

The PFAS Journey

NC Pretreatment Consortium

September 18, 2023

Bob Patterson, PE

Water Resources Director



Water Resources

CITY OF BURLINGTON

CITY OF BURLINGTON

Water Resources Department

1302 Belmont Street - (336) 222-5133

<http://burlingtonnc.gov/56/Water-Resources>



Bob Patterson, PE
Water Resources Director

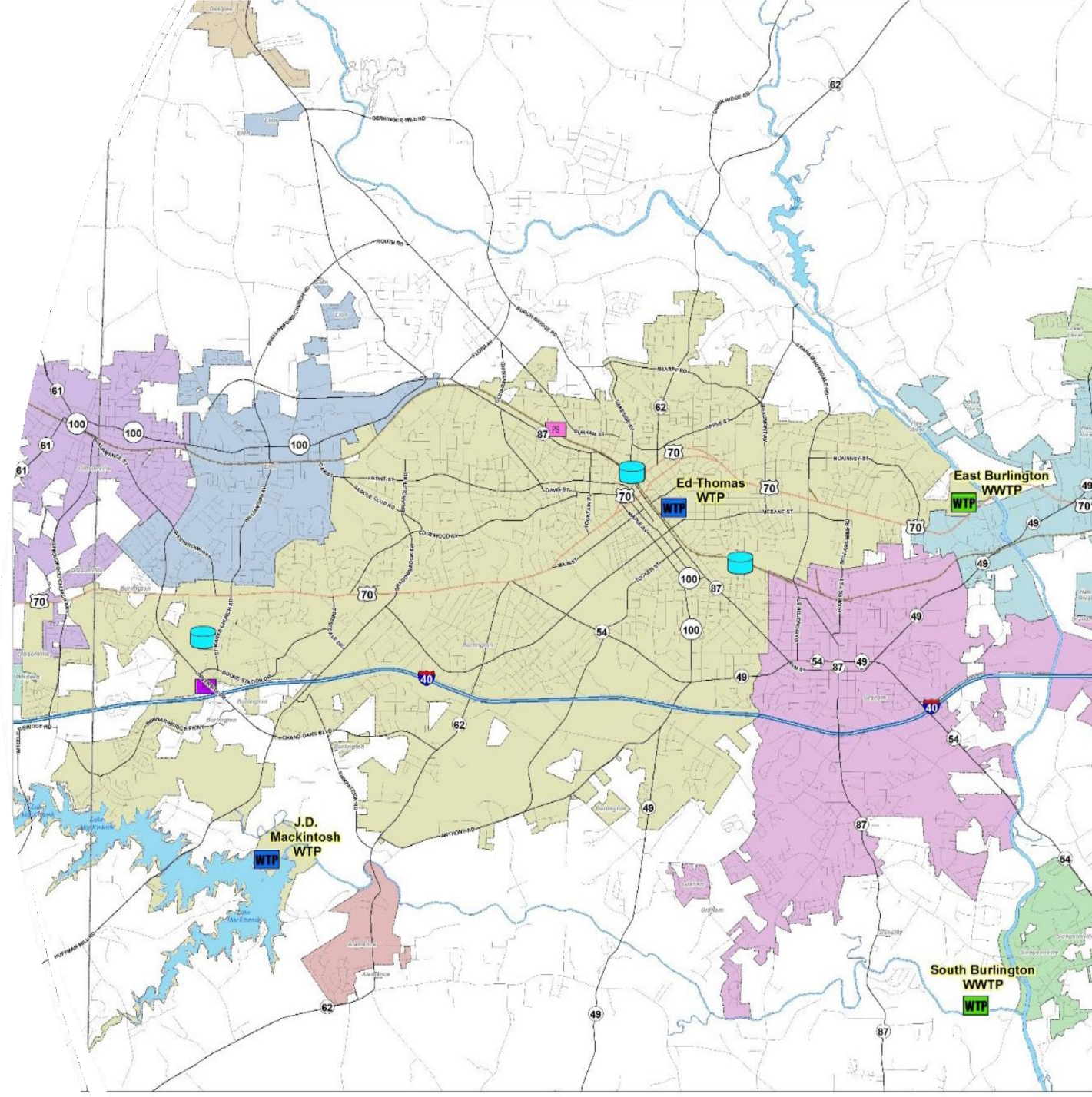
Sharon Wagoner
Lab Services Manager

Kristy King
Pretreatment Compliance Specialist



Service Area and Facilities Map

- Municipal water/sewer customers:
- Greensboro (W)
- Whitsett (W)
- Elon (W/S)
- Gibsonville (W/S)
- Ossipee (W)
- Haw River (W/S)
- Green Level (S)
- Graham (S) (W-emergency connection)
- Swepsonville (S)
- Alamance (W/S)





