calibration sheet: "Temperature", "Initial % Saturation", and "Initial Meter Reading (mg/L)".
10) Use the *Dissolved Oxygen Table* for your location to find the "D.O. Table Value" (based on the temperature displayed on the meter), and record value on calibration sheet.
11) Press ↵ (Enter) to calibrate Dissolved Oxygen. "`Calibrated`" should be displayed at the top of the screen.
12) On the calibration sheet, record the displayed mg/L value as "Calibrated Meter Reading" and the % SAT value as the "Calibrated % Saturation" value.

* **NOTE: The "D.O. Table Value" and the "Calibrated Meter Reading" value should be within ±0.5 mg/L of each other.**

13) Press ↵ (Enter) to return to the **D.O. Calibration Menu**. Press "**Esc**" (3 times) to return to the main menu.

Terminal Calibration Check (Post-Sampling Meter Check)

14) Repeat calibration steps 1 thru 6. Record "Temperature", "% Saturation", "Initial Meter Reading" from the `Run Mode`.
15) Record the barometric pressure and altitude where the terminal calibration check is being performed.
16) Repeat calibration step 10.
17) The post-sampling "D.O. Table Value" and the post-sampling "Initial Meter Reading" should be within ±0.5 mg/L of each other.

DISSOLVED OXYGEN

YSI 6920 with ROX (OPTICAL D. O.) SENSOR

MAINTENANCE

Probe Storage:

The probe must be stored in a moist environment.

Store probe in Calibration/Storage Cup approximately half full of tap water. Do not use distilled water (this will negatively affect the pH probe).

During long-term storage, inspect at least once a month to ensure the probe is still in a moist environment.

Optical D.O. Membrane Re-hydration:

If left in ambient air for more than 2 hours, the optical D.O. membrane must be re-hydrated.

1) Pour approximately 400 mL of water into a 600 mL glass beaker (plastic containers should NOT be used). Use a thermostatted hotplate or an oven to heat the water to a consistent temperature of 50° C, ± 5° C.
2) Place the probe tip containing the optical D.O. membrane in warm water and leave it at the elevated temperature for approximately 24 hours. Cover vessel to minimize evaporation.
3) After re-hydration, store the probe in either water or water-saturated air before calibration and deployment.

Optical D.O. Sensor Cleaning:

Clean only with a lens tissue that has been moistened with water.

NEVER use alcohol or other organic solvents; organic solvents will ruin the membrane.

Wiper Operation:

The wiper can be used as-needed to wipe the sensor face during sampling.

1.) Use the display menus to activate the wiper:

`650 Main Menu` ⇨ `Sonde run` ⇨ `Clean Optics` (upper right corner of screen) ⇨ Press ↵ (Enter) to clean optics.

2.) After the wiper has finished rotating, wait 30 seconds before recording a measurement.

Changing the Wiper:

1.) Loosen setscrew until the wiper can be removed from the shaft.
2.) Place new wiper on the wiper shaft.
3.) Gently press the wiper against the face of the probe until the foam pad is compressed to roughly one half of the original thickness and then tighten the setscrew.

It is recommended that a business card be slid in between the wiper arm body and the probe face when installing the wiper. After installation, a gap about the thickness of a business card should be between the wiper arm body and the face of the probe

4.) Rotate the wiper to confirm that it "parks" correctly (180° from the ROX membrane):

`650 Main Menu` ⇨ `Sonde run` ⇨ `Clean Optics` (upper right corner of screen) ⇨ Press ↵ (Enter) to clean optics.

NEVER rotate the wiper manually. This will void the warranty.

Optical D.O. Membrane (sensor cap) Replacement:

Optical D.O. membrane should be replaced once a year or if damaged.

Detailed instructions are sent with the new membrane kit (YSI 6155).

When installing a new membrane, new calibration codes (included with each new membrane) must be entered.

SPECIFIC CONDUCTANCE | **YSI 6920**

CALIBRATION

THREE-STEP SPECIFIC CONDUCTIVITY PROCEDURE:

I. "DRY AIR" (ALWAYS ZERO):

The "Dry Air" step is a **check** for YSI meters.

1) Attach calibration cup to probe. Fill calibration cup half-full with deionized water and seal with lid. Shake probe to rinse. Repeat.
2) Remove calibration cup. Place cup on work surface with the uncapped end facing upward.
3) Use a cotton swab to dry the inside of the conductivity cells.
4) Record displayed value as "Initial Meter Reading" in the "Dry Air" section of the calibration sheet. The probe should read close to zero (± 2).
   If the reading is not within ± 2, follow cleaning procedure, and repeat calibration procedure.

II. CONDUCTIVITY STANDARD:

Calibrations should be performed using a **fresh, certified** conductivity standard that is similar to the conductivity of the samples to be collected that day. Record the standard's "true value" (found on the certificate of analysis or bottle label) and lot number (also called analysis number) on the calibration sheet. Traceable® Certificate of Analysis for Conductivity Solution sheets (one certificate for each lot number) should be retained and stored in a notebook.

5) Re-attach calibration cup. Fill cup half-full with deionized water. Seal cup with lid and shake probe to rinse. Repeat.
6) Rinse sensors with small amount of fresh conductivity standard. Discard rinse.
7) Remove calibration cup from sonde. Place cup on work surface with the uncapped end facing upward.
8) Pour conductivity standard into the calibration cup. Make sure there is enough standard to cover the entire conductivity cell when the probe is placed in the cup.
9) Place sonde into the calibration cup. Agitate sonde to remove air bubbles trapped in the conductivity cells. Air bubbles will give erroneously low readings.
10) Enter Run mode to view readings:
    `650 Main Menu ⇨ Sonde run`
11) Press **Esc** to go back to the `650 Main Menu`.
12) Access the `Calibrate menu` for Specific Conductance:
    `650 Main Menu ⇨ Sonde menu ⇨ Calibrate ⇨ Conductivity ⇨ SpCond`
13) Enter the True Value of the conductivity standard in **milliSiemens/cm**. Press ↵ (Enter).
14) Wait for readings to stabilize.
15) Record displayed value as "Initial Meter Reading" in the "Conductivity Standard" section of the calibration sheet.
16) Press ↵ (Enter) to calibrate meter. The message in the top center of the screen will switch to "`Calibrated`".
    Record displayed value as "Calibrated Meter Reading" on calibration sheet.
    Never accept an out-of-range calibration.
17) Press ↵ (Enter) to return to the `Calibrate menu`.

III. CALIBRATION CHECK:

18) Rinse with deionized water and wipe dry with a lens tissue or a lint-free cloth.
19) Confirm that the meter display is reading 0 (zero) µS before going to the next step.
20) Repeat steps 5-10 with a fresh conductivity standard of a value different from the one used in the previous calibration steps. Choose a standard that will give the best range of values for the anticipated samples to be collected.
21) Record SpCond value as "Initial Meter Reading" in the Calibration Check section on the calibration sheet. The value must be within 10% of the standard.

Terminal Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 4, and record value in the "Dry Air" section on the calibration sheet.
   For the "Dry Air" check, displayed value should be between –2 and 2 µS.
b. Repeat calibration steps 5 thru 10. Record value in the "Conductivity Standard" section on the calibration sheet.
   "Conductivity Standard" value should be within ±10% of the standard.
c. Repeat step 18-21, and record value in the "Calibration Check" section on the calibration sheet.
   "Calibration Check" value should be within ±10% of the standard.

SPECIFIC CONDUCTANCE | **YSI 6920**

MAINTENANCE

✶ **Never accept an out-of-range calibration!**

Checking the Conductivity Cell Constant:

When troubleshooting the conductivity probe, first check the cell constant.

1) `650 Main Menu ⇨ Sonde menu ⇨ Advanced ⇨ Cal constants`
2) The value displayed next to "`Cond`" should be 5.0, ± 0.45.
   Numbers outside of this range indicate a problem in the calibration process or that a contaminated standard was used to calibrate the meter.
3) If conductivity cell constant is not within the acceptance range (between 4.55 and 5.45), clean the cell, and reset the calibration cell constant (see instructions below).

Cleaning Conductivity Sensor:

Conductivity cell should be rinsed with deionized water after field use.

Clean conductivity cell frequently. A clean cell is imperative for accurate readings.

1) Dip small cleaning brush (provided with new meters) into distilled or deionized water and insert brush into each hole 15-20 times. For a more thorough cleaning, use a mild dishwashing detergent with the brush.
2) Rinse sensor thoroughly with deionized water.
3) Perform the Dry Air Check described in Calibration Steps 1-4 to ensure probe reads close to zero in air.

Reset Calibration Cell Constant:

1) Reset the calibration cell constant by accessing the `Calibrate menu`:
   `650 Main Menu ⇨ Sonde menu ⇨ Calibrate ⇨ Conductivity ⇨ SpCond`
2) When prompted to "`Enter the SpCond (mS/cm)`", press and hold the **Enter** key (↵) and press the **Esc** key.
3) The menu will ask "**`Uncal?`**" Select Yes. Press the **Enter** key (↵)
4) Recalibrate the meter using fresh, certified conductivity standards.

pH	YSI 6920

CALIBRATION

Two-point pH Calibration Required (Three-point pH Calibration is Optional):

1ST CALIBRATION POINT (ALWAYS START WITH 7 BUFFER):

1) Rinse probes and calibration cup with distilled water.
2) Rinse probes and calibration cup with small amount of 7 pH buffer. Discard buffer rinse. Repeat.
3) Remove calibration cup from sonde. Place cup on work surface with uncapped end facing upward.
4) Fill calibration cup with enough **fresh** buffer to cover the pH glass bulb and temperature sensor.
5) Check temperature of pH buffer. Record value on calibration sheet.
   To view buffer temperature: `650 Main Menu ⇨ Sonde run`
6) Note: If the temperature at which you are calibrating is significantly different from 25° C, check the buffer bottle for the corrected pH value at the corresponding temperature (the corrected pH value will be used in step 8).
6) Access `Calibrate menu` for pH: `650 Main Menu ⇨ Sonde menu ⇨ Calibrate ⇨ ISE1 pH`
7) Choose either the `2-point` or `3-point calibration`.
8) The prompt "`Enter 1st pH`" will appear. Enter 7.0 (or, if applicable, the corrected pH value from step 5).
9) Real-time readings will be displayed. When readings have stabilized, record displayed pH value as "Initial Meter Reading" for Buffer # 1 on calibration sheet.
10) Press ↵ (Enter) to calibrate.
11) "`Calibrated`" will be displayed at the top of the screen. Record displayed pH value as "Calibrated Meter Reading" for Buffer #1.

2ND CALIBRATION POINT:

12) Remove calibration cup from sonde.

Note: "Calibrated" should still be displayed at the top of the screen. Remain on the same display screen as in Step 11 in order to see the real-time temperature reading for the 2nd buffer. Do not return to the calibration menu.

13) Rinse probes with distilled water.
14) Rinse probes and calibration cup with small amount of 2nd buffer (either 4 or 10 pH buffer).
15) Fill calibration cup with enough fresh buffer to cover the pH glass bulb and temperature sensor.
16) Real-time readings will be displayed. When readings have stabilized, record the temperature reading.
    Note: If the temperature at which you are calibrating is significantly different from 25° C, check the buffer bottle for the corrected pH value at the corresponding temperature (the corrected pH value will be used in step 18).
17) Press ↵ (Enter) to return to the `Calibrate menu`. The prompt "Enter 2nd pH" will be displayed.
18) At the "`Enter 2nd pH`" prompt, enter value of 2nd buffer (or, if applicable, the corrected pH value from Step 16).
19) Real-time readings will be displayed. When readings have stabilized, record displayed pH value as "Initial Meter Reading" for Buffer # 2 on the calibration sheet.
20) Press ↵ (Enter) to calibrate.
21) "`Calibrated`" will be displayed at the top of the screen. Record displayed pH value as "Calibrated Meter Reading" for Buffer #2.

If you chose to do a "`3-point calibration`", repeat steps 12 through 21 using the 3rd buffer.

If only performing a 2-point calibration, press ↵ (Enter) and then **Esc** to return to the main menu.

CONFIRMATION BUFFER:

22) Rinse probes and calibration cup with distilled water.
23) Rinse probes and calibration cup with small amount of 7.0 pH buffer. Discard buffer rinse. Repeat.
24) Remove calibration cup from sonde. Place cup on work surface with the uncapped end facing upward.
25) Fill the calibration cup with enough **fresh** buffer to cover the pH glass bulb and temperature sensor.
    26) Enter Run mode to view readings: `650 Main Menu ⇨ Sonde run`
    27) Wait 1 to 3 minutes for pH readings to stabilize.
    28) Record the displayed pH value as the "Meter Reading" under "Confirmation Buffer 7.0" on the calibration sheet
29) Confirm that the "Meter Reading" value is within ± 0.1 of the buffer value (between 6.9 and 7.1).

Terminal Check (Post-Sampling Meter Check)

a. Repeat steps 22 thru 29 (for 7 buffer); record displayed value on calibration sheet. Value should be within ±0.2 of 7.0.
b. Repeat steps 22 thru 29 for Buffer #2. Record value on calibration sheet. Value should be within ±0.2 of Buffer #2.

pH	YSI 6920

MAINTENANCE

Indicators that maintenance is needed:
Difficulty calibrating pH sensor, slow response, erratic readings, clogged or black reference junction, coated glass bulb.

Probe Storage:
Store probe in calibration/storage cup filled half-full with tap water (never use distilled water to store probe). If probe will not be used for several months, remove probe and store in pH 4 buffer or electrode storage solution.

Probe Lifespan:
The pH probe has a lifetime of approximately 18-24 months (in some cases, probes may last 3+ years).

When troubleshooting pH sensor problems, start by checking age of probe and replace as-needed:
Near the silver stainless steel connector of each probe is the imprint "YSI 6561" followed by 2 numbers and a letter. The 2 numbers and the letter indicate the year and month in which the probe was made. For instance, 07D means the probe was made in April, 2007. (i.e. A=Jan, B=Feb, etc.).

Troubleshooting with mV readings:
1) Activate pH mV readings in the `Report menu:`
   `650 Main Menu ⇨ Sonde menu ⇨ Report ⇨ pH mV`
   Note: pH mV is active when a black dot appears in the circle next to it. Press "Enter" to toggle between active and inactive.
2) Follow steps for pH calibration. During calibration, record pH mV values from the "Calibrated " screen for each buffer.
3) Evaluate the pH mV values:
   The span or "slope" between the pH 4 and pH 7 and between pH 7 and pH 10 should be approximately 165 to 180 mV.
   pH 7 should be 0 mV ± 50 mV. pH 4 should be 180 mV ± 50 mV. pH 10 should be -180 mV ± 50 mV.
   Example: If a probe reads +10 mV in pH 7 buffer, then the probe should also read between 175 and 190 mV in pH 4 buffer, and between -155 mV and -170mV in pH 10 buffer.
4) If the mV values fall outside the range of 160-180 mV, the probe should be replaced soon.
   Note: The probe will no longer calibrate when the span is outside of the range of 150-210 mV.

General pH Probe Cleaning:
Use deionized water and a soft lens cloth or a cotton swab to remove foreign material from the glass bulb. If good response is not restored, perform the following procedure:
1) GENTLY clean the glass bulb and white probe face by carefully rubbing a cotton swab soaked in mild dishwashing detergent. Apply little to no pressure, as the glass bulb is very thin and fragile!
2) Rinse probe thoroughly with deionized water.
3) Wipe probe with cotton swab that has been saturated with water. Rinse probe again.

Advanced pH Probe Cleaning and Restoration:
To remove more resistant deposits and biological growth, use HCl acid and bleach.
The need and frequency depend on the type of surface water being monitoring.
The probe must be removed from the sonde before advanced cleaning.
To perform an advanced cleaning, refer to Section 2.10.2 of the YSI 6-Series User Manual.

Reference Junction:
The reference junction is a small tab located between the edge of the white surface of the pH probe face and the gray raised area around the pH probe face.
When new, the junction will be an off-white color.
As it ages, the junction will become darker.
A black reference junction coupled with slow response and/or erratic readings indicates a more advanced cleaning may be needed.

Appendix 4: DWR's YSI Pro Plus Multiparameter Guidance Sheet

DISSOLVED OXYGEN

YSI PRO PLUS with POLARGRAPHIC SENSOR

CALIBRATION

D.O. Calibration for YSI Meters with Polargraphic Sensor:

All calibrations should be performed in a controlled environment. Field calibrations are not recommended.

I. BAROMETER CALIBRATION

Access the Barometer Calibration Menu:

1) Press **Cal** key, highlight **Barometer,** and press **Enter**.
2) Highlight **mmHg**, and press **Enter**.
3) Highlight **Calibration Value**, and press **Enter.** Input the "true" barometric pressure (mmHg). Highlight **<<<Enter>>>,** and press **Enter**. *True barometric pressure is listed on the Dissolved Oxygen Table for your corresponding regional office.*
4) Wait for readings to stabilize. Record displayed value as "Initial Reading" in the "Barometer Calibration" section of the calibration sheet.
5) Highlight **Accept Calibration** and press **Enter** to calibrate Barometric Pressure.
6) "`calibrating channel...`" and then "`saving configuration...`" will be displayed at bottom of calibration screen before returning to the main screen.
7) Record displayed value as "Calibrated Value" in the "Barometer Calibration" section of the calibration sheet.

II. (% AIR CALIBRATION IN WATER-SATURATED AIR)

8) Remove calibration storage cup from sonde. Confirm D.O. probe has been stored in moist environment. Place calibration cup on work surface with uncapped end facing upward.
9) Use lens tissue to carefully dry all sensors. Temperature and D.O. sensors must be completely dry.
10) Pour small amount of tap water into calibration cup (approximately 1/8" - just enough to completely cover the bottom of the calibration cup and create a 100% humid environment). Temperature and D.O. sensors CANNOT be in contact with water during calibration.
11) Carefully place probes (pointing downward) into calibration cup so that no water gets on the temperature or D.O. sensor.
12) Twist calibration cup onto sonde **no more than 1 or 2 threads**, so the cup is able to vent to the atmosphere.
13) Wait at least 15 minutes for D.O. sensor to stabilize.
14) Record the following values on calibration sheet: "Temperature", "Initial % Saturation", and "Initial Meter Reading (mg/L)".
15) Use the *Dissolved Oxygen Table* for your location to find the "D.O. Table Value" (based on the temperature displayed on the meter), and record value on calibration sheet.

Access the D.O. Calibration Menu:

16) Press **Cal** key, highlight **DO,** and press **Enter**.
17) Highlight **DO%**, and press **Enter**.
    NOTE: Dissolved oxygen should always be calibrated using % saturation.
    Calibrations based on "mg/l" require a water sample with a known D.O. concentration (requires Winkler titration).
18) In the "Dissolved Oxygen" section of the calibration sheet, record the "Barometric Pressure" displayed on the meter and the altitude for your location (provided on regional office *Dissolved Oxygen Tables*).
19) Highlight **Accept Calibration** and press **Enter** to calibrate Dissolved Oxygen.
    "`calibrating channel...`" and then "`saving configuration...`" will be displayed at bottom of calibration screen before returning to the main screen.
20) On the calibration sheet, record the displayed mg/L value as "Calibrated Meter Reading" and the DO% value as the "Calibrated % Saturation" value.

    *** NOTE: The "D.O. Table Value" and the "Calibrated Meter Reading" value should be within ±0.5 mg/L of each other.**

Terminal Calibration Check (Post-Sampling Meter Check)

NOTE: Barometric pressure is not checked or recalibrated post-sampling.

a. Repeat calibration steps 8 thru 13. Record "Temperature", "% Saturation", "Initial Meter Reading".
b. Record the barometric pressure and altitude for the location post-sampling checks are being performed.
c. Repeat calibration step 15.
d. The post-sampling "D.O. Table Value" and the post-sampling "Initial Meter Reading" should be within ±0.5 mg/L of each other.

DISSOLVED OXYGEN

YSI PRO PLUS with POLARGRAPHIC SENSOR

MAINTENANCE

Cracked Probe:

If meter readings are unusual and calibrating the meter does not correct the issue, check the condition of the D.O. probe – sometimes a crack can develop in the plastic along the side of the probe. Cracked probes should be replaced immediately.

Probe Storage:

Store probe in Calibration/Storage Cup with a small of tap water to create a 100% saturated air environment.

During storage, probes should not be submerged in water.

Do not use distilled water (this will damage the pH probe).

During long-term storage, inspect at least once a month to ensure the probe is still in a moist environment.

D.O. Membrane Replacement (YSI 5908- Yellow Teflon):

Replace electrode solution and membrane at least every 30 days during regular use or if: bubbles are visible under membrane; significant deposits of dried electrolyte are visible on membrane; calibration is impossible; readings are erratic or unstable; or membrane is damaged.

1) Remove and discard old membrane cap.
2) Rinse sensor tip with distilled or deionized water.
3) Prepare electrolyte solution (Na_2SO_4, KCl) according to the directions on the bottle (included in Membrane Cap Kit). Newly prepared solution must sit for 1 hour before using to prevent air bubbles under the membrane.

   When a new electrolyte solution is prepared, record preparation date (in permanent ink) on the side of the solution bottle. Discard electrolyte solutions 12 months after the recorded preparation date.
4) Fill new membrane cap half-full with electrolyte solution. Do not touch membrane surface. Tap side of cap lightly to release bubbles.
5) Screw membrane cap onto probe (small amount of electrolyte should overflow).
6) Re-attach probe sensor guard.

Cleaning Dirty, Tarnished Silver Anode and Gold Cathode:

SANDING AND CLEANING THE ELECTRODE ARE NOT PART OF THE ROUTINE MAINTENANCE AND SHOULD ONLY BE PERFORMED WHEN ABSOLUTELY NECESSARY! If performed too frequently, the electrode will be destroyed!

1) Remove membrane and soak probe overnight in 3% ammonium hydroxide (NH_4OH).
2) Rinse sensor tip with deionized water.
3) Use 400 or 600 grit wet/dry sandpaper to clean and polish the anode and cathode – no more than 3 to 4 twists of the sandpaper should be sufficient to remove any deposits or tarnish.
4) Rinse heavily with deionized water.
5) Install new membrane.
6) Turn meter "ON" and allow unit to stabilize for at least 30 minutes to 3 hours before calibrating.

May take several hours for the meter to stabilize.

SPECIFIC CONDUCTANCE	YSI PRO PLUS

CALIBRATION

THREE-STEP SPECIFIC CONDUCTANCE PROCEDURE:

I. "DRY AIR" (ALWAYS ZERO):

The "Dry Air" step is a **check** for YSI meters.

1) Attach calibration cup to probe. Fill cup half-full with deionized water and seal with lid. Shake probe to rinse.
2) Remove calibration cup. Place cup on work surface with the uncapped end facing upward.
3) Use a cotton swab to dry the inside of the conductivity cells.
4) Record displayed value as "Initial Meter Reading" in the "Dry Air" section of the calibration sheet. The probe should read close to zero (± 2).

   If the reading is not within ± 2, follow cleaning procedure, and repeat calibration procedure.

II. CONDUCTIVITY STANDARD:

Calibrations should be performed using a **fresh, certified** conductivity standard that is similar to the conductivity of the samples to be collected that day. Record the standard's "true value" (found on the certificate of analysis or bottle label) and lot number (also called analysis number) on the calibration sheet. Traceable® Certificate of Analysis for Conductivity Solution sheets (one certificate for each lot number) should be retained and stored in a notebook.

5) Re-attach calibration cup. Fill cup half-full with deionized water. Seal cup with lid and shake probe to rinse. Discard rinse water.
6) Rinse sensors with small amount of conductivity standard. Discard rinse.
7) Pour fresh conductivity standard (≥1000 µS/cm) into the calibration cup. Make sure there is enough standard to cover the entire conductivity cell and temperature sensor when the probe is placed in the cup.
8) Tap or agitate sonde to remove air bubbles trapped in the conductivity cells. Air bubbles will result in erroneously low readings.
9) Press **Cal** key, highlight **Conductivity**, and press **Enter**.
10) Highlight **Sp. Conductance** and press **Enter**.
11) Highlight **SPC- uS/cm** and press **Enter**.
12) Highlight **Calibration Value** and press **Enter**. Input the True Value of the conductivity standard in **microSiemens/cm (µs/cm)**. Highlight **<<<Enter>>>**, and press **Enter.**
13) Wait for readings to stabilize. Record displayed value as "Initial Meter Reading" in the "Conductivity Standard" section of the calibration sheet.
14) Highlight **Accept Calibration** and press **Enter** to calibrate meter.
    "`Calibrating Channel...`" and then "`Saving Configuration...`" will be displayed at bottom of calibration screen before returning to the main screen.
15) Record displayed value as "Calibrated Meter Reading" on calibration sheet.

    Never accept an out-of-range calibration (flagged by an error message on the meter).

III. CALIBRATION CHECK:

16) Rinse with deionized water and wipe dry with a lens tissue or a lint-free cloth.
17) Confirm that the meter display is reading 0 (zero) µS before going to the next step.
18) Repeat steps 5-8 with a conductivity standard of a value different from the one used in the previous calibration steps. Choose a standard that will give the best range of values for the anticipated samples to be collected.
19) Record SpCond value as "Initial Meter Reading" in the Calibration Check section on the calibration sheet. The value must be within 10% of the standard.

Terminal Calibration Check (Post-Sampling Meter Check)

a. Repeat calibration steps 1 thru 4, and record value in the "Dry Air" section on the calibration sheet.
   For the "Dry Air" check, displayed value should be between -2 and 2 µS.
b. Repeat calibration steps 5 thru 8. Record value in the "Conductivity Standard" section on the calibration sheet.
   "Conductivity Standard" value should be within ±10% of the standard.
c. Repeat steps 16-19, and record value in the "Calibration Check" section on the calibration sheet.
   "Calibration Check" value should be within ±10% of the standard.

SPECIFIC CONDUCTANCE	YSI PRO PLUS

MAINTENANCE

✱ **Never accept an out-of-range calibration**! (flagged by an error message on the meter display)

Checking the Conductivity Cell Constant:

When troubleshooting the conductivity probe, first check the cell constant.

1) Press **Folder** Key. Highlight **View GLP**, and press **Enter**. Scroll to most recent conductivity calibration to view the Cal Cell Constant.
2) The value displayed next to "`Cal cell constant`" should be 5.0, ± 0.45.
   Numbers outside of this range indicate a problem in the calibration process or that a contaminated standard was used to calibrate the meter.
3) If conductivity cell constant is not within the acceptance range (between 4.55 and 5.45), clean the cell, and reset the calibration cell constant (see instructions below).

Cleaning Conductivity Sensor:

Conductivity cell should be rinsed with deionized water after field use.

Clean conductivity cell frequently. A clean cell is imperative for accurate readings.

1) Dip small cleaning brush (provided with new meters) into distilled or deionized water and insert brush into each hole 15-20 times. For a more thorough cleaning, use a mild liquid or foam dishwashing detergent with the brush.
2) Rinse sensor thoroughly with deionized water.
3) Perform the Dry Air Check described in Calibration Steps 1-4 to ensure probe reads close to zero in air.

Reset Calibration Cell Constant:

Reset the calibration cell constant by accessing the Calibrate menu:

1) Press **Cal** Key, highlight **Restore Default Cal,** and press **Enter**. Highlight **Conductivity**, and press **Enter.**

2) The menu will ask **"Are you sure you want to remove the current user calibration parameters for this channel?"** Highlight **Yes**. Press the **Enter** key.

3) Recalibrate the meter using fresh, certified conductivity standards.

pH

YSI PRO PLUS

CALIBRATION

Two-point pH Calibration Required (Three-point pH Calibration is Optional):

1ST CALIBRATION POINT (ALWAYS START WITH 7 BUFFER):

1) Rinse probes and calibration cup with distilled water.
2) Rinse probes and calibration cup with small amount of 7 pH buffer. Discard buffer rinse.
3) Fill calibration cup with enough **fresh** 7 pH buffer to cover the pH glass bulb and temperature sensor.
4) Check temperature of pH buffer. Record value on calibration sheet.

   Note: If the temperature at which you are calibrating is significantly different from 25° C, check the buffer bottle for the corrected pH value at the corresponding temperature (the corrected pH value will be used in step 7).
5) Press **Cal** key. Highlight **ISE1 (pH)** and press **Enter**.
6) The prompt "`Ready for point 1`" will appear briefly at the bottom of the screen. Check Calibration Value. If value is correct, go to Step 7. If value is incorrect, highlight **Calibration Value** and press **Enter**. Input 7.0 (or, if applicable, the corrected pH value from step 4). Highlight **<<<Enter>>>**, and press **Enter.**
7) Actual-time readings will be displayed. When readings have stabilized, record displayed actual pH value as "Initial Meter Reading" for Buffer # 1 on calibration sheet.
8) Highlight **Accept Calibration**, and press **Enter** to calibrate.
9) "`Ready for Point 2`" will be displayed at the bottom of the screen very briefly. Record displayed pH calibration value as "Calibrated Meter Reading" for Buffer #1.

NOTE: IF YOU ACCIDENTALLY LEAVE THE pH CALIBRATION MENU BEFORE CALIBRATING YOUR 2ND POINT, YOU MUST START OVER BECAUSE THE 1ST CALIBRATION POINT WAS NOT COMPLETED. "Calibrate ISE1 (pH)" should still be displayed at the top of the screen. Remain on the same display screen as in Step 9 in order to see the actual-time temperature reading for the 2nd buffer.

2ND CALIBRATION POINT:

10) Rinse probes and calibration cup with distilled water.
11) Rinse probes and calibration cup with small amount of 2nd buffer (either 4 or 10 pH buffer). Discard buffer rinse.
12) Fill calibration cup with enough **fresh** buffer to cover the pH glass bulb and temperature sensor.
13) Actual-time readings will be displayed. When readings have stabilized, record the temperature reading.

    Note: If the temperature at which you are calibrating is significantly different from 25° C, check the buffer bottle for the corrected pH value at the corresponding temperature (the corrected pH value will be used in step 14).
14) Check Calibration Value. If value is correct, go to Step 15. If value is incorrect, highlight **Calibration Value** and press **Enter**. Input correct buffer value (or, if applicable, the corrected pH value from step 13). Highlight **<<<Enter>>>**, and press **Enter.**
15) Actual-time readings will be displayed. When readings have stabilized, record displayed actual pH value as "Initial Meter Reading" for Buffer # 2 on the calibration sheet.
16) Highlight **Accept Calibration** and press **Enter** to calibrate.
17) "`Ready for Point 3`" will be displayed briefly at the bottom of the screen. If only performing a 2-point calibration, press **Cal** Key to complete calibration process.
18) Record displayed pH value as "Calibrated Meter Reading" for Buffer #2.

If you chose to do a "`3-point calibration`", do NOT press **Cal** key in step 17 and repeat steps 10 through 17 using the 3rd buffer.

CONFIRMATION BUFFER: CONFIRMATION BUFFER STEP IS VERY CRITICAL FOR THE YSI PRO PLUS – DO NOT SKIP IT!

20) Rinse probes and calibration cup with distilled water.
21) Rinse probes and calibration cup with small amount of 7.0 pH buffer. Discard buffer rinse.
22) Fill the calibration cup with enough **fresh** buffer to cover the pH glass bulb and temperature sensor.
23) Wait 1 to 3 minutes for pH readings to stabilize.
24) Record the displayed pH value as the "Meter Reading" under "Confirmation Buffer 7.0" on the calibration sheet
25) Confirm that the "Meter Reading" value is within ± 0.1 of the buffer value (between 6.9 and 7.1).

Terminal Check (Post-Sampling Meter Check)

a. Repeat steps 20 thru 23 (for 7 buffer); record displayed value on calibration sheet. Value should be within ±0.2 of 7.0.
b. Repeat steps 20 thru 23 for Buffer #2. Record value on calibration sheet. Value should be within ±0.2 of Buffer #2.

pH | **YSI PRO PLUS**

MAINTENANCE

✱ **Never accept an out-of-range calibration**! (flagged by an error message on the meter display)

Indicators that maintenance is needed:
Difficulty calibrating pH sensor, slow response, erratic readings, clogged or black reference junction, coated glass bulb.

Probe Storage:
Do NOT allow the pH sensor to dry out! Sensors that have dried out may be permanently damaged!
Store probe in calibration/storage cup filled with 1/8" of tap water (never use distilled water to store probe).
If probe will not be used for several months, remove probe and store in pH 4 buffer. Seal the vacant port with a port plug.

Probe Lifespan:
The pH probe has a lifetime of approximately 12-24 months (in some cases, probes may last 3+ years).

When troubleshooting pH sensor problems, start by checking age of probe and replace as-needed:
On the side of each probe is the imprint "YSI 1001" followed by 2 numbers and a letter. The 2 numbers and the letter indicate the year and month in which the probe was made. For instance, 07D means the probe was made in April, 2007. (i.e. A=Jan, B=Feb, etc.).

