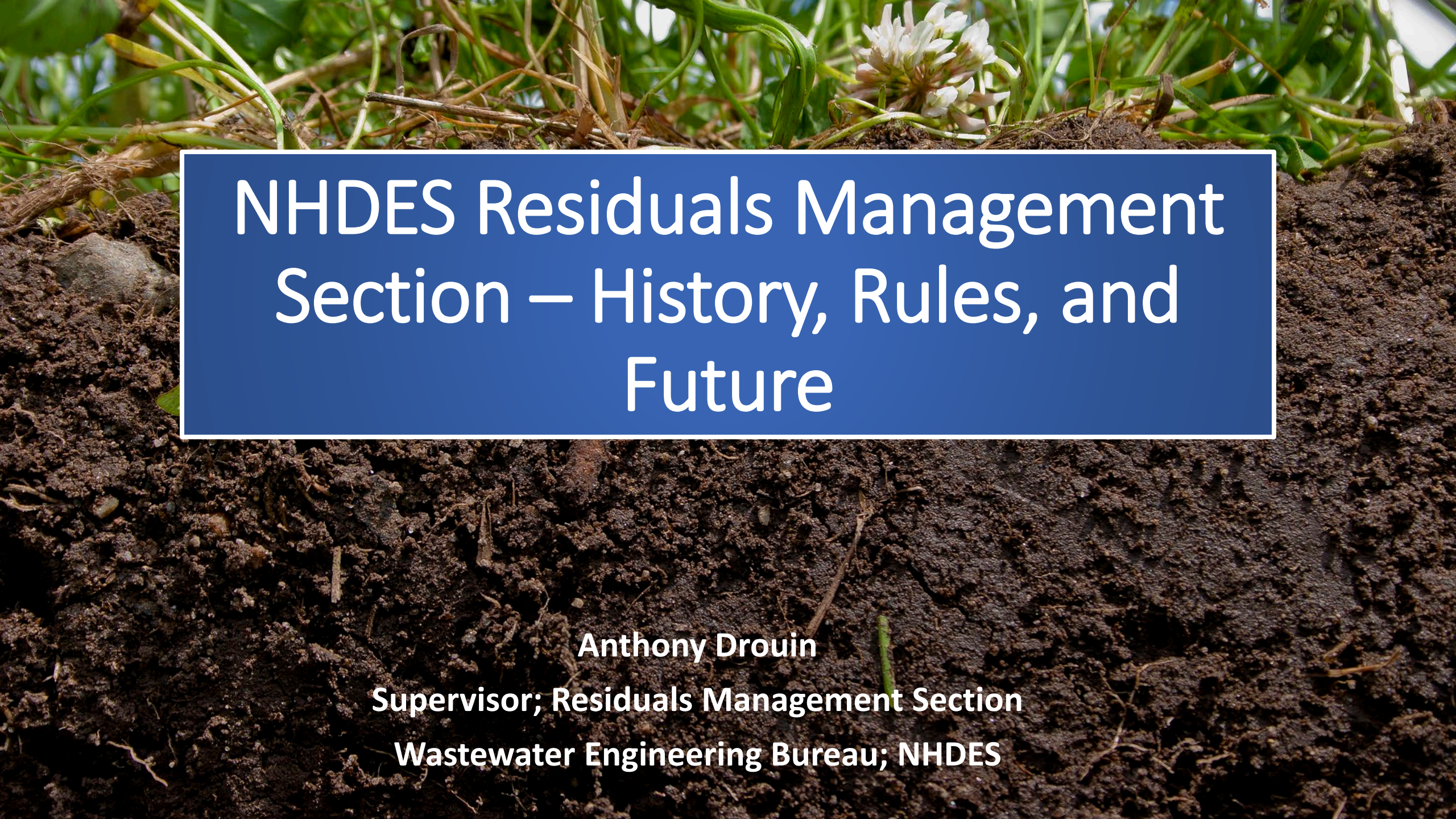


NHDES Residuals Management Section – History, Rules, and Future

Anthony Drouin

Supervisor; Residuals Management Section

Wastewater Engineering Bureau; NHDES

Outline

- Who is the Residuals Management Section?
- Why do we need Clean Water?
- History of sludge compliance in New Hampshire
- Education Outreach
- How is sludge and septage managed in New Hampshire?
- Sludge Quality Certificate PFAS Investigation data
- The future for sludge and septage management in NH