City of Burlington

PFAS

- General Info
- Sampling
 - Equipment
 - Grab samples
 - Composite samples
- Data Summary
- Industry Information

General Info

- Michigan DEQ PFAS sampling guidance
 - No food
 - No water-resistant clothing
 - No sunscreen/insect repellent
 - Ball Point Pens only
 - Ziplocs if not in contact with sample
 - Ice during sample collection and shipment
 - HDPE/Stainless Steel/Silicone
- Prior to beginning sampling:
 - Tested Deionized Water, composite sampler components, ProPak bags
 - Visited sampling locations
 - Letters to residents (sewer shed sampling)
 - Designated equipment
- Sampling:
 - New gloves per sample
 - Iced –sampling and transport
 - Grab vs Composite
 - Lab supplied sample bottles
- Shipping/Pick up samples:
 - No blue ice packs ; Double bag ice
 - Copies of ALL COC
- Fun Facts:
 - 256 samples have been collected & analyzed since 11/2020

Sampling Equipment

- Liquinox – decontamination of equipment
- Tygon tubing – (B-44-3 beverage grade)
- Silicone pump assembly tubing
- Silicone tubing (discharge tube)
- Composite samplers
- Stainless steel dippers
- Stainless steel scoop
- Stainless steel milk bucket with lid
- Manhole cover lift
- ISCO ProPAK sampler bags
- 10 L wide mouth carboys/lids (no liners) – HDPE
- Sample kits – supplied by commercial lab
- PFAS free water
- Ziploc Bags
- Nitrile gloves
- Labels
- Ball Point Pens
- COC
- Coolers
- Ice
- Safety cones
- Tags for samplers
- Locks

Grab Samples

- Sewer Sheds (when composite not possible)
- Biosolids
- Collect field blanks
 - Commercial lab provided
- Stainless steel dipper / scoop
 - Rinse with PFAS free water and sample to be collected
- Store on ice



Composite Samples

- Effluent, Influent, Industry, Sewer Shed
- Collect Equipment Blanks
 - Commercial lab provided
- Time composite
- ProPak bags in carboy
- Sampler iced
- Samples poured in lab
- Clean equipment
 - Liquinox and DI rinse
- Tubing change