Troubleshooting with mV readings:
1) Follow steps for pH calibration. During calibration, record pH mV values from the "Calibrated" screen for each buffer.
2) Evaluate the pH mV values:
   The span or "slope" between the pH 4 and pH 7 and between pH 7 and pH 10 should be approximately 165 to 180 mV.
   pH 7 should be 0 mV ± 50 mV. pH 4 should be 180 mV ± 50 mV. pH 10 should be -180 mV ± 50 mV.
   Example: If a probe reads +10 mV in pH 7 buffer, then the probe should also read between 175 and 190 mV in pH 4 buffer, and between -155 mV and -170mV in pH 10 buffer.
3) If the mV values fall outside the range of 160-180 mV, the probe should be replaced soon.
   Note: The probe will no longer calibrate when the span is outside of the range of 150-210 mV.

General pH Probe Cleaning:
Use deionized water and a soft lens cloth or a cotton swab to remove foreign material from the glass bulb. If good response is not restored, perform the following procedure:
1) GENTLY clean the glass bulb and white probe face by carefully rubbing a cotton swab soaked in mild dishwashing detergent. Apply little to no pressure, as the glass bulb is very thin and fragile!
2) Rinse probe thoroughly with deionized water.
3) Wipe probe with cotton swab that has been saturated with water. Rinse probe again.

Advanced pH Probe Cleaning and Restoration:
The need and frequency depend on the type of surface water being monitoring.
The probe must be removed from the sonde before advanced cleaning.
To remove more resistant deposits and biological growth, use HCl acid and bleach.
To perform an advanced cleaning, refer to the Care, Maintenance, and Storage section of the YSI Professional Plus User Manual.

Reference Junction:
The reference junction is a small tab located between the edge of the white surface of the pH probe face and the gray raised area around the pH probe face.
When new, the junction will be an off-white color.
As it ages, the junction will become darker.
A black reference junction coupled with slow response and/or erratic readings indicates a more advanced cleaning may be needed.

Corrected D.O. Tabl for a specific locati or DWR office are available upon request from the ES Quality Assurance Coordinator.

APPENDIX 5: Uncorrected Dissolved Oxygen Table

APP

Sea Level *(Uncorrected D.O. Values)*

Dissolved Oxygen (D.O.) TABLE

Altitude at Sea Level = 0 feet

Barometric Pressure (BP) at Sea Level = 760 mm

APPENDIX 5 – UNCORRECTED DISSOLVED OXYGEN TABLE

D.O. Correction Chart

Altitude (ft)	Barometric Pressure (mmHg)	Correction Factor	Altitude (ft)	Barometric Pressure (mmHg)	Correction Factor
100	757	0.996	2400	695	0.914
200	755	0.993	2500	692	0.910
300	752	0.989	2600	689	0.907
400	749	0.985	2700	686	0.903
500	746	0.981	2800	684	0.900
600	743	0.978	2900	682	0.897
700	740	0.974	3000	679	0.893
800	737	0.970	3100	676	0.890
900	735	0.967	3200	673	0.886
1000	732	0.963	3300	671	0.883
1100	729	0.959	3400	669	0.880
1200	727	0.956	3500	666	0.876
1300	724	0.952	3600	663	0.873
1400	721	0.949	3700	661	0.870
1500	718	0.945	3800	658	0.866
1600	715	0.941	3900	656	0.863
1700	713	0.938	4000	654	0.860
1800	710	0.934	4100	651	0.857
1900	708	0.931	4200	648	0.853
2000	705	0.927	4300	646	0.850
2100	702	0.924	4400	644	0.847
2200	699	0.920	4500	641	0.844
2300	697	0.917			

How to Correct D.O. Table Values:

Corrected D.O. Value = Value from Sea Level Table x Correction Factor

1) **Use the temperature displayed on your meter and the "Sea Level Table" (on the back of this page) to find the *Uncorrected D.O. Value*.**

2) **Use your location's altitude and the "D.O. Correction Chart" (on this page) to find the corresponding *Correction Factor*.**

3) **Multiply the *Uncorrected D.O. Value* (from step 1) by the *Correction Factor* (from step 2) to get the *Corrected D.O. Value*.**

4) **The value calculated in step 3 (*Corrected D.O. Value*) and the value displayed on the meter should be within ± 0.5 mg/L of each other.**

Corrected D.O. Tables for a specific location or DWR office are available upon request from the ESS QA Coordinator.

D.O. Correction Factors 08/24/2007

APPENDIX 6: SOP for Filtering in the Field

Field Filtering SOP (Cont.)

STANDARD OPERATING PROCEDURES FOR FIELD FILTERING USING THE VACUUM PUMP PROCEDURE.

Field Procedure:

1. Obtain filtering equipment including sterile 0.45 µm 47 mm diameter Millipore filters, glass fiber filters, nitrile gloves, forceps, and a supply of deionized (DI) water. An example of an appropriate filtering kit is Nalgene - filter holder with receiver 500 mL (Nalgene #300-4050).
2. After donning gloves, thoroughly rinse the field filtering equipment with deionized water on the day of sampling at the first sampling station.
3. Remove 0.45 um filter from package with clean forceps and place on the filter platform, gridded side up.
4. Inspect filter for proper placement-centered; no wrinkles, bends, cracks, holes, or gaps.
5. Reassemble apparatus.
6. Attach hand pump to outlet of bottom chamber with tubing.
7. If first sample of the day, do field blank for quality control first using DI water and following steps 8-16.
8. Pour required volume of sample water in the top chamber (example-volume for orthophosphorus and dissolved phosphorus is at least 200 mL for each).
9. Use hand pump to create vacuum.
10. Continue adding sample and pumping until required filtered volume (based on parameter) is obtained and top chamber is empty. **Note:** It may be necessary to change filters several times or use a glass fiber pre-filter (see turbid samples options below) to obtain enough filtrate.
11. Samples for all dissolved parameters can be filtered at once.
12. Before disassembling, make sure that no sample remains in the top chamber and no pressure in the bottom chamber: remove tubing, or press release on pump.
13. Disassemble apparatus.
14. Decant filtrate into sample bottles, preserve and handle as per laboratory guidance.
15. Remove filter with forceps and dispose of filter.
16. Rinse filtering apparatus with DI water. This rinse must be repeated before field filtering at any additional locations (i.e. between stations).
17. After last sample of the day is completed, do terminal field blank sample.

Turbid Samples Options:

When the filter becomes clogged:

Option 1: Change filters

1. Finish filtering any sample left in top chamber.
2. Ensure zero pressure in bottom chamber.
3. Disassemble apparatus.
4. Using forceps, remove clogged filter and replace with new filter. **Caution:** Don't let residue on filter contact any part of the interior of the apparatus or tips of forceps.
5. Re-assemble apparatus and continue filtering.

Option 2: Pre-filter

1. The sample can be taken through a preliminary step using a filter with a larger pore size, such as a glass fiber filter.
2. This can be accomplished by placing the glass fiber filter on top of the 0.45 *u*m filter on the filter platform. A small amount of DI water can be squirted on top of the combined filters to prevent vapor lock. It may be necessary to change these filters as they get clogged to obtain enough filtrate but this procedure should minimize the number of times the filters must be changed.

Quality Control Procedures

1. The filtering apparatus and DI wash bottle should be regularly cleaned with phosphate-free detergent and completely rinsed with DI water, as is done with all other sampling equipment.
2. Initial and terminal quality control samples (blanks) of filtered deionized water must be taken for each day's sampling for each parameter and submitted to the laboratory.
3. Blanks must be filtered in the field: one at the beginning of the day before the first water sample is processed, and one at the end of the day after the last water sample is processed.
4. Sources of contamination include:
   -air/environment;
   -field staff;
   -sampling equipment and bottle;
   -filtration equipment (filter holder, filter, tubing);
   -DI water, and
   -chemical preservatives.
5. Station location on the lab sheet should indicate QC sample type.
6. Blanks should come back as non-detects.
7. If blanks show detectable levels of analytes:
   - results from associated samples must be flagged, and flags reported to data users.
   - perform rigorous data review to see if contamination concerns are severe enough to warrant discarding the data.
   - patterns of dirty blanks should be reviewed and a plan for contamination source identification, corrective actions, and re-evaluations should be developed.

APPENDIX 7: Flow Measurement Field Sheet

Flow Sheet

Location: _____

Station: _____

Date: _____ Time: _____

Staff: _____

	Distance (ft.)	Depth (ft.)	Velocity (fps)		Notes:
RB		------	---------		

****need a minimum of 18 points

***depths of 2.5 feet and less, the average velocity is measured at 0.6 of the depth from the water surface.

*** depths greater than 2.5 feet measure the velocity at 0.2 and 0.8 of the water depth (the average of these two velocities will later be recorded as a single value).

To: Strynar, Mark[Strynar.Mark@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]
Cc: Buckley, Timothy[Buckley.Timothy@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]
From: Pjetraj, Michael
Sent: Wed 5/2/2018 9:10:52 PM
Subject: NC DAQ - Rainwater analysis results
2018-05-02 DAQ GenX Rainwater sampling and analysis summary.xlsx
E181205 SVOA FINAL 04 27 18 1108.PDF
031918 Samples Thrufall&Open 31800359_FINAL.pdf

Hello,
Please find attached a summary of the rainwater analysis that DAQ has performed. Maps of the data have been posted at:
https://deq.nc.gov/news/hot-topics/genx-investigation/investigations-and-enforcement-actions

I have also attached the SGS & SESD lab results for the 3/19/18 rainfall event. The vegetation throughfall results were reported with a matrix interference.

Dr. Jim Bowyer can confirm if we still have sample volume left for any additional analysis.

Thanks

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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.

DAQ GenX Rain Sampling and Analysis										
Site #	1/28/18 - 1/28/18	2/4/18 - 2/5/18	2/28/18 - 3/2/18	3/6/18 - 3/7/18	3/10/18 - 3/12/18	3/16/18 - 3/20/18	3/20/18 - 3/27/18	3/27/18 - 4/3/18	4/3/18 - 4/10/18
#01	-	14.9	-	-	-	-	-	-	-
#02	ND	28.1	114	-	11.9	148	ND	1.6[a]	174
#02 Through fall	-	-	-	-	8340[a]	6030[a]	-	-	-
#03	5.18	18.3	-	-	-	-	-	-	-
#04	11.7	9.68	-	-	-	-	-	-	-
#05	36.4	14.5	-	-	-	-	-	-	-
#06	ND	58.1	-	-	17.1	-	-	-	-
#07 Through fall	-	-	-	-	435	-	-	-	-
#07	93.2	40.9	786	-	-	-	-	-	-
#08	NS	59.2	-	-	-	-	-	-	-
#09	630	286	96.3	NS	-	-	-	-	-
#10	79.4	76.4	591	-	-	-	-	-	-
#11	-	-	85.6	-	-	-	-	-	-
#12	-	-	486	-	-	-	-	-	-
#13	-	-	NS	-	-	-	-	-	-
#14	-	-	136	-	-	-	-	-	-
#15	-	-	810	-	-	-	-	-	-
#16	-	-	45.3	-	-	-	-	-	-
#17	-	-	90.3	-	-	-	-	-	-
#18	-	-	56.1	-	-	-	-	-	-
#19	-	-	89.7	-	5.48	-	-	-	-
#19 Through fall	-	-	-	-	4840	-	-	-	-
#20	-	-	-	NS	-	-	-	-	-
#21	-	-	-	-	-	50.5	ND	66.5[f]	-
#21 Through fall	-	-	-	-	-	4970	-	-	-
#21 Wet	-	-	-	-	-	-	-	-	15.9
#21 Dry[g]	-	-	-	-	-	-	-	-	25.1
#23	-	-	-	-	-	20.3	104	-	-
#23 Through fall	-	-	-	-	-	1730[a]	-	-	-
#24	-	-	-	-	-	51.9	111	11.3[f]	148
#24 Through fall	-	-	-	-	-	2130	-	-	-
#25	-	-	-	-	-	-	-	46.5[f]	-
#25 Wet	-	-	-	-	-	-	-	-	27.4
#25 Dry[g]	-	-	-	-	-	-	-	-	17.3

ND - Non Detect

NS - No Sample recovered - container missing

"-" No sample collected at that site on that date

[a] Limited sample and matrix interference suspected of sample, concentration unreliable.

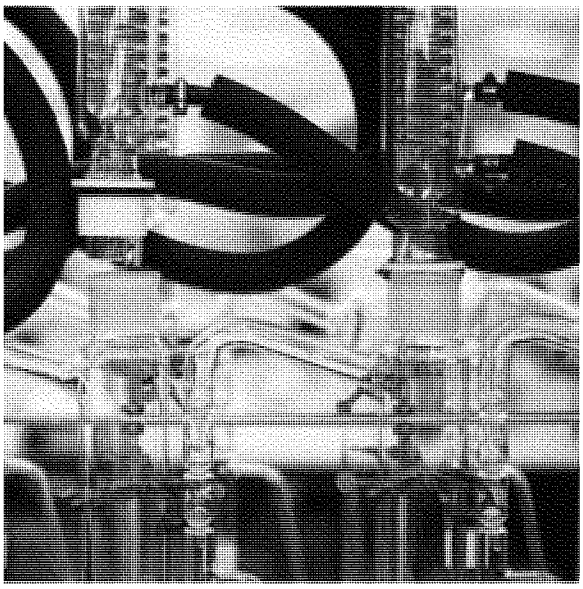
[f] No precipitation - 600 ml of PFAS free water added to container

Through fall - precipitation falling through the vegetation cover to the surface. Containers were located underthrees to collect the rain.

Starting the week of 4/3/18-4/10/18, a nautomated wet/dry deposition sampler was deployed for sites #25 & #23

[g] 600ml PFAS free water was added to the dry deposition sample

Site #	Lat, Long
1	35.8138N°, -78.7145E°
2	34.8593N°, -78.8848W°
3	34.8977N°, -78.8360W°
4	34.8586N°, -78.8446W°
5	34.8587N°, -78.8467W°
6	34.8404N°, -78.8569W°
7	34.8148N°, -78.8485W°
8	34.8353N°, -78.8369W°
9	34.8365N°, -78.8574W°
10	34.8461N°, -78.8079W°
11	34.8889N°, -78.8273W°
12	34.8736N°, -78.7947W°
13	34.9145N°, -78.8203E°
14	34.9091N°, -78.7940W°
15	34.9005N°, -78.7777W°
16	34.9417N°, -78.8040E°
17	34.9353N°, -78.7742W°
18	34.9262N°, -78.7925E°
19	34.8501N°, -78.8529W°
20	34.8434N°, -78.8596E°
21	34.8343N°, -78.8503N°
23	34.8394N°, -78.8460W°
24	34.8325N°, -78.8507W°
25	34.8388N°, -78.8490W°



FINAL LAB REPORT

Rain Water Study

31800359

04-Apr-2018

Prepared by

SGS NORTH AMERICA

Prepared for

NC DEQ Division of Air Quality

Jim Bowyer, Ph.D.

Digitally sig
DN: CN=An
E=amy.boe
Reason: I a
Location:
Date: 2018-

This repon

Amy Boehm

amy.boehm@sgs.com

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
American Association for Laboratory Accreditation (A2LA)	2726.01 (ISO 17025:2005, 2009 TNI, DoD ELAP QSM5.0)
Florida DOH	E87634
Louisiana DEQ	4115
Louisiana DOH	LA180027
Maine	2016028
Massachusetts	M-NC919
Minnesota (Primary NELAP For Method 23)	1179213
Mississippi	Reciprocity
Nebraska	NE-OS-33-17
New Hampshire	208317 & 208517
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	9502
Washington	C913
West Virginia	293

Rev. 13-Mar-2018

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
031918-02G Open	31800359001	03/19/2018	08:30	03/21/2018	16:07	Water
031918-02H Thrufall	31800359002	03/19/2018	08:30	03/21/2018	16:07	Water
031918-21I Open	31800359003	03/19/2018	11:00	03/21/2018	16:07	Water
031918-21J Thrufall	31800359004	03/19/2018	11:00	03/21/2018	16:07	Water
031918-24K Open	31800359005	03/19/2018	09:30	03/21/2018	16:07	Water
031918-24L Thrufall	31800359006	03/19/2018	09:30	03/21/2018	16:07	Water
031918-23M Open	31800359007	03/19/2018	07:30	03/21/2018	16:07	Water
031918-23N Thrufall	31800359008	03/19/2018	07:30	03/21/2018	16:07	Water
WO31318 MB	31800359009	03/13/2018	12:00	03/21/2018	16:07	Water
032018-00A	31800359010	03/20/2018	14:00	03/21/2018	16:07	Water
032018-00C	31800359011	03/20/2018	14:00	03/21/2018	16:07	Water
032018-00F	31800359012	03/20/2018	14:00	03/21/2018	16:07	Water
032018-00S	31800359013	03/20/2018	14:00	03/21/2018	16:07	Water
032018-FB	31800359014	03/21/2018	08:30	03/21/2018	16:07	Water
032018-TB	31800359015	03/21/2018	08:30	03/21/2018	16:07	Water
FAY-Rain-A-032018	31800359016	03/20/2018	06:45	03/21/2018	16:07	Water
FAY-Rain-A-032018 Temp Blank	31800359017	03/20/2018	06:45	03/21/2018	16:07	Water
FAY-Rain-Wet-A2-031218	31800359018	03/12/2018	16:00	03/21/2018	16:07	Water
FAY-Rain-Wet-A2-031218 Temp. B	31800359019	03/12/2018	16:00	03/21/2018	16:07	Water

Case Narrative

031918-02G Open

Sample was re-extracted due to low ES (surrogate) recovery. The re-extract resulted in a similar low recovery suggesting that the low recovery is due to matrix interference. Data from the original extraction was used.

031918-02H Thrufall

E - Results over Calibration Range

Analyte concentration is outside of the calibration range. There is no back up sample to perform an extraction at a lower volume. Cannot dilute sample enough to get analyte concentration within range without losing the signal from the ES (surrogate).

031918-21I Open

Sample was re-extracted due to low ES (surrogate) recovery. The re-extract resulted in a similar low recovery suggesting that the low recovery is due to matrix interference. Data from the original extraction was used.

031918-21J Thrufall

E - Results over Calibration Range

Analyte concentration is outside of the calibration range. There is no back up sample to perform an extraction at a lower volume. Cannot dilute sample enough to get analyte concentration within range without losing the signal from the ES (surrogate).

031918-23N Thrufall

E - Results over Calibration Range

Analyte concentration is outside of the calibration range. There is no back up sample to perform an extraction at a lower volume. Cannot dilute sample enough to get analyte concentration within range without losing the signal from the ES (surrogate).

031918-24K Open

Sample was re-extracted due to low ES (surrogate) recovery. The re-extract resulted in a similar low recovery suggesting that the low recovery is due to matrix interference. Data from the original extraction was used.

031918-24L Thrufall

Analyte concentration is outside of the calibration range. Sample was re-extracted at a lower volume.

FAY-Rain-A-032018

Analyte concentration was outisde of the calibration range. A 5x dilution was performed to bring analyte concentration within calibration range.

Detectable Results Summary

Client Sample ID: **031918-02G Open**
Lab Sample ID:31800359001-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	148	ng/L

Client Sample ID: **031918-02H Thrufall**
Lab Sample ID:31800359002-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	9030	ng/L

Client Sample ID: **031918-21I Open**
Lab Sample ID:31800359003-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	50.5	ng/L

Client Sample ID: **031918-21J Thrufall**
Lab Sample ID:31800359004-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	4970	ng/L

Client Sample ID: **031918-24K Open**
Lab Sample ID:31800359005-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	51.9	ng/L

Client Sample ID: **031918-24L Thrufall**
Lab Sample ID:31800359006

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	2130	ng/L

Client Sample ID: **031918-23M Open**
Lab Sample ID:31800359007-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	20.3	ng/L

Client Sample ID: **031918-23N Thrufall**
Lab Sample ID:31800359008-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	1730	ng/L

Client Sample ID: **FAY-Rain-A-032018**
Lab Sample ID:31800359016-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	337	ng/L

Client Sample ID: **FAY-Rain-Wet-A2-031218**
Lab Sample ID:31800359018-A

	Parameter	Result	Units
GenX	HFPO-DA (GenX)	10.4	ng/L

Parameter Cross Reference

SURROGATE

PARAMETER	CASNO	FULL NAME
13C-GenX	13CGENX	2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3,heptafluoropropoxyC13)propanoic acid

REGULAR

PARAMETER	CASNO	FULL NAME
HFPO-DA (GenX)	13252-13-6	2,3,3,3-tetrafluoro-2-(heptafluoropropoxy)propanoic acid

Results of **031918-02G Open**

Client Sample ID: **031918-02G Open**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359001-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 08:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**148**		5.10	10.2	ng/L	1	03/28/2018 12:47
Surrogates							
13C-GenX	32.6*			70.0-130	%	1	03/28/2018 12:47

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 245 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-02H Thrufall**

Client Sample ID: **031918-02H Thrufall**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359002-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 08:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**9030**	E	6.25	12.5	ng/L	1	03/28/2018 13:18
Surrogates							
13C-GenX	272*			70.0-130	%	1	03/28/2018 13:18

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 200 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-21I Open**

Client Sample ID: **031918-21I Open**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359003-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 11:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**50.5**		4.90	9.80	ng/L	1	03/28/2018 13:48
Surrogates							
13C-GenX	34.9*			70.0-130	%	1	03/28/2018 13:48

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-21J Thrufall**

Client Sample ID: **031918-21J Thrufall**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359004-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 11:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**4970**	E	5.00	10.0	ng/L	1	03/28/2018 14:19
Surrogates							
13C-GenX	338*			70.0-130	%	1	03/28/2018 14:19

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-24K Open**

Client Sample ID: **031918-24K Open**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359005-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 09:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**51.9**		5.10	10.2	ng/L	1	03/28/2018 14:50
Surrogates							
13C-GenX	38.4*			70.0-130	%	1	03/28/2018 14:50

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 245 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-24L Thrufall**

Client Sample ID: **031918-24L Thrufall**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359006
Lab Project ID: 31800359

Collection Date: 03/19/2018 09:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**2130**		249	498	ng/L	1	03/30/2018 18:25
Surrogates							
13C-GenX	66.9*			70.0-130	%	1	03/30/2018 18:25

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2138
Prep Method: GenX Prep
Prep Date/Time: 03/29/2018 11:03
Prep Initial Wt./Vol.: 5.02 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-23M Open**

Client Sample ID: **031918-23M Open**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359007-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 07:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**20.3**		5.00	10.0	ng/L	1	03/28/2018 15:51
Surrogates							
13C-GenX	63.7*			70.0-130	%	1	03/28/2018 15:51

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **031918-23N Thrufall**

Client Sample ID: **031918-23N Thrufall**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359008-A
Lab Project ID: 31800359

Collection Date: 03/19/2018 07:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**1730**	E	5.10	10.2	ng/L	1	03/28/2018 16:22
Surrogates							
13C-GenX	141*			70.0-130	%	1	03/28/2018 16:22

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 245 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **WO31318 MB**

Client Sample ID: **WO31318 MB**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359009-A
Lab Project ID: 31800359

Collection Date: 03/13/2018 12:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	4.81	9.62	ng/L	1	03/28/2018 17:23
Surrogates							
13C-GenX	76.6			70.0-130	%	1	03/28/2018 17:23

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-00A**

Client Sample ID: **032018-00A**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359010-A
Lab Project ID: 31800359

Collection Date: 03/20/2018 14:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	5.10	10.2	ng/L	1	03/28/2018 17:54
Surrogates							
13C-GenX	72.8			70.0-130	%	1	03/28/2018 17:54

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 245 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-00C**

Client Sample ID: **032018-00C**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359011-A
Lab Project ID: 31800359

Collection Date: 03/20/2018 14:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	5.32	10.6	ng/L	1	03/28/2018 18:25
Surrogates							
13C-GenX	78.9			70.0-130	%	1	03/28/2018 18:25

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 235 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-00F**

Client Sample ID: **032018-00F**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359012-A
Lab Project ID: 31800359

Collection Date: 03/20/2018 14:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	5.21	10.4	ng/L	1	03/28/2018 18:55
Surrogates							
13C-GenX	74.8			70.0-130	%	1	03/28/2018 18:55

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 240 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-00S**

Client Sample ID: **032018-00S**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359013-A
Lab Project ID: 31800359

Collection Date: 03/20/2018 14:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	5.10	10.2	ng/L	1	03/28/2018 19:26
Surrogates							
13C-GenX	82.6			70.0-130	%	1	03/28/2018 19:26

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 245 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-FB**

Client Sample ID: **032018-FB**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359014-A
Lab Project ID: 31800359

Collection Date: 03/21/2018 08:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	4.90	9.80	ng/L	1	03/28/2018 19:57
Surrogates							
13C-GenX	95.7			70.0-130	%	1	03/28/2018 19:57

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **032018-TB**

Client Sample ID: **032018-TB**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359015-A
Lab Project ID: 31800359

Collection Date: 03/21/2018 08:30
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	ND	U	4.81	9.62	ng/L	1	03/28/2018 20:27
Surrogates							
13C-GenX	87.5			70.0-130	%	1	03/28/2018 20:27

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **FAY-Rain-A-032018**

Client Sample ID: **FAY-Rain-A-032018**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359016-A
Lab Project ID: 31800359

Collection Date: 03/20/2018 06:45
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**337**		20.5	41.0	ng/L	5	03/30/2018 21:29
Surrogates							
13C-GenX	64.6*			70.0-130	%	5	03/30/2018 21:29

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 305 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Results of **FAY-Rain-Wet-A2-031218**

Client Sample ID: **FAY-Rain-Wet-A2-031218**
Client Project ID: **Rain Water Study**
Lab Sample ID: 31800359018-A
Lab Project ID: 31800359

Collection Date: 03/12/2018 16:00
Received Date: 03/21/2018 16:07
Matrix: Water

Results by **GenX**

Parameter	Result	Qual	DL	LOQ/CL	Units	DF	Date Analyzed
HFPO-DA (GenX)	**10.4**		4.17	8.33	ng/L	1	03/28/2018 23:01
Surrogates							
13C-GenX	78.9			70.0-130	%	1	03/28/2018 23:01

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Prep Initial Wt./Vol.: 300 mL
Prep Extract Vol: 1 mL

Print Date: 04/04/2018

N.C. Certification # 481

Batch Summary

Analytical Method: GenX

Prep Method: GenX Prep
Prep Batch: HXX2135
Prep Date: 03/23/2018 09:48

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 144397 [HXX/2135]	217926	03/28/2018 11:45	XLC1162	TQS1	ADM
LCS for HBN 144397 [HXX/2135]	217927	03/28/2018 12:16	XLC1162	TQS1	ADM
FAY-Rain-A-032018(217906MS)	217928	03/30/2018 19:57	XLC1163	TQS1	ADM
FAY-Rain-A-03201...(217907DUP)	217929	03/28/2018 23:31	XLC1162	TQS1	ADM
031918-02G Open	31800359001	03/28/2018 12:47	XLC1162	TQS1	ADM
031918-02H Thrufall	31800359002	03/28/2018 13:18	XLC1162	TQS1	ADM
031918-21I Open	31800359003	03/28/2018 13:48	XLC1162	TQS1	ADM
031918-21J Thrufall	31800359004	03/28/2018 14:19	XLC1162	TQS1	ADM
031918-24K Open	31800359005	03/28/2018 14:50	XLC1162	TQS1	ADM
031918-23M Open	31800359007	03/28/2018 15:51	XLC1162	TQS1	ADM
031918-23N Thrufall	31800359008	03/28/2018 16:22	XLC1162	TQS1	ADM
WO31318 MB	31800359009	03/28/2018 17:23	XLC1162	TQS1	ADM
032018-00A	31800359010	03/28/2018 17:54	XLC1162	TQS1	ADM
032018-00C	31800359011	03/28/2018 18:25	XLC1162	TQS1	ADM
032018-00F	31800359012	03/28/2018 18:55	XLC1162	TQS1	ADM
032018-00S	31800359013	03/28/2018 19:26	XLC1162	TQS1	ADM
032018-FB	31800359014	03/28/2018 19:57	XLC1162	TQS1	ADM
032018-TB	31800359015	03/28/2018 20:27	XLC1162	TQS1	ADM
FAY-Rain-A-032018	31800359016	03/30/2018 21:29	XLC1163	TQS1	ADM
FAY-Rain-Wet-A2-031218	31800359018	03/28/2018 23:01	XLC1162	TQS1	ADM

Method Blank

Blank ID: MB for HBN 144397 [HXX/2135] Matrix: Water
Blank Lab ID: 217926
QC for Samples:
31800359001, 31800359002, 31800359003, 31800359004, 31800359005, 31800359007, 31800359008, 31800359009, 31800359010, 31800359011, 31800359012, 31800359013, 31800359014, 31800359015, 31800359016, 31800359018

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	84.0			70.0-130	%	1

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 3/23/2018 9:48:26AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 144397 [HXX/2135]
Blank Spike Lab ID: 217927
Date Analyzed: 03/28/2018 12:16

Matrix: Water

QC for Samples: 31800359001, 31800359002, 31800359003, 31800359004, 31800359005, 31800359007, 31800359008, 31800359009, 31800359010, 31800359011, 31800359012, 31800359013, 31800359014, 31800359015, 31800359016, 31800359018

Results by GenX

Parameter	Blank Spike (ng/L) Spike	Result	Rec (%)	CL
HFPO-DA (GenX)	100	113	113	70.0-130
Surrogates				
13C-GenX			82.6	70.0-130

Batch Information

Analytical Batch: XLC1162
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
Spike Init Wt./Vol.: 250 mL Extract Vol1 mL
Dupe Init Wt./Vol.: Extract Vol:

Matrix Spike Summary

Original Sample ID: 31800359016 (FAY-Rain-A-032018) Analysis Date: 03/30/2018 21:29
MS Sample ID: 217928 Analysis Date: 03/30/2018 19:57
MSD Sample ID: Analysis Date:
Matrix: Water

QC for Samples: 31800359001, 31800359002, 31800359003, 31800359004, 31800359005, 31800359007, 31800359008, 31800359009, 31800359010, 31800359011, 31800359012, 31800359013, 31800359014, 31800359015, 31800359016, 31800359018

Results by GenX

		Matrix Spike (ng/L)			Spike Duplicate (ng/L)					
Parameter	Sample	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
HFPO-DA (GenX)	337	84.7	385	56.7 *				70.0-130		
Surrogates										
13C-GenX				73.9				70.0-130		

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2135
Prep Method: GenX Prep
Prep Date/Time: 03/23/2018 09:48
MS Init Wt./Vol.: 295 mL Extract Vol.: 1 mL
MSD Init Wt./Vol.: Extract Vol.:

Print Date: 04/04/2018 N.C. Certification # 481

Batch Summary

Analytical Method: GenX

Prep Method: GenX Prep
Prep Batch: HXX2138
Prep Date: 03/29/2018 11:03

Client Sample ID	Lab Sample ID	Analysis Date	Analytical Batch	Instrument	Analyst
MB for HBN 144405 [HXX/2138]	218005	03/30/2018 14:50	XLC1163	TQS1	ADM
LCS for HBN 144405 [HXX/2138]	218006	03/30/2018 15:51	XLC1163	TQS1	ADM
031918-24L Thrufall(217896MSD)	218064	03/30/2018 18:56	XLC1163	TQS1	ADM
031918-24L Thrufall(217896MS)	218065	03/30/2018 19:26	XLC1163	TQS1	ADM
031918-24L Thrufall	31800359006	03/30/2018 18:25	XLC1163	TQS1	ADM

Method Blank

Blank ID: MB for HBN 144405 [HXX/2138]
Blank Lab ID: 218005
QC for Samples:
31800359006

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	72.7			70.0-130	%	1

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2138
Prep Method: GenX Prep
Prep Date/Time: 3/29/2018 11:03:33AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 144405 [HXX/2138]
Blank Spike Lab ID: 218006
Date Analyzed: 03/30/2018 15:51

Matrix: Water

QC for Samples: 31800359006

Results by GenX

Parameter	Blank Spike (ng/L) Spike	Result	Rec (%)	CL
HFPO-DA (GenX)	100	114	114	70.0-130
Surrogates				
13C-GenX			**68.4***	70.0-130

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2138
Prep Method: GenX Prep
Prep Date/Time: 03/29/2018 11:03
Spike Init Wt./Vol.: 250 mL Extract Vol1 mL
Dupe Init Wt./Vol.: Extract Vol:

Print Date: 04/04/2018

N.C. Certification # 481

Matrix Spike Summary

Original Sample ID: 31800359006 (031918-24L Thrufall) — Analysis Date: 03/30/2018 18:25
MS Sample ID: 218065 — Analysis Date: 03/30/2018 19:26
MSD Sample ID: 218064 — Analysis Date: 03/30/2018 18:56
Matrix: Water

QC for Samples: 31800359006

Results by GenX

Parameter	Sample	Matrix Spike (ng/L) Spike	Result	Rec (%)	Spike Duplicate (ng/L) Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
HFPO-DA (GenX)	2130	4960	7380	106	4930	7870	116	70.0-130	6.4	30.00
Surrogates										
13C-GenX				65.5 *			65.4 *	70.0-130		

Batch Information

Analytical Batch: XLC1163
Analytical Method: GenX
Instrument: TQS1
Analyst: ADM

Prep Batch: HXX2138
Prep Method: GenX Prep
Prep Date/Time: 03/29/2018 11:03
MS Init Wt./Vol.: 5.04 mL Extract Vol.:1 mL
MSD Init Wt./Vol.: 5.07 mL Extract Vol.:1 mL

Print Date: 04/04/2018 — N.C. Certification # 481

SGS CHAIN OF CUSTODY | TRACE & SHALE

318 00359

PROJECT INFO:
PROJECT: Rain Water Study
P.O. #:
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: (see reverse) ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES: ☐ State of Origin: ☐ EDD: ☐ DoD: ☐ Other:

SEND DOCUMENTATION / RESULTS TO:
COMPANY: NCDEQ
CONTACT:
ADDRESS:
PHONE:
EMAIL:

INVOICE TO: (☐ CHECK IF SAME)
COMPANY: NCDEQ CONTACT:
ADDRESS:
PHONE:
EMAIL:

SPECIAL INSTRUCTIONS / COMMENTS:

PRESERVATIVE: Yes
ANALYSIS & METHOD: Gen X

LAB ID	SAMPLE ID / DESCRIPTION	DATE	TIME	QC MS	QC MSD	QC DUP	TYPE (C, G)	MATRIX	CONT. QTY	REMARKS
	~~031918-02 G Thru Fall~~									
-001	031918-02 G OPEN	3.21.18						W	2	
-002	031918-02 H. Thrufall								1	
-003	031918-21 I. open								2	
-004	031918-21 J. Thrufall								1	
-005	031918-24 K open								2	
-006	031918-24 L Thrufall								2	
-007	031918 23 M open								2	
-008	031918 23 N Thrufall								1	
-009	W031318 MB								1	

COLLECTED/RELINQUISHED BY (1):	DATE:	TIME:	RECEIVED BY:
Karen Clevenger	3/21/18	16:07	
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY: Ashley Owens DATE: 3/21/18 TIME: 16:07
COC SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT
SAMPLE RECEIPT TEMP: °C 0.3°
CARRIER: Courier TRACKING #:
NOTES:

actual collection dates

White - Retained by Lab
Yellow - Retained by Client

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SGS

CHAIN OF CUSTODY | TRACE & SHALE

31800359

PROJECT INFO:
PROJECT: Rain Water study
P.O. #:
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: (see reverse) ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES: ☐ State of Origin: ☐ EDD: ☐ DoD: ☐ Other:

SEND DOCUMENTATION / RESULTS TO:
COMPANY: NCDEQ
CONTACT:
ADDRESS:
PHONE:
EMAIL:

INVOICE TO: (☐ CHECK IF SAME)
COMPANY: CONTACT:
ADDRESS:
PHONE:
EMAIL:

SPECIAL INSTRUCTIONS / COMMENTS:

PRESERVATIVE: Yes

ANALYSIS & METHOD: Gen X

actual collection dates

LAB ID	SAMPLE ID / DESCRIPTION	DATE	TIME	QC MS	QC MSO	QC DUP	TYPE (C, G)	MATRIX	CONT. QTY	REMARKS
	~~032018-00C~~ LB 3/21/18									
-010	032018-00A	3/21/18	8:30 AM					W	2	
-011	032018-00C	3/21/18								
-012	032018-00F	3/21/18								
-013	032018-00S	3/21/18								
-014	032018-FB Field Blank	3/21/18							1	
-015	032018-TB Trip/Temp. Blk	3/21/18							1	

ARCHIVE ? Yes or No?