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

NHDES Residuals Management Section

- **Water Division**
  - **Wastewater Engineering Bureau**
    - **Residuals Management Section**

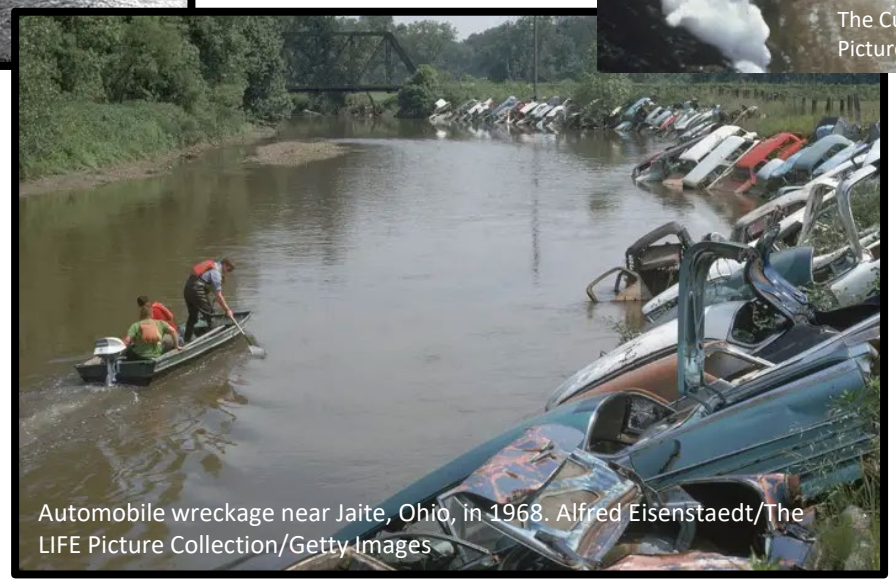
Anthony Drouin **Supervisor** *Sludge Quality Certification Permitting*	**VACANT** **Permitting & Enforcement Engineer** *Site and Facility Permitting*	Wade Pelham **Sludge & Septage Coordinator** *Training and Outreach*	Jim Talvy **Inspector** *Sludge & Septage Hauler Permitting*

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Our Rivers prior to the Clean Water Act

A Cuyahoga River fire in 1952. Courtesy of Cleveland State University, Michael Schwartz Library, Special Collections.

The Cuyahoga River in 1968. Alfred Eisenstaedt/The LIFE Picture Collection/Getty Images



Automobile wreckage near Jaite, Ohio, in 1968. Alfred Eisenstaedt/The LIFE Picture Collection/Getty Images

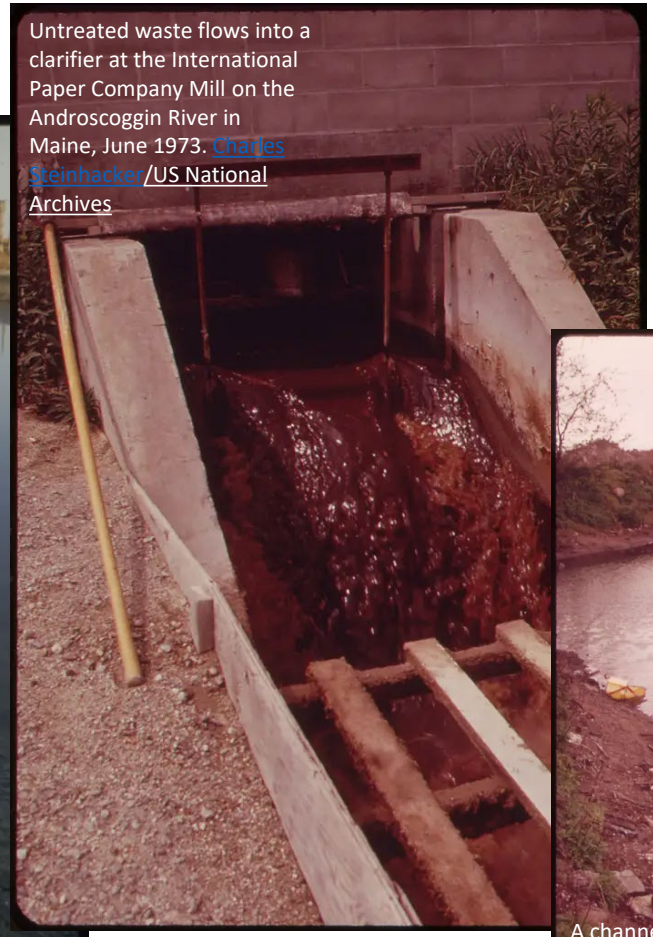
An oil slick creeps up on the Statue of Liberty in 1973. Chester Higgins/Documerica/US National Archives