Field / Eq Blank Kit

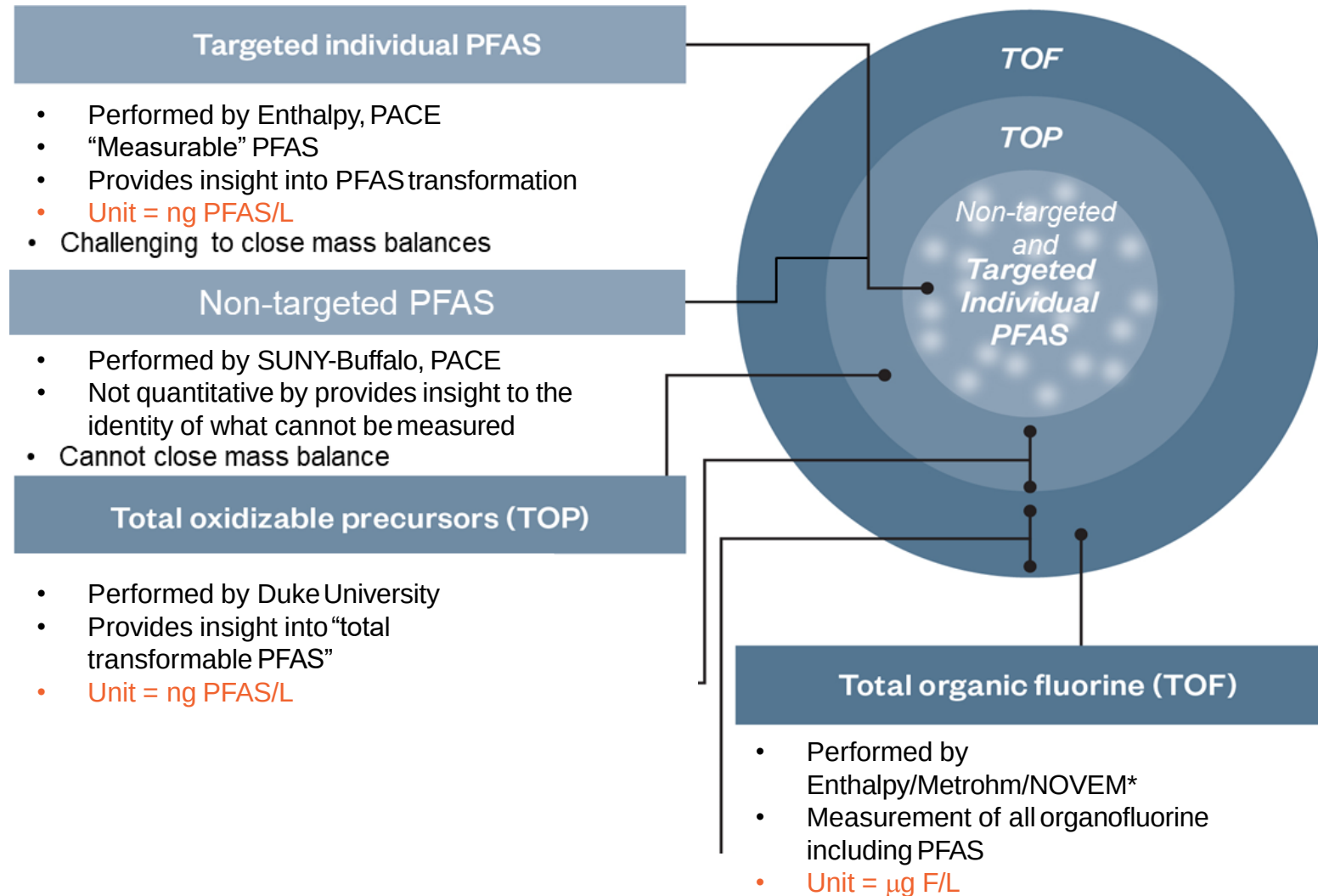


Soil Kit



Sample kit

Several Different Methods Used to Generate Information at Multiple Locations



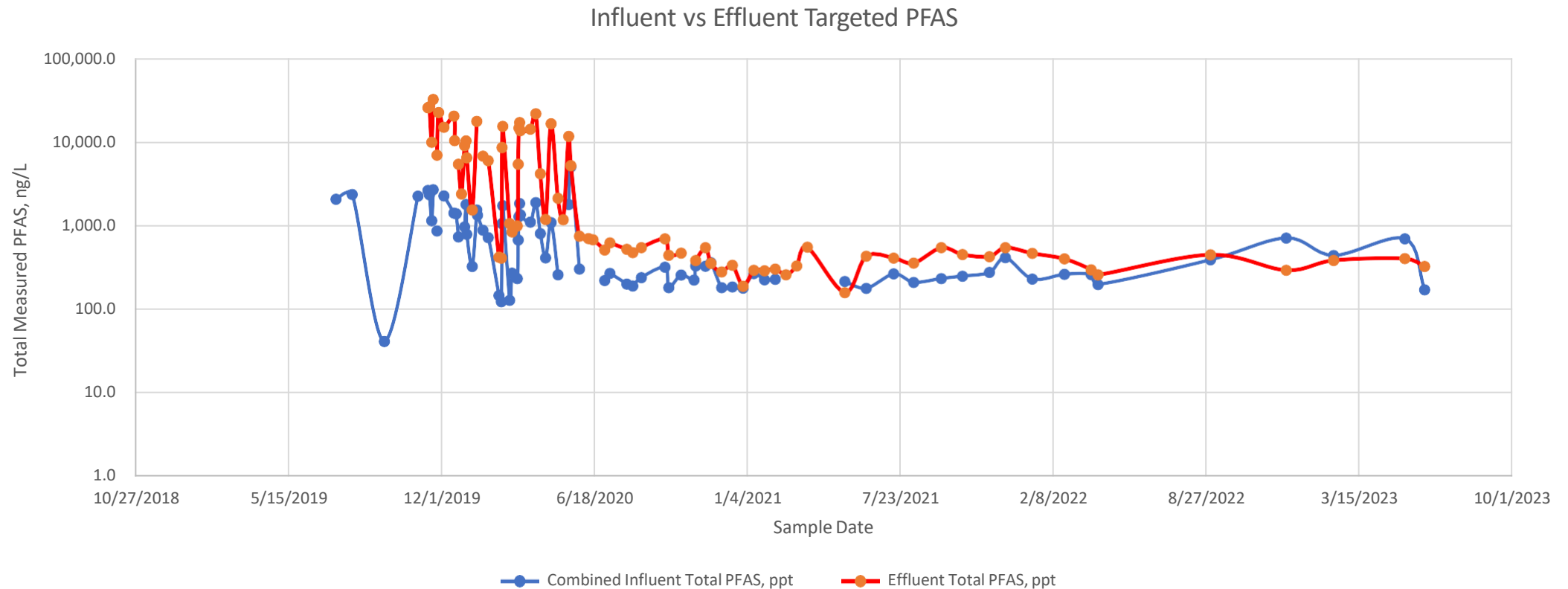
*Measurement from enthalpy was AOF

EBWWTP EFFLUENT

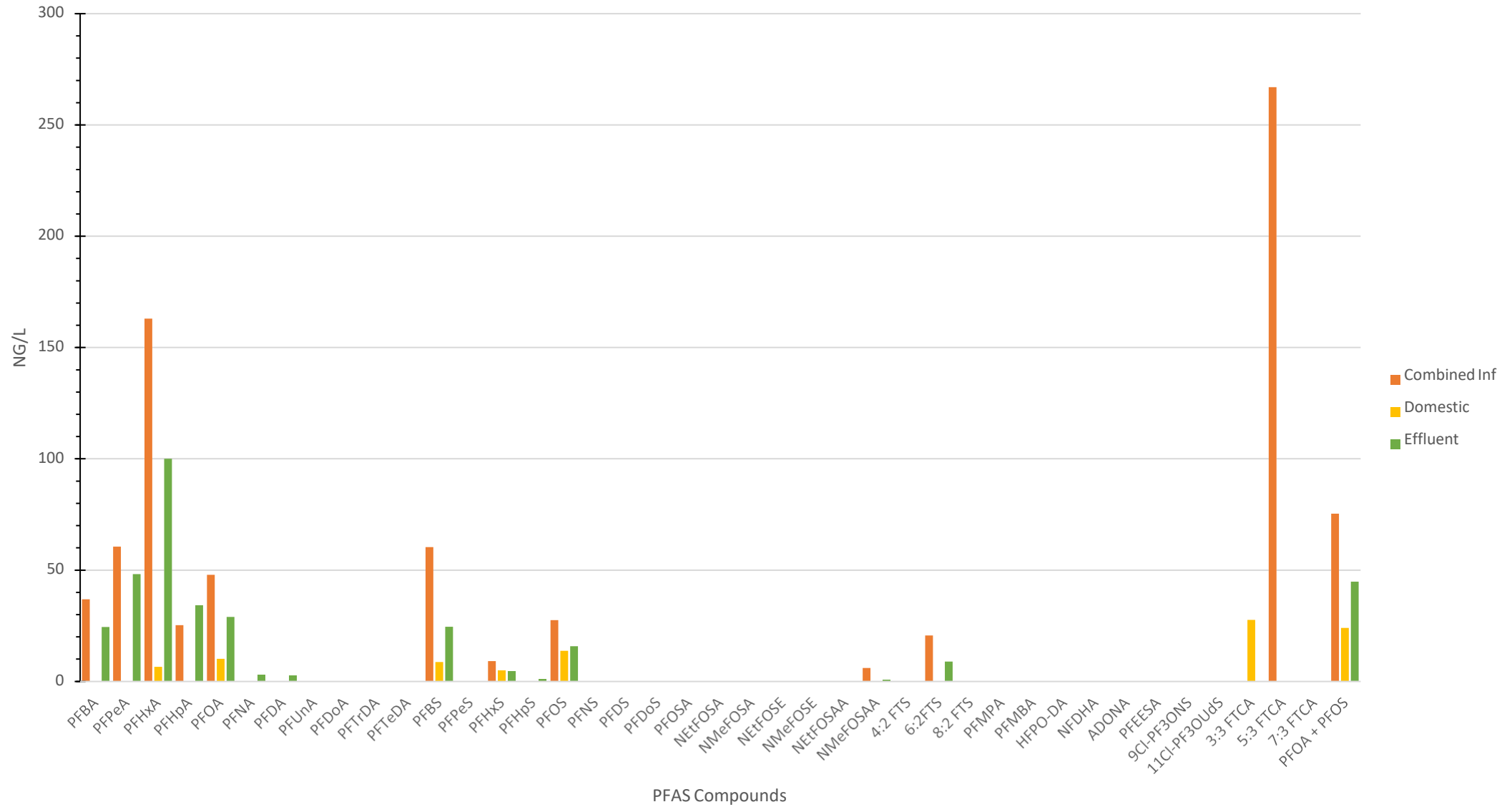
<http://berlintonc.gov/FAS>
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	Sample Date	Collection Time	Sample Type	ZIMPRO Hours	Flow MGD	1,4 Dioxane ppb or µg/L	PFOA ppt	PFOS ppt	PFBA ppt	PFPeA ppt	PFHxA ppt	PFHpA ppt	PFNA ppt	PFDA ppt	PFUnDA ppt	PFDoDA ppt	
	8/6/2019																
	9/17/2019																
	10/31/2019																
	11/8/2019																
	11/13/2019	1035	Grab	46 hrs prior	4.28	10	201	36.4	1140	6280	11700	6940	24	39.1	3.42	1.52	
	11/15/2019	0925	Grab	56 hrs prior	3.32		238	25	1230	10400	9090	6080	19.1	28.8	2.82	1.35	
	11/18/2019	1210	Grab	4 hrs prior	3.01		139	21.7	1570	3310	3680	1430	13.3	29.2	2.64	0	
	11/20/2019	1510	Grab	48 hrs prior	3.53		172	31.8	1070	6360	15300	10300	26.6	41.1	2.98	1.62	
	11/22/2019																
	11/25/2019	1355	Grab	5 hrs prior	4.07	11	119	0	942	1970	2860	1220	0	0	0	0	
	12/4/2019	0910	Grab	60 hrs prior	4.02		111	17.7	599	2550	10200	9660	26.3	22.4	0	0	