COLLECTED/RELINQUISHED BY (1):	DATE:	TIME:	RECEIVED BY:
Karen Clevenger / Chaitali Bhaumik	3/21/18	16:07	
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:

RECEIVED BY LABORATORY:	DATE:	TIME:
Ashley Owens	3/21/18	16:07

COC SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT
SAMPLE RECEIPT TEMP: °C 0.3°
CARRIER: COURIER TRACKING #:
NOTES:

White - Retained by Lab
Yellow - Retained by Client

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SGS CHAIN OF CUSTODY | TRACE & SHALE

PROJECT INFO:
PROJECT: Rain Water Study
P.O. #:
QUOTE #:
SITE REF:
TURN AROUND TIME: Standard
REPORT LEVEL: (see reverse) ☐ Level I ☐ Level II ☐ Level IV
SPECIAL DELIVERABLES: ☐ State of Origin: ☐ EDD: ☐ DoD: ☐ Other:

SEND DOCUMENTATION / RESULTS TO:
COMPANY: NCDEQ
CONTACT:
ADDRESS:
PHONE:
EMAIL:

INVOICE TO: (☐ CHECK IF SAME)
COMPANY: NCDEQ CONTACT:
ADDRESS:
PHONE:
EMAIL:

SPECIAL INSTRUCTIONS / COMMENTS: 318003359

PRESERVATIVE: NO
ANALYSIS & METHOD: Gen X

LAB ID	SAMPLE ID / DESCRIPTION	DATE	TIME	QC MS	QC MSD	QC DUP	TYPE (C, G)	MATRIX	CONT. QTY	REMARKS
-016	FAY-Rain-A-032018	3/20/18	0645					W	2	
-017	FAY-Rain-A-032018 Temp. Blk	~~3/20/18~~	~~0645~~						1	ARCHIVE
-018	FAY-Rain-Wet-A2-031218	3/12/18	1600						2	
-019	FAY-Rain-Wet-A2-031218 Temp Blk	~~3/12/18~~	~~1600~~						1	ARCHIVE
	actual collection dates									

COLLECTED/RELINQUISHED BY (1):	DATE:	TIME:	RECEIVED BY:	RECEIVED BY LABORATORY:	DATE:	TIME:
Karen Clevenger	3/21/18	16:07		Ashley Owens	3/21/18	16:07
RELINQUISHED BY (2):	DATE:	TIME:	RECEIVED BY:	COC SEAL: ☐ INTACT ☐ BROKEN ☒ ABSENT		
				SAMPLE RECEIPT TEMP: °C 0.3°		
				CARRIER: Courier	TRACKING #:	
				NOTES:		

White - Retained by Lab
Yellow - Retained by Client

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SGS North America Inc.

Sample Receipt Checklist (SRC)

Client: **NC DEQ Division of Air Quality** Work Order No.: **31800359**

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. x Chilled on Receipt Actual Temp.(s) in °C: 0.3 Thermometer ID#: IR3
   ___ 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
   x Additional Preservatives verified (see notes) Trizma

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:
* = Samples -001 through -013, sample collection date on COC does not match sample collection date on samples. Samples -001 through -009 sample collection time not listed on COCs.Samples -010 through -013 sample collection times do not match collection times on COCs. Logged in as listed on each sample. Samples -016 , -017, -018, & -019 are not SGS sample bottles.

Inspected and Logged in by: AMO
Date: 3/22/2018

*NCDENR must be notified when collection, holding time or preservation requirements are not met. MI_11.11

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

April 27, 2018

4SESD-ASB

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 18-0268, Chemours - rain water
Drinking Water

FROM: Diana Burdette
OCS Analyst

THRU: Floyd Wellborn, Chief
ASB Organic Chemistry Section

TO: Floyd Wellborn

Attached are the final results for the analytical groups listed below. These analyses were accordance with the Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM) found at www.epa.gov/region4/sesd/asbsop. Any unique project data quality obj specified in writing by the data requestor have also been incorporated into the data unless Report Narrative. Chemistry data have been verified based on the ASB LOQAM specifications and hav qualified by this laboratory if the applicable quality control criteria were not met. Verification is defined in Section 5.2 of the ASB LOQAM. For a listing of specific data qualifiers and explanations, please Data Qualifier Definitions included in this report. The reported results are accurate withi method(s) and are representative only of the samples as received by the laboratory.

Analyses Included in this report:	Method Used:	Accreditations:
Semi Volatile Organics (SVOA)		
PFAS	ASB 100S (Water)	

ED_002003J_00022997-00001

Sample Disposal Policy

Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a
Air samples collected in summa canisters will be disposed of 30 days following the issuance
other sample media including original samples, sample extracts and or digestates will be di
accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the labo
the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If sample
beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at
R4SampleCustody@epa.gov

ED_002003J_00022997-00002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

SAMPLES INCLUDED IN THIS REPORT

Project: 18-0268, Chemours - rain water

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
031018-02B	E181205-01	Water	3/10/18 00:00	3/23/18 10:40
031018-06C	E181205-02	Water	3/10/18 00:00	3/23/18 10:40
031018-06D	E181205-03	Water	3/10/18 00:00	3/23/18 10:40
031018-19E	E181205-04	Water	3/10/18 00:00	3/23/18 10:40
031018-19F	E181205-05	Water	3/10/18 00:00	3/23/18 10:40
031918-02G	E181205-06	Water	3/19/18 00:00	3/23/18 10:40
031918-21I	E181205-07	Water	3/19/18 00:00	3/23/18 10:40
031918-21J	E181205-08	Water	3/19/18 00:00	3/23/18 10:40
Trip Blank	E181205-09	Trip Blank - Water	3/22/18 00:00	3/23/18 10:40

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

DATA QUALIFIER DEFINITIONS

U	The analyte was not detected at or above the reporting limit.
H-6	Sample originally analyzed within holding time; some QC requirements not met. The reported result i second analysis performed for confirmation which occurred after the holding time expired.
H-8	Recommended analytical holding time exceeded
J	The identification of the analyte is acceptable; the reported value is an estimate.
Q-2	Result greater than MDL but less than MRL.

ACRONYMS AND ABBREVIATIONS

CAS Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", by the EPA Substance Registry (www.epa.gov/srs), or beginning with "R4-" identifier assigned by the EPA Region 4 laboratory.

MDL Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured reported with a 99% confidence that the analyte concentration is greater than zero.

MRL Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level o quantitation. The MRL is sample specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the identity of the compound or the estimated concentration reported.

ACCREDITATIONS:

ISO ASB is accredited by ISO/IEC 17025, using an amplification for forensic accreditation through ANSI National Accreditation Board

Refer to the certificate and scope of accreditation AT
http://www.epa.gov/aboutepa/about-region-4s-science-and-ecosystem-support-division-sesd

NR The EPA Region 4 Laboratory has not requested accreditation for this test.

ED_002003J_00022997-00004

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031018-02B **Lab ID:** E181205-01
Station ID: 031018-02B **Matrix:** Water

Date Collected: 3/10/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
13252-13-6	HFPO-DA	22 J, Q-2	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
2355-31-9	N-MeFOSAA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
335-77-3	PFDS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
2706-93-3	PFPeA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 18:11	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:11	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031018-06C **Lab ID:** E181205-02
Station ID: 031018-06C **Matrix:** Water

Date Collected: 3/10/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
27619-97-2	6:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
39108-34-4	8:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
13252-13-6	HFPO-DA	20 J, Q-2	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
2355-31-9	N-MeFOSAA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
307-55-1	PFDoA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
335-77-3	PFDS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
2706-93-3	PFPeA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 18:34	ASB 100S
2058-94-8	PFUdA	41 U	ng/L	41	4/02/18 17:34	4/09/18 18:34	ASB 100S

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031018-06D **Lab ID:** E181205-03
Station ID: 031018-06D **Matrix:** Water

Date Collected: 3/10/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
13252-13-6	HFPO-DA	540	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
2355-31-9	N-MeFOSAA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
335-77-3	PFDS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
2706-93-3	PFPeA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 18:56	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	4/02/18 17:34	4/09/18 18:56	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031018-19E **Lab ID:** E181205-04
Station ID: 031018-19E **Matrix:** Water

Date Collected: 3/10/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
2355-31-9	N-MeFOSAA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
335-77-3	PFDS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
2706-93-3	PFPeA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 19:19	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:19	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031018-19F **Lab ID:** E181205-05
Station ID: 031018-19F **Matrix:** Water

Date Collected: 3/10/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
13252-13-6	HFPO-DA	4100J, H-6	ng/L	400	4/02/18 17:34	4/17/18 21:37	ASB 100S
2355-31-9	N-MeFOSAA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
335-77-3	PFDS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
2706-93-3	PFPeA	67	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 19:41	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	4/02/18 17:34	4/09/18 19:41	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031918-02G **Lab ID:** E181205-06
Station ID: 031918-02G **Matrix:** Water

Date Collected: 3/19/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
27619-97-2	6:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
39108-34-4	8:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
13252-13-6	HFPO-DA	110	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
2355-31-9	N-MeFOSAA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
307-55-1	PFDoA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
335-77-3	PFDS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
2706-93-3	PFPeA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 20:04	ASB 100S
2058-94-8	PFUdA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:04	ASB 100S

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031918-21I **Lab ID:** E181205-07

Station ID: 031918-21I **Matrix:** Water

Date Collected: 3/19/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
27619-97-2	6:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
39108-34-4	8:2FTS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
13252-13-6	HFPO-DA	56	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
2355-31-9	N-MeFOSAA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
307-55-1	PFDoA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
335-77-3	PFDS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
2706-93-3	PFPeA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S
72629-94-8	PFTrDA	200 U	ng/L	200	4/02/18 17:34	4/09/18 20:26	ASB 100S
2058-94-8	PFUdA	41 U	ng/L	41	4/02/18 17:34	4/09/18 20:26	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: 031918-21J **Lab ID:** E181205-08
Station ID: 031918-21J **Matrix:** Water

Date Collected: 3/19/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
27619-97-2	6:2FTS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
39108-34-4	8:2FTS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
754-91-6	FOSA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
13252-13-6	HFPO-DA	24000J, H-8	ng/L	830	4/02/18 17:34	4/17/18 22:00	ASB 100S
2355-31-9	N-MeFOSAA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
375-22-4	PFBA	57	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
375-73-5	PFBS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
335-76-2	PFDA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
307-55-1	PFDoA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
335-77-3	PFDS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
375-85-9	PFHpA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
375-92-8	PFHpS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
307-24-4	PFHxA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
355-46-4	PFHxS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
375-95-1	PFNA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
68259-12-1	PFNS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
335-67-1	PFOA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
1763-23-1	PFOS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
2706-93-3	PFPeA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
2706-91-4	PFPeS	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S
72629-94-8	PFTrDA	210 U	ng/L	210	4/02/18 17:34	4/09/18 20:48	ASB 100S
2058-94-8	PFUdA	42 U	ng/L	42	4/02/18 17:34	4/09/18 20:48	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Project: 18-0268, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0268, Chemours - rain water

Sample ID: Trip Blank **Lab ID:** E181205-09

Station ID: **Matrix:** Trip Blank - Water

Date Collected: 3/22/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
2355-31-9	N-MeFOSAA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
335-77-3	PFDS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
2706-93-3	PFPeA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S
72629-94-8	PFTrDA	140	ng/L	200	4/02/18 17:34	4/09/18 21:11	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	4/02/18 17:34	4/09/18 21:11	ASB 100S

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1804004 - SPFC										
Blank (1804004-BLK1)				Prepared: 04/02/18 Analyzed: 04/09/18						
ASB 100S										
4:2FTS	U	40	ng/L							U
6:2FTS	U	40	"							U
8:2FTS	U	40	"							U
FOSA	U	40	"							U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	40	"							U
PFBA	U	40	"							U
PFBS	U	40	"							U
PFDA	U	40	"							U
PFDoA	U	40	"							U
PFDS	U	40	"							U
PFHpA	U	40	"							U
PFHpS	U	40	"							U
PFHxA	U	40	"							U
PFHxS	U	40	"							U
PFNA	U	40	"							U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	200	"							U
PFUdA	U	40	"							U
Blank (1804004-BLK2)				Prepared: 04/02/18 Analyzed: 04/09/18						
ASB 100S										
4:2FTS	U	40	ng/L							U
6:2FTS	U	40	"							U
8:2FTS	U	40	"							U
FOSA	U	40	"							U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	40	"							U
PFBA	U	40	"							U
PFBS	U	40	"							U
PFDA	U	40	"							U
PFDoA	U	40	"							U
PFDS	U	40	"							U
PFHpA	U	40	"							U
PFHpS	U	40	"							U

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1804004 - SPFC										
Blank (1804004-BLK2)				Prepared: 04/02/18 Analyzed: 04/09/18						
PFHxA	U	40	ng/L							U
PFHxS	U	40	"							U
PFNA	U	40	"							U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	200	"							U
PFUdA	U	40	"							U
LCS (1804004-BS1)				Prepared: 04/02/18 Analyzed: 04/09/18						
ASB 100S										
4:2FTS	385	40	ng/L	371.77		104	70-130			
6:2FTS	389	40	"	377.73		103	70-130			
8:2FTS	425	40	"	381.71		111	70-130			
FOSA	430	40	"	397.61		108	70-130			
HFPO-DA	396	40	"	397.61		99.5	70-130			
N-MeFOSAA	397	40	"	397.61		99.9	70-130			
PFBA	404	40	"	397.61		102	70-130			
PFBS	331	40	"	351.89		94.0	70-130			
PFDA	431	40	"	397.61		109	70-130			
PFDoA	479	40	"	397.61		120	70-130			
PFDS	320	40	"	383.70		83.3	70-130			
PFHpA	403	40	"	397.61		101	70-130			
PFHpS	380	40	"	377.73		101	70-130			
PFHxA	374	40	"	397.61		94.1	70-130			
PFHxS	350	40	"	362.62		96.4	70-130			
PFNA	410	40	"	397.61		103	70-130			
PFNS	386	40	"	381.71		101	70-130			
PFOA	435	40	"	397.61		109	70-130			
PFOS	382	40	"	367.99		104	70-130			
PFPeA	381	40	"	397.61		95.8	70-130			
PFPeS	375	40	"	373.76		100	70-130			
PFTrDA	664	200	"	397.61		167	70-130			QL-2
PFUdA	449	40	"	397.61		113	70-130			

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1804004 - SPFC										
MRL Verification (1804004-PS1)				Prepared: 04/02/18 Analyzed: 04/17/18						
ASB 100S										
4:2FTS	40.9	40	ng/L	37.177		110	50-150			MRL-2
6:2FTS	26.6	40	"	37.773		70.4	50-150			J, MRL-2, Q-2
8:2FTS	27.2	40	"	38.171		71.3	50-150			J, MRL-2, Q-2
FOSA	36.8	40	"	39.761		92.5	50-150			J, MRL-2, Q-2
HFPO-DA	28.6	40	"	39.761		71.9	50-150			J, MRL-2, Q-2
N-MeFOSAA	29.9	80	"	39.761		75.2	50-150			J, MRL-2, Q-2
PFBA	35.2	40	"	39.761		88.6	50-150			J, MRL-2, Q-2
PFBS	19.4	40	"	35.189		55.2	50-150			J, MRL-2, Q-2
PFDA	51.0	40	"	39.761		128	50-150			MRL-2
PFDoA	59.0	40	"	39.761		148	50-150			MRL-2
PFDS	44.2	40	"	38.370		115	50-150			MRL-2, QC-2
PFHpA	34.3	40	"	39.761		86.4	50-150			J, MRL-2, Q-2
PFHpS	35.5	40	"	37.773		94.1	50-150			J, MRL-2, Q-2
PFHxA	46.3	40	"	39.761		116	50-150			MRL-2
PFHxS	31.3	40	"	36.262		86.3	50-150			J, MRL-2, Q-2
PFNA	34.7	40	"	39.761		87.3	50-150			J, MRL-2, Q-2
PFNS	43.5	40	"	38.171		114	50-150			MRL-2
PFOA	41.0	40	"	39.761		103	50-150			MRL-2
PFOS	30.8	40	"	36.799		83.7	50-150			J, MRL-2, Q-2
PFPeA	38.2	40	"	39.761		96.1	50-150			J, MRL-2, Q-2

ED_002003J_00022997-00016

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1804004 - SPFC										
MRL Verification (1804004-PS1)				Prepared: 04/02/18 Analyzed: 04/17/18						
PFPeS	39.5	40	ng/L	37.376		106	50-150			J, MRL-2, Q-2
PFTrDA	64.2	80	"	39.761		162	50-150			QC-5, QR-2, J, MRL-2, Q-2
PFUdA	51.7	40	"	39.761		130	50-150			MRL-2

ED_002003J_00022997-00017

Notes and Definitions for QC Samples

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
MRL-2	MRL verification for Non-Potable Water matrix
Q-2	Result greater than MDL but less than MRL.
QC-2	Analyte concentration high in continuing calibration verification standard
QC-5	Calibration check standard less than method control limits.
QL-2	Laboratory Control Spike Recovery greater than method control limits
QR-2	MRL verification recovery greater than upper control limits.

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Strynar, Mark[strynar.mark@epa.gov]
From: Buckley, Timothy
Sent: Thur 4/5/2018 11:35:58 AM
Subject: RE: [External] Fwd: Wect article

Thank you Linda. We had a good presentation/discussion too. We very much appreciate your acknowledgement of our partnership. We see it as a big success story (that is continuing).

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Wednesday, April 04, 2018 5:27 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>
Subject: FW: [External] Fwd: Wect article

Sharing article on UNCW research. Had a good discussion in the afternoon session of the ORD State Coordination Team meeting you talked with this morning.
Thanked you all again for all your support.

Linda Culpepper
Interim 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: Beth Eckert [mailto:Beth.Eckert@cfpua.org]
Sent: Wednesday, April 04, 2018 5:07 PM
To: Gregson, Jim <jim.gregson@ncdenr.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>; Holman, Sheila <sheila.holman@ncdenr.gov>; Chris Johnson <Christopher.Johnson@cfpua.org>; Godreau, Jessica <jessica.godreau@ncdenr.gov>; Cox, Heidi <heidi.cox@ncdenr.gov>; King, Morella s <morella.sanchez-king@ncdenr.gov>
Subject: [External] Fwd: Wect article

External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.

Hey Guys
Thought this article may be of interest to you.

Beth Eckert
Begin forwarded message:

> **From:** Lindsey Hallock <Lindsey.Hallock@cfpua.org>
> **Date:** April 4, 2018 at 4:44:40 PM EDT
> **To:** GenX Working Group <GenXWorkingGroup@cfpua.org>, Linda Miles < Personal Email / Ex. 6
> **Subject: Wect article**

http://m.wect.com/story/37878952/uncw-researchers-release-initial-report-of-genx-findings

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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Buckley, Timothy
Sent: Wed 4/4/2018 12:27:42 PM
Subject: RE: [External] FW: community meeting in Wilmington: April 16

No biomonitoring data yet available to report so just drinking water.

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Tuesday, April 03, 2018 9:00 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>
Subject: RE: [External] FW: community meeting in Wilmington: April 16

I haven't heard back from Sheila yet. Know I will talk with her in the morning.
I was not aware of the event. This indicates it is to discuss the water results from the GenX study, but wondering if they are discussing any biomonitoring data from Dr. Hoppin's study?

Sent from Mail for Windows 10

From: Buckley, Timothy <Buckley.Timothy@epa.gov>
Sent: Tuesday, April 3, 2018 9:08:13 AM
To: Culpepper, Linda; Allenbach, Becky
Subject: [External] FW: community meeting in Wilmington: April 16

External email. Do not click links or open attachments unless verified. Send all suspicious email as an attachment to Report Spam.

Becky and Linda,

See email string below. Can you let me know if you have any concerns with Andy and Mark attending the community meeting 4/16?

Thanks.

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: Watkins, Tim
Sent: Tuesday, April 03, 2018 8:39 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Guiseppi-Elie, Annette <Guiseppi-Elie.Annette@epa.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>
Subject: RE: community meeting in Wilmington: April 16

Hi Tim –

Following up on the brief discussion we had about Mark and Andy's invitation to participate in the community meeting in Wilmington. I have discussed this invitation with both Jennifer and Peter Grevatt, so they are aware. Mark and Andy may accept the invitation to participate, but it is important for them to only address and discuss the approach they used and the results generated in the Cape Fear study. This seems consistent with the email below which invites them to participate and indicates that "the water results from the GenX exposure study" will be discussed at the meeting.

Related to this, do you know if NC DEQ and EPA Region 4 are aware of the meeting? If not, I think we need to make them aware and let them know that Andy and Mark have been invited and are planning to participate. I am willing to give Sheila Holman and/or Becky Allenbach a call if needed.

Thanks.

Tim Watkins
Director
National Exposure Research Laboratory
Office of Research and Development
US EPA
Personal Phone / Ex. 6
Watkins.tim@epa.gov

From: Buckley, Timothy
Sent: Tuesday, March 27, 2018 3:42 PM
To: Watkins, Tim <Watkins.Tim@epa.gov>; Guiseppi-Elie, Annette <Guiseppi-Elie.Annette@epa.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>
Subject: Fwd: community meeting in Wilmington: April 16

See request below for Andy and Mark to participate in a community meeting in Wilmington.

Sent from my iPhone
Begin forwarded message:

> **From:** "Lindstrom, Andrew" <Lindstrom.Andrew@epa.gov>
> **Date:** March 27, 2018 at 2:36:49 PM CDT
> **To:** "Buckley, Timothy" <Buckley.Timothy@epa.gov>
> **Cc:** "Strynar, Mark" <Strynar.Mark@epa.gov>, "Biales, Adam" <Biales.Adam@epa.gov>, "Medina-Vera, Myriam" <Medina-Vera.Myriam@epa.gov>
> **Subject: FW: community meeting in Wilmington: April 16**
>
> Tim,
>
> Please let us know if we can participate in this community meeting.
>
> Thank you,
>
> Andy
>
> **From:** Jane Hoppin [mailto:jahoppin@ncsu.edu]
> **Sent:** Tuesday, March 27, 2018 3:30 PM
> **To:** Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
> **Subject:** community meeting in Wilmington: April 16

Hi Mark and Andy,

We are planning to host a community meeting in Wilmington the evening of April 16, 2018, to discuss the water results from the GenX exposure study. Given your expertise on the subject, it would be great if you could attend this meeting.

Current location is TBA, but we'll plan for an early evening meeting so community members can attend.

I hope you can join us.

Best wishes,

Jane

--

Jane Hoppin, ScD
Deputy Director, Center for Human Health and the Environment
Associate Professor, Department of Biological Sciences
CB 7633
North Carolina State University
Raleigh, NC 27695

919-515-2918 (office)
jahoppin@ncsu.edu
http://jahoppin.wordpress.ncsu.edu/

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Buckley, Timothy
Sent: Tue 4/3/2018 1:08:13 PM
Subject: FW: community meeting in Wilmington: April 16

Becky and Linda,

See email string below. Can you let me know if you have any concerns with Andy and Mark attending the community meeting 4/16?

Thanks.

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: Watkins, Tim
Sent: Tuesday, April 03, 2018 8:39 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Guiseppi-Elie, Annette <Guiseppi-Elie.Annette@epa.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>
Subject: RE: community meeting in Wilmington: April 16

Hi Tim –

Following up on the brief discussion we had about Mark and Andy's invitation to participate in the community meeting in Wilmington. I have discussed this invitation with both Jennifer and Peter Grevatt, so they are aware. Mark and Andy may accept the invitation to participate, but it is important for them to only address and discuss the approach they used and the results generated in the Cape Fear study. This seems consistent with the email below which invites them to participate and indicates that "the water results from the GenX exposure study" will be discussed at the meeting.

Related to this, do you know if NC DEQ and EPA Region 4 are aware of the meeting? If not, I think we need to make them aware and let them know that Andy and Mark have been invited and are planning to participate. I am willing to give Sheila Holman and/or Becky Allenbach a call if needed.

Thanks.

Tim Watkins
Director
National Exposure Research Laboratory
Office of Research and Development
US EPA
Personal Phone / Ex. 6
Watkins.tim@epa.gov

From: Buckley, Timothy
Sent: Tuesday, March 27, 2018 3:42 PM
To: Watkins, Tim <Watkins.Tim@epa.gov>; Guiseppi-Elie, Annette <Guiseppi-Elie.Annette@epa.gov>; Gillespie, Andrew <Gillespie.Andrew@epa.gov>
Subject: Fwd: community meeting in Wilmington: April 16

See request below for Andy and Mark to participate in a community meeting in Wilmington.

Sent from my iPhone
Begin forwarded message:

From: "Lindstrom, Andrew" <Lindstrom.Andrew@epa.gov>
Date: March 27, 2018 at 2:36:49 PM CDT
To: "Buckley, Timothy" <Buckley.Timothy@epa.gov>
Cc: "Strynar, Mark" <Strynar.Mark@epa.gov>, "Biales, Adam" <Biales.Adam@epa.gov>, "Medina-Vera, Myriam" <Medina-Vera.Myriam@epa.gov>
Subject: FW: community meeting in Wilmington: April 16

Tim,

Please let us know if we can participate in this community meeting.

Thank you,

Andy

From: Jane Hoppin [mailto:jahoppin@ncsu.edu]
Sent: Tuesday, March 27, 2018 3:30 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>
Subject: community meeting in Wilmington: April 16

Hi Mark and Andy,
We are planning to host a community meeting in Wilmington the evening of April 16, 2018, to discuss the water results from the GenX exposure study. Given your expertise on the subject, it would be great if you could attend this meeting.
Current location is TBA, but we'll plan for an early evening meeting so community members can attend.
I hope you can join us.

Best wishes,

Jane

--
Jane Hoppin, ScD
Deputy Director, Center for Human Health and the Environment
Associate Professor, Department of Biological Sciences
CB 7633
North Carolina State University
Raleigh, NC 27695

919-515-2918 (office)
jahoppin@ncsu.edu
http://jahoppin.wordpress.ncsu.edu/

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Buckley, Timothy
Sent: Thur 12/21/2017 9:07:37 PM
Subject: Re: Jordan Lake

Thank you Linda.

On another front, I will be preparing an award nomination for the team of folks that worked with NC DEQ and Region 4 to respond to PFAS public health concerns. Would you be willing to provide a couple sentences describing the value/importance of our collaboration that I could quote in my write-up. Nominations are due Jan 3rd. I appreciate your help.

Tim

Timothy J. Buckley, PhD
Director, EMMD
National Exposure Research Laboratory
Phone: (919) 541-2454
Personal Phone / Ex. 6

From: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Sent: Thursday, December 21, 2017 3:43:51 PM
To: Allenbach, Becky; Walker, Mary; Kemker, Carol; Mitchell, Ken; Banister, Beverly; France, Danny; Sivertsen, Scott; Buckley, Timothy; Strynar, Mark
Cc: Green, Jason; Karoly, Cyndi
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

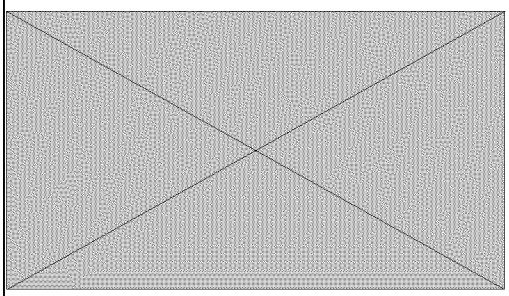
Email correspondence to and from this address is subject to the

North Carolina Public Records Law and may be disclosed to third parties.

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/



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/

	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: Matthews, Lisa[Matthews.Lisa@epa.gov]; Scheuer, Amy[Scheuer.Amy@epa.gov]
Cc: Holman, Sheila[sheila.holman@ncdenr.gov]; Watkins, Tim[Watkins.Tim@epa.gov]; Guiseppi-Elie, Annette[Guiseppi-Elie.Annette@epa.gov]
From: Buckley, Timothy
Sent: Mon 10/30/2017 3:12:22 PM
Subject: RE: slides for Oct 30 ECOS-EPA PFAS Call
ECOS_Buckley presentation10302017_updates.pptx

Lisa and Amy,

Attached is the slide that I will talk from.

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: Matthews, Lisa
Sent: Thursday, October 26, 2017 2:06 PM
To: Morris, Jeff <Morris.Jeff@epa.gov>; Holman, Sheila <sheila.holman@ncdenr.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; nik.dzamov@epa.ohio.gov; Flowers, Lynn <Flowers.Lynn@epa.gov>
Cc: Cherepy, Andrea <Cherepy.Andrea@epa.gov>; Bonnie.Buthker@epa.ohio.gov; Impellitteri, Christopher <Impellitteri.Christopher@epa.gov>; Scheuer, Amy <Scheuer.Amy@epa.gov>
Subject: slides for Oct 30 ECOS-EPA PFAS Call

Good afternoon,
If you have not already done so, please send Amy Scheuer (scheuer.amy@epa.gov) and me your PowerPoint slides by Monday morning, October 30 to upload for the ECOS-EPA PFAS call in the afternoon.

If you prefer not to use slides, just let us know. Thanks so much, and we look forward to your presentations and updates.