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

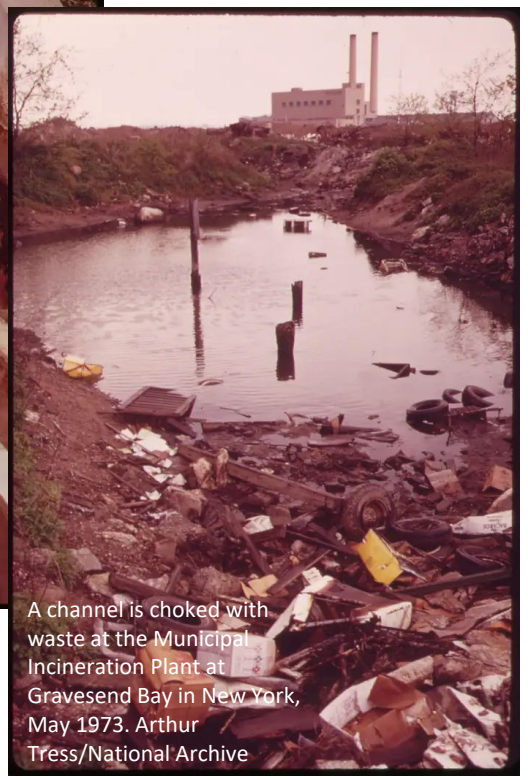
Our Rivers prior to Clean Water

Effluent from the International Paper Co. mill near the Androscoggin River in June 1973. National Archives/Charles Steinhacker

A polluted area on Mustang Island, south of Houston, Texas, in February 1972. Marc St. Gil/National Archives



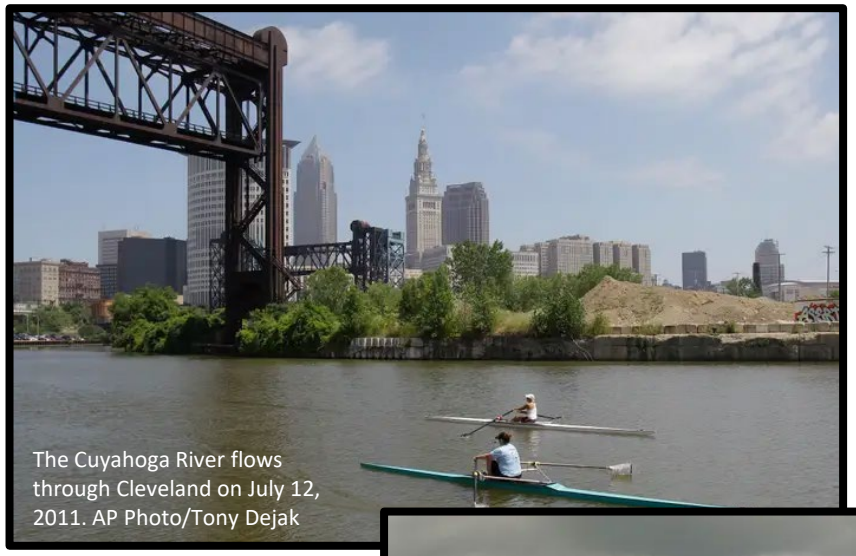
Untreated waste flows into a clarifier at the International Paper Company Mill on the Androscoggin River in Maine, June 1973. Charles Steinhacker/US National Archives