	12/17/2019	1240	Grab	24 hrs prior	5.17		97.9	28.5	447	1650	6510	6640	21.1	21.9	0	0	
	12/18/2019	0746	Grab	36 hrs prior	4.98		100	22.7	432	1990	8740	9680	19.2	17.9	0	0	
	12/20/2019	0915	Grab	Shut dn 55hr	4.06		183	31.2	934	2290	3540	3600	19.9	28.3	0	0	
	12/22/2019					2.3											
	12/23/2019	1130	Grab	Shut dn 5dys	2.88		143	31.8	1020	1460	1860	989	15.5	33.8	0	0	
	12/27/2019	0930	Grab	shut dn 8 dys	2.96		81.5	22.9	511	687	825	270	10.2	25.2	0	0	
	12/31/2019	1405	Grab	24 hrs prior	3.71		80.3	31.0	370	1470	4270.00	3010	12.9	23.1	0	0	
	1/2/2020	750	Grab	shut dn 48 hrs	3.61		141	30.5	391	2380	4610.00	2970	14.4	21	0	0	
	1/3/2020	915	Grab	shut dn 72 hrs	7.13	2.7	126	28.6	364	1550	2960.00	1580	12.4	25	0	0	
	1/10/2020	0950	Grab	shut dn 10 dys	4.13	11	64.6	51.6	183	314	591.00	337	12.5	13.2	0	0	
	1/16/2020	0835	Grab	40 hrs prior	5.13	13	121	42	0	1730	6110.00	10100	31.9	14.6	0	0	
	1/17/2020																
	1/24/2020	1355	Grab	shut dn 60hrs	4.82		103	24.6	244	1000	2290.00	3240	20.9	14.3	0	0	
	1/31/2020	0955	Grab	shut dn 36hrs	4.75		108	24.3	319	988	1870.00	2750	19.6	15.7	0	0	
	2/14/2020	1000	Grab	shut dn 14 dys	7.34	6.2	46.3	35.9	0	95.6	172.00	69.2	0	9.17	0	0	
	2/17/2020	1335	Grab	5 hours prior	4.62		44.6	32.7	95.9	162	65.50	6.71	7.94	0	0	0	