Lisa

From: Matthews, Lisa
Sent: Friday, October 20, 2017 11:26 AM
To: 'kristy.richardson@state.co.us' <kristy.richardson@state.co.us>; 'Nicole.lugli@ct.gov' <Nicole.lugli@ct.gov>; robert.kaliszewski@ct.gov; 'kerri.malinowski@maine.gov' <kerri.malinowski@maine.gov>; douglas.fine@state.ma.us; c.mark.smith@state.ma.us; 'delaneyr@michigan.gov' <delaneyr@michigan.gov>; 'krukowskim@michigan.gov' <krukowskim@michigan.gov>; 'remusm@michigan.gov' <remusm@michigan.gov>; 'clark.freise@des.nh.gov' <clark.freise@des.nh.gov>; 'Brandon.kernen@des.nh.gov' <Brandon.kernen@des.nh.gov>; 'Steve.Maybury@dep.nj.gov' <Steve.Maybury@dep.nj.gov>; 'eileen.murphy@dec.ny.gov' <eileen.murphy@dec.ny.gov>; 'robert.schick@dec.ny.gov' <robert.schick@dec.ny.gov>; 'jason.fagel@dec.ny.gov' <jason.fagel@dec.ny.gov>; 'Holman, Sheila' <sheila.holman@ncdenr.gov>; 'linda.culpepper@ncdenr.gov' <linda.culpepper@ncdenr.gov>; 'craig.butler@epa.ohio.gov' <craig.butler@epa.ohio.gov>; 'nik.dzamov@epa.ohio.gov' <nik.dzamov@epa.ohio.gov>; 'susan.kessler@epa.ohio.gov' <susan.kessler@epa.ohio.gov>; 'jenyfer.allen@epa.ohio.gov' <jenyfer.allen@epa.ohio.gov>; MASTERSON.Kevin@deq.state.or.us; 'marz.nicole@deq.state.or.us' <marz.nicole@deq.state.or.us>; 'steven.jetter@state.or.us' <steven.jetter@state.or.us>; 'Heidi.Hales@vermont.gov' <Heidi.Hales@vermont.gov>; 'chuck.schwer@vermont.gov' <chuck.schwer@vermont.gov>; 'kzar461@ecy.wa.gov' <kzar461@ecy.wa.gov>; 'janice.willey@navy.mil' <janice.willey@navy.mil>; 'aroberson@asdwa.org' <aroberson@asdwa.org>; Carolyn Hanson <chanson@ecos.org>; 'slongsworth@ecos.org' <slongsworth@ecos.org>; 'Bowe, Patrick' <Patrick.Bowe@ct.gov>; 'Iwenofu, Samuel (ECY' <siwe461@ECY.WA.GOV>; 'Ottaway, William (DEC' <william.ottaway@dec.ny.gov>; betsey.wingfield@ct.gov; 'Gloria.Post@dep.nj.gov' <Gloria.Post@dep.nj.gov>; 'elizabeth.lewis-michl@health.ny.gov'

<elizabeth.lewis-michl@health.ny.gov>; Impellitteri, Christopher <Impellitteri.Christopher@epa.gov>; Caporale, Cynthia <Caporale.Cynthia@epa.gov>; Fitz-James, Schatzi <Fitz-James.Schatzi@epa.gov>; Raffaele, Kathleen <raffaele.kathleen@epa.gov>; Flowers, Lynn <Flowers.Lynn@epa.gov>; Sinks, Tom <Sinks.Tom@epa.gov>; Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Buckley, Timothy <Buckley.Timothy@epa.gov>; Sonich-Mullin, Cynthia <Sonich-Mullin.Cynthia@epa.gov>; Gilliland, Alice <Gilliland.Alice@epa.gov>; McDonald, James <McDonald.James@epa.gov>; Gettle, Jeaneanne <Gettle.Jeaneanne@epa.gov>; Carter, Bobbi <Carter.Bobbi@epa.gov>; Behl, Betsy <Behl.Betsy@epa.gov>; Strong, Jamie <Strong.Jamie@epa.gov>; Foster, Stiven <Foster.Stiven@epa.gov>; Deener, Kathleen <Deener.Kathleen@epa.gov>; Barbery, Andrea <Barbery.Andrea@epa.gov>; Scheuer, Amy <Scheuer.Amy@epa.gov>; 'MARZ Nicole' <nicole.marz@state.or.us>; 'Karoly, Cyndi' <cyndi.karoly@ncdenr.gov>; Mundrick, Doug <Mundrick.Doug@epa.gov>; France, Danny <France.Danny@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Zapata, Cesar <Zapata.Cesar@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Heard, Anne <Heard.Anne@epa.gov>; Lapierre, Kenneth <lapierre.kenneth@epa.gov>; 'Shehee, Mina' <mina.shehee@dhhs.nc.gov>; Hall, Renea <Hall.Renea@epa.gov>; Campbell-Dunbar, Shawneille <Campbell-Dunbar.Shawneille@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>; 'Godreau, Jessica' <jessica.godreau@ncdenr.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; 'Dean, Glenda' <GLD@adem.alabama.gov>; efp@adem.alabama.gov; 'Harrison, Dennis' <DDH@adem.alabama.gov>; 'Hays, Lewis' <Lewis.Hays@dnr.ga.gov>; 'Capp, James' <James.Capp@dnr.ga.gov>; 'Carnley, Keith' <keith.carnley@dnr.ga.gov>; 'Booth, Elizabeth' <Elizabeth.Booth@dnr.ga.gov>; 'Justin.B.Green@dep.state.fl.us' <Justin.B.Green@dep.state.fl.us>; 'Zimmerman, Jay' <jay.zimmerman@ncdenr.gov>; 'Kinard, Doug' <KINARDDB@dhec.sc.gov>; 'Bird, Joel (ECY' <jbir461@ECY.WA.GOV>; Yaquian-Luna, Jose <yaquian-luna.josea@epa.gov>; Taylor, Dawn <Taylor.Dawn@epa.gov>; Sassman, Hannah <sassman.hannah@epa.gov>; Braverman, Carole <braverman.carole@epa.gov>; O'shea, Marie <OShea.Marie@epa.gov>; Harris, Kimberly <harris.kimberly@epa.gov>; 'Nwogu, Peter' <Peter.Nwogu@dnr.ga.gov>; Azzam, Nidal <Azzam.Nidal@epa.gov>; Maddaloni, Mark <Maddaloni.Mark@epa.gov>; Cutt, Diana <Cutt.Diana@epa.gov> Personal Email / Ex. 6 ; 'Recer, Gregg M (HEALTH' <gregg.recer@health.ny.gov>; 'Leach, James F (HEALTH' <james.leach@health.ny.gov>; 'Deming, Justin H (HEALTH' <justin.deming@health.ny.gov>; 'Parsons, Patrick J (HEALTH' <patrick.parsons@health.ny.gov>; 'Spink, David C (HEALTH' <david.spink@health.ny.gov>; 'Wu, Qian (HEALTH' <qian.wu@health.ny.gov>; Gwinn, Maureen <gwinn.maureen@epa.gov>; 'Pociu, Shannon' <Shannon.Pociu@ct.gov>; Flaherty, Colleen <Flaherty.Colleen@epa.gov>; Hauchman, Fred <hauchman.fred@epa.gov>; 'Malone, Kevin M (HEALTH' <kevin.malone@health.ny.gov>; 'Adam DeWeese' <Adam.DeWeese@wisconsin.gov>; 'Amy LaChance' <LACHANCEA1@michigan.gov>; 'Cathrine Wunderlich' <cathrine.wunderlich@wisconsin.gov>; 'David McMillan' <Dave.McMillan@illinois.gov>; 'Eric Oswald' <OswaldE1@michigan.gov>; 'Mary Hollingsworth' <mholling@idem.in.gov>; 'Matt Prater' <mprater@idem.in.gov>; 'Randy Ellingboe' <randy.ellingboe@state.mn.us>; 'Richard Benzier' <benzier@michigan.gov>; 'Rick Cobb' <rick.cobb@Illinois.gov>; 'Sara Pierson' <spierson@idem.in.gov>; 'Steve Elmore' <Steve.Elmore@Wisconsin.gov>; 'Suzanne Ruch' <RuchS@michigan.gov>; helen.goeden@state.mn.us; James.kelly@state.mn.us; Connie.Sullinger@illinois.gov; 'klemansd@michigan.gov' <klemansd@michigan.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; 'seidelt@michigan.gov' <seidelt@michigan.gov>; 'argiroffp@michigan.gov' <argiroffp@michigan.gov>; 'alexanderc2@michigan.gov' <alexanderc2@michigan.gov>; 'DebruynD@michigan.gov' <DebruynD@michigan.gov>; 'Johnson, Thomas B (HEALTH' <thomas.johnson@health.ny.gov>; Gaines, Linda <Gaines.Linda@epa.gov>; 'Snyder, Sandra' <snydersl@dhec.sc.gov>; Klasen, Matthew <Klasen.Matthew@epa.gov>; 'Bush, Christina Rose (DHHS' <BushC6@michigan.gov>; Morris, Jeff <Morris.Jeff@epa.gov>; Cherepy, Andrea <Cherepy.Andrea@epa.gov>; Burden, Susan <Burden.Susan@epa.gov>; 'Bonnie.Buthker@epa.ohio.gov' <Bonnie.Buthker@epa.ohio.gov>; Freeman, Bruce <BMF@adem.alabama.gov>; Lahne Mattas-Curry <Mattas-Curry.Lahne@epa.gov>; Hubbard, Carolyn <Hubbard.Carolyn@epa.gov>; Menghrajani, jacquelyn <Menghrajani.Jacquelyn@epa.gov>; Zambrana, Jose <Zambrana.Jose@epa.gov>
Cc: Kavlock, Robert <Kavlock.Robert@epa.gov>; Robbins, Chris <Robbins.Chris@epa.gov>; Rodan, Bruce <rodan.bruce@epa.gov>; Yamada, Richard (Yujiro) <yamada.richard@epa.gov>
Subject: agenda for Oct 30 ECOS-EPA PFAS Call

ECOS-EPA PFAS Call
October 30, 2017
4:00-5:00 pm ET

Call-in number Personal Phone / Ex. 6
Webinar link: http://epawebconferencing.acms.com/pfasoctober/

Agenda

1. Welcome and Introductions – Jennifer Orme-Zavaleta, EPA's Office of Research and Development (ORD) (5 mins)

2. Amended TSCA: How implementation could influence actions around PFAS – Jeff Morris, Director, EPA's Office of Pollution Prevention and Toxics (15 mins)

3. GenX in the Cape Fear River Basin

   - State update – Sheila Holman, NC DEQ Assistant Secretary for Environment (10 mins)

   - PFAS methods work to support NC – Tim Buckley, EPA ORD National Exposure Research Laboratory (5 mins)

4. Overview of the PFAS Investigation at Wright-Patterson AFB

   - Including the sampling of a sentinel well network designed to detect contamination before it impacts the city of Dayton's downgradient wellfields – Bonnie Buthker, Chief, Southwest District Office, Ohio EPA (10 mins)

5. Ohio EPA Progress on Analytical Methods

   - Drinking water and direct injection method for other waters – Nik Dzamov, Chief, Division of Environmental Services, Ohio EPA (5 mins)

6. Updates from the EPA PFAS Workgroups

   - Methods Development – Chris Impellitteri, EPA ORD Co-Chair (5 mins)

   - Toxicity – Lynn Flowers, EPA ORD Co-Chair (5 mins)

7. Open forum to share info (states)

8. Wrap-up and Adjourn – Jennifer Orme-Zavaleta, EPA ORD

These calls are held every other month for states and EPA to share information on PFAS methods, toxicity and treatment work. Please send any suggestions for December agenda topics to Lisa Matthews (matthews.lisa@epa.gov) and Sarah Grace Longsworth (slongsworth@ecos.org). Thank you.

Lisa Matthews
Senior Advisor and State Liaison
US EPA Office of Research and Development
202-564-6669 office
Personal Phone / Ex. 6

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Grevatt, Peter[Grevatt.Peter@epa.gov]; Behl, Betsy[Behl.Betsy@epa.gov]; Morris, Jeff[Morris.Jeff@epa.gov]
Cc: Andrew Gillespie[Gillespie.Andrew@epa.gov]; Strynar, Mark[strynar.mark@epa.gov]; McCord, James[mccord.james@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]
From: Buckley, Timothy
Sent: Fri 12/8/2017 1:18:30 PM
Subject: Manuscript Elevated Clearance
McCord_GenX_Manuscript_Final.docx
NERL Fact Sheet McCord PFECAs method 11-28-17.docx

The attached manuscript has been entered into STICS and has been identified for elevated clearance prior to submission. The manuscript is undergoing elevated clearance because it reports sensitive data of our PFAS measurements in the Cape Fear River including discharge, surface, and finished drinking water samples. All of the sampling results reported within the manuscript have previously been reported through NERL data reports to Linda Culpepper and Becky Allenbach. What is new and the focus of the paper is data supporting performance / validation of the laboratory method.

If you have any questions or concerns about the manuscript, please let me know. Andy Gillespie will be managing the elevated clearance within ORD which I anticipate will require 2 weeks brining us to Dec 22nd. Please provide any comments before that date.

Happy reading.

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

To: Allenbach, Becky[Allenbach.Becky@epa.gov]; Culpepper, Linda[linda.culpepper@ncdenr.gov]
From: Buckley, Timothy
Sent: Mon 1/8/2018 5:18:18 PM
Subject: RE: EPA Honor Award Nomination - NERL GenX discovery

Becky,

Excellent edits. Let me know who else need to be included.

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: Allenbach, Becky
Sent: Monday, January 08, 2018 11:20 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Gettle, Jeaneanne <Gettle.Jeaneanne@epa.gov>; Monell, Carol <Monell.Carol@epa.gov>; Kemker, Carol <Kemker.Carol@epa.gov>; Walker, Mary <walker.mary@epa.gov>; Banister, Beverly <Banister.Beverly@epa.gov>; Heard, Anne <Heard.Anne@epa.gov>
Subject: RE: EPA Honor Award Nomination - NERL GenX discovery
Importance: High

Tim/Linda:

I made some suggested edits to the write-up. Thank you for including us! I am copying our senior managers to determine who else they think should be included and for my manager's concurrence. Is there a limit? We will likely have a handful if we stick to the scope of your nomination. Regionally, I could see us putting this forward as well to also include our broader TSCA efforts that you all were not involved in.... They may have some thoughts on that as well.

Becky

Becky B. Allenbach, Chief
Grants and Drinking Water Protection Branch
Water Protection Division
EPA Region 4 - Atlanta
Office: 404-562-9687
Personal Phone / Ex. 6

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From: Buckley, Timothy
Sent: Sunday, January 7, 2018 1:35 PM
To: Allenbach, Becky <Allenbach.Becky@epa.gov>; Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: EPA Honor Award Nomination

Becky,

We have pulled together the attached EPA Honor Award nomination based on our work with NC DEQ. Can you review and let me know if anyone else in the Region should be included. I also need a note from your supervisor indicating concurrence for your inclusion.

Linda, can you review and fact check for me?

Thank you both.

Tim

Timothy J. Buckley, PhD
Director, EMMD
National Exposure Research Laboratory
Phone: (919) 541-2454
Personal Phone / Ex. 6

To: Thomas, Russell[Thomas.Russell@epa.gov]; Crofton, Kevin[Crofton.Kevin@epa.gov]
Cc: Risen, Amy J[Amy.Risen@dhhs.nc.gov]
From: Buckley, Timothy
Sent: Thur 8/10/2017 5:38:45 PM
Subject: FW: EPA Contact about PFECAs

Rusty and Kevin,

I wanted to introduce you to Amy Risen. Amy is the toxicologist with NC DEQ who will have the challenging role of assessing risk associated with the non-targeted PFCs we will be reporting. I told her that we working with you on strategies to screen for toxicity. If possible, can you loop her in on what you are planning and learning?

Thanks.

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: Risen, Amy J [mailto:Amy.Risen@dhhs.nc.gov]
Sent: Thursday, August 10, 2017 11:07 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: FW: EPA Contact about PFECAs

Hello Dr. Buckley,

I'm not sure if we've crossed paths on any of the GenX meetings, but I know I've seen your name. One of my roles is to predict human health effects, and our department then uses findings to suggest non-regulatory risk-based statements that can be used for communication.

We're going to need to do some outreach pretty soon on the PFECAs. There is essentially no data that I'm aware of on the toxicity of these compounds (not including GenX). Some folks at EPA headquarters told us they did not believe it would be appropriate to read across any health effects from other PFAS, due to differences in the chemical structure. I'm open to ideas though.

I'd like to follow up with you on the phone to discuss this, and if you have time today that would be wonderful. I'll give your office a call in a few minutes, and I'll be in my office most of the day today. Tomorrow I'll be in most of the day, except gone for a longish lunch meeting.

Table 1: Perfluoroalkyl Ether Carboxylic Acids (PFECAs) Reported in Cape Fear River & Drinking Water by Sun et al 2016.

Abbreviation	Chemical Name	CAS
*PFPrOPrA	Perfluoro-2-propoxypropanoic acid	13252-13-6, 62037-80-3
PFMOAA	Perfluoro-2-methoxyacetic acid	674-13-5
PFMOPrA	Perfluoro-3-methoxypropanoic acid	377-73-1

PFMOBA	Perfluoro-4-methoxybutanoic acid	863090-89-5
PFO2HxA	Perfluoro-(3,5-dioxahexanoic) acid	39492-88-1
PFO3OA	Perfluoro-(3,5,7-trioxaoctanoic) acid	39492-89-2
PFO4DA	Perfluoro-(3,5,7,9-tetraoxadecanoic) acid	39492-90-5
*PFPrOPrA has been referred to as GenX Sun et al. Legacy and Emerging Perfluoroalkyl Substances Are Important Drinking Water Contaminants in the Cape Fear River Watershed of North Carolina. Environmental Science & Technology Letters. Nov 2016. DOI: 10.1021/acs.estlett.6b00398.		

Best,
Amy

Amy Risen, PhD
Environmental Toxicologist
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

(919) 707-5911 office
(919) 870-4807 fax
Amy.Risen@dhhs.nc.gov

5505 Six Forks Road
1912 Mail Service Center
Raleigh, NC 27699-1912

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From: Culpepper, Linda
Sent: Wednesday, August 09, 2017 3:53 PM
To: Shehee, Mina <mina.shehee@dhhs.nc.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: RE: EPA Contact about PFECAs

Just finished a phone call with EPA and sent you an email in follow up.
Timothy Buckley is going to introduce you to the Computational Toxicology Center contacts.

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: Shehee, Mina
Sent: Wednesday, August 09, 2017 12:19 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Cc: Risen, Amy J <Amy.Risen@dhhs.nc.gov>; Dittman, Elizabeth <Beth.Dittman@dhhs.nc.gov>
Subject: EPA Contact about PFECAs
Importance: High

Linda,
Zack said he met with you and Noelle about messaging for the next set of test results, namely the PFECAs. He said you might know of someone at EPA who intimated that we could say something about the health effects behind the PFECAs. Is this the case? If so, may we have the point of contact at EPA about health effects and PFECAs? We would like to discuss this with EPA.
Thanks,
Mina

Mina Shehee, PhD
Branch Head
Division Public Health, Occupational and Environmental Epidemiology
North Carolina Department of Health and Human Services

919 707 5920 office
919 870 4807 fax
mina.shehee@dhhs.nc.gov

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Twitter YouTube
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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]; Williams, Melanie[melanie.williams@ncdenr.gov]
From: Buckley, Timothy
Sent: Mon 8/7/2017 6:48:53 PM
Subject: RE: Graphs

Thank you Linda.

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: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, August 07, 2017 2:30 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>; Williams, Melanie <melanie.williams@ncdenr.gov>
Subject: FW: Graphs

Tim – Sharing the graphs Melanie has developed (attached).
Results by week are on the webpage: https://deq.nc.gov/news/hot-topics/genx-investigation/genx-sampling-sites

Thank you, Melanie.

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: Williams, Melanie
Sent: Monday, August 07, 2017 1:56 PM
To: Culpepper, Linda <linda.culpepper@ncdenr.gov>
Subject: RE: Graphs

Hey Linda,
Here are the graphs that I have pulled together. The first graph is of all locations, each location a different color but the two test facilities have different shapes. I find this graph pretty difficult to find a conclusion; however, the individual location graphs below that are a little easier. I can reorganize this in a different way if you would prefer or would like to look at it a little differently.

Just let me know.

Thanks,
Mel

-- Melanie Williams

To: Woosley, Julie[julie.woosley@ncdenr.gov]
From: Buckley, Timothy
Sent: Wed 9/13/2017 8:23:10 PM
Subject: RE: Request for EPA NERL PFAS analytical services

Yes, perfect.

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: Woosley, Julie [mailto:julie.woosley@ncdenr.gov]
Sent: Wednesday, September 13, 2017 4:19 PM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: RE: Request for EPA NERL PFAS analytical services

Hi Tim,
I'm definitely available for a call. A couple of other folks here would also like to be on the call, including toxicologist Sandy Mort, Division Director Michael Scott and PIO Laura Linney. Would 4:30 pm work? We can use the following meet me number: 919-707-9408, PW: 123456#.

Thanks,
Julie

Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

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From: Buckley, Timothy [mailto:Buckley.Timothy@epa.gov]
Sent: Wednesday, September 13, 2017 3:39 PM
To: Woosley, Julie <julie.woosley@ncdenr.gov>
Subject: RE: Request for EPA NERL PFAS analytical services

Julie,

I wanted to give you a heads-up that we are very close to having our report ready to send to you. If you have a moment, can you give me a call at my office no. below?

Thanks.

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: Woosley, Julie [mailto:julie.woosley@ncdenr.gov]
Sent: Monday, July 24, 2017 2:20 PM
To: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Ghiold, Joe <joe.ghiold@ncdenr.gov>; Mort, Sandra L <sandy.mort@ncdenr.gov>; Bud.mccarty@ncdenr.gov; Watkins, Tim <Watkins.Tim@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Grimm, Ann <Grimm.Ann@epa.gov>; Bud.mccarty@ncdenr.gov; Ghiold, Joe <joe.ghiold@ncdenr.gov>
Subject: RE: Request for EPA NERL PFAS analytical services

Thank you. We will follow up with Tim Watkins and Tim Buckley.

Best,

Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

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From: Orme-Zavaleta, Jennifer [mailto:Orme-Zavaleta.Jennifer@epa.gov]
Sent: Monday, July 24, 2017 1:19 PM
To: Woosley, Julie <julie.woosley@ncdenr.gov>
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Ghiold, Joe <joe.ghiold@ncdenr.gov>; Mort, Sandra L <sandy.mort@ncdenr.gov>; Mccarty, Bud <bud.mccarty@ncdenr.gov>; Watkins, Tim <Watkins.Tim@epa.gov>; Allenbach, Becky <Allenbach.Becky@epa.gov>; Grimm, Ann <Grimm.Ann@epa.gov>
Subject: RE: Request for EPA NERL PFAS analytical services

Dear Julie,

In checking with our staff, we can assist in the analyses for the additional samples. As a matter of clarification, we do not use Method 537 established for treated drinking water. We have a research method that provides analytical results for analytes in Method 537 and also the additional PFAS that are of interest to the NC DEQ characterization effort.

Please follow up with Tim Watkins and Tim Buckley cc'd above regarding delivery of samples and for any further questions.

Thanks

Jennifer

Jennifer Orme-Zavaleta, PhD
Director, National Exposure Research Laboratory
USEPA Office of Research and Development
109 TW Alexander Dr MC 305-01
RTP, NC 27711

Personal Phone / Ex. 6

orme-zavaleta.jennifer@epa.gov

From: Woosley, Julie [mailto:julie.woosley@ncdenr.gov]
Sent: Friday, July 21, 2017 11:00 AM
To: Orme-Zavaleta, Jennifer <Orme-Zavaleta.Jennifer@epa.gov>
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>; Medina-Vera, Myriam <Medina-Vera.Myriam@epa.gov>; Biales, Adam <Biales.Adam@epa.gov>; Strynar, Mark <Strynar.Mark@epa.gov>; Lindstrom, Andrew <Lindstrom.Andrew@epa.gov>; Scott, Michael <michael.scott@ncdenr.gov>; Ghiold, Joe <joe.ghiold@ncdenr.gov>; Mort, Sandra L <sandy.mort@ncdenr.gov>; Bud.mccarty@ncdenr.gov
Subject: Request for EPA NERL PFAS analytical services

Dr. Jennifer Orme-Zavaleta -

The NC DEQ Division of Waste Management is requesting analytical support from the EPA NERL RTP to analyze split samples of groundwater and river water collected at the Chemours-Fayetteville NC facility for Method 537 PFAS compounds and GenX (CASN 13252-13-6). We anticipate 14-20 samples to be collected by the facility the week of July 31, 2017. Chemours staff will be collecting the samples and DEQ staff will observe the sampling collections and accept the splits for analysis.

The Chemours-Fayetteville facility is a RCRA-regulated facility and the DEQ Hazardous Waste Section would like a comprehensive PFAS characterization of the groundwater at the facility. PFOA and PFPeA (perfluoropentanoic acid) have been previously detected in the facility groundwater at ppb levels. The Hazardous Waste Section is asking EPA to share the full set of laboratory results with us as soon as possible once the analysis and QC are complete.

I would be happy to speak with you by phone to answer any questions you have, or to arrange a conference call for interested parties to further discuss. I know this is a short lead time, but we consider this data to be of utmost importance to the public of North Carolina and would like to work with you to ensure that the data we produce is of the highest possible quality. We appreciate your consideration.

DEQ Contacts for this request:
Julie Woosley, Hazardous Waste Section Chief, julie.woosley@ncdenr.gov, 919.707.8203
Joe Ghiold, Chemours-Fayetteville Project Manager, joe.ghiold@ncdenr.gov, 919.707.8375
Sandy Mort, PhD, HWS Toxicologist, sandy.mort@ncdenr.gov, 919.707.8217

Kind Regards,

Julie S. Woosley
Hazardous Waste Section Chief
Department of Environmental Quality

919 707 8203 office
Julie.Woosley@ncdenr.gov

Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

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To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Orme-Zavaleta, Jennifer[Orme-Zavaleta.Jennifer@epa.gov]; Watkins, Tim[Watkins.Tim@epa.gov]; Smith, Emily J.[Smith.Emily@epa.gov]; Guiseppi-Elie, Annette[Guiseppi-Elie.Annette@epa.gov]; Medina-Vera, Myriam[Medina-Vera.Myriam@epa.gov]; Strynar, Mark[strynar.mark@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Tong-Argao, Sania[Tong-Argao.Sania@epa.gov]
From: Buckley, Timothy
Sent: Thur 7/13/2017 1:12:34 PM
Subject: Cape Fear GenX Results Weeks 1-3
NC DEQ Report07132017.pdf

Linda,

Attached please find our report. I will put a hardcopy in the mail.

Tim Buckley

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

To: Culpepper, Linda[linda.culpepper@ncdenr.gov]
Cc: Allenbach, Becky[Allenbach.Becky@epa.gov]
From: Buckley, Timothy
Sent: Tue 7/11/2017 12:15:02 PM
Subject: RE: Accepted: PFAS in Cape Fear Drinking Water NC / R4 / NERL Collaboration

Linda,

By way of update, we are thinking that we will limit this initial report to GenX as the additional PFAS are a bit more complicated to report given no standards. We expect to report the additional PFAS as well as additional rounds of sampling the last week of July. Let me know if this will be a problem for you.

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

-----Original Message-----
From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
Sent: Monday, July 10, 2017 11:15 AM
To: Buckley, Timothy <Buckley.Timothy@epa.gov>
Subject: Re: Accepted: PFAS in Cape Fear Drinking Water NC / R4 / NERL Collaboration

Thank you for the update - really appreciate your help.

Sent from my iPhone

> On Jul 10, 2017, at 11:09 AM, Buckley, Timothy <Buckley.Timothy@epa.gov> wrote:
>
> Linda,
>
> Yes. We are working toward a goal of reporting results from sampling rounds 1,2, &3 by the end of this week. Be advised that this is not entirely in my control, but that is the way things are looking right now. I should be able to confirm on Wed.
>
> 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**
>

> -----Original Message-----
> From: Culpepper, Linda [mailto:linda.culpepper@ncdenr.gov]
> Sent: Monday, July 10, 2017 9:25 AM
> To: Buckley, Timothy <Buckley.Timothy@epa.gov>
> Subject: Re: Accepted: PFAS in Cape Fear Drinking Water NC / R4 / NERL
> Collaboration
>
> Good morning - any word on if we can see the EPA analysis information from the first two weeks sooner than the week of July 24th? Thank you.
>
> Sent from my iPhone
>
>> On Jul 7, 2017, at 10:49 PM, Culpepper, Linda <linda.culpepper@ncdenr.gov> wrote:
>>
>> <meeting.ics>

To: Pjetraj, Michael[michael.pjetraj@ncdenr.gov]; Strynar, Mark[strynar.mark@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]
Cc: Mitchell, Ken[Mitchell.Ken@epa.gov]
From: Buckley, Timothy
Sent: Thur 5/3/2018 11:37:38 AM
Subject: RE: NC DAQ - Rainwater analysis results

Thanks Michael. I will share with the larger group.

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: Pjetraj, Michael [mailto:michael.pjetraj@ncdenr.gov]
Sent: Wednesday, May 02, 2018 5:11 PM
To: Strynar, Mark <Strynar.Mark@epa.gov>; James Bowyer <jim.bowyer@ncdenr.gov>
Cc: Buckley, Timothy <Buckley.Timothy@epa.gov>; Mitchell, Ken <Mitchell.Ken@epa.gov>
Subject: NC DAQ - Rainwater analysis results

Hello,
Please find attached a summary of the rainwater analysis that DAQ has performed. Maps of the data have been posted at: https://deq.nc.gov/news/hot-topics/genx-investigation/investigations-and-enforcement-actions

I have also attached the SGS & SESD lab results for the 3/19/18 rainfall event. The vegetation throughfall results were reported with a matrix interference.

Dr. Jim Bowyer can confirm if we still have sample volume left for any additional analysis.

Thanks

Michael Pjetraj, P.E.
Deputy Director
Division of Air Quality
North Carolina Department of Environmental Quality

919-707-8497 office
michael.pjetraj@ncdenr.gov

217 West Jones Street
1641 Mail Service Center
Raleigh, NC 27699-1641

Nothing Compares

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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]
From: Strynar, Mark
Sent: Tue 11/7/2017 1:28:36 PM
Subject: monofluoro-malonate

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:

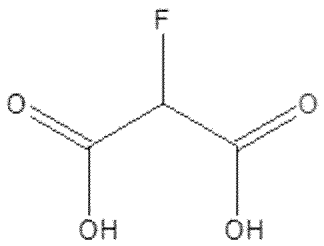
Samples used
Laboratory blank
NCDEQ Chemours outfall 002 Week#1 (around mid June)
NCDEQ Chemours outfall 002 pre shutdown (Around mid October)
Chemours onsite monitoring well LTW03

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.

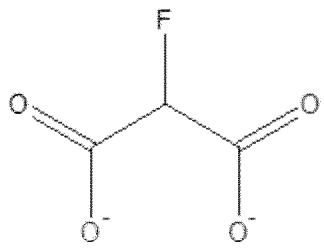
2) I then looked at every sample we have run on the TOFMS that was collected as part of the NCDEQ efforts and screened only for the singly charged ion (m/z 120.9943) as I cannot look at data below 100 m/z for the samples we have already run for the doubly charged ion. I again saw NO evidence in any sample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

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

Mark

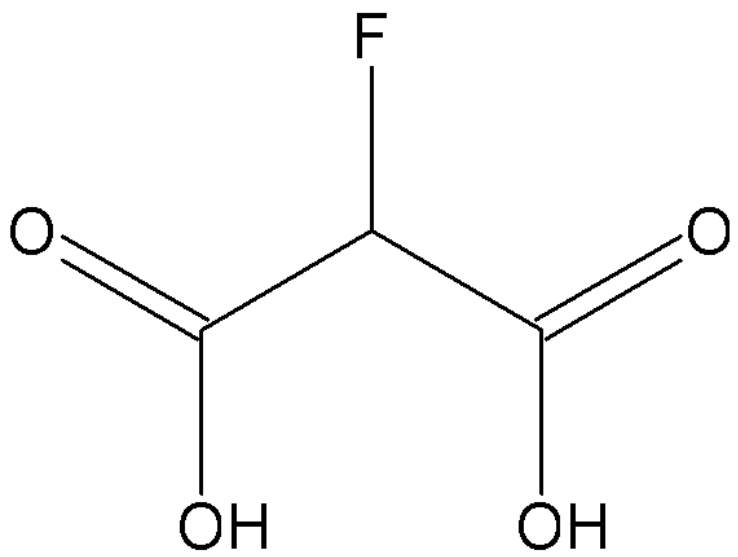


Molecular Formula: $C_3H_3FO_4$
Monoisotopic Mass: 122.001537 Da
[M-H]-: m/z 120.99426 Da

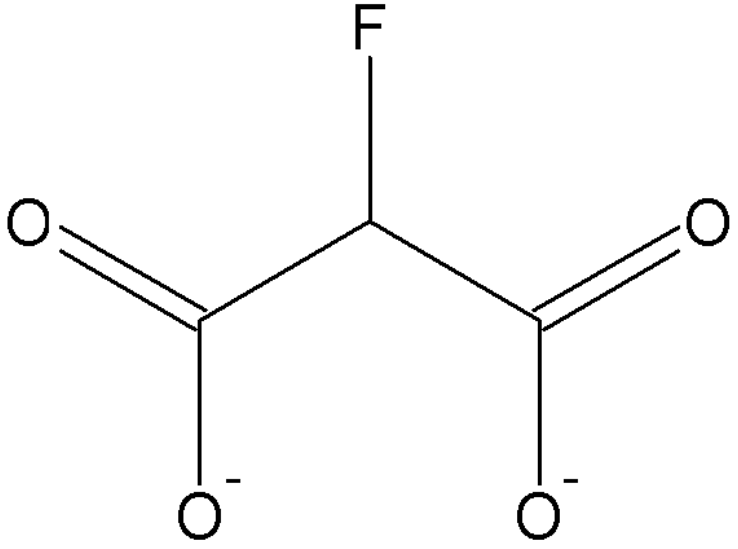


Monoisotopic Mass: 119.986984 Da
M-2H]-2: m/z 59.9935

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



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

ED_002003J_00027748-00001

Organizer: Elizabeth Dittman[Beth.Dittman@dhhs.nc.gov]
From: Elizabeth Dittman
Location: Conference Line / Ex. 6 passcode Personal Phone / Ex. 6
Importance: Normal
Subject: FW: Follow up call with NC DHHS re: PFECAs and PFAS
Start Time: Tue 3/27/2018 7:00:00 PM
End Time: Tue 3/27/2018 8:00:00 PM
Required Attendees: Rodgers-Jenkins, Crystal; Holsinger, Hannah; Burneson, Eric; Suzanne.fenton@nih.gov; Flowers, Lynn; Gloria.post@dep.nj.gov; Pritchett, Jamie R; Shehee, Mina; Moore, Zack; Mort, Sandra L; Henry, Audra E. (ATSDR/DCHI/WB); idz7@cdc.gov; Chou, Selene (ATSDR/DTHHS/ETB); Scinicariello, Franco (ATSDR/DTHHS/ETB); Benson, Amy; Lau, Chris; Strynar, Mark; Lindstrom, Andrew; Allenbach, Becky; Behl, Betsy; Patlewicz, Grace; Henry, Tala; Decker, John A. (CDC/ONDIEH/NCEH); Birnbaum, Linda (NIH/NIEHS) [E]; Blystone, Chad (NIH/NIEHS) [E]; Devito, Michael (NIH/NIEHS) [E]; bucher@niehs.nih.gov; Auerbach, Scott S (NIH/NIEHS) [E]; Maddaloni, Mark; Evangelista, Pat; Azzam, Nidal; Foster, Stiven; Crofton, Kevin; Sinks, Tom; Raffaele, Kathleen; Huff, Lisa; connie.brower@ncdenr.gov; Scott, Michael; Strong, Jamie

Just wanted to make sure you all were on this at least as an FYI.