A channel is choked with waste at the Municipal Incineration Plant at Gravesend Bay in New York, May 1973. Arthur Tress/National Archive

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

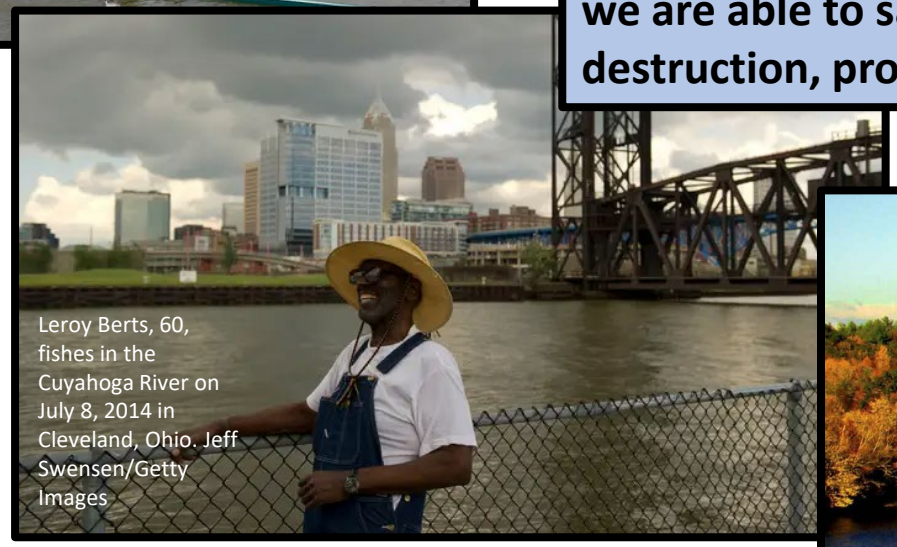
Today is a different story – but we are not finished



The Cuyahoga River flows through Cleveland on July 12, 2011. AP Photo/Tony Dejak

As President Ronald Reagan put it in his 1984 State of the Union address: "Preservation of our environment is not a liberal or conservative challenge, it's common sense."

Congress passed the Clean Water Act in 1972 to protect all "waters of the United States." Fifty years later, the law is still the main way we are able to safeguard our nation's waters from pollution and destruction, protecting public health and wildlife habitat. - NWF



Leroy Berts, 60, fishes in the Cuyahoga River on July 8, 2014 in Cleveland, Ohio. Jeff Swensen/Getty Images

https://umlconnector.com/2022/01/diving-into-the-threats-to-the-merrimack-river/

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Applicable Laws and Rules for Residuals Management Options

Federal Law : Clean Water Act

State Law: RSA 485-a : Water Pollution and Waste Disposal Act

- **Federal Regulation on Sludge Management : 40 CFR part 503**
- **Land Application:**
  - **Env-Wq 800 – sludge management rules**
  - **Env-Wq 1600 – septage management rules – septic systems are a different bureau & rules**

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Brief History of Regulations

- **1972 –** Adoption of federal Clean Water Act
  - *Creation of wastewater sludge from treatment plants begins*
  - *Sludge disposal to surface water addressed and remediated*
  - *Section 405 (d) of CWA states the department (EPA) will promulgate rules to manage sludge*

- **Before 1990** – Sludge regulated as solid waste
  - *Sludge disposed in unlined town dumps, lined landfills, or stockpiled*
  - *Risk assessment begins with EPA on understanding the risk for land applying sludge*

- **1990** – Statute shifts regulatory responsibility to Water Division/DES
  - *Aligned with the Clean Water Act – section 405(d)*
  - *RSA 485a is adopted January 1st, 1990*

Brief History of Regulations

- **1991** – Rules promulgated as Env-Ws 800 for both septage and sludge
- **Before 1993** – DES considers more comprehensive regulation of both
- **Feb. 1993** – After adoption of 40 CFR Part 503 (federal EPA rules), DES drops rulemaking and regulation of biosolids