Targeted PFAS Sampling - Σ (measured PFAS) Influent vs Effluent



Targeted EPA DRAFT METHOD 1633
Sample Date 12/9/2022



Novem – TOF Results (12/9/2022)

Name	Date	Quantification Limit (ppm)	Detection Limit (ppm)	Reported Sample TOF (ppm)	Estimated Sample TOF (ppm)	Reported Sample FF (ppm)	Note					
Elevate Textiles	12/7/2022	0.155	0.045	<0.155	<0.045	0.50	sample less than detection limit, not above background					
Shawmut	12/7/2022	0.155	0.045	<0.155	<0.045	0.49	sample less than detection limit, not above background					
Unichem	12/9/2022	0.155	0.045	<0.155	<0.045	0.47	sample less than detection limit, not above background					
Indulor	12/7/2022	0.155	0.045	<0.155	<0.045	<0.10	sample less than detection limit, not above background					
East Domestic	12/9/2022	0.155	0.045	<0.155	0.057	0.46	signal between detection limit and quantification limit, estimated TOF					
East Comb Int	12/9/2022	0.155	0.045	<0.155	0.126	0.44	signal between detection limit and quantification limit, estimated TOF					
East Effluent	12/9/2022	0.155	0.045	<0.155	0.062	0.37	signal between detection limit and quantification limit, estimated TOF					

Pace Analytical – EPA DRAFT METHOD 1621

Sample ID	AOF (ug/L)
ELEVATE TEXTILES	970
SHAWMUT	47
INDULOR	6.3
UNICHEM	14

Industry Information



City of Burlington

Robert C. Patterson, Jr., P.E.
Water Resources Director

11/13/19

Regina Allen
Carolina Dyeing and Finishing LLC
220 Elmira Street
Burlington, NC 27214

Re: Request for Information

Dear Ms. Allen:

We are writing to Industrial Users and other non-domestic Users of the City of Burlington wastewater collection and treatment system to request information and data on your possible use, production, and discharge of PFAS chemicals, including any use, production, and discharge of purchased materials or other products or substances that may contain PFAS.