-----Original Appointment-----
From: Dittman, Elizabeth [mailto:Beth.Dittman@dhhs.nc.gov]
Sent: Monday, February 26, 2018 3:13 PM
To: Dittman, Elizabeth; Suzanne.fenton@nih.gov; Flowers, Lynn; Gloria.post@dep.nj.gov; Pritchett, Jamie R; Shehee, Mina; Moore, Zack; Mort, Sandra L; Henry, Audra E. (ATSDR/DCHI/WB); idz7@cdc.gov; Chou, Selene (ATSDR/DTHHS/ETB); Scinicariello, Franco (ATSDR/DTHHS/ETB); Benson, Amy; Lau, Chris; Strynar, Mark; Lindstrom, Andrew; Allenbach, Becky; Behl, Betsy; Patlewicz, Grace; Henry, Tala; Decker, John A. (CDC/ONDIEH/NCEH); Birnbaum, Linda (NIH/NIEHS) [E]; Blystone, Chad (NIH/NIEHS) [E]; Devito, Michael (NIH/NIEHS) [E]; bucher@niehs.nih.gov; Auerbach, Scott S (NIH/NIEHS) [E]; Maddaloni, Mark; Evangelista, Pat; Azzam, Nidal; Foster, Stiven; Crofton, Kevin; Sinks, Tom; Raffaele, Kathleen; Huff, Lisa; connie.brower@ncdenr.gov; Scott, Michael; Strong, Jamie
Subject: Follow up call with NC DHHS re: PFECAs and PFAS
When: Tuesday, March 27, 2018 3:00 PM-4:00 PM (UTC-05:00) Eastern Time (US & Canada).
Where: Conference Line / Ex. 6 (passcode Personal Phone / Ex. 6

All –

Your input and expertise has been crucial for N.C. in our response to GenX and other emerging PFAS in the state. We last had a group call with federal partners on October 11 regarding the important work going on at the federal level to better understand these compounds and their potential health effects, as well as how to address exposure to PFAS mixtures. I would like to schedule a follow up call. The focus of the call will be to hear updates on the various projects that each group is working on to help fill the knowledge gaps surrounding PFECAs and PFAS. I have scheduled a call for **Tuesday March 27 at 3:00PM**. The call-in number Conference Line / Ex. 6 **7** Conference Line / Ex. 6 **(passcode** Personal Phone / Ex. 6 I hope you can join us. Please forward this invitation to folks in your organization that I may have missed.

Thank you all for your time and expertise.

~Beth Dittman

Beth Dittman
Toxicologist and Public Health Assessor
Division of Public Health, Occupational and Environmental Epidemiology Branch
North Carolina Department of Health and Human Services

919 707 5906 office
919 870 4807 fax
Beth.Dittman@dhhs.nc.gov

5505 Six Forks Road

1912 Mail Service Center
Raleigh, NC 27699

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

Twitter YouTube

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Email correspondence to and from this address is subject to the North Carolina Public Records Law and may be disclosed to third parties by an authorized State official. Unauthorized disclosure of juvenile, health, legally privileged, or otherwise confidential information, including confidential information relating to an ongoing State procurement effort, is prohibited by law. If you have received this email in error, please notify the sender immediately and delete all records of this email.

To: Wellborn, Floyd[Wellborn.Floyd@epa.gov]
Cc: R4SampleCustody[R4SampleCustody@epa.gov]; Monell, Carol[Monell.Carol@epa.gov]; Sivertsen, Scott[Sivertsen.Scott@epa.gov]; linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Banister, Beverly[Banister.Beverly@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Toney, Anthony[Toney.Anthony@epa.gov]; Bookman, Robert[Bookman.Robert@epa.gov]; George, Verne[George.Verne@epa.gov]; Walker, Mary[walker.mary@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Campbell-Dunbar, Shawneille[Campbell-Dunbar.Shawneille@epa.gov]; Hall, Renea[Hall.Renea@epa.gov]; Davis, Molly[Davis.Molly@epa.gov]; Moyer, Adam[moyer.adam@epa.gov]; Doa, Maria[Doa.Maria@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Morris, Eric B[eric.morris@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; julie.woosley@ncdenr.gov[julie.woosley@ncdenr.gov]; michael.scott@ncdenr.gov[michael.scott@ncdenr.gov]; sandy.mort@ncdenr.gov[sandy.mort@ncdenr.gov]; Wellborn, Floyd[Wellborn.Floyd@epa.gov]; France, Danny[France.Danny@epa.gov]
From: R4SampleCustody@epa.gov
Sent: Fri 6/22/2018 2:47:11 AM
Subject: R4 LIMS Sample Log for Project 18-0531, WorkOrder E182509
E182509 WKO 06 21 18 1603.pdf
E182509_COC_01.pdf

Attached is a detailed work order report, in Adobe Acrobat PDF format, containing information about samples and their scheduled analyses for the following Project:

Project Number: 18-0531
Project Name: Chemours - rain water
City: Wilmington **State:** NC

Samples in the following categories have been submitted for analysis:
Semi Volatile Organics (SVOA)

Please review the attached report and notify our Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov if you have any questions, concerns, or if you notice any errors.

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WORK ORDER

Printed: 6/21/2018 4:03:27P

E182509

US-EPA, Region 4, SESD

Client:	Drinking Water (201H53, 000H53)	Project Number	18-0531
Project	Chemours - rain water - FWELLBCR	Acct #/ Location:	000H53 Wilmington NC

Project Leader	Willborn, Floyd	Date Due:	07/26/18 (35 day TAT)
Received By:	Beall, Mike	Date Received:	06/21/18 10:10
Logged In By:	Beall, Mike	Date Logged In:	06/21/18 15:52

Samples Received at 1.2°C	Placed in Cooler after Ice Removed: YES	ART. Project ID 18-0033
Custody Seals:	Sample Containers Intact: Yes	Program/Activity:
Custody Seals Intact:	Samples &COC Match: Yes	Site/Waterbody : ()
COC Present: Yes	COC/Labels Agree: Yes	
Ice in Cooler: Yes	All Analyses on COC: Yes	

Analysis	Due	TAT	Expires	Comments
E182509-01 061218-02 / 061218-02 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-02 061218-19 / 061218-19 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-03 W061218-21 / W061218-21 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-04 D061218-21 / D061218-21 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-05 061218-24 / 061218-24 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-06 W061218-25 / W061218-25 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-07 D061218-25 / D061218-25 [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-08 061218 MB / 061218 MB [Water / Water] Sampled 06/19/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/26/18 00:00	35	07/17/18 00:00	
E182509-09 TB062018-00 / [Water / Trip Blank - Water] Sampled 06/20/18 00:00				
A = 15 mL Plastic				
PFAS-Full List	07/26/18 00:00	35	07/18/18 00:00	

E182509

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182509
18-0531

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

(Sample Collected)

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-01	01692A	061218-02	6/19/18		Karen Clevenger	Water	GenX/PFAS
-01	01693B	↓	↓		↓	↓	GenX/PFAS
-02	01694A	061218-19	↓		↓	↓	GenX/PFAS
-02	01695B	↓	↓		↓	↓	GenX/PFAS
-03	01696A	W061218-21	↓		↓	↓	GenX/PFAS
-03	01698B	↓	↓		↓	↓	GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhaumik	Chaitali Bhaumik	6/20/18	12:30				
NATHAN MILLER	[signature]	6/20/18	12:30	RMBEALL	RMBeall EPA SESD ASB	6-21-18	1010

E182509

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182509
18-0531

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

(Sample Collected)

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-04	01699A	D061218-21	6/19/18		Karen Clevinger	Water	GenX/PFAS
-04	01701B	↓	↓		↓	↓	GenX/PFAS
-05	01705A	061218-24					GenX/PFAS
-05	01706B	↓					GenX/PFAS
-06	01707A	W061218-25					GenX/PFAS
-06	01708B	↓	↓		↓	↓	GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhavnik	Chaitali Bhavnik	6/20/18	12:30				
NATHAN MILLER	N L Miller	6/20/18	12:30	R M BEALL	R M Beall EPA SESD ASB	6-21-18	1010

E182509

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182509
18-0531

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

(Sample Collected)

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-07	01709A	D061218-25	6/19/18		Karen Clevenger	Water	GenX/PFAS
-07	01710B	↓	↓		↓	↓	GenX/PFAS
-08	01711A	061218 MB					GenX/PFAS
-08	01712B	↓	↓		↓	↓	GenX/PFAS
-09	01702A	TB062018-00	6/20/18		Chaitali Bhaumik	↓	GenX/PFAS
							GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhaumik	Chaitali Bhaumik	6/20/18	12:30				
NATHAN MILLER	N Miller	6/20/18	12:30	RM Beall EPA SESD ASB	R M Beall	6-21-18	1010

To: Wellborn, Floyd[Wellborn.Floyd@epa.gov]
Cc: Monell, Carol[Monell.Carol@epa.gov]; Sivertsen, Scott[Sivertsen.Scott@epa.gov]; linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Banister, Beverly[Banister.Beverly@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Toney, Anthony[Toney.Anthony@epa.gov]; Bookman, Robert[Bookman.Robert@epa.gov]; George, Verne[George.Verne@epa.gov]; Walker, Mary[walker.mary@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Campbell-Dunbar, Shawneille[Campbell-Dunbar.Shawneille@epa.gov]; Hall, Renea[Hall.Renea@epa.gov]; Davis, Molly[Davis.Molly@epa.gov]; Moyer, Adam[moyer.adam@epa.gov]; Doa, Maria[Doa.Maria@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Morris, Eric B[eric.morris@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; julie.woosley@ncdenr.gov[julie.woosley@ncdenr.gov]; michael.scott@ncdenr.gov[michael.scott@ncdenr.gov]; sandy.mort@ncdenr.gov[sandy.mort@ncdenr.gov]; Burdette, Diana[Burdette.Diana@epa.gov]; Wellborn, Floyd[Wellborn.Floyd@epa.gov]; France, Danny[France.Danny@epa.gov]
From: R4LIMS@epa.gov
Sent: Thur 6/21/2018 2:45:53 AM
Subject: R4 LIMS Results: Project 18-0425, E182005 SVOA 06 20 18 1430
E182005 SVOA FINAL 06 20 18 1430.PDF
E182005 SVOA FINAL 06 20 18 1430 - 18-0425 - 06-20-2018..Dat

On Wednesday, June 20, 2018, results for the following were released by the Region 4 Laboratory:

Analyses:
Semi Volatile Organics (SVOA)

Project Number: 18-0425
Project Name: Chemours - rain water
City: Wilmington **State:** NC

These results were reported by:
Diana Burdette (E-mail: Burdette.Diana@epa.gov)
If you have questions concerning the laboratory results, please feel free to contact the laboratory personnel shown above as having reported the data. We also encourage you to provide feedback to the Region 4 laboratory by filling out our online (*EPA internal network only*) Customer Survey Form.

These results are for the following Sample Type(s):
Water
Water (Trip Blank - Water)

PDF DATA RESULTS REPORT FILE ATTACHMENT:
An Adobe Acrobat PDF file is attached to this message that contains final results for the analyses as indicated in the data report.

DATA EXPORT FILE ATTACHMENT:
If attached, data export files will be tab delimited ASCII text files contained in a file that has been formatted using the ZIP archiving format (.Dat extension). Please consult your local computer support personnel if you have problems extracting these files. If you have questions about the data file formats and the information contained in these files, or if you would like to request export files for previously reported data, use the contact information shown below to contact the appropriate person with your concerns. To generate export files for previously reported data we'll need the name of the PDF report file that was attached to the original transmittal message.

For questions concerning this message and attachments, or any other LIMS or data reporting issues, please call the SESD PC Hotline at 706-355-8825 or send an email to r4lims@epa.gov.

SAMPLE DISPOSAL POLICY:
Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a periodic schedule. Air samples collected in summa canisters will be disposed of 30 days following the issuance of this report. All other sample media including original samples, sample extracts and or digestates will be disposed

of, in accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the laboratory is notified by the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If samples require storage beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

June 20, 2018

4SESD-ASB

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 18-0425, Chemours - rain water
Drinking Water

FROM: Diana Burdette
OCS Analyst

THRU: Floyd Wellborn, Chief
ASB Organic Chemistry Section

TO: Floyd Wellborn

Attached are the final results for the analytical groups listed below. These analyses were accordance with the Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM) found at www.epa.gov/region4/sesd/asbsop. Any unique project data quality obj specified in writing by the data requestor have also been incorporated into the data unless Report Narrative. Chemistry data have been verified based on the ASB LOQAM specifications and hav qualified by this laboratory if the applicable quality control criteria were not met. Verification is defined in Section 5.2 of the ASB LOQAM. For a listing of specific data qualifiers and explanations, please Data Qualifier Definitions included in this report. The reported results are accurate withi method(s) and are representative only of the samples as received by the laboratory.

Analyses Included in this report:	Method Used:	Accreditations:
Semi Volatile Organics (SVOA)		
PFAS	ASB 100S (Water)	

ED_002003J_00039109-00001

Sample Disposal Policy

Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a
Air samples collected in summa canisters will be disposed of 30 days following the issuance
other sample media including original samples, sample extracts and or digestates will be di
accordance with applicable regulations, 60 days from the date of this report.

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the criminal investigators that case development and litigation are complete.

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beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at
R4SampleCustody@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

SAMPLES INCLUDED IN THIS REPORT

Project: 18-0425, Chemours - rain water

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
W050818-21	E182005-01	Water	5/8/18 00:00	5/17/18 9:45
D050818-21	E182005-02	Water	5/8/18 00:00	5/17/18 9:45
050818-24	E182005-03	Water	5/8/18 00:00	5/17/18 9:45
W050818-25	E182005-04	Water	5/8/18 00:00	5/17/18 9:45
D050818-25	E182005-05	Water	5/8/18 00:00	5/17/18 9:45
050818MB	E182005-06	Water	5/8/18 00:00	5/17/18 9:45
TB050818-00	E182005-08	Trip Blank - Water	5/16/18 00:00	5/17/18 9:45

ED_002003J_00039109-00003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

DATA QUALIFIER DEFINITIONS

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
QC-1	Analyte concentration low in continuing calibration verification standard
QC-3	Analyte calibration criteria not met
QR-1	MRL verification recovery less than lower control limits.
QS-3	Surrogate recovery is lower than established control limits.

ACRONYMS AND ABBREVIATIONS

CAS Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", by the EPA Substance Registry System (www.epa.gov/srs), or beginning with "R4-" identifier assigned by the EPA Region 4 laboratory.

MDL Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured reported with a 99% confidence that the analyte concentration is greater than zero.

MRL Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level of quantitation. The MRL is sample specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the compound or the estimated concentration reported.

ACCREDITATIONS:

ISO ASB is accredited by ISO/IEC 17025, including an amplification for forensic accreditation through ANSI National Accreditation Board

Refer to the certificate and scope of accreditation AT http://www.epa.gov/aboutepa/about-region-4s-science-and-ecosystem-support-division-sesd

NR The EPA Region 4 Laboratory has not requested accreditation for this test.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: W50818-21 **Lab ID:** E182005-01

Station ID: W50818-21 **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
39108-34-4	8:2FTS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
2355-31-9	N-MeFOSAA	79 U	ng/L	79	6/04/18 10:24	6/15/18 20:43	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 20:43	ASB 100S
307-55-1	PFDoA	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
335-77-3	PFDS	160 U, J, QS-3	ng/L	160	6/04/18 10:24	6/15/18 20:43	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
68259-12-1	PFNS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
1763-23-1	PFOS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S
72629-94-8	PFTrDA	79 U, J, QC-1, QC-3, QR-1, QS-3	ng/L	79	6/04/18 10:24	6/15/18 20:43	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	6/04/18 10:24	6/15/18 20:43	ASB 100S

ED_002003J_00039109-00005

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: D050818-21 **Lab ID:** E182005-02

Station ID: D050818-21 **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/04/18 10:24	6/15/18 21:06	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 21:06	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
335-77-3	PFDS	160 U	ng/L	160	6/04/18 10:24	6/15/18 21:06	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S
72629-94-8	PFTrDA	80 U, J, QC-1, QC-3, QR-1	ng/L	80	6/04/18 10:24	6/15/18 21:06	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:06	ASB 100S

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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D. A. R. T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: 050818-24 **Lab ID:** E182005-03

Station ID: 050818-24 **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
27619-97-2	6:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
39108-34-4	8:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
13252-13-6	HFPO-DA	42	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
2355-31-9	N-MeFOSAA	82 U	ng/L	82	6/04/18 10:24	6/15/18 21:28	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 21:28	ASB 100S
307-55-1	PFDoA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
335-77-3	PFDS	160 U	ng/L	160	6/04/18 10:24	6/15/18 21:28	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
2706-90-3	PFPeA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S
72629-94-8	PFTrDA	82 U, J, QC-1, QC-3, QR-1	ng/L	82	6/04/18 10:24	6/15/18 21:28	ASB 100S
2058-94-8	PFUdA	41 U	ng/L	41	6/04/18 10:24	6/15/18 21:28	ASB 100S

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D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: W50818-25 **Lab ID:** E182005-04

Station ID: W50818-25 **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
39108-34-4	8:2FTS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/04/18 10:24	6/15/18 21:51	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 21:51	ASB 100S
307-55-1	PFDoA	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
335-77-3	PFDS	160 U, J, QS-3	ng/L	160	6/04/18 10:24	6/15/18 21:51	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
68259-12-1	PFNS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
1763-23-1	PFOS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S
72629-94-8	PFTrDA	80 U, J, QC-1, QC-3, QR-1, QS-3	ng/L	80	6/04/18 10:24	6/15/18 21:51	ASB 100S
2058-94-8	PFUdA	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 21:51	ASB 100S

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Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: D050818-25 **Lab ID:** E182005-05

Station ID: D050818-25 **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
39108-34-4	8:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
2355-31-9	N-MeFOSAA	81 U	ng/L	81	6/04/18 10:24	6/15/18 22:13	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 22:13	ASB 100S
307-55-1	PFDoA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
335-77-3	PFDS	160 U	ng/L	160	6/04/18 10:24	6/15/18 22:13	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S
72629-94-8	PFTrDA	81 U, J, QC-1, QC-3, QR-1	ng/L	81	6/04/18 10:24	6/15/18 22:13	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:13	ASB 100S

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Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: 050818MB **Lab ID:** E182005-06

Station ID: 050818MB **Matrix:** Water

Date Collected: 5/8/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
27619-97-2	6:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
39108-34-4	8:2FTS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
13252-13-6	HFPO-DA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
2355-31-9	N-MeFOSAA	82 U, J, QS-3	ng/L	82	6/04/18 10:24	6/15/18 22:36	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 22:36	ASB 100S
307-55-1	PFDoA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
335-77-3	PFDS	160 U	ng/L	160	6/04/18 10:24	6/15/18 22:36	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
2706-90-3	PFPeA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S
72629-94-8	PFTrDA	82 U, J, QC-1, QC-3, QR-1	ng/L	82	6/04/18 10:24	6/15/18 22:36	ASB 100S
2058-94-8	PFUdA	41 U	ng/L	41	6/04/18 10:24	6/15/18 22:36	ASB 100S

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Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0425, Chemours - rain water

Sample ID: TB050818-00 **Lab ID:** E182005-08

Station ID: **Matrix:** Trip Blank - Water

Date Collected: 5/16/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
27619-97-2	6:2FTS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
39108-34-4	8:2FTS	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/04/18 10:24	6/15/18 22:58	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
335-76-2	PFDA	160 U, J, QC-3	ng/L	160	6/04/18 10:24	6/15/18 22:58	ASB 100S
307-55-1	PFDoA	40 U, J, QS-3	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
335-77-3	PFDS	160 U	ng/L	160	6/04/18 10:24	6/15/18 22:58	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S
72629-94-8	PFTrDA	80 U, J, QC-1, QC-3, QR-1, QS-3	ng/L	80	6/04/18 10:24	6/15/18 22:58	ASB 100S
2058-94-8	PFUdA	40 U	ng/L	40	6/04/18 10:24	6/15/18 22:58	ASB 100S

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Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics (SVOA) - Quality Control
US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806002 - SPFC										
Blank (1806002-BLK1)				Prepared & Analyzed: 06/15/18						
ASB 100S										
4:2FTS	U	40	ng/L							QS-3, U
6:2FTS	U	40	"							QS-3, U
8:2FTS	U	40	"							QS-3, U
FOSA	U	40	"							QS-3, U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	80	"							QS-3, U
PFBA	U	40	"							QS-3, U
PFBS	U	40	"							U
PFDA	U	160	"							QC-3, U
PFDoA	U	40	"							U
PFDS	U	160	"							U
PFHpA	U	40	"							QS-3, U
PFHpS	U	40	"							U
PFHxA	U	40	"							QS-3, U
PFHxS	U	40	"							U
PFNA	U	40	"							QS-3, U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	80	"							QC-1, QC-3, QR-1, U
PFUdA	U	40	"							QS-3, U
Blank (1806002-BLK2)				Prepared & Analyzed: 06/15/18						
ASB 100S										
4:2FTS	U	40	ng/L							U
6:2FTS	U	40	"							U
8:2FTS	U	40	"							U
FOSA	U	40	"							U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	80	"							U
PFBA	U	40	"							U
PFBS	U	40	"							U
PFDA	U	160	"							QC-3, U
PFDoA	U	40	"							U
PFDS	U	160	"							U

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Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics (SVOA) - Quality Control
US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806002 - SPFC										
Blank (1806002-BLK2)				Prepared & Analyzed: 06/15/18						
PFHpA	U	40	ng/L							U
PFHpS	U	40	"							U
PFHxA	U	40	"							U
PFHxS	U	40	"							U
PFNA	U	40	"							U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	80	"							QC-1, QC-3, QR-1, U
PFUdA	U	40	"							U
LCS (1806002-BS1)				Prepared & Analyzed: 06/15/18						
ASB 100S										
4:2FTS	376	40	ng/L	372.51		101	70-130			
6:2FTS	326	40	"	378.49		86.2	70-130			
8:2FTS	380	40	"	382.47		99.2	70-130			
FOSA	364	40	"	398.41		91.3	70-130			
HFPO-DA	332	40	"	398.41		83.3	70-130			
N-MeFOSAA	411	80	"	398.41		103	70-130			
PFBA	353	40	"	398.41		88.6	70-130			
PFBS	338	40	"	352.59		95.9	70-130			
PFDA	497	160	"	398.41		125	70-130			QC-3
PFDoA	392	40	"	398.41		98.5	70-130			
PFDS	502	160	"	384.46		131	70-130			QC-2, QL-2
PFHpA	373	40	"	398.41		93.6	70-130			
PFHpS	350	40	"	378.49		92.6	70-130			
PFHxA	386	40	"	398.41		96.9	70-130			
PFHxS	342	40	"	363.35		94.2	70-130			
PFNA	381	40	"	398.41		95.6	70-130			
PFNS	390	40	"	382.47		102	70-130			
PFOA	391	40	"	398.41		98.0	70-130			
PFOS	374	40	"	368.73		102	70-130			
PFPeA	367	40	"	398.41		92.1	70-130			
PFPeS	335	40	"	374.50		89.3	70-130			
PFTrDA	478	80	"	398.41		120	70-130			QC-1, QC-3

ED_002003J_00039109-00013

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics (SVOA) - Quality Control
US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806002 - SPFC										
LCS (1806002-BS1)				Prepared & Analyzed: 06/15/18						
PFUdA	473	40	ng/L	398.41		119	70-130			
MRL Verification (1806002-PS1)				Prepared & Analyzed: 06/15/18						
ASB 100S										
4:2FTS	42.5	40	ng/L	37.251		114	50-150			MRL-2
6:2FTS	37.2	40	"	37.849		98.4	50-150			Q-2, J MRL-2
8:2FTS	26.5	40	"	38.247		69.4	50-150			Q-2, MRL-2, J
FOSA	31.4	40	"	39.841		78.9	50-150			Q-2, J MRL-2
HFPO-DA	53.7	40	"	39.841		135	50-150			MRL-2
PFBA	31.4	40	"	39.841		78.7	50-150			J, MRL-2, Q-2
PFBS	52.9	40	"	35.259		150	50-150			MRL-2
PFDoA	28.6	40	"	39.841		71.7	50-150			Q-2, J MRL-2
PFDS	28.6	160	"	38.446		74.5	50-150			Q-2, MRL-2, J, QC-2
PFHpA	42.3	40	"	39.841		106	50-150			MRL-2
PFHpS	49.2	40	"	37.849		130	50-150			MRL-2
PFHxA	32.0	40	"	39.841		80.3	50-150			J, Q-2 MRL-2
PFHxS	33.7	40	"	36.335		92.8	50-150			Q-2, J MRL-2
PFNA	52.4	40	"	39.841		131	50-150			MRL-2
PFNS	42.4	40	"	38.247		111	50-150			MRL-2
PFOA	52.0	40	"	39.841		130	50-150			MRL-2
PFOS	48.0	40	"	36.873		130	50-150			MRL-2
PFPeA	38.3	40	"	39.841		96.1	50-150			J, MRL-2, Q-2
PFPeS	38.0	40	"	37.450		101	50-150			Q-2, J MRL-2
PFUdA	46.6	40	"	39.841		117	50-150			MRL-2
MRL Verification (1806002-PS2)				Prepared & Analyzed: 06/15/18						
ASB 100S										
N-MeFOSAA	94.4	80	ng/L	159.68		59.1	50-150			MRL-2
PFDA	198	160	"	159.68		124	50-150			QC-3, MRL-2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0425, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806002 - SPFC										
MRL Verification (1806002-PS2)				Prepared & Analyzed: 06/15/18						
PFTrDA	72.4	80	ng/L	159.68		45.4	50-150			Q-2, QC-1, QC-3, MRL-2, J, QR-1

ED_002003J_00039109-00015

Notes and Definitions for QC Samples

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
MRL-2	MRL verification for Non-Potable Water matrix
Q-2	Result greater than MDL but less than MRL.
QC-1	Analyte concentration low in continuing calibration verification standard
QC-2	Analyte concentration high in continuing calibration verification standard
QC-3	Analyte calibration criteria not met
QL-2	Laboratory Control Spike Recovery greater than method control limits
QR-1	MRL verification recovery less than lower control limits.
QS-3	Surrogate recovery is lower than established control limits.

QUALIFIER	QualifierDefinitions
U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
QC-1	Analyte concentration low in continuing calibration verification standard
QC-3	Analyte calibration criteria not met
QR-1	MRL verification recovery less than lower control limits.
QS-3	Surrogate recovery is lower than established control limits.

O Other qualifiers have been assigned providing additional information. These explanatory qualifiers are included in the printable pdf report and in other columns in the export files.