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Brief History of Regulations

- **Aug. 1993** – DES amended Env-Ws 800, leaving a permit system only for septage and industrial sludge
- **1994 & 1995** – Sludge land application complaints increased, mostly associated with odor
- **Nov. 1995** – Adopted “Emergency Rules” to address key public concerns (odor, lack of DES oversight, out-of-state sludge)

Brief History of Regulations

- **March 1996 –** Adopted permit regulations
- **March 1999** – Readopted Env-Wq 800 as the Sludge Management Rules
- **May 1999** – Adopted Env-Ws 1600 as the Septage Management Rules
- **Oct. 2005** – Re-adopt Septage Management Rules as Env-Wq 1600

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Brief History of Regulations

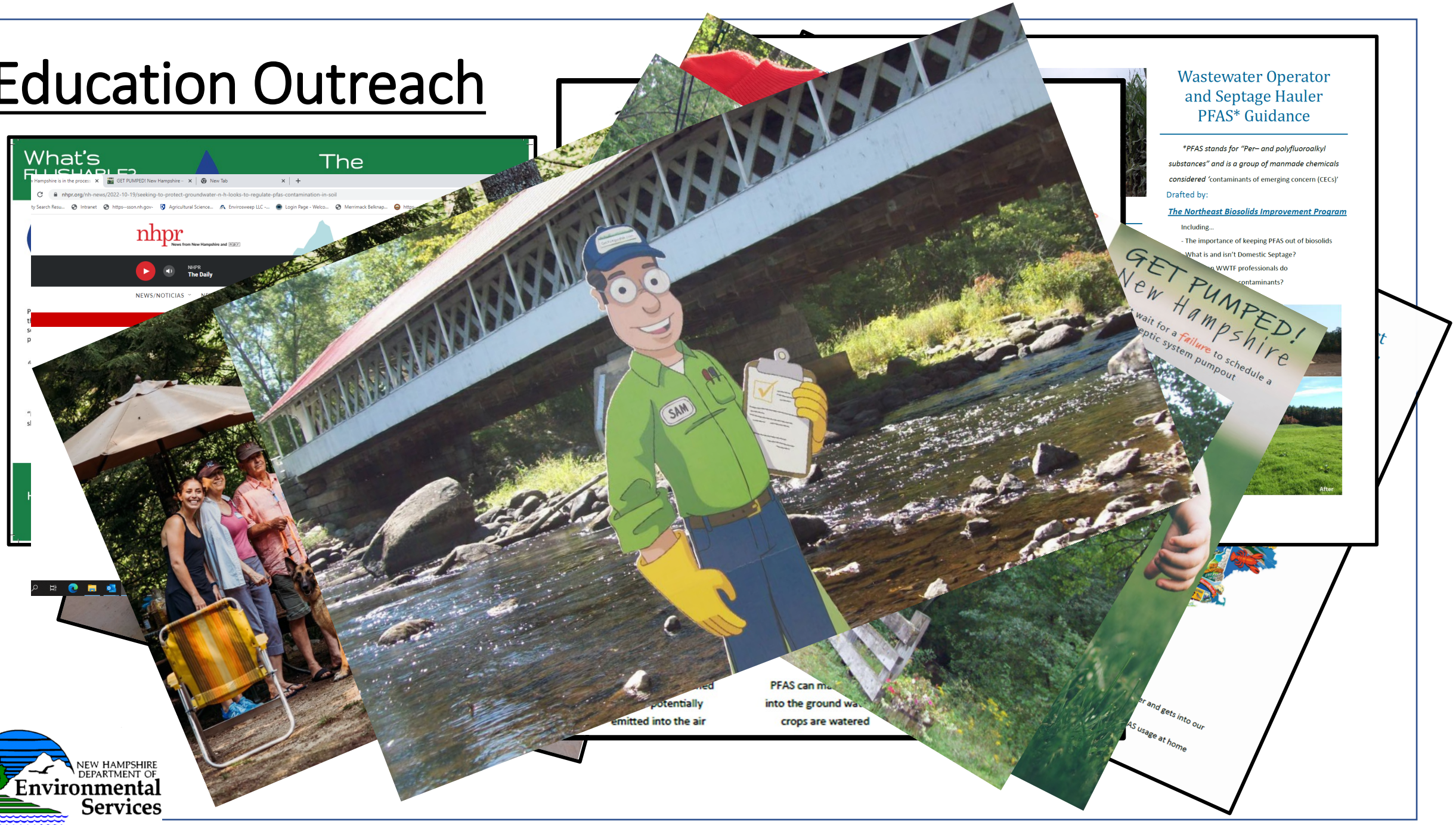
- **May 2007** – Readopt Sludge Management Rules as Env-Wq 800
- **2013** – Re-adoption of Env-Wq 1600
- **2014 to 2015** – Stakeholder input on re-adoption of Env-Wq 800
- **January 1, 2016** – Readopted Env-Wq 800 with amendments
- **June 2017** – Sludge Quality Certificate PFAS investigation begins (still ongoing, investigating sludge, septage, and collection systems wastewater)