Per- and poly-fluoroalkyl substances (PFAS) are a large class of organic chemical substances that have been manufactured and used around the world and in the U.S. since at least the 1940s. These chemicals are persistent in the environment, and they are suspected of presenting human health and other risks. "PFOA," "PFOS," and "GenX" are some of the more highly studied and highly publicized of the PFAS chemicals.

PFAS chemicals are found in many consumer products like cookware, food packaging, and stain repellants. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the main sources of PFAS, although they are also known to occur in other common industrial or consumer products. PFAS may be released into the air, soil, and water, including sources of drinking water. For more generic information on PFAS see EPA at the following website.

<https://www.epa.gov/pfas>

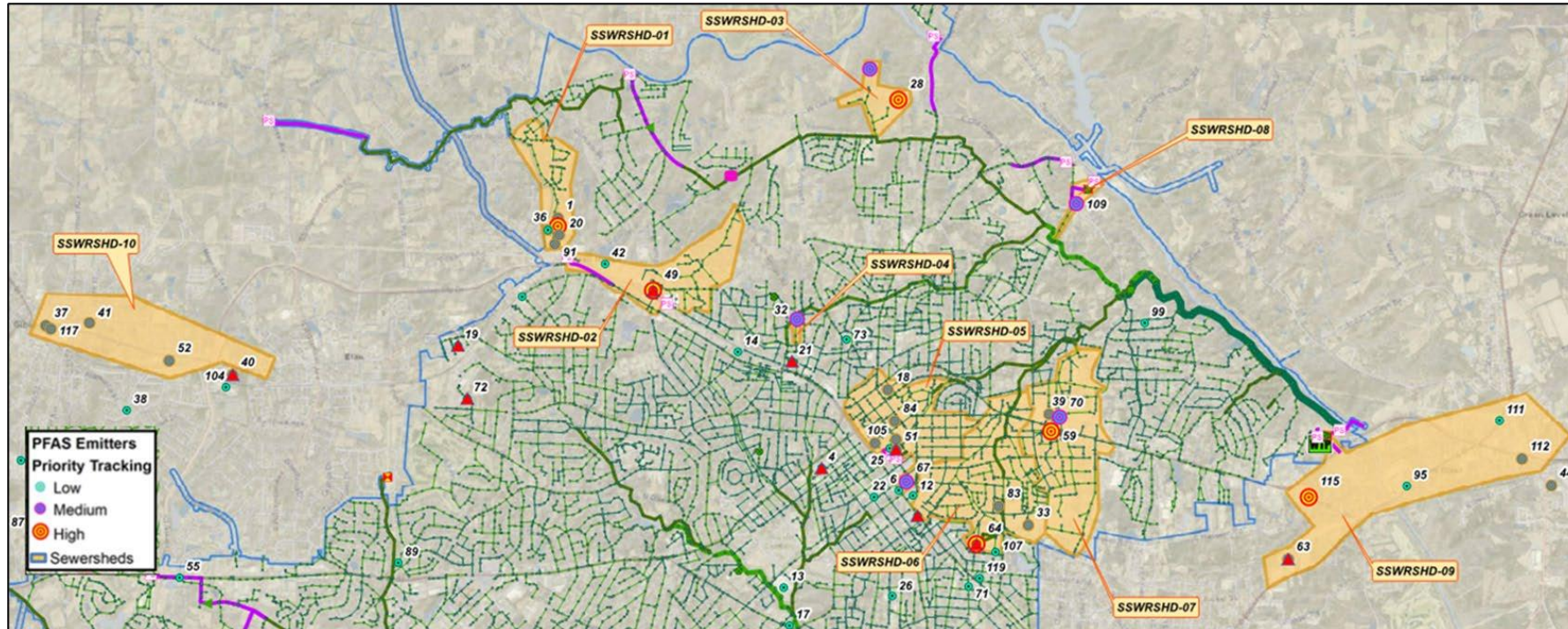
Our request for information does not imply any problem with or legal noncompliance as to the wastes discharged by your organization. Rather, because of public interest in PFAS chemicals, and concerns that may be raised by state and federal regulatory agencies, City of Burlington wishes to better evaluate the possible presence of PFAS in our system and any issues that possible presence may raise.