Laboratory ProjectNumber Project CLP_CaseNo R4DART_SiteCode R4DART_SiteName
LabSampleNumber SampleName Station CLP_MDNo CLP_DNo LabMatrix
ClientMatrix DateSampled DateReceived GeneralMethod AnalysisDescription
Prepared Analyzed Method Dissolved_Analysis TIC CASNumber
Analyte Result Qualifiers PrimaryQualifiers Units MRL

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 757124-72-4 4:2FTS 40 U
U ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 27619-97-2 6:2FTS 40 U
U ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 39108-34-4 8:2FTS 40 U,J,QS-
3 U,J,O ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2355-31-9 N-MeFOSAA 79 U
U ng/L 79

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-22-4 PFBA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-76-2 PFDA 160 U,J,QC-3
U,J,O ng/L 160

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 307-55-1 PFDoA 40 U,J,QS-
3 U,J,O ng/L 40

US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR

E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-77-3 PFDS 160 U,J,QS-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-85-9 PFHpA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-92-8 PFHpS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 307-24-4 PFHxA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 68259-12-1 PFNS 40 U,J,QS-3
U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-67-1 PFOA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 1763-23-1 PFOS 40 U,J,QS-3
U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-90-3 PFPeA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018

12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 72629-94-8 PFTrDA 79 U,J,QC-
1,QC-3,QR-1,QS-3 U,J,O ng/L 79
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-01 W050818-21 W050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2058-94-8 PFUdA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 757124-72-4 4:2FTS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 27619-97-2 6:2FTS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 39108-34-4 8:2FTS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2355-31-9 N-MeFOSAA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-22-4 PFBA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-76-2 PFDA 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018

06/15/2018 ASB 100S 307-55-1 PFDoA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-77-3 PFDS 160 U U
ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-85-9 PFHpA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-92-8 PFHpS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 307-24-4 PFHxA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-67-1 PFOA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-90-3 PFPeA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-91-4 PFPeS 40 U

U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 72629-94-8 PFTrDA 80 U,J,QC-
1,QC-3,QR-1 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-02 D050818-21 D050818-21 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2058-94-8 PFUdA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 757124-72-4 4:2FTS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 27619-97-2 6:2FTS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 39108-34-4 8:2FTS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-03 050818-24 050818-24 Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-76-2 PFDA 160 U,J,QC-3
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E182005-03 050818-24 050818-24 Water Water 05/08/2018
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-22-4 PFBA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR

E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-73-5 PFBS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-76-2 PFDA 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 307-55-1 PFDoA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-77-3 PFDS 160 U U
ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-85-9 PFHpA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-92-8 PFHpS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 307-24-4 PFHxA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 355-46-4 PFHxS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 375-95-1 PFNA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 68259-12-1 PFNS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 335-67-1 PFOA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018

12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 1763-23-1 PFOS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-90-3 PFPeA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2706-91-4 PFPeS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 72629-94-8 PFTrDA 82 U,J,QC-
1,QC-3,QR-1 U,J,O ng/L 82
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-06 050818MB 050818MB Water Water 05/08/2018
12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics PFAS 06/04/2018
06/15/2018 ASB 100S 2058-94-8 PFUdA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 757124-72-4 4:2FTS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 27619-97-2 6:2FTS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 39108-34-4 8:2FTS
40 U,J,QS-3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 754-91-6 FOSA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 13252-13-6 HFPO-
DA 40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 2355-31-9 N-
MeFOSAA 80 U U ng/L 80
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics

PFAS 06/04/2018 06/15/2018 ASB 100S 375-22-4 PFBA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 375-73-5 PFBS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 335-76-2 PFDA
160 U,J,QC-3 U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 307-55-1 PFDoA
40 U,J,QS-3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 335-77-3 PFDS
160 U U ng/L 160
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 375-85-9 PFHpA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 375-92-8 PFHpS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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PFAS 06/04/2018 06/15/2018 ASB 100S 307-24-4 PFHxA
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
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PFAS 06/04/2018 06/15/2018 ASB 100S 355-46-4 PFHxS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 375-95-1 PFNA
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
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PFAS 06/04/2018 06/15/2018 ASB 100S 68259-12-1 PFNS
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
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PFAS 06/04/2018 06/15/2018 ASB 100S 335-67-1 PFOA

40 U U ng/L 40
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 1763-23-1 PFOS
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
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PFAS 06/04/2018 06/15/2018 ASB 100S 2706-90-3 PFPeA
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E182005-08 TB050818-00 Water Trip Blank - Water
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PFAS 06/04/2018 06/15/2018 ASB 100S 2706-91-4 PFPeS
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US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
PFAS 06/04/2018 06/15/2018 ASB 100S 72629-94-8
PFTrDA 80 U,J,QC-1,QC-3,QR-1,QS-3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0425 Chemours - rain water - FWELLBOR
E182005-08 TB050818-00 Water Trip Blank - Water
05/16/2018 12:00:00 AM 05/17/2018 09:45:00 AM Semi Volatile Organics
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SAMPLE_TYPE_CODE SAMPLE_SOURCE PARENT_SAMPLE_CODE
SAMPLE_DELIVERY_GROUP SAMPLE_DATE SAMPLE_TIME
SYS_LOC_CODE START_DEPTH END_DEPTH DEPTH_UNIT
CHAIN_OF_CUSTODY SENT_TO_LAB_DATE SAMPLE_RECEIPT_DATE
SAMPLER SAMPLING_COMPANY_CODE SAMPLING_REASON
SAMPLING_TECHNIQUE TASK_CODE TASK_TYPE COLLECTION_QUARTER
COMPOSITE_YN COMPOSITE_DESC SAMPLE_CLASS CUSTOM_FIELD_1
CUSTOM_FIELD_2 CUSTOM_FIELD_3 COMMENT SAMPLE_RECEIPT_TIME
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00:00 W050818-21 05/17/2018 Clevenger,
Karen PL-SESD 18-0033 Y
09:45
R4-E182005-02 D050818-21 N Field 18-0425 05/08/2018
00:00 D050818-21 05/17/2018 Clevenger,
Karen PL-SESD 18-0033 Y
09:45
R4-E182005-03 050818-24 N Field 18-0425 05/08/2018
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09:45
R4-E182005-06 050818MB N Field 18-0425 05/08/2018
00:00 050818MB 05/17/2018 Clevenger,
Karen PL-SESD 18-0033 Y
09:45
R4-E182005-08 TB050818-00 TW TW Field 18-0425 05/16/2018
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PL-SESD 18-0033 N
09:45

#SYS_SAMPLE_CODE LAB_ANL_METHOD_NAME ANALYSIS_DATE
ANALYSIS_TIME TOTAL_OR_DISSOLVED COLUMN_NUMBER TEST_TYPE
CAS_RN CHEMICAL_NAME RESULT_VALUE RESULT_ERROR_DELTA
RESULT_TYPE_CODE REPORTABLE_RESULT DETECT_FLAG
LAB_QUALIFIERS VALIDATED_QUALIFIERS INTERPRETED_QUALIFIERS
ORGANIC_YN METHOD_DETECTION_LIMIT MINIMUM_REPORTING_LIMIT
QUANTITATION_LIMIT RESULT_UNIT MINIMUM_REPORTING_LIMIT_UNIT
TIC_RETENTION_TIME RESULT_COMMENT

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13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
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23-1 PFOS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 2058-
94-8 PFUdA 40 TRG Yes N U U
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31-9 N-MeFOSAA 79 TRG Yes N U U
79 79 ng/L ng/L
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90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
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91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
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97-2 6:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 307-24-
4 PFHxA 40 TRG Yes N U U
40 40 ng/L ng/L
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1 PFDoA 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 335-67-
1 PFOA 40 TRG Yes N U U 40
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2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 335-77-
3 PFDS 160 TRG Yes N U,J,QS-3 U,J,O
160 160 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L

R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 375-92-
8 PFHpS 40 TRG Yes N U U
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1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 39108-
34-4 8:2FTS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
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12-1 PFNS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
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94-8 PFTrDA 79 TRG Yes N U,J,QC-1,QC-3,QR-1,QS-3
U,J,O 79 79 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N 757124-
72-4 4:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
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13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
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23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 2058-
94-8 PFUdA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 27619-
97-2 6:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 307-24-
4 PFHxA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 307-55-
1 PFDoA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 335-76-
2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 335-77-
3 PFDS 160 TRG Yes N U U 160

160 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 375-92-
8 PFHpS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 39108-
34-4 8:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 72629-
94-8 PFTrDA 80 TRG Yes N U,J,QC-1,QC-3,QR-1 U,J,O
80 80 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N 757124-
72-4 4:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 13252-
13-6 HFPO-DA 42 TRG Yes Y
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 1763-
23-1 PFOS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 2058-
94-8 PFUdA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 2355-
31-9 N-MeFOSAA 82 TRG Yes N U U
82 82 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 2706-
90-3 PFPeA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 2706-
91-4 PFPeS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 27619-
97-2 6:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 307-24-

4 PFHxA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 307-55-
1 PFDoA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 335-67-
1 PFOA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 335-76-
2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 335-77-
3 PFDS 160 TRG Yes N U U 160
160 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 355-46-
4 PFHxS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 375-22-
4 PFBA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 375-73-
5 PFBS 41 TRG Yes N U U 41
41 ng/L ng/L
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9 PFHpA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 375-92-
8 PFHpS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 375-95-
1 PFNA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 39108-
34-4 8:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 68259-
12-1 PFNS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 72629-
94-8 PFTrDA 82 TRG Yes N U,J,QC-1,QC-3,QR-1 U,J,O
82 82 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 754-91-
6 FOSA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N 757124-
72-4 4:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 1763-
23-1 PFOS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 2058-
94-8 PFUdA 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L

R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
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90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 27619-
97-2 6:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 307-24-
4 PFHxA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 307-55-
1 PFDoA 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 335-67-
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40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 335-76-
2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 335-77-
3 PFDS 160 TRG Yes N U,J,QS-3 U,J,O
160 160 ng/L ng/L
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4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 375-92-
8 PFHpS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 39108-
34-4 8:2FTS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 68259-
12-1 PFNS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 72629-
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U,J,O 80 80 ng/L ng/L
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6 FOSA 40 TRG Yes N U U 40

40 ng/L ng/L
R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N 757124-
72-4 4:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
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23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 2058-
94-8 PFUdA 40 TRG Yes N U U
40 40 ng/L ng/L
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31-9 N-MeFOSAA 81 TRG Yes N U U
81 81 ng/L ng/L
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91-4 PFPeS 40 TRG Yes N U U
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R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 27619-
97-2 6:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 307-24-
4 PFHxA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 307-55-
1 PFDoA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 335-76-
2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 335-77-
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160 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 375-92-
8 PFHpS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 375-95-

1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 39108-
34-4 8:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 72629-
94-8 PFTrDA 81 TRG Yes N U,J,QC-1,QC-3,QR-1 U,J,O
81 81 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N 757124-
72-4 4:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 13252-
13-6 HFPO-DA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 1763-
23-1 PFOS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 2058-
94-8 PFUdA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 2355-
31-9 N-MeFOSAA 82 TRG Yes N U,J,QS-3 U,J,O
82 82 ng/L ng/L
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41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 2706-
91-4 PFPeS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 27619-
97-2 6:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 307-24-
4 PFHxA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 307-55-
1 PFDoA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 335-67-
1 PFOA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 335-76-
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160 160 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 335-77-
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160 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 355-46-
4 PFHxS 41 TRG Yes N U U
41 41 ng/L ng/L

R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 375-22-
4 PFBA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 375-73-
5 PFBS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 375-85-
9 PFHpA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 375-92-
8 PFHpS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 375-95-
1 PFNA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 39108-
34-4 8:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 68259-
12-1 PFNS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 72629-
94-8 PFTrDA 82 TRG Yes N U,J,QC-1,QC-3,QR-1 U,J,O
82 82 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 754-91-
6 FOSA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N 757124-
72-4 4:2FTS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
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94-8 PFUdA 40 TRG Yes N U U
40 40 ng/L ng/L
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31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 27619-
97-2 6:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 307-24-
4 PFHxA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 307-55-
1 PFDoA 40 TRG Yes N U,J,QS-3 U,J,O

40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 335-76-
2 PFDA 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 335-77-
3 PFDS 160 TRG Yes N U U 160
160 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 375-92-
8 PFHpS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 39108-
34-4 8:2FTS 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 72629-
94-8 PFTrDA 80 TRG Yes N U,J,QC-1,QC-3,QR-1,QS-3
U,J,O 80 80 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N 757124-
72-4 4:2FTS 40 TRG Yes N U U
40 40 ng/L ng/L

#SYS_SAMPLE_CODE LAB_ANL_METHOD_NAME ANALYSIS_DATE
ANALYSIS_TIME TOTAL_OR_DISSOLVED COLUMN_NUMBER TEST_TYPE
LAB_MATRIX_CODE ANALYSIS_LOCATION BASIS CONTAINER_ID
DILUTION_FACTOR LAB_PREP_METHOD_NAME PREP_DATE PREP_TIME
LEACHATE_METHOD LEACHATE_DATE LEACHATE_TIME LAB_NAME_CODE
QC_LEVEL LAB_SAMPLE_ID PERCENT_MOISTURE
SUBSAMPLE_AMOUNT SUBSAMPLE_AMOUNT_UNIT ANALYST_NAME
INSTRUMENT_ID COMMENT PRESERVATIVE FINAL_VOLUME
FINAL_VOLUME_UNIT

R4-E182005-01 SVOA:ASB 100S 06/15/2018 20:43 N Water
LB NA R4-SESD
R4E E182005-01

R4-E182005-02 SVOA:ASB 100S 06/15/2018 21:06 N Water
LB NA R4-SESD
R4E E182005-02

R4-E182005-03 SVOA:ASB 100S 06/15/2018 21:28 N Water
LB NA R4-SESD
R4E E182005-03

R4-E182005-04 SVOA:ASB 100S 06/15/2018 21:51 N Water
LB NA R4-SESD
R4E E182005-04

R4-E182005-05 SVOA:ASB 100S 06/15/2018 22:13 N Water
LB NA R4-SESD
R4E E182005-05

R4-E182005-06 SVOA:ASB 100S 06/15/2018 22:36 N Water
LB NA R4-SESD
R4E E182005-06

R4-E182005-08 SVOA:ASB 100S 06/15/2018 22:58 N Water
LB NA R4-SESD
R4E E182005-08

FILENAME: READTHIS.TXT - last revision November 2, 2006
Region 4 LIMS DATA EXPORT

Please consult your local Computer Support services
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If you have questions concerning the analytical results,
contact Region 4 LIMS support by email at r4lims@epa.gov
or contact the analyst listed on the transmittal memo and email.

The files included in the zip archive may vary depending
on needs. However, at a minimum, the following files
will be included:

ReadThis.txt
This file - the file you're reading now.

R4Export.txt
A tab delimited ASCII text file that contains sample
and analytical information for the reported dataset.
The first row contains column headers that have been
named to provide a reasonable explanation as to the
type of data contained in the particular column.

QualifierDefinitions.txt
A tab delimited ASCII text file that contains the list
of qualifiers and their definitions used in this dataset.

ReportNarrative.txt
An optional ASCII text file containing further information
about the samples and/or analytical results.
Not all datasets will include this file.

EPAR4_FSAMPLE_v1.txt
A tab delimited ASCII text file containing sample information
for use with the Region 4 D.A.R.T. system.

EPAR4_RES_v1.txt
A tab delimited ASCII text file containing results information
for use with the Region 4 D.A.R.T. system.

EPAR4_TST_v1.txt
A tab delimited ASCII text file containing test information
for use with the Region 4 D.A.R.T. system.

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system is expressly designed for environmental data. It
provides tools for Region 4 personnel to assist in the
acquisition and tracking of data, and includes a user
interface that allows for easy retrieval of data in
several formats. It also allows for advanced usage of the
data by integrating seamlessly with a variety of
commercially available software programs.

Files designated for use with the Region 4 D.A.R.T. system
have been formatted specifically for the Region 4 D.A.R.T.
database system, and are not generally useful for purposes
outside of that system.

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Cc: Monell, Carol[Monell.Carol@epa.gov]; Sivertsen, Scott[Sivertsen.Scott@epa.gov]; linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Banister, Beverly[Banister.Beverly@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Toney, Anthony[Toney.Anthony@epa.gov]; Bookman, Robert[Bookman.Robert@epa.gov]; George, Verne[George.Verne@epa.gov]; Walker, Mary[walker.mary@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Campbell-Dunbar, Shawneille[Campbell-Dunbar.Shawneille@epa.gov]; Hall, Renea[Hall.Renea@epa.gov]; Davis, Molly[Davis.Molly@epa.gov]; Moyer, Adam[moyer.adam@epa.gov]; Doa, Maria[Doa.Maria@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Morris, Eric B[eric.morris@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; julie.woosley@ncdenr.gov[julie.woosley@ncdenr.gov]; michael.scott@ncdenr.gov[michael.scott@ncdenr.gov]; sandy.mort@ncdenr.gov[sandy.mort@ncdenr.gov]; Wellborn, Floyd[Wellborn.Floyd@epa.gov]; France, Danny[France.Danny@epa.gov]
From: R4LIMS@epa.gov
Sent: Wed 6/20/2018 2:46:40 AM
Subject: R4 LIMS Results: Project 18-0408, E182002 SVOA 06 19 18 1440
E182002 SVOA FINAL 06 19 18 1440.PDF
E182002 SVOA FINAL 06 19 18 1440 - 18-0408 - 06-19-2018..Dat

On Tuesday, June 19, 2018, results for the following were released by the Region 4 Laboratory:

Analyses:
Semi Volatile Organics (SVOA)

Project Number: 18-0408
Project Name: Jordan Lake PFAS
State: NC

These results were reported by:
Floyd Wellborn (E-mail: Wellborn.Floyd@epa.gov)
If you have questions concerning the laboratory results, please feel free to contact the laboratory personnel shown above as having reported the data. We also encourage you to provide feedback to the Region 4 laboratory by filling out our online (*EPA internal network only*) Customer Survey Form.

These results are for the following Sample Type(s):
Water
Water (Trip Blank - Water)

PDF DATA RESULTS REPORT FILE ATTACHMENT:
An Adobe Acrobat PDF file is attached to this message that contains final results for the analyses as indicated in the data report.

DATA EXPORT FILE ATTACHMENT:
If attached, data export files will be tab delimited ASCII text files contained in a file that has been formatted using the ZIP archiving format (.Dat extension). Please consult your local computer support personnel if you have problems extracting these files. If you have questions about the data file formats and the information contained in these files, or if you would like to request export files for previously reported data, use the contact information shown below to contact the appropriate person with your concerns. To generate export files for previously reported data we'll need the name of the PDF report file that was attached to the original transmittal message.

For questions concerning this message and attachments, or any other LIMS or data reporting issues, please call the SESD PC Hotline at 706-355-8825 or send an email to r4lims@epa.gov.

SAMPLE DISPOSAL POLICY:
Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a periodic schedule. Air samples collected in summa canisters will be disposed of 30 days following the issuance of this report. All other sample media including original samples, sample extracts and or digestates will be disposed

of, in accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the laboratory is notified by the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If samples require storage beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

June 19, 2018

4SESD-ASB

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 18-0408, Jordan Lake PFAS
Drinking Water

FROM: Floyd Wellborn
ASB Organic Chemistry Section Chief

THRU: Danny France, Chief
Analytical Support Branch

TO: Floyd Wellborn

Attached are the final results for the analytical groups listed below. These analyses were accordance with the Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM) found at www.epa.gov/region4/sesd/asbsop. Any unique project data quality obj specified in writing by the data requestor have also been incorporated into the data unless Report Narrative. Chemistry data have been verified based on the ASB LOQAM specifications and hav qualified by this laboratory if the applicable quality control criteria were not met. Verification is defined in Section 5.2 of the ASB LOQAM. For a listing of specific data qualifiers and explanations, please Data Qualifier Definitions included in this report. The reported results are accurate withi method(s) and are representative only of the samples as received by the laboratory.

Analyses Included in this report:	Method Used:	Accreditations:
Semi Volatile Organics (SVOA)		
PFAS	ASB 100S (Water)	

ED_002003J_00039117-00001

Sample Disposal Policy

Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a
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D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

SAMPLES INCLUDED IN THIS REPORT

Project: 18-0408, Jordan Lake PFAS

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
CPF081A1C	E182002-01	Water	5/9/18 09:15	5/15/18 10:5
CPF086C	E182002-02	Water	5/9/18 09:50	5/15/18 10:5
CPF086F	E182002-03	Water	5/9/18 10:10	5/15/18 10:5
CPF087D	E182002-04	Water	5/9/18 11:00	5/15/18 10:5
CPF089	E182002-05	Water	5/9/18 11:50	5/15/18 10:5
CPF055C	E182002-06	Water	5/9/18 13:15	5/15/18 10:5
Trip Blank - B	E182002-07	Trip Blank - Water	5/9/18 15:00	5/15/18 10:5
B3025000	E182002-08	Water	5/9/18 08:45	5/15/18 10:5
B3660000	E182002-09	Water	5/9/18 09:20	5/15/18 10:5
B3040000	E182002-10	Water	5/9/18 09:55	5/15/18 10:5
B3900000	E182002-11	Water	5/9/18 10:25	5/15/18 10:5
B3750000	E182002-12	Water	5/9/18 11:05	5/15/18 10:5
B210000	E182002-13	Water	5/9/18 11:55	5/15/18 10:5
B210000 DUP	E182002-14	Water	5/9/18 12:00	5/15/18 10:5
B4050000	E182002-15	Water	5/9/18 13:10	5/15/18 10:5
Trip Blank - T	E182002-16	Trip Blank - Water	5/9/18 07:45	5/15/18 10:5

ED_002003J_00039117-00003

DATA QUALIFIER DEFINITIONS

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
Q-2	Result greater than MDL but less than MRL.
QC-3	Analyte calibration criteria not met
QL-3	Laboratory Control Spike Precision outside method control limits
QS-3	Surrogate recovery is lower than established control limits.

ACRONYMS AND ABBREVIATIONS

CAS Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", by the EPA Substance Registry (www.epa.gov/srs), or beginning with "R4-" identifier assigned by the EPA Region 4 laboratory.

MDL Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured and reported with a 99% confidence that the analyte concentration is greater than zero.

MRL Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level of quantitation. The MRL is sample specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the identity of the compound or the estimated concentration reported.

ACCREDITATIONS:

ISO ASB is accredited by ISO/IEC 17025, including an amplification for forensic accreditation through ANSI National Accreditation Board

Refer to the certificate and scope of accreditation AT
http://www.epa.gov/aboutepa/about-region-4s-science-and-ecosystem-support-division-sesd

NR The EPA Region 4 Laboratory has not requested accreditation for this test.

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D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPF081A1C **Lab ID:** E182002-01
Station ID: CPF081A1C **Matrix:** Water

Date Collected: 5/9/18 9:15

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 1:03	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 1:03	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3, QS-3	ng/L	80	6/06/18 11:59	6/13/18 1:03	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/13/18 21:48	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 1:03	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 1:03	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/13/18 21:48	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
307-24-4	PFHxA	80 U	ng/L	80	6/06/18 11:59	6/13/18 1:03	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:03	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 1:03	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 1:03	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPF086C **Lab ID:** E182002-02
Station ID: CPF086C **Matrix:** Water

Date Collected: 5/9/18 9:50

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	82 U	ng/L	82	6/06/18 11:59	6/13/18 1:26	ASB 100S
27619-97-2	6:2FTS	310 U	ng/L	310	6/06/18 11:59	6/13/18 1:26	ASB 100S
39108-34-4	8:2FTS	82 U, J, QC-3, QS-3	ng/L	82	6/06/18 11:59	6/13/18 1:26	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
13252-13-6	HFPO-DA	41 U	ng/L	41	6/06/18 11:59	6/13/18 22:11	ASB 100S
2355-31-9	N-MeFOSAA	82 U	ng/L	82	6/06/18 11:59	6/13/18 1:26	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
307-55-1	PFDoA	82 U	ng/L	82	6/06/18 11:59	6/13/18 1:26	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/13/18 22:11	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
375-92-8	PFHpS	41 U, J, QL-3	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
307-24-4	PFHxA	82 U	ng/L	82	6/06/18 11:59	6/13/18 1:26	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
2706-90-3	PFPeA	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	6/06/18 11:59	6/13/18 1:26	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 1:26	ASB 100S
2058-94-8	PFUdA	310 U	ng/L	310	6/06/18 11:59	6/13/18 1:26	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPP086F **Lab ID:** E182002-03
Station ID: CPP086F **Matrix:** Water

Date Collected: 5/9/18 10:10

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	79 U	ng/L	79	6/06/18 11:59	6/13/18 1:48	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 1:48	ASB 100S
39108-34-4	8:2FTS	79 U, J, QC-3	ng/L	79	6/06/18 11:59	6/13/18 1:48	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/13/18 22:33	ASB 100S
2355-31-9	N-MeFOSAA	79 U	ng/L	79	6/06/18 11:59	6/13/18 1:48	ASB 100S
375-22-4	PFBA	19 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
307-55-1	PFDoA	79 U	ng/L	79	6/06/18 11:59	6/13/18 1:48	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/13/18 22:33	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
307-24-4	PFHxA	79 U	ng/L	79	6/06/18 11:59	6/13/18 1:48	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 1:48	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 1:48	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 1:48	ASB 100S

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Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPF087D **Lab ID:** E182002-04

Station ID: CPF087D **Matrix:** Water

Date Collected: 5/9/18 11:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:11	ASB 100S
27619-97-2	6:2FTS	290 U	ng/L	290	6/06/18 11:59	6/13/18 2:11	ASB 100S
39108-34-4	8:2FTS	77 U, J, QC-3	ng/L	77	6/06/18 11:59	6/13/18 2:11	ASB 100S
754-91-6	FOSA	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
13252-13-6	HFPO-DA	38 U	ng/L	38	6/06/18 11:59	6/13/18 22:56	ASB 100S
2355-31-9	N-MeFOSAA	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:11	ASB 100S
375-22-4	PFBA	23 J, Q-2	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
375-73-5	PFBS	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
335-76-2	PFDA	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
307-55-1	PFDoA	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:11	ASB 100S
335-77-3	PFDS	150 U, J, QC-3	ng/L	150	6/06/18 11:59	6/13/18 22:56	ASB 100S
375-85-9	PFHpA	28 J, Q-2	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
375-92-8	PFHpS	38 U, J, QL-3	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
307-24-4	PFHxA	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:11	ASB 100S
355-46-4	PFHxS	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
375-95-1	PFNA	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
68259-12-1	PFNS	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
335-67-1	PFOA	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
1763-23-1	PFOS	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
2706-90-3	PFPeA	21 J, Q-2	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
2706-91-4	PFPeS	38 U	ng/L	38	6/06/18 11:59	6/13/18 2:11	ASB 100S
72629-94-8	PFTrDA	150 U	ng/L	150	6/06/18 11:59	6/13/18 2:11	ASB 100S
2058-94-8	PFUdA	290 U	ng/L	290	6/06/18 11:59	6/13/18 2:11	ASB 100S

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D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPF089 **Lab ID:** E182002-05
Station ID: CPF089 **Matrix:** Water

Date Collected: 5/9/18 11:50

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:33	ASB 100S
27619-97-2	6:2FTS	290 U	ng/L	290	6/06/18 11:59	6/13/18 2:33	ASB 100S
39108-34-4	8:2FTS	77 U, J, QC-3, QS-3	ng/L	77	6/06/18 11:59	6/13/18 2:33	ASB 100S
754-91-6	FOSA	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
13252-13-6	HFPO-DA	39 U	ng/L	39	6/06/18 11:59	6/13/18 23:18	ASB 100S
2355-31-9	N-MeFOSAA	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:33	ASB 100S
375-22-4	PFBA	25 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
375-73-5	PFBS	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
335-76-2	PFDA	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
307-55-1	PFDoA	77 U	ng/L	77	6/06/18 11:59	6/13/18 2:33	ASB 100S
335-77-3	PFDS	150 U, J, QC-3	ng/L	150	6/06/18 11:59	6/13/18 23:18	ASB 100S
375-85-9	PFHpA	26 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
375-92-8	PFHpS	39 U, J, QL-3	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
307-24-4	PFHxA	35 J, Q-2	ng/L	77	6/06/18 11:59	6/13/18 2:33	ASB 100S
355-46-4	PFHxS	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
375-95-1	PFNA	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
68259-12-1	PFNS	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
335-67-1	PFOA	32 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
1763-23-1	PFOS	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
2706-90-3	PFPeA	32 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
2706-91-4	PFPeS	39 U	ng/L	39	6/06/18 11:59	6/13/18 2:33	ASB 100S
72629-94-8	PFTrDA	150 U	ng/L	150	6/06/18 11:59	6/13/18 2:33	ASB 100S
2058-94-8	PFUdA	290 U	ng/L	290	6/06/18 11:59	6/13/18 2:33	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: CPR055C **Lab ID:** E182002-06
Station ID: CPR055C **Matrix:** Water

Date Collected: 5/9/18 13:15

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	79 U	ng/L	79	6/06/18 11:59	6/13/18 2:56	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 2:56	ASB 100S
39108-34-4	8:2FTS	79 U, J, QC-3	ng/L	79	6/06/18 11:59	6/13/18 2:56	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/13/18 23:41	ASB 100S
2355-31-9	N-MeFOSAA	79 U	ng/L	79	6/06/18 11:59	6/13/18 2:56	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
307-55-1	PFDoA	79 U	ng/L	79	6/06/18 11:59	6/13/18 2:56	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/13/18 23:41	ASB 100S
375-85-9	PFHpA	57	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
307-24-4	PFHxA	66	ng/L	79	6/06/18 11:59	6/13/18 2:56	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
335-67-1	PFOA	32 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
1763-23-1	PFOS	27 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
2706-90-3	PFPeA	50	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 2:56	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 2:56	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 2:56	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: Trip Blank - B
Lab ID: E182002-07
Station ID:
Matrix: Trip Blank - Water

Date Collected: 5/9/18 15:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 3:18	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 3:18	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3	ng/L	80	6/06/18 11:59	6/13/18 3:18	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/14/18 0:03	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 3:18	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 3:18	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 0:03	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
307-24-4	PFHxA	80 U	ng/L	80	6/06/18 11:59	6/13/18 3:18	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
375-95-1	PFNA	40 U, J, QS-3	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 3:18	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 3:18	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 3:18	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B3025000 **Lab ID:** E182002-08
Station ID: B3025000 **Matrix:** Water

Date Collected: 5/9/18 8:45

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	78 U	ng/L	78	6/06/18 11:59	6/13/18 3:41	ASB 100S
27619-97-2	6:2FTS	290 U	ng/L	290	6/06/18 11:59	6/13/18 3:41	ASB 100S
39108-34-4	8:2FTS	78 U, J, QC-3	ng/L	78	6/06/18 11:59	6/13/18 3:41	ASB 100S
754-91-6	FOSA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
13252-13-6	HFPO-DA	39 U	ng/L	39	6/06/18 11:59	6/14/18 0:25	ASB 100S
2355-31-9	N-MeFOSAA	78 U	ng/L	78	6/06/18 11:59	6/13/18 3:41	ASB 100S
375-22-4	PFBA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
375-73-5	PFBS	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
335-76-2	PFDA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
307-55-1	PFDoA	78 U	ng/L	78	6/06/18 11:59	6/13/18 3:41	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 0:25	ASB 100S
375-85-9	PFHpA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
375-92-8	PFHpS	39 U, J, QL-3	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
307-24-4	PFHxA	78 U	ng/L	78	6/06/18 11:59	6/13/18 3:41	ASB 100S
355-46-4	PFHxS	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
375-95-1	PFNA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
68259-12-1	PFNS	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
335-67-1	PFOA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
1763-23-1	PFOS	26 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
2706-90-3	PFPeA	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
2706-91-4	PFPeS	39 U	ng/L	39	6/06/18 11:59	6/13/18 3:41	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 3:41	ASB 100S
2058-94-8	PFUdA	290 U	ng/L	290	6/06/18 11:59	6/13/18 3:41	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B3660000 **Lab ID:** E182002-09
Station ID: B3660000 **Matrix:** Water

Date Collected: 5/9/18 9:20

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 4:03	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 4:03	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3	ng/L	80	6/06/18 11:59	6/13/18 4:03	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/14/18 0:48	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 4:03	ASB 100S
375-22-4	PFBA	160	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 4:03	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 0:48	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
307-24-4	PFHxA	80 U	ng/L	80	6/06/18 11:59	6/13/18 4:03	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
2706-90-3	PFPeA	45	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 4:03	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 4:03	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 4:03	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B3040000 **Lab ID:** E182002-10

Station ID: B3040000 **Matrix:** Water

Date Collected: 5/9/18 9:55

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:25	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 4:25	ASB 100S
39108-34-4	8:2FTS	81 U, J, QC-3	ng/L	81	6/06/18 11:59	6/13/18 4:25	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
13252-13-6	HFPO-DA	41 U	ng/L	41	6/06/18 11:59	6/14/18 1:10	ASB 100S
2355-31-9	N-MeFOSAA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:25	ASB 100S
375-22-4	PFBA	17 J, Q-2	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
307-55-1	PFDoA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:25	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 1:10	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
375-92-8	PFHpS	41 U, J, QL-3	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
307-24-4	PFHxA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:25	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
2706-90-3	PFPeA	26 J, Q-2	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:25	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 4:25	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 4:25	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B3900000 **Lab ID:** E182002-11

Station ID: B3900000 **Matrix:** Water

Date Collected: 5/9/18 10:25

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:48	ASB 100S
27619-97-2	6:2FTS	310 U	ng/L	310	6/06/18 11:59	6/13/18 4:48	ASB 100S
39108-34-4	8:2FTS	81 U, J, QC-3	ng/L	81	6/06/18 11:59	6/13/18 4:48	ASB 100S
754-91-6	FOSA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
13252-13-6	HFPO-DA	41 U	ng/L	41	6/06/18 11:59	6/14/18 1:33	ASB 100S
2355-31-9	N-MeFOSAA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:48	ASB 100S
375-22-4	PFBA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
307-55-1	PFDoA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:48	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 1:33	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
375-92-8	PFHpS	41 U, J, QL-3	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
307-24-4	PFHxA	81 U	ng/L	81	6/06/18 11:59	6/13/18 4:48	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
375-95-1	PFNA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
68259-12-1	PFNS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
335-67-1	PFOA	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
1763-23-1	PFOS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
2706-90-3	PFPeA	21 J, Q-2	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	6/06/18 11:59	6/13/18 4:48	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 4:48	ASB 100S
2058-94-8	PFUdA	310 U	ng/L	310	6/06/18 11:59	6/13/18 4:48	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B3750000 **Lab ID:** E182002-12
Station ID: B3750000 **Matrix:** Water

Date Collected: 5/9/18 11:05

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	78 U	ng/L	78	6/06/18 11:59	6/13/18 5:10	ASB 100S
27619-97-2	6:2FTS	290 U	ng/L	290	6/06/18 11:59	6/13/18 5:10	ASB 100S
39108-34-4	8:2FTS	78 U, J, QC-3	ng/L	78	6/06/18 11:59	6/13/18 5:10	ASB 100S
754-91-6	FOSA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
13252-13-6	HFPO-DA	39 U	ng/L	39	6/06/18 11:59	6/14/18 1:55	ASB 100S
2355-31-9	N-MeFOSAA	78 U	ng/L	78	6/06/18 11:59	6/13/18 5:10	ASB 100S
375-22-4	PFBA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
375-73-5	PFBS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
335-76-2	PFDA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
307-55-1	PFDoA	78 U	ng/L	78	6/06/18 11:59	6/13/18 5:10	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 1:55	ASB 100S
375-85-9	PFHpA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
375-92-8	PFHpS	39 U, J, QL-3	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
307-24-4	PFHxA	78 U	ng/L	78	6/06/18 11:59	6/13/18 5:10	ASB 100S
355-46-4	PFHxS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
375-95-1	PFNA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
68259-12-1	PFNS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
335-67-1	PFOA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
1763-23-1	PFOS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
2706-90-3	PFPeA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
2706-91-4	PFPeS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:10	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 5:10	ASB 100S
2058-94-8	PFUdA	290 U	ng/L	290	6/06/18 11:59	6/13/18 5:10	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B210000 **Lab ID:** E182002-13
Station ID: B210000 **Matrix:** Water

Date Collected: 5/9/18 11:55

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	79 U	ng/L	79	6/06/18 11:59	6/13/18 5:33	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 5:33	ASB 100S
39108-34-4	8:2FTS	79 U, J, QC-3	ng/L	79	6/06/18 11:59	6/13/18 5:33	ASB 100S
754-91-6	FOSA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
13252-13-6	HFPO-DA	39 U	ng/L	39	6/06/18 11:59	6/14/18 2:18	ASB 100S
2355-31-9	N-MeFOSAA	79 U	ng/L	79	6/06/18 11:59	6/13/18 5:33	ASB 100S
375-22-4	PFBA	34 J, Q-2	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
375-73-5	PFBS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
335-76-2	PFDA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
307-55-1	PFDoA	79 U	ng/L	79	6/06/18 11:59	6/13/18 5:33	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 2:18	ASB 100S
375-85-9	PFHpA	53	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
375-92-8	PFHpS	39 U, J, QL-3	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
307-24-4	PFHxA	98	ng/L	79	6/06/18 11:59	6/13/18 5:33	ASB 100S
355-46-4	PFHxS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
375-95-1	PFNA	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
68259-12-1	PFNS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
335-67-1	PFOA	43	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
1763-23-1	PFOS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
2706-90-3	PFPeA	71	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
2706-91-4	PFPeS	39 U	ng/L	39	6/06/18 11:59	6/13/18 5:33	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 5:33	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 5:33	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B210000 DLP
Station ID: B210000 DLP
Lab ID: E182002-14
Matrix: Water