Connecting the Triad and the Triangle
1302 Belmont Street-PO Box 1358-Burlington, NC 27216
Phone 336-222-5133-www.BurlingtonNC.gov

PFAS Surveys

- Survey created by North Carolina Water Quality Association in 2019
- Industries of concern identified using Industrial Waste Survey
- Survey sent to all SIUs and industries of concern discharging to EBWWTP
 - SIUs
 - Textile
 - Metal finishing
 - Organic chemical (Polymer emulsion and resin manufacturing)
 - Industries of concern:
 - Textile industry
 - Chemical industry
 - Plastic manufacturing
 - Metal coating
 - Food processors
 - Aircraft industry
 - Paper industry
 - Electrical industry
- More comprehensive survey form to be used after 08/01/2023 for new/expanding industries > 7,500 gpd

Sewershed Sampling Locations



- Industries of concern identified using Industrial Waste Survey
- Potential PFAS contribution based on industry type (peer reviewed literature)
- Ranked total potential load contributed to EBWWTP

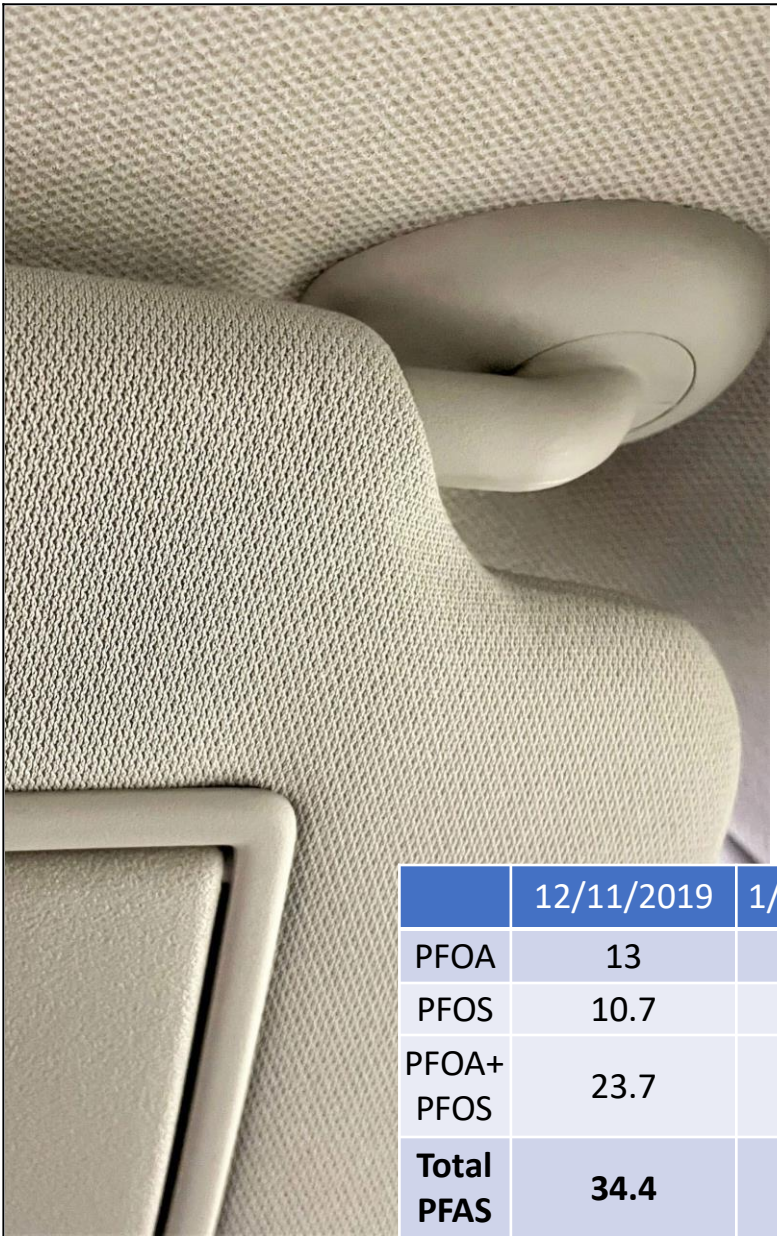


Elevate Textiles (SIU)

- Textile - Technical Fabrics
- Product lines of concern: Military/medical barrier fabric, furniture fabric
- Flow: ~400,000 gpd
- PFAS survey response:
 - Use C6 water repellent chemicals
 - No knowledge of PFAS components
- Plan of Action by Industry:
 - Created pfas-free product substitute for water repellency (2020)
 - Educate customers (No substitute for oil repellency available) ~ 1/3 of product line non-PFAS as of 7/01/2023
 - Implemented closed-loop system (late 2022)
 - Phase out intentional PFAS use by 06/15/2025



	12/3/2019	1/9/2020	2/18/2020	7/15/2021	11/16/2021	9/8/2022	12/8/2022	2/9/2023	5/9-12/2023	6/7/2023
PFOA	10.3	17.9	28	16.7	23.8	31.3	32.7	14	33	24
PFOS	9.37	18.1	19	20.7	22.3	22.9	18.8	13	18	23
PFOA+ PFOS	19.67	36	47	37.4	46.1	54.2	51.5	27	51	47
Total PFAS	58.7	68.5	234.6	122.4	151.6	155.3	439.41	60.1	280.18	210.4
method	mod-iso-dil	mod-iso-dil	mod-iso-dil	mod-iso-dil	mod-iso-dil	mod-iso-dil	draft 1633	draft 1633	draft 1633	draft 1633



Shawmut (SIU)

- Textile - Technical Fabrics
- Product line of concern is automotive fabric
- Flow: ~300,000 gpd
- PFAS survey response:
 - Bluesign® certified
 - Two products known to contain PFAS were being captured and disposed of using an environmental agency
- Plan of Action by Industry:
 - Sampling to identify unknown products with PFAS
 - Implement PFAS-free product substitution (e.g. water repellency)
 - Discontinue oil-repellency product line (2023)
 - Require PFAS-free certification from vendors

	12/11/2019	1/ 9/2020	2/18/2020	7/15/2021	10/19/2021	9/8/2022	12/8/2022	2/9/2023
PFOA	13	12.6	9.41	16.9	18.5	22.2	45.3	14
PFOS	10.7	14.2	6.68	16.9	15.4	18.8	11.5	13
PFOA+ PFOS	23.7	26.8	16.09	33.8	33.9	41	56.8	27
Total PFAS	34.4	35.66	29.09	45.6	61	81.1	182.12	60.1

method mod-iso-dil

mod-iso-dil

mod-iso-dil

mod-iso-dil

mod-iso-dil

mod-iso-dil

draft 1633

draft 1633



Unichem (IU)

- Chemical manufacturer
- Flow: ~2,000 gpd
- PFAS survey response:
 - PFAS present in water and oil repellent products
 - Predict minimal discharge
- **CLOSED BURLINGTON FACILITY (2023)**

	10/18/2021	12/7/2021	9/15/2022
PFOA	147	0	34.2
PFAS	115	0	30.1
Total PFAS	1416.2	0.0	292.7

Engineered Controls - Metal Finishing (CIU)

	9/15/2022	12/3/2019	1/9/2020
PFOA	0	0	0
PFAS	0	8.76	7.93
Total PFAS	0.0	8.8	7.9

Graham Dying & Finishing - Textile (Hosiery) (SIU)

	12/11/2019	1/9/2020	2/18/2020
PFOA	6.92	0	6.27
PFAS	6.42	12.3	10.6
Total PFAS	20.6	12.3	16.9

Indulor - Polymer Emulsion and Resin Manufacturing (CIU)

	12/3/2019	1/9/2020	3/5/2020	6/30/2020	7/23/2020	10/19/2021	12/7/2021	9/15/2022
PFOA	0	0	0	0	0	13.2	7.79	0
PFOS	0	0	0	0	0	7.27	9.84	0
Total PFAS	6.8	0.0	0.0	0.0	0.0	429.5	40.7	0.0

Leachate

Alamance Leachate~ 0.28% of EBWWTP flow				
	PFOA	PFOS	PFOA + PFOS	SUM ALL
n=28	ppt	ppt	ppt	ppt
Min	619.0	39.0	742.0	3,270.7
Max	2,200.0	459.0	2,659.0	17,045.0
Ave	1,199.7	164.1	1,363.8	7,187.3

Republic Leachate~ 0.57% of EBWWTP Flow				
	PFOA	PFOS	PFOA + PFOS	SUM ALL
n=35	ppt	ppt	ppt	ppt
Min	884.0	145.0	1,129.0	1,993.1
Max	3,020.0	538.0	3,551.0	25,576.7
Ave	1,953.9	323.3	2,277.2	15,263.8

PFAS source contribution

PFAS Contributions:		
	Targeted PFAS	TOF
Raw influent	34%	87%
Alamance LF	19%	1%
Republic LF	41%	2%

Questions ?

- <https://burlingtonnc.gov/2121/PFAS14-DIOXANE-INFORMATION/PFAS>
- Burlington Water Resources 336-222-5133
- bpatterson@burlingtonnc.gov