Date Collected: 5/9/18 12:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 5:55	ASB 100S
27619-97-2	6:2FTS	300 U, J, QS-3	ng/L	300	6/06/18 11:59	6/13/18 5:55	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3	ng/L	80	6/06/18 11:59	6/13/18 5:55	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/14/18 2:40	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 5:55	ASB 100S
375-22-4	PFBA	36 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 5:55	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 2:40	ASB 100S
375-85-9	PFHpA	38 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
307-24-4	PFHxA	110	ng/L	80	6/06/18 11:59	6/13/18 5:55	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
335-67-1	PFOA	41	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
2706-90-3	PFPeA	74	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 5:55	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 5:55	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 5:55	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: B4050000 **Lab ID:** E182002-15
Station ID: B4050000 **Matrix:** Water

Date Collected: 5/9/18 13:10

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:18	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 6:18	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3	ng/L	80	6/06/18 11:59	6/13/18 6:18	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/14/18 3:03	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:18	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:18	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 3:03	ASB 100S
375-85-9	PFHpA	24 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
307-24-4	PFHxA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:18	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
335-67-1	PFOA	32 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
2706-90-3	PFPeA	30 J, Q-2	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:18	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 6:18	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 6:18	ASB 100S

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Semi Volatile Organics

Project: 18-0408, Jordan Lake PFAS

Sample ID: Trip Blank - T
Lab ID: E182002-16
Station ID:
Matrix: Trip Blank - Water

Date Collected: 5/9/18 7:45

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:40	ASB 100S
27619-97-2	6:2FTS	300 U	ng/L	300	6/06/18 11:59	6/13/18 6:40	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-3	ng/L	80	6/06/18 11:59	6/13/18 6:40	ASB 100S
754-91-6	FOSA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
13252-13-6	HFPO-DA	40 U	ng/L	40	6/06/18 11:59	6/14/18 3:25	ASB 100S
2355-31-9	N-MeFOSAA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:40	ASB 100S
375-22-4	PFBA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
307-55-1	PFDoA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:40	ASB 100S
335-77-3	PFDS	160 U, J, QC-3	ng/L	160	6/06/18 11:59	6/14/18 3:25	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
375-92-8	PFHpS	40 U, J, QL-3	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
307-24-4	PFHxA	80 U	ng/L	80	6/06/18 11:59	6/13/18 6:40	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
375-95-1	PFNA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
68259-12-1	PFNS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	6/06/18 11:59	6/13/18 6:40	ASB 100S
72629-94-8	PFTrDA	160 U	ng/L	160	6/06/18 11:59	6/13/18 6:40	ASB 100S
2058-94-8	PFUdA	300 U	ng/L	300	6/06/18 11:59	6/13/18 6:40	ASB 100S

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806007 - SPFC										
Blank (1806007-BLK1)				Prepared & Analyzed: 06/12/18						
ASB 100S										
4:2FTS	U	80	ng/L							U
6:2FTS	U	300	"							QS-3, U
8:2FTS	U	80	"							QC-3, U
FOSA	U	40	"							U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	80	"							QS-3, U
PFBA	U	40	"							U
PFBS	U	40	"							U
PFDA	U	40	"							U
PFDoA	U	80	"							U
PFDS	U	160	"							QC-3, U
PFHpA	U	40	"							U
PFHpS	U	40	"							QL-3, U
PFHxA	U	80	"							U
PFHxS	U	40	"							U
PFNA	U	40	"							U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	160	"							U
PFUdA	U	300	"							U
Blank (1806007-BLK2)				Prepared & Analyzed: 06/12/18						
ASB 100S										
4:2FTS	U	80	ng/L							U
6:2FTS	U	300	"							U
8:2FTS	U	80	"							QC-3, U
FOSA	U	40	"							U
HFPO-DA	U	40	"							U
N-MeFOSAA	U	80	"							QS-3, U
PFBA	U	40	"							U
PFBS	U	40	"							U
PFDA	U	40	"							U
PFDoA	U	80	"							U
PFDS	U	160	"							QC-3, U
PFHpA	U	40	"							U
PFHpS	U	40	"							QL-3, U

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806007 - SPFC										
Blank (1806007-BLK2)				Prepared & Analyzed: 06/12/18						
PFHxA	U	80	ng/L							U
PFHxS	U	40	"							U
PFNA	U	40	"							U
PFNS	U	40	"							U
PFOA	U	40	"							U
PFOS	U	40	"							U
PFPeA	U	40	"							U
PFPeS	U	40	"							U
PFTrDA	U	160	"							U
PFUdA	U	300	"							U
LCS (1806007-BS1)				Prepared & Analyzed: 06/12/18						
ASB 100S										
4:2FTS	356	80	ng/L	374.00		95.2	70-130			
6:2FTS	271	300	"	380.00		71.3	70-130			J, Q-:
8:2FTS	361	80	"	384.00		94.0	70-130			QC-3
FOSA	467	40	"	400.00		117	70-130			
HFPO-DA	448	40	"	400.00		112	70-130			
N-MeFOSAA	516	80	"	400.00		129	70-130			
PFBA	379	40	"	400.00		94.7	70-130			
PFBS	290	40	"	354.00		81.8	70-130			
PFDA	461	40	"	400.00		115	70-130			
PFDoA	495	80	"	400.00		124	70-130			
PFDS	360	160	"	386.00		93.2	70-130			QC-3
PFHpA	399	40	"	400.00		99.7	70-130			
PFHpS	273	40	"	380.00		72.0	70-130			QL-3
PFHxA	412	80	"	400.00		103	70-130			
PFHxS	329	40	"	364.80		90.2	70-130			
PFNA	334	40	"	400.00		83.4	70-130			
PFNS	480	40	"	384.00		125	70-130			
PFOA	374	40	"	400.00		93.4	70-130			
PFOS	405	40	"	370.20		109	70-130			
PFPeA	377	40	"	400.00		94.2	70-130			
PFPeS	356	40	"	376.00		94.6	70-130			
PFTrDA	541	160	"	400.00		135	70-130			QL-2, QC-2
PFUdA	470	300	"	400.00		117	70-130			

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Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806007 - SPFC										
LCS Dup (1806007-BSD1)				Prepared & Analyzed: 06/12/18						
ASB 100S										
4:2FTS	372	80	ng/L	374.00		99.5	70-130	4.46	30	
6:2FTS	274	300	"	380.00		72.2	70-130	1.21	30	J, Q-2
8:2FTS	284	80	"	384.00		73.9	70-130	23.9	30	QC-3
FOSA	509	40	"	400.00		127	70-130	8.75	30	
HFPO-DA	376	40	"	400.00		94.1	70-130	17.4	30	
N-MeFOSAA	441	80	"	400.00		110	70-130	15.7	30	
PFBA	399	40	"	400.00		99.6	70-130	5.11	30	
PFBS	330	40	"	354.00		93.2	70-130	13.1	30	
PFDA	418	40	"	400.00		104	70-130	9.88	30	
PFDoA	510	80	"	400.00		128	70-130	3.10	30	
PFDS	394	160	"	386.00		102	70-130	9.14	30	QC-3
PFHpA	409	40	"	400.00		102	70-130	2.41	30	
PFHpS	374	40	"	380.00		98.4	70-130	31.0	30	QL-3
PFHxA	385	80	"	400.00		96.4	70-130	6.64	30	
PFHxS	349	40	"	364.80		95.6	70-130	5.87	30	
PFNA	354	40	"	400.00		88.6	70-130	5.97	30	
PFNS	379	40	"	384.00		98.7	70-130	23.5	30	
PFOA	355	40	"	400.00		88.8	70-130	5.03	30	
PFOS	362	40	"	370.20		97.8	70-130	11.1	30	
PFPeA	397	40	"	400.00		99.4	70-130	5.36	30	
PFPeS	363	40	"	376.00		96.6	70-130	2.15	30	
PFTrDA	519	160	"	400.00		130	70-130	4.23	30	QC-2
PFUdA	375	300	"	400.00		93.8	70-130	22.3	30	
Duplicate (1806007-DUP1)		**Source: E182002-01**		Prepared: 06/06/18 Analyzed: 06/13/18						
ASB 100S										
4:2FTS	U	78	ng/L		U				200	U
6:2FTS	U	290	"		U				200	U
8:2FTS	U	78	"		U				200	J, QC-3, U
FOSA	U	39	"		U				200	J, QS-3, U
HFPO-DA	U	39	"		U				200	U
N-MeFOSAA	U	78	"		U				200	U
PFBA	U	39	"		U				200	U
PFBS	U	39	"		U				200	U
PFDA	U	39	"		U				200	U
PFDoA	U	78	"		U				200	U
PFDS	U	160	"		U				200	J, QC-3, U

ED_002003J_00039117-00023

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806007 - SPFC										
Duplicate (1806007-DUP1)		**Source: E182002-01**		Prepared: 06/06/18 Analyzed: 06/13/18						
PFHpA	U	39	ng/L		U				200	U
PFHpS	U	39	"		U				200	J, QL-3 U
PFHxA	U	78	"		U				200	U
PFHxS	U	39	"		U				200	U
PFNA	U	39	"		U				200	U
PFNS	U	39	"		U				200	U
PFOA	U	39	"		U				200	U
PFOS	U	39	"		U				200	U
PFPeA	U	39	"		U				200	U
PFPeS	U	39	"		U				200	U
PFTrDA	U	160	"		U				200	U
PFUdA	U	290	"		U				200	U
MRL Verification (1806007-PS1)				Prepared: 06/12/18 Analyzed: 06/13/18						
ASB 100S										
FOSA	24.4	40	ng/L	39.920		61.2	50-150			J, Q-2 MRL-2
HFPO-DA	23.8	40	"	39.920		59.7	50-150			J, Q-2 MRL-2
N-MeFOSAA	34.0	80	"	39.920		85.3	50-150			J, MRL-2, Q-2
PFBA	54.2	40	"	39.920		136	50-150			MRL-2
PFBS	37.7	40	"	35.329		107	50-150			J, MRL-2, Q-2
PFDA	53.5	40	"	39.920		134	50-150			MRL-2
PFDoA	48.6	80	"	39.920		122	50-150			J, Q-2 MRL-2
PFHpA	44.0	40	"	39.920		110	50-150			MRL-2
PFHpS	39.8	40	"	37.924		105	50-150			J, Q-2 MRL-2
PFHxS	39.8	40	"	36.407		109	50-150			J, Q-2 MRL-2
PFNA	58.7	40	"	39.920		147	50-150			MRL-2
PFNS	45.4	40	"	38.323		119	50-150			MRL-2
PFOA	57.4	40	"	39.920		144	50-150			MRL-2
PFOS	38.7	40	"	36.946		105	50-150			J, Q-2 MRL-2
PFPeA	34.5	40	"	39.920		86.4	50-150			J, MRL-2, Q-2

ED_002003J_00039117-00024

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0408, Jordan Lake PFAS - Reported by Floyd Wellborn

Semi Volatile Organics (SVOA) - Quality Control

US-EPA, Region 4, SESD

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch 1806007 - SPFC										
MRL Verification (1806007-PS1)				Prepared: 06/12/18 Analyzed: 06/13/18						
PFPeS	32.3	40	ng/L	37.525		86.0	50-150			J, Q-2 MRL-2
MRL Verification (1806007-PS2)				Prepared: 06/12/18 Analyzed: 06/13/18						
ASB 100S										
4:2FTS	150	80	ng/L	149.30		101	50-150			MRL-2
6:2FTS	83.1	300	"	151.70		54.8	50-150			MRL-2, J, Q-2
8:2FTS	114	80	"	153.29		74.5	50-150			MRL-2, QC-3
FOSA	185	40	"	159.68		116	50-150			MRL-2
PFDS	187	160	"	154.09		121	50-150			MRL-2, QC-3
PFHxA	203	80	"	159.68		127	50-150			MRL-2
PFTrDA	299	160	"	159.68		187	50-150			MRL-2, QR-2, QC-2
PFUdA	273	300	"	159.68		171	50-150			J, MRL-2, QR-2, Q-2

Notes and Definitions for QC Samples

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
MRL-2	MRL verification for Non-Potable Water matrix
Q-2	Result greater than MDL but less than MRL.
QC-2	Analyte concentration high in continuing calibration verification standard
QC-3	Analyte calibration criteria not met
QL-2	Laboratory Control Spike Recovery greater than method control limits
QL-3	Laboratory Control Spike Precision outside method control limits
QR-2	MRL verification recovery greater than upper control limits.
QS-3	Surrogate recovery is lower than established control limits.

QUALIFIER	QualifierDefinitions
U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
Q-2	Result greater than MDL but less than MRL.
QC-3	Analyte calibration criteria not met
QL-3	Laboratory Control Spike Precision outside method control limits
QS-3	Surrogate recovery is lower than established control limits.

O Other qualifiers have been assigned providing additional information. These explanatory qualifiers are included in the printable pdf report and in other columns in the export files.

Laboratory ProjectNumber Project CLP_CaseNo R4DART_SiteCode R4DART_SiteName
LabSampleNumber SampleName Station CLP_MDNo CLP_DNo LabMatrix
ClientMatrix DateSampled DateReceived GeneralMethod AnalysisDescription
Prepared Analyzed Method Dissolved_Analysis TIC CASNumber
Analyte Result Qualifiers PrimaryQualifiers Units MRL

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 80 U
U ng/L 80

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 300 U
U ng/L 300

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 80 U,J,QC-
3,QS-3 U,J,O ng/L 80

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 80 U
U ng/L 80

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 80 U
U ng/L 80

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018

09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-01 CPF081A1C CPF081A1C Water Water 05/09/2018
09:15:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 82 U
U ng/L 82
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 310 U
U ng/L 310
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 82 U,J,QC-
3,QS-3 U,J,O ng/L 82
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 13252-13-6 HFPO-DA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 82 U
U ng/L 82
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018

06/13/2018 ASB 100S 307-55-1 PFDoA 82 U
U ng/L 82
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 41 U,J,QL-
3 U,J,O ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 82 U
U ng/L 82
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 41 U U
ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 41 U
U ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 41 U

U ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-02 CPF086C CPF086C Water Water 05/09/2018
09:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 310 U
U ng/L 310
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 79 U,J,QC-
3 U,J,O ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 19 J,Q-2 J,O
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-03 CPF086F CPF086F Water Water 05/09/2018
10:10:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 290 U
U ng/L 290
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 77 U,J,QC-
3 U,J,O ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 38 U U
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 23 J,Q-2 J,O
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 38 U U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018

11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 150 U,J,QC-3
U,J,O ng/L 150
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 28 J,Q-2
J,O ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 38 U,J,QL-
3 U,J,O ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 38 U
U ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 38 U U
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 38 U U
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 38 U U
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 38 U U
ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018

06/13/2018 ASB 100S 2706-90-3 PFPeA 21 J,Q-2
J,O ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 38 U
U ng/L 38
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 150 U
U ng/L 150
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-04 CPF087D CPF087D Water Water 05/09/2018
11:00:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 290 U
U ng/L 290
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 290 U
U ng/L 290
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 77 U,J,QC-
3,QS-3 U,J,O ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 13252-13-6 HFPO-DA 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 25 J,Q-2 J,O
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 39 U U

ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 77 U
U ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 150 U,J,QC-3
U,J,O ng/L 150
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 26 J,Q-2
J,O ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 39 U,J,QL-
3 U,J,O ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 35 J,Q-2
J,O ng/L 77
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 32 J,Q-2 J,O
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 39 U U
ng/L 39

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 32 J,Q-2
J,O ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 150 U
U ng/L 150
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-05 CPF089 CPF089 Water Water 05/09/2018
11:50:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 290 U
U ng/L 290
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 79 U,J,QC-
3 U,J,O ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
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U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018

01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-06 CPF055C CPF055C Water Water 05/09/2018
01:15:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 757124-72-4 4:2FTS
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 27619-97-2 6:2FTS
300 U U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 39108-34-4 8:2FTS
80 U,J,QC-3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 754-91-6 FOSA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
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PFAS 06/06/2018 06/14/2018 ASB 100S 13252-13-6 HFPO-
DA 40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
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MeFOSAA 80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics

PFAS 06/06/2018 06/13/2018 ASB 100S 375-22-4 PFBA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-73-5 PFBS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 335-76-2 PFDA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 307-55-1 PFDoA
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/14/2018 ASB 100S 335-77-3 PFDS
160 U,J,QC-3 U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-85-9 PFHpA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-92-8 PFHpS
40 U,J,QL-3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 307-24-4 PFHxA
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 355-46-4 PFHxS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-95-1 PFNA
40 U,J,QS-3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 68259-12-1 PFNS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 335-67-1 PFOA

40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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PFAS 06/06/2018 06/13/2018 ASB 100S 1763-23-1 PFOS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2706-90-3 PFPeA
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2706-91-4 PFPeS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 72629-94-8
PFTrDA 160 U U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-07 Trip Blank - B Water Trip Blank - Water
05/09/2018 03:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2058-94-8 PFUdA
300 U U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 757124-72-4 4:2FTS 78 U
U ng/L 78
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 290 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 78 U,J,QC-
3 U,J,O ng/L 78
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
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06/13/2018 ASB 100S 754-91-6 FOSA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
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U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 78 U
U ng/L 78

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 78 U
U ng/L 78
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 39 U,J,QL-
3 U,J,O ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 78 U
U ng/L 78
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 26 J,Q-2 J,O
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
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06/13/2018 ASB 100S 2706-91-4 PFPeS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
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06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-08 B3025000 B3025000 Water Water 05/09/2018
08:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 290 U
U ng/L 290
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 757124-72-4 4:2FTS 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 80 U,J,QC-
3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018

09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 160
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 307-55-1 PFDoA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 335-67-1 PFOA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
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06/13/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-09 B3660000 B3660000 Water Water 05/09/2018
09:20:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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09:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-11 B3900000 B3900000 Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-11 B3900000 B3900000 Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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J,O ng/L 41
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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06/13/2018 ASB 100S 2706-91-4 PFPeS 41 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 78 U,J,QC-
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018

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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 78 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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06/13/2018 ASB 100S 375-73-5 PFBS 39 U U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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06/13/2018 ASB 100S 335-76-2 PFDA 39 U U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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06/13/2018 ASB 100S 307-55-1 PFDoA 78 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 39 U
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 39 U,J,QL-
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-12 B3750000 B3750000 Water Water 05/09/2018
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E182002-12 B3750000 B3750000 Water Water 05/09/2018
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11:05:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
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11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 79 U,J,QC-
3 U,J,O ng/L 79

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 13252-13-6 HFPO-DA 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 34 J,Q-2 J,O
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 79 U
U ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 53
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 39 U,J,QL-
3 U,J,O ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 98
ng/L 79
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 43
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 39 U U
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 71
ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 39 U
U ng/L 39
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-13 B210000 B210000 Water Water 05/09/2018
11:55:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 27619-97-2 6:2FTS 300 U,J,QS-
3 U,J,O ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018

12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 36 J,Q-2 J,O
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 38 J,Q-2
J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018

06/13/2018 ASB 100S 307-24-4 PFHxA 110
ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-14 B210000 DUP B210000 DUP Water Water 05/09/2018
12:00:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
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US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 39108-34-4 8:2FTS 80 U,J,QC-
3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 754-91-6 FOSA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 13252-13-6 HFPO-DA 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2355-31-9 N-MeFOSAA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-22-4 PFBA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-73-5 PFBS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-76-2 PFDA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-55-1 PFDoA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/14/2018 ASB 100S 335-77-3 PFDS 160 U,J,QC-3
U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-85-9 PFHpA 24 J,Q-2
J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-92-8 PFHpS 40 U,J,QL-
3 U,J,O ng/L 40

US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 307-24-4 PFHxA 80 U
U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 355-46-4 PFHxS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 375-95-1 PFNA 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 68259-12-1 PFNS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 335-67-1 PFOA 32 J,Q-2 J,O
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 1763-23-1 PFOS 40 U U
ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-90-3 PFPeA 30 J,Q-2
J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2706-91-4 PFPeS 40 U
U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 72629-94-8 PFTrDA 160 U
U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-15 B4050000 B4050000 Water Water 05/09/2018
01:10:00 PM 05/15/2018 10:55:00 AM Semi Volatile Organics PFAS 06/06/2018
06/13/2018 ASB 100S 2058-94-8 PFUdA 300 U
U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 757124-72-4 4:2FTS
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR

E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 27619-97-2 6:2FTS
300 U U ng/L 300
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 39108-34-4 8:2FTS
80 U,J,QC-3 U,J,O ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 754-91-6 FOSA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/14/2018 ASB 100S 13252-13-6 HFPO-
DA 40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2355-31-9 N-
MeFOSAA 80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-22-4 PFBA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-73-5 PFBS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 335-76-2 PFDA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 307-55-1 PFDoA
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/14/2018 ASB 100S 335-77-3 PFDS
160 U,J,QC-3 U,J,O ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-85-9 PFHpA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water

05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-92-8 PFHpS
40 U,J,QL-3 U,J,O ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 307-24-4 PFHxA
80 U U ng/L 80
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 355-46-4 PFHxS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 375-95-1 PFNA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 68259-12-1 PFNS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 335-67-1 PFOA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 1763-23-1 PFOS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2706-90-3 PFPeA
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2706-91-4 PFPeS
40 U U ng/L 40
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 72629-94-8
PFTrDA 160 U U ng/L 160
US-EPA, Region 4, SESD 18-0408 Jordan Lake PFAS - FWELLBOR
E182002-16 Trip Blank - T Water Trip Blank - Water
05/09/2018 07:45:00 AM 05/15/2018 10:55:00 AM Semi Volatile Organics
PFAS 06/06/2018 06/13/2018 ASB 100S 2058-94-8 PFUdA
300 U U ng/L 300

#SYS_SAMPLE_CODE SAMPLE_NAME SAMPLE_MATRIX_CODE
SAMPLE_TYPE_CODE SAMPLE_SOURCE PARENT_SAMPLE_CODE
SAMPLE_DELIVERY_GROUP SAMPLE_DATE SAMPLE_TIME
SYS_LOC_CODE START_DEPTH END_DEPTH DEPTH_UNIT
CHAIN_OF_CUSTODY SENT_TO_LAB_DATE SAMPLE_RECEIPT_DATE
SAMPLER SAMPLING_COMPANY_CODE SAMPLING_REASON
SAMPLING_TECHNIQUE TASK_CODE TASK_TYPE COLLECTION_QUARTER
COMPOSITE_YN COMPOSITE_DESC SAMPLE_CLASS CUSTOM_FIELD_1
CUSTOM_FIELD_2 CUSTOM_FIELD_3 COMMENT SAMPLE_RECEIPT_TIME
R4-E182002-01 CPF081A1C N Field 18-0408 05/09/2018
09:15 CPF081A1C 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-02 CPF086C N Field 18-0408 05/09/2018
09:50 CPF086C 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-03 CPF086F N Field 18-0408 05/09/2018
10:10 CPF086F 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-04 CPF087D N Field 18-0408 05/09/2018
11:00 CPF087D 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-05 CPF089 N Field 18-0408 05/09/2018
11:50 CPF089 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-06 CPF055C N Field 18-0408 05/09/2018
13:15 CPF055C 05/15/2018 Smith, Joseph
PL-SESD 18-0033 N
10:55
R4-E182002-07 Trip Blank - B TW TW Field 18-0408 05/09/2018
15:00 05/15/2018 Smith, Joseph PL-
SESD 18-0033 N
10:55
R4-E182002-08 B3025000 N Field 18-0408 05/09/2018
08:45 B3025000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-09 B3660000 N Field 18-0408 05/09/2018
09:20 B3660000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-10 B3040000 N Field 18-0408 05/09/2018
09:55 B3040000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-11 B3900000 N Field 18-0408 05/09/2018
10:25 B3900000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-12 B3750000 N Field 18-0408 05/09/2018
11:05 B3750000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N

10:55
R4-E182002-13 B210000 N Field 18-0408 05/09/2018
11:55 B210000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-14 B210000 DUP N Field 18-0408 05/09/2018
12:00 B210000 DUP 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-15 B4050000 N Field 18-0408 05/09/2018
13:10 B4050000 05/15/2018 Thomas,
Zachary PL-SESD 18-0033 N
10:55
R4-E182002-16 Trip Blank - T TW TW Field 18-0408 05/09/2018
07:45 05/15/2018 Thomas, Zachary
PL-SESD 18-0033 N
10:55

#SYS_SAMPLE_CODE LAB_ANL_METHOD_NAME ANALYSIS_DATE
ANALYSIS_TIME TOTAL_OR_DISSOLVED COLUMN_NUMBER TEST_TYPE
CAS_RN CHEMICAL_NAME RESULT_VALUE RESULT_ERROR_DELTA
RESULT_TYPE_CODE REPORTABLE_RESULT DETECT_FLAG
LAB_QUALIFIERS VALIDATED_QUALIFIERS INTERPRETED_QUALIFIERS
ORGANIC_YN METHOD_DETECTION_LIMIT MINIMUM_REPORTING_LIMIT
QUANTITATION_LIMIT RESULT_UNIT MINIMUM_REPORTING_LIMIT_UNIT
TIC_RETENTION_TIME RESULT_COMMENT

R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 307-24-
4 PFHxA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L

R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3,QS-3 U,J,O
80 80 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 21:48 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-01 SVOA:ASB 100S 06/13/2018 21:48 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 1763-
23-1 PFOS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 2058-
94-8 PFUdA 310 TRG Yes N U U
310 310 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 2355-
31-9 N-MeFOSAA 82 TRG Yes N U U
82 82 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 2706-
90-3 PFPeA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 2706-
91-4 PFPeS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 27619-
97-2 6:2FTS 310 TRG Yes N U U
310 310 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 307-24-
4 PFHxA 82 TRG Yes N U U
82 82 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 307-55-
1 PFDoA 82 TRG Yes N U U
82 82 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 335-67-
1 PFOA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 335-76-
2 PFDA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 355-46-
4 PFHxS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 375-22-
4 PFBA 41 TRG Yes N U U 41

41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 375-73-
5 PFBS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 375-85-
9 PFHpA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 375-92-
8 PFHpS 41 TRG Yes N U,J,QL-3 U,J,O
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 375-95-
1 PFNA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 39108-
34-4 8:2FTS 82 TRG Yes N U,J,QC-3,QS-3 U,J,O
82 82 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 68259-
12-1 PFNS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 754-91-
6 FOSA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N 757124-
72-4 4:2FTS 82 TRG Yes N U U
82 82 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 22:11 N 13252-
13-6 HFPO-DA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-02 SVOA:ASB 100S 06/13/2018 22:11 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 2355-
31-9 N-MeFOSAA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 307-24-
4 PFHxA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 307-55-

1 PFDoA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 375-22-
4 PFBA 19 TRG Yes Y J,Q-2 J,O 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 39108-
34-4 8:2FTS 79 TRG Yes N U,J,QC-3 U,J,O
79 79 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N 757124-
72-4 4:2FTS 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 22:33 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-03 SVOA:ASB 100S 06/13/2018 22:33 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 1763-
23-1 PFOS 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 2058-
94-8 PFUdA 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 2355-
31-9 N-MeFOSAA 77 TRG Yes N U U
77 77 ng/L ng/L

R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 2706-
90-3 PFPeA 21 TRG Yes Y J,Q-2 J,O
38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 2706-
91-4 PFPeS 38 TRG Yes N U U
38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 27619-
97-2 6:2FTS 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 307-24-
4 PFHxA 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 307-55-
1 PFDoA 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 335-67-
1 PFOA 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 335-76-
2 PFDA 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 355-46-
4 PFHxS 38 TRG Yes N U U
38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 375-22-
4 PFBA 23 TRG Yes Y J,Q-2 J,O 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 375-73-
5 PFBS 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 375-85-
9 PFHpA 28 TRG Yes Y J,Q-2 J,O
38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 375-92-
8 PFHpS 38 TRG Yes N U,J,QL-3 U,J,O
38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 375-95-
1 PFNA 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 39108-
34-4 8:2FTS 77 TRG Yes N U,J,QC-3 U,J,O
77 77 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 68259-
12-1 PFNS 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 72629-
94-8 PFTrDA 150 TRG Yes N U U
150 150 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 754-91-
6 FOSA 38 TRG Yes N U U 38
38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N 757124-
72-4 4:2FTS 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 22:56 N 13252-
13-6 HFPO-DA 38 TRG Yes N U U

38 38 ng/L ng/L
R4-E182002-04 SVOA:ASB 100S 06/13/2018 22:56 N 335-77-
3 PFDS 150 TRG Yes N U,J,QC-3 U,J,O
150 150 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 1763-
23-1 PFOS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 2058-
94-8 PFUdA 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 2355-
31-9 N-MeFOSAA 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 2706-
90-3 PFPeA 32 TRG Yes Y J,Q-2 J,O
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 2706-
91-4 PFPeS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 27619-
97-2 6:2FTS 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 307-24-
4 PFHxA 35 TRG Yes Y J,Q-2 J,O
77 77 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 307-55-
1 PFDoA 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 335-67-
1 PFOA 32 TRG Yes Y J,Q-2 J,O 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 335-76-
2 PFDA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 355-46-
4 PFHxS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 375-22-
4 PFBA 25 TRG Yes Y J,Q-2 J,O 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 375-73-
5 PFBS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 375-85-
9 PFHpA 26 TRG Yes Y J,Q-2 J,O
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 375-92-
8 PFHpS 39 TRG Yes N U,J,QL-3 U,J,O
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 375-95-
1 PFNA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 39108-
34-4 8:2FTS 77 TRG Yes N U,J,QC-3,QS-3 U,J,O
77 77 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 68259-

12-1 PFNS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 72629-
94-8 PFTrDA 150 TRG Yes N U U
150 150 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 754-91-
6 FOSA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N 757124-
72-4 4:2FTS 77 TRG Yes N U U
77 77 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 23:18 N 13252-
13-6 HFPO-DA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-05 SVOA:ASB 100S 06/13/2018 23:18 N 335-77-
3 PFDS 150 TRG Yes N U,J,QC-3 U,J,O
150 150 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 1763-
23-1 PFOS 27 TRG Yes Y J,Q-2 J,O 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 2355-
31-9 N-MeFOSAA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 2706-
90-3 PFPeA 50 TRG Yes Y
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 307-24-
4 PFHxA 66 TRG Yes Y
79 79 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 307-55-
1 PFDoA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 335-67-
1 PFOA 32 TRG Yes Y J,Q-2 J,O 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L

R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 375-85-
9 PFHpA 57 TRG Yes Y
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 39108-
34-4 8:2FTS 79 TRG Yes N U,J,QC-3 U,J,O
79 79 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N 757124-
72-4 4:2FTS 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 23:41 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-06 SVOA:ASB 100S 06/13/2018 23:41 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 307-24-
4 PFHxA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 335-67-
1 PFOA 40 TRG Yes N U U 40

40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 375-95-
1 PFNA 40 TRG Yes N U,J,QS-3 U,J,O
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3 U,J,O
80 80 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/14/2018 00:03 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-07 SVOA:ASB 100S 06/14/2018 00:03 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 1763-
23-1 PFOS 26 TRG Yes Y J,Q-2 J,O 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 2058-
94-8 PFUdA 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 2355-
31-9 N-MeFOSAA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 2706-
90-3 PFPeA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 2706-

91-4 PFPeS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 27619-
97-2 6:2FTS 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 307-24-
4 PFHxA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 307-55-
1 PFDoA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 335-67-
1 PFOA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 335-76-
2 PFDA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 355-46-
4 PFHxS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 375-22-
4 PFBA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 375-73-
5 PFBS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 375-85-
9 PFHpA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 375-92-
8 PFHpS 39 TRG Yes N U,J,QL-3 U,J,O
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 375-95-
1 PFNA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 39108-
34-4 8:2FTS 78 TRG Yes N U,J,QC-3 U,J,O
78 78 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 68259-
12-1 PFNS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 754-91-
6 FOSA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N 757124-
72-4 4:2FTS 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/14/2018 00:25 N 13252-
13-6 HFPO-DA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-08 SVOA:ASB 100S 06/14/2018 00:25 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L

R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 2706-
90-3 PFPeA 45 TRG Yes Y
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 307-24-
4 PFHxA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 375-22-
4 PFBA 160 TRG Yes Y 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3 U,J,O
80 80 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 72629-
94-8 PFTrDA 160 TRG Yes N U U

160 160 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/14/2018 00:48 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-09 SVOA:ASB 100S 06/14/2018 00:48 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 1763-
23-1 PFOS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 2355-
31-9 N-MeFOSAA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 2706-
90-3 PFPeA 26 TRG Yes Y J,Q-2 J,O
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 2706-
91-4 PFPeS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 307-24-
4 PFHxA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 307-55-
1 PFDoA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 335-67-
1 PFOA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 335-76-
2 PFDA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 355-46-
4 PFHxS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 375-22-
4 PFBA 17 TRG Yes Y J,Q-2 J,O 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 375-73-
5 PFBS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 375-85-
9 PFHpA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 375-92-

8 PFHpS 41 TRG Yes N U,J,QL-3 U,J,O
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 375-95-
1 PFNA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 39108-
34-4 8:2FTS 81 TRG Yes N U,J,QC-3 U,J,O
81 81 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 68259-
12-1 PFNS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 754-91-
6 FOSA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N 757124-
72-4 4:2FTS 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/14/2018 01:10 N 13252-
13-6 HFPO-DA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-10 SVOA:ASB 100S 06/14/2018 01:10 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 1763-
23-1 PFOS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 2058-
94-8 PFUdA 310 TRG Yes N U U
310 310 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 2355-
31-9 N-MeFOSAA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 2706-
90-3 PFPeA 21 TRG Yes Y J,Q-2 J,O
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 2706-
91-4 PFPeS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 27619-
97-2 6:2FTS 310 TRG Yes N U U
310 310 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 307-24-
4 PFHxA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 307-55-
1 PFDoA 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 335-67-
1 PFOA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 335-76-
2 PFDA 41 TRG Yes N U U 41
41 ng/L ng/L

R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 355-46-
4 PFHxS 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 375-22-
4 PFBA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 375-73-
5 PFBS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 375-85-
9 PFHpA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 375-92-
8 PFHpS 41 TRG Yes N U,J,QL-3 U,J,O
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 375-95-
1 PFNA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 39108-
34-4 8:2FTS 81 TRG Yes N U,J,QC-3 U,J,O
81 81 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 68259-
12-1 PFNS 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 754-91-
6 FOSA 41 TRG Yes N U U 41
41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N 757124-
72-4 4:2FTS 81 TRG Yes N U U
81 81 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/14/2018 01:33 N 13252-
13-6 HFPO-DA 41 TRG Yes N U U
41 41 ng/L ng/L
R4-E182002-11 SVOA:ASB 100S 06/14/2018 01:33 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 1763-
23-1 PFOS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 2058-
94-8 PFUdA 290 TRG Yes N U U
290 290 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 2355-
31-9 N-MeFOSAA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 2706-
90-3 PFPeA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 2706-
91-4 PFPeS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 27619-
97-2 6:2FTS 290 TRG Yes N U U

290 290 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 307-24-
4 PFHxA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 307-55-
1 PFDoA 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 335-67-
1 PFOA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 335-76-
2 PFDA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 355-46-
4 PFHxS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 375-22-
4 PFBA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 375-73-
5 PFBS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 375-85-
9 PFHpA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 375-92-
8 PFHpS 39 TRG Yes N U,J,QL-3 U,J,O
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 375-95-
1 PFNA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 39108-
34-4 8:2FTS 78 TRG Yes N U,J,QC-3 U,J,O
78 78 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 68259-
12-1 PFNS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 754-91-
6 FOSA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N 757124-
72-4 4:2FTS 78 TRG Yes N U U
78 78 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/14/2018 01:55 N 13252-
13-6 HFPO-DA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-12 SVOA:ASB 100S 06/14/2018 01:55 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 1763-
23-1 PFOS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 2058-

94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 2355-
31-9 N-MeFOSAA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 2706-
90-3 PFPeA 71 TRG Yes Y
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 2706-
91-4 PFPeS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 307-24-
4 PFHxA 98 TRG Yes Y
79 79 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 307-55-
1 PFDoA 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 335-67-
1 PFOA 43 TRG Yes Y 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 335-76-
2 PFDA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 355-46-
4 PFHxS 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 375-22-
4 PFBA 34 TRG Yes Y J,Q-2 J,O 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 375-73-
5 PFBS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 375-85-
9 PFHpA 53 TRG Yes Y
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 375-92-
8 PFHpS 39 TRG Yes N U,J,QL-3 U,J,O
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 375-95-
1 PFNA 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 39108-
34-4 8:2FTS 79 TRG Yes N U,J,QC-3 U,J,O
79 79 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 68259-
12-1 PFNS 39 TRG Yes N U U 39
39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 754-91-
6 FOSA 39 TRG Yes N U U 39
39 ng/L ng/L

R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N 757124-
72-4 4:2FTS 79 TRG Yes N U U
79 79 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/14/2018 02:18 N 13252-
13-6 HFPO-DA 39 TRG Yes N U U
39 39 ng/L ng/L
R4-E182002-13 SVOA:ASB 100S 06/14/2018 02:18 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 2706-
90-3 PFPeA 74 TRG Yes Y
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 27619-
97-2 6:2FTS 300 TRG Yes N U,J,QS-3 U,J,O
300 300 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 307-24-
4 PFHxA 110 TRG Yes Y
80 80 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 335-67-
1 PFOA 41 TRG Yes Y 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 375-22-
4 PFBA 36 TRG Yes Y J,Q-2 J,O 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 375-85-
9 PFHpA 38 TRG Yes Y J,Q-2 J,O
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 375-95-
1 PFNA 40 TRG Yes N U U 40

40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3 U,J,O
80 80 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/14/2018 02:40 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-14 SVOA:ASB 100S 06/14/2018 02:40 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 2706-
90-3 PFPeA 30 TRG Yes Y J,Q-2 J,O
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 307-24-
4 PFHxA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 335-67-
1 PFOA 32 TRG Yes Y J,Q-2 J,O 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 375-22-

4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 375-85-
9 PFHpA 24 TRG Yes Y J,Q-2 J,O
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3 U,J,O
80 80 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/14/2018 03:03 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-15 SVOA:ASB 100S 06/14/2018 03:03 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 1763-
23-1 PFOS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 2058-
94-8 PFUdA 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 2355-
31-9 N-MeFOSAA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 2706-
90-3 PFPeA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 2706-
91-4 PFPeS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 27619-
97-2 6:2FTS 300 TRG Yes N U U
300 300 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 307-24-
4 PFHxA 80 TRG Yes N U U
80 80 ng/L ng/L

R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 307-55-
1 PFDoA 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 335-67-
1 PFOA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 335-76-
2 PFDA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 355-46-
4 PFHxS 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 375-22-
4 PFBA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 375-73-
5 PFBS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 375-85-
9 PFHpA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 375-92-
8 PFHpS 40 TRG Yes N U,J,QL-3 U,J,O
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 375-95-
1 PFNA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 39108-
34-4 8:2FTS 80 TRG Yes N U,J,QC-3 U,J,O
80 80 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 68259-
12-1 PFNS 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 72629-
94-8 PFTrDA 160 TRG Yes N U U
160 160 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 754-91-
6 FOSA 40 TRG Yes N U U 40
40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N 757124-
72-4 4:2FTS 80 TRG Yes N U U
80 80 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/14/2018 03:25 N 13252-
13-6 HFPO-DA 40 TRG Yes N U U
40 40 ng/L ng/L
R4-E182002-16 SVOA:ASB 100S 06/14/2018 03:25 N 335-77-
3 PFDS 160 TRG Yes N U,J,QC-3 U,J,O
160 160 ng/L ng/L

#SYS_SAMPLE_CODE LAB_ANL_METHOD_NAME ANALYSIS_DATE
ANALYSIS_TIME TOTAL_OR_DISSOLVED COLUMN_NUMBER TEST_TYPE
LAB_MATRIX_CODE ANALYSIS_LOCATION BASIS CONTAINER_ID
DILUTION_FACTOR LAB_PREP_METHOD_NAME PREP_DATE PREP_TIME
LEACHATE_METHOD LEACHATE_DATE LEACHATE_TIME LAB_NAME_CODE
QC_LEVEL LAB_SAMPLE_ID PERCENT_MOISTURE
SUBSAMPLE_AMOUNT SUBSAMPLE_AMOUNT_UNIT ANALYST_NAME
INSTRUMENT_ID COMMENT PRESERVATIVE FINAL_VOLUME
FINAL_VOLUME_UNIT

R4-E182002-01 SVOA:ASB 100S 06/13/2018 01:03 N Water
LB NA R4-SESD
R4E E182002-01
R4-E182002-01 SVOA:ASB 100S 06/13/2018 21:48 N Water
LB NA R4-SESD
R4E E182002-01
R4-E182002-02 SVOA:ASB 100S 06/13/2018 01:26 N Water
LB NA R4-SESD
R4E E182002-02
R4-E182002-02 SVOA:ASB 100S 06/13/2018 22:11 N Water
LB NA R4-SESD
R4E E182002-02
R4-E182002-03 SVOA:ASB 100S 06/13/2018 01:48 N Water
LB NA R4-SESD
R4E E182002-03
R4-E182002-03 SVOA:ASB 100S 06/13/2018 22:33 N Water
LB NA R4-SESD
R4E E182002-03
R4-E182002-04 SVOA:ASB 100S 06/13/2018 02:11 N Water
LB NA R4-SESD
R4E E182002-04
R4-E182002-04 SVOA:ASB 100S 06/13/2018 22:56 N Water
LB NA R4-SESD
R4E E182002-04
R4-E182002-05 SVOA:ASB 100S 06/13/2018 02:33 N Water
LB NA R4-SESD
R4E E182002-05
R4-E182002-05 SVOA:ASB 100S 06/13/2018 23:18 N Water
LB NA R4-SESD
R4E E182002-05
R4-E182002-06 SVOA:ASB 100S 06/13/2018 02:56 N Water
LB NA R4-SESD
R4E E182002-06
R4-E182002-06 SVOA:ASB 100S 06/13/2018 23:41 N Water
LB NA R4-SESD
R4E E182002-06
R4-E182002-07 SVOA:ASB 100S 06/13/2018 03:18 N Water
LB NA R4-SESD
R4E E182002-07
R4-E182002-07 SVOA:ASB 100S 06/14/2018 00:03 N Water
LB NA R4-SESD
R4E E182002-07
R4-E182002-08 SVOA:ASB 100S 06/13/2018 03:41 N Water
LB NA R4-SESD
R4E E182002-08
R4-E182002-08 SVOA:ASB 100S 06/14/2018 00:25 N Water
LB NA R4-SESD

R4E E182002-08
R4-E182002-09 SVOA:ASB 100S 06/13/2018 04:03 N Water
LB NA R4-SESD
R4E E182002-09
R4-E182002-09 SVOA:ASB 100S 06/14/2018 00:48 N Water
LB NA R4-SESD
R4E E182002-09
R4-E182002-10 SVOA:ASB 100S 06/13/2018 04:25 N Water
LB NA R4-SESD
R4E E182002-10
R4-E182002-10 SVOA:ASB 100S 06/14/2018 01:10 N Water
LB NA R4-SESD
R4E E182002-10
R4-E182002-11 SVOA:ASB 100S 06/13/2018 04:48 N Water
LB NA R4-SESD
R4E E182002-11
R4-E182002-11 SVOA:ASB 100S 06/14/2018 01:33 N Water
LB NA R4-SESD
R4E E182002-11
R4-E182002-12 SVOA:ASB 100S 06/13/2018 05:10 N Water
LB NA R4-SESD
R4E E182002-12
R4-E182002-12 SVOA:ASB 100S 06/14/2018 01:55 N Water
LB NA R4-SESD
R4E E182002-12
R4-E182002-13 SVOA:ASB 100S 06/13/2018 05:33 N Water
LB NA R4-SESD
R4E E182002-13
R4-E182002-13 SVOA:ASB 100S 06/14/2018 02:18 N Water
LB NA R4-SESD
R4E E182002-13
R4-E182002-14 SVOA:ASB 100S 06/13/2018 05:55 N Water
LB NA R4-SESD
R4E E182002-14
R4-E182002-14 SVOA:ASB 100S 06/14/2018 02:40 N Water
LB NA R4-SESD
R4E E182002-14
R4-E182002-15 SVOA:ASB 100S 06/13/2018 06:18 N Water
LB NA R4-SESD
R4E E182002-15
R4-E182002-15 SVOA:ASB 100S 06/14/2018 03:03 N Water
LB NA R4-SESD
R4E E182002-15
R4-E182002-16 SVOA:ASB 100S 06/13/2018 06:40 N Water
LB NA R4-SESD
R4E E182002-16
R4-E182002-16 SVOA:ASB 100S 06/14/2018 03:25 N Water
LB NA R4-SESD
R4E E182002-16

FILENAME: READTHIS.TXT - last revision November 2, 2006
Region 4 LIMS DATA EXPORT

Please consult your local Computer Support services
if you have problems utilizing these files.

If you have questions concerning the analytical results,
contact Region 4 LIMS support by email at r4lims@epa.gov
or contact the analyst listed on the transmittal memo and email.

The files included in the zip archive may vary depending
on needs. However, at a minimum, the following files
will be included:

ReadThis.txt
This file - the file you're reading now.

R4Export.txt
A tab delimited ASCII text file that contains sample
and analytical information for the reported dataset.
The first row contains column headers that have been
named to provide a reasonable explanation as to the
type of data contained in the particular column.

QualifierDefinitions.txt
A tab delimited ASCII text file that contains the list
of qualifiers and their definitions used in this dataset.

ReportNarrative.txt
An optional ASCII text file containing further information
about the samples and/or analytical results.
Not all datasets will include this file.

EPAR4_FSAMPLE_v1.txt
A tab delimited ASCII text file containing sample information
for use with the Region 4 D.A.R.T. system.

EPAR4_RES_v1.txt
A tab delimited ASCII text file containing results information
for use with the Region 4 D.A.R.T. system.

EPAR4_TST_v1.txt
A tab delimited ASCII text file containing test information
for use with the Region 4 D.A.R.T. system.

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system is expressly designed for environmental data. It
provides tools for Region 4 personnel to assist in the
acquisition and tracking of data, and includes a user
interface that allows for easy retrieval of data in
several formats. It also allows for advanced usage of the
data by integrating seamlessly with a variety of
commercially available software programs.

Files designated for use with the Region 4 D.A.R.T. system
have been formatted specifically for the Region 4 D.A.R.T.
database system, and are not generally useful for purposes
outside of that system.

For more information about the Region 4 D.A.R.T. system,
send an email message to R4DART@epa.gov

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To: Wellborn, Floyd[Wellborn.Floyd@epa.gov]
Cc: R4SampleCustody[R4SampleCustody@epa.gov]; Monell, Carol[Monell.Carol@epa.gov]; Sivertsen, Scott[Sivertsen.Scott@epa.gov]; linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Banister, Beverly[Banister.Beverly@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Toney, Anthony[Toney.Anthony@epa.gov]; Bookman, Robert[Bookman.Robert@epa.gov]; George, Verne[George.Verne@epa.gov]; Walker, Mary[walker.mary@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Campbell-Dunbar, Shawneille[Campbell-Dunbar.Shawneille@epa.gov]; Hall, Renea[Hall.Renea@epa.gov]; Davis, Molly[Davis.Molly@epa.gov]; Moyer, Adam[moyer.adam@epa.gov]; Doa, Maria[Doa.Maria@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Morris, Eric B[eric.morris@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; julie.woosley@ncdenr.gov[julie.woosley@ncdenr.gov]; michael.scott@ncdenr.gov[michael.scott@ncdenr.gov]; sandy.mort@ncdenr.gov[sandy.mort@ncdenr.gov]; Wellborn, Floyd[Wellborn.Floyd@epa.gov]; France, Danny[France.Danny@epa.gov]
From: R4SampleCustody@epa.gov
Sent: Sat 6/16/2018 2:46:16 AM
Subject: R4 LIMS Sample Log for Project 18-0514, WorkOrder E182416
E182416 WKO 06 15 18 0944.pdf
E182416_COC_01.pdf

Attached is a detailed work order report, in Adobe Acrobat PDF format, containing information about samples and their scheduled analyses for the following Project:

Project Number: 18-0514
Project Name: Chemours - rain water
City: Wilmington **State:** NC

Samples in the following categories have been submitted for analysis:
Semi Volatile Organics (SVOA)

Please review the attached report and notify our Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov if you have any questions, concerns, or if you notice any errors.

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WORK ORDER

Printed: 6/15/2018 9:45:03A

E182416

US-EPA, Region 4, SESD

Client:	Drinking Water (201H53, 000H53)	Project Number	18-0514
Project	Chemours - rain water - FWELLBOR	Acct #/ Location:	000H53 Wilmington NC

Project Leader	Willborn, Floyd	Date Due:	07/19/18 (35 day TAT)
Received By:	Beall, Mike	Date Received:	06/14/18 11:00
Logged In By:	Beall, Mike	Date Logged In:	06/15/18 09:30

Samples Received at 0.8°C	Placed in Cooler after Ice Removed: YES	SMART Project ID 18-0033
Custody Seals:	Sample Containers Intact: Yes	Program/Activity:
Custody Seals Intact:	Samples &COC Match: Yes	Site/Waterbody : ()
COC Present: Yes	COC/Labels Agree: Yes	
Ice in Cooler: Yes	All Analyses on COC: Yes	

Analysis	Due	TAT	Expires	Comments
E182416-01 060518-02 / 060518-02 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-02 060518-19 / 060518-19 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-03 W060518-21 / W060518-21 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-04 D060518-21 / D060518-21 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-05 060518-24 / 060518-24 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-06 W060518-25 / W060518-25 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-07 D060518-25 / D060518-25 [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-08 060518 MB / 060518 MB [Water / Water] Sampled 06/12/18 00:00				
A = 15 mL Plastic *B = 15 mL Plastic*				
PFAS-Full List	07/19/18 00:00	35	07/10/18 00:00	
E182416-09 TB061318-00 / [Water / Trip Blank - Water] Sampled 06/13/18 00:00				
A = 15 mL Plastic				
PFAS-Full List	07/19/18 00:00	35	07/11/18 00:00	

E182416

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182416
18-0514

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-01	01476A ✓	060518-02	6-12-18		KAREN CLEVENGER	WATER	GenX/PFAS
-01	01477B ✓	↓	↓		↓	↓	GenX/PFAS
-02	01478A ✓	060518-19	6-12-18		↓	↓	GenX/PFAS
-02	01479B ✓	↓	↓		↓	↓	GenX/PFAS
-03	01480A ✓	~~W0~~ NM W060518-21	6-12-18		↓	↓	GenX/PFAS
-03	01481B ✓	↓	↓		↓	↓	GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhavmik	Chaitali Bhavmik	6/13/18	15:15	RM BEALL	RMBeall EPA SESD ASB	6-14-18	1100
NATHAN MILLER	[signature]	6/13/18	15:15				

E182416

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182416
18-0514

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-04	01682 A	D060518-21	6-12-18		KAREN CLEVENGER	WATER	GenX/PFAS
-04	01683B	↓	↓		↓	↓	GenX/PFAS
-05	01684A	060518-24	6-12-18		↓	↓	GenX/PFAS
-05	01685B	↓	↓		↓	↓	GenX/PFAS
-06	01686A	W 060518-25	6-12-18		↓	↓	GenX/PFAS
-06	01687B	↓	↓		↓	↓	GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhaumik	Chaitali Bhaumik	6/13/18	15:15	RMBEALL	RMBeall EAD SESD ASB	6-14-18	1100
NATHAN MILLER	[illegible]	6/13/18	15:15				

E182416

North Carolina Department of Environmental Quality
Division of Air Quality, Ambient Monitoring Section
Sample Chain of Custody Form for EPA Lab

E182416

18-0514

Investigation Name: Emerging Contaminants in Rainwater	Phone No: 919-733-9777
Agency: NC Division of Air Quality	Fax No: 919-715-0890
Address: 4403 Reedy Creek Rd	Date Submitted:
City/County: Raleigh/Wake	Requested By
State: NC	Name (Print)
Zip Code: 27607	Signature

	EPA Vial #	Sample Site	Date Sampled	Time Sampled	Collected By: (Print Name)	Sample Type (air, water, etc.)	Analysis Requested
-07	01688A	D060518-25	6-12-18		KAREN CLEVENGER	WATER	GenX/PFAS
-07	01689B	↓	↓		↓	↓	GenX/PFAS
-08	01690A	060518 MB	6-12-18		↓	↓	GenX/PFAS
-08	01691B	↓	↓		↓	↓	GenX/PFAS
-09	01697A	TB061318-00	6-13-18		Chaitali Bhaumik	↓	GenX/PFAS
							GenX/PFAS

Comments:

Relinquished By:				Relinquished To:			
Print Name	Signature	Date	Time	Print Name	Signature	Date	Time
Chaitali Bhaumik	Chaitali Bhaumik	6/13/18	15:15	R.M BEALL	R.M Beall EPA SESD ASB	6-14-18	1100
NATHAN MILLER	[illegible]	6/13/18	15:15				

To: Wellborn, Floyd[Wellborn.Floyd@epa.gov]
Cc: Monell, Carol[Monell.Carol@epa.gov]; Sivertsen, Scott[Sivertsen.Scott@epa.gov]; linda.culpepper@ncdenr.gov[linda.culpepper@ncdenr.gov]; Jones, Aaryn[Jones.Aaryn@epa.gov]; Banister, Beverly[Banister.Beverly@epa.gov]; Kemker, Carol[Kemker.Carol@epa.gov]; Mitchell, Ken[Mitchell.Ken@epa.gov]; Toney, Anthony[Toney.Anthony@epa.gov]; Bookman, Robert[Bookman.Robert@epa.gov]; George, Verne[George.Verne@epa.gov]; Walker, Mary[walker.mary@epa.gov]; Allenbach, Becky[Allenbach.Becky@epa.gov]; Campbell-Dunbar, Shawneille[Campbell-Dunbar.Shawneille@epa.gov]; Hall, Renea[Hall.Renea@epa.gov]; Davis, Molly[Davis.Molly@epa.gov]; Moyer, Adam[moyer.adam@epa.gov]; Doa, Maria[Doa.Maria@epa.gov]; James Bowyer[jim.bowyer@ncdenr.gov]; Michael Pjetraj[michael.pjetraj@ncdenr.gov]; Morris, Eric B[eric.morris@ncdenr.gov]; Bud.mccarty@ncdenr.gov[Bud.mccarty@ncdenr.gov]; julie.woosley@ncdenr.gov[julie.woosley@ncdenr.gov]; michael.scott@ncdenr.gov[michael.scott@ncdenr.gov]; sandy.mort@ncdenr.gov[sandy.mort@ncdenr.gov]; Burdette, Diana[Burdette.Diana@epa.gov]; Wellborn, Floyd[Wellborn.Floyd@epa.gov]; France, Danny[France.Danny@epa.gov]
From: R4LIMS@epa.gov
Sent: Fri 6/15/2018 2:45:32 AM
Subject: R4 LIMS Results: Project 18-0423, E181904 SVOA 06 14 18 1551
E181904 SVOA FINAL 06 14 18 1551.PDF
E181904 SVOA FINAL 06 14 18 1551 - 18-0423 - 06-14-2018..Dat

On Thursday, June 14, 2018, results for the following were released by the Region 4 Laboratory:

Analyses:
Semi Volatile Organics (SVOA)

Project Number: 18-0423
Project Name: Chemours - rain water
City: Wilmington **State:** NC

These results were reported by:
Diana Burdette (E-mail: Burdette.Diana@epa.gov)
If you have questions concerning the laboratory results, please feel free to contact the laboratory personnel shown above as having reported the data. We also encourage you to provide feedback to the Region 4 laboratory by filling out our online (*EPA internal network only*) Customer Survey Form.

These results are for the following Sample Type(s):
Water
Water (Trip Blank - Water)

PDF DATA RESULTS REPORT FILE ATTACHMENT:
An Adobe Acrobat PDF file is attached to this message that contains final results for the analyses as indicated in the data report.

DATA EXPORT FILE ATTACHMENT:
If attached, data export files will be tab delimited ASCII text files contained in a file that has been formatted using the ZIP archiving format (.Dat extension). Please consult your local computer support personnel if you have problems extracting these files. If you have questions about the data file formats and the information contained in these files, or if you would like to request export files for previously reported data, use the contact information shown below to contact the appropriate person with your concerns. To generate export files for previously reported data we'll need the name of the PDF report file that was attached to the original transmittal message.

For questions concerning this message and attachments, or any other LIMS or data reporting issues, please call the SESD PC Hotline at 706-355-8825 or send an email to r4lims@epa.gov.

SAMPLE DISPOSAL POLICY:
Due to limited space for long term sample storage, ASB's policy is to dispose of samples on a periodic schedule. Air samples collected in summa canisters will be disposed of 30 days following the issuance of this report. All other sample media including original samples, sample extracts and or digestates will be disposed

of, in accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the laboratory is notified by the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If samples require storage beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at R4SampleCustody@epa.gov.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0423, Chemours - rain water - Reported by Diana Burdette

June 14, 2018

4SESD-ASB

MEMORANDUM

SUBJECT: FINAL Analytical Report
Project: 18-0423, Chemours - rain water
Drinking Water

FROM: Diana Burdette
OCS Analyst

THRU: Floyd Wellborn, Chief
ASB Organic Chemistry Section

TO: Floyd Wellborn

Attached are the final results for the analytical groups listed below. These analyses were accordance with the Analytical Support Branch Laboratory Operations and Quality Assurance Manual (ASB LOQAM) found at www.epa.gov/region4/sesd/asbsop. Any unique project data quality obj specified in writing by the data requestor have also been incorporated into the data unless Report Narrative. Chemistry data have been verified based on the ASB LOQAM specifications and hav qualified by this laboratory if the applicable quality control criteria were not met. Verification is defined in Section 5.2 of the ASB LOQAM. For a listing of specific data qualifiers and explanations, please Data Qualifier Definitions included in this report. The reported results are accurate withi method(s) and are representative only of the samples as received by the laboratory.

Analyses Included in this report:	Method Used:	Accreditations:
Semi Volatile Organics (SVOA)		
PFAS	ASB 100S (Water)	

ED_002003J_00039128-00001

Sample Disposal Policy

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Air samples collected in summa canisters will be disposed of 30 days following the issuance
other sample media including original samples, sample extracts and or digestates will be di
accordance with applicable regulations, 60 days from the date of this report.

This sample disposal policy does not apply to criminal samples which are held until the labo
the criminal investigators that case development and litigation are complete.

These samples may be held in the laboratory's custody for a longer period of time. If sample
beyond the 60-day period, please contact the Sample Control Coordinator by e-mail at
R4SampleCustody@epa.gov

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0423, Chemours - rain water - Reported by Diana Burdette

SAMPLES INCLUDED IN THIS REPORT

Project: 18-0423, Chemours - rain water

Sample ID	Laboratory ID	Matrix	Date Collected	Date Received
050118-02A	E181904-01	Water	5/1/18 00:00	5/10/18 10:4
W050118-21	E181904-02	Water	5/1/18 00:00	5/10/18 10:4
D050118-21	E181904-03	Water	5/1/18 00:00	5/10/18 10:4
050118-24B	E181904-04	Water	5/1/18 00:00	5/10/18 10:4
W050118-25	E181904-05	Water	5/1/18 00:00	5/10/18 10:4
D050118-25	E181904-06	Water	5/1/18 00:00	5/10/18 10:4
050118 MB	E181904-07	Water	5/1/18 00:00	5/10/18 10:4
TB050118-00	E181904-08	Trip Blank - Water	5/9/18 00:00	5/10/18 10:4

ED_002003J_00039128-00003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0423, Chemours - rain water - Reported by Diana Burdette

DATA QUALIFIER DEFINITIONS

U	The analyte was not detected at or above the reporting limit.
J	The identification of the analyte is acceptable; the reported value is an estimate.
QC-3	Analyte calibration criteria not met
QC-5	Calibration check standard less than method control limits.
QL-1	Laboratory Control Spike Recovery less than method control limits
QL-3	Laboratory Control Spike Precision outside method control limits
QS-3	Surrogate recovery is lower than established control limits.

ACRONYMS AND ABBREVIATIONS

CAS Chemical Abstracts Service

Note: Analytes with no known CAS identifiers have been assigned codes beginning with "E", by the EPA Substance Registry System (www.epa.gov/srs), or beginning with "R4-" identifier assigned by the EPA Region 4 laboratory.

MDL Method Detection Limit - The minimum concentration of a substance (an analyte) that can be measured reported with a 99% confidence that the analyte concentration is greater than zero.

MRL Minimum Reporting Limit - Analyte concentration that corresponds to the lowest demonstrated level of quantitation. The MRL is sample specific and accounts for preparation weights and volumes, dilutions, and moisture content of soil/sediments.

TIC Tentatively Identified Compound - An analyte identified based on a match with the instrument software's mass spectral library. A calibration standard has not been analyzed to confirm the compound or the estimated concentration reported.

ACCREDITATIONS:

ISO ASB is accredited by ISO/IEC 17025, including an amplification for forensic accreditation through ANSI National Accreditation Board

Refer to the certificate and scope of accreditation AT http://www.epa.gov/aboutepa/about-region-4s-science-and-ecosystem-support-division-sesd

NR The EPA Region 4 Laboratory has not requested accreditation for this test.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0423, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0423, Chemours - rain water

Sample ID: 050118-02A **Lab ID:** E181904-01
Station ID: 050118-02A **Matrix:** Water

Date Collected: 5/1/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
27619-97-2	6:2FTS	80 U	ng/L	80	5/22/18 15:20	6/05/18 19:05	ASB 100S
39108-34-4	8:2FTS	80 U, J, QC-5	ng/L	80	5/22/18 15:20	6/05/18 19:05	ASB 100S
754-91-6	FOSA	40 U, J, QL-3	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
13252-13-6	HFPO-DA	570	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
2355-31-9	N-MeFOSAA	40 U, J, QC-3, QL-3	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
375-22-4	PFBA	80 U	ng/L	80	5/22/18 15:20	6/05/18 19:05	ASB 100S
375-73-5	PFBS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
335-76-2	PFDA	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
307-55-1	PFDoA	160 U	ng/L	160	5/22/18 15:20	6/05/18 19:05	ASB 100S
335-77-3	PFDS	40 U, J, QC-3	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
375-85-9	PFHpA	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
375-92-8	PFHpS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
307-24-4	PFHxA	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
355-46-4	PFHxS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
375-95-1	PFNA	160 U, J, QL-3	ng/L	160	5/22/18 15:20	6/05/18 19:05	ASB 100S
68259-12-1	PFNS	160 U	ng/L	160	5/22/18 15:20	6/05/18 19:05	ASB 100S
335-67-1	PFOA	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
1763-23-1	PFOS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
2706-90-3	PFPeA	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
2706-91-4	PFPeS	40 U	ng/L	40	5/22/18 15:20	6/05/18 19:05	ASB 100S
72629-94-8	PFTrDA	80 U, J, QC-5, QL-3	ng/L	80	5/22/18 15:20	6/05/18 19:05	ASB 100S
2058-94-8	PFUdA	80 U, J, QC-3, QC-5, QL-1	ng/L	80	5/22/18 15:20	6/05/18 19:05	ASB 100S

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 4 Science and Ecosystem Support Division
980 College Station Road, Athens, Georgia 30605-2700
D.A.R.T. Id: 18-0033
Project: 18-0423, Chemours - rain water - Reported by Diana Burdette

Semi Volatile Organics

Project: 18-0423, Chemours - rain water

Sample ID: W50118-21 **Lab ID:** E181904-02

Station ID: W50118-21 **Matrix:** Water

Date Collected: 5/1/18 0:00

CAS Number	Analyte	Results Qualifiers	Units	MRL	Prepared	Analyzed	Method
757124-72-4	4:2FTS	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
27619-97-2	6:2FTS	82 U	ng/L	82	5/22/18 15:20	6/05/18 19:28	ASB 100S
39108-34-4	8:2FTS	82 U, J, QC-5	ng/L	82	5/22/18 15:20	6/05/18 19:28	ASB 100S
754-91-6	FOSA	41 U, J, QL-3	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
13252-13-6	HFPO-DA	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
2355-31-9	N-MeFOSAA	41 U, J, QC-3, QL-3	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
375-22-4	PFBA	82 U	ng/L	82	5/22/18 15:20	6/05/18 19:28	ASB 100S
375-73-5	PFBS	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
335-76-2	PFDA	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
307-55-1	PFDoA	160 U	ng/L	160	5/22/18 15:20	6/05/18 19:28	ASB 100S
335-77-3	PFDS	41 U, J, QC-3	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
375-85-9	PFHpA	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
375-92-8	PFHpS	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
307-24-4	PFHxA	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
355-46-4	PFHxS	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
375-95-1	PFNA	160 U, J, QL-3	ng/L	160	5/22/18 15:20	6/05/18 19:28	ASB 100S
68259-12-1	PFNS	160 U	ng/L	160	5/22/18 15:20	6/05/18 19:28	ASB 100S
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2706-90-3	PFPeA	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
2706-91-4	PFPeS	41 U	ng/L	41	5/22/18 15:20	6/05/18 19:28	ASB 100S
72629-94-8	PFTrDA	82 U, J, QC-5, QL-3	ng/L	82	5/22/18 15:20	6/05/18 19:28	ASB 100S
2058-94-8	PFUdA	82 U, J, QC-3, QC-5, QL-1	ng/L	82	5/22/18 15:20	6/05/18 19:28	ASB 100S