Brief History of Regulations

- **May 2019** – Addition of PFAS monitoring and annual reporting for source pollution prevention tactics to reduce PFAS concentrations in sludge
  - *Full training for PFAS sampling analysis plan to permittees*
  - *NHDES PFAS sampling conducted to keep it to one sampling and one lab*
  - *Individual generator training with each inspection to ensure two operators are trained on sampling SOPs*
- **Dec. 2019** – Formation of Northeast Biosolids Improvement Program to create education outreach on impacts of PFAS on wastewater systems
- **Feb 2021** – USGS Soil and Sludge PFAS Leaching Study commences & wastewater collection system PFAS investigations begin
- **2022** – ongoing PFAS sampling training begins for all NH certified wastewater operators & address septage lagoon management
- **Goal by end of Nov 2023** – Adoption of amended Env-Wq 1600 rules per schedule
- **Goal by End of 2023** – Adoption of PFAS Soil Remediation Standards as sludge screening standards
  - Revision of Sludge Quality Certificate to state the approved test method once validated and monitored quarterly
  - Sludge Quality Certificate will state the PFAS screening standards

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Education Outreach



NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge & Septage Management:

- Hauling
- Residuals Quality
- Sites/Land – Application
- Facilities
- Recordkeeping
- Reporting to NHDES

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge REGULATION

Env – Wq 800

- DRINKING WATER TREATMENT
- SHORT PAPER FIBER
- WASTEWATER TREATMENT
  - SLUDGE
  - BIOSOLIDS

Septage REGULATION

Env-Wq 1600

- SEPTIC TANK
- GREASE INTERCEPTOR
- PORTABLE TOILETS
- MARINE SANITATION DEVICE

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge vs. Biosolids

- NOT treated
- NO significant testing required
- NO CERTIFICATION
- ONLY for Landfill or incineration

- Treated
- Tested for 170+Analytes
- Beneficial Use
- NHDES CERTIFIED
- NHDES Annual Reports

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge Quality Certification

- Basic information
- Industrial pretreatment information
- Quantity
- Pathogen & vector attraction reduction options
  - Class A & Class B biosolids
    - Process to Significantly Reduce Pathogens: Class B
    - Process to Further Reduce Pathogens: Class A
  - Short Paper Fiber
  - Drinking Water Residuals
- Historical & current quality data

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge Quality Certification

- Annual Testing (frequency of testing based on volume generated)
- Recordkeeping
- Annual Report to NHDES by last business day in January, each year
- Renew certificate every 5 years

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

Sludge Quality Certification

Beneficial Use is the utilization of the nutrients and organic matter from the biosolids for the agronomic need as long as it *does not pose a significant threat to human health or environment*. Beneficial use applies to agricultural, forest, and land reclamation management practices

- Bulk biosolids must obtain an SQC to be distributed in NH
- Annual soil test determine crops nutrient demand supplied from biosolids (UNH BMP)
- Class B land application must obtain a site permit through RMS – many items covered in application process
- Concentration limits and screening standards set for VOC, SVOC, PCB's, Dioxin, & Metals – **168 analytes + PFAS**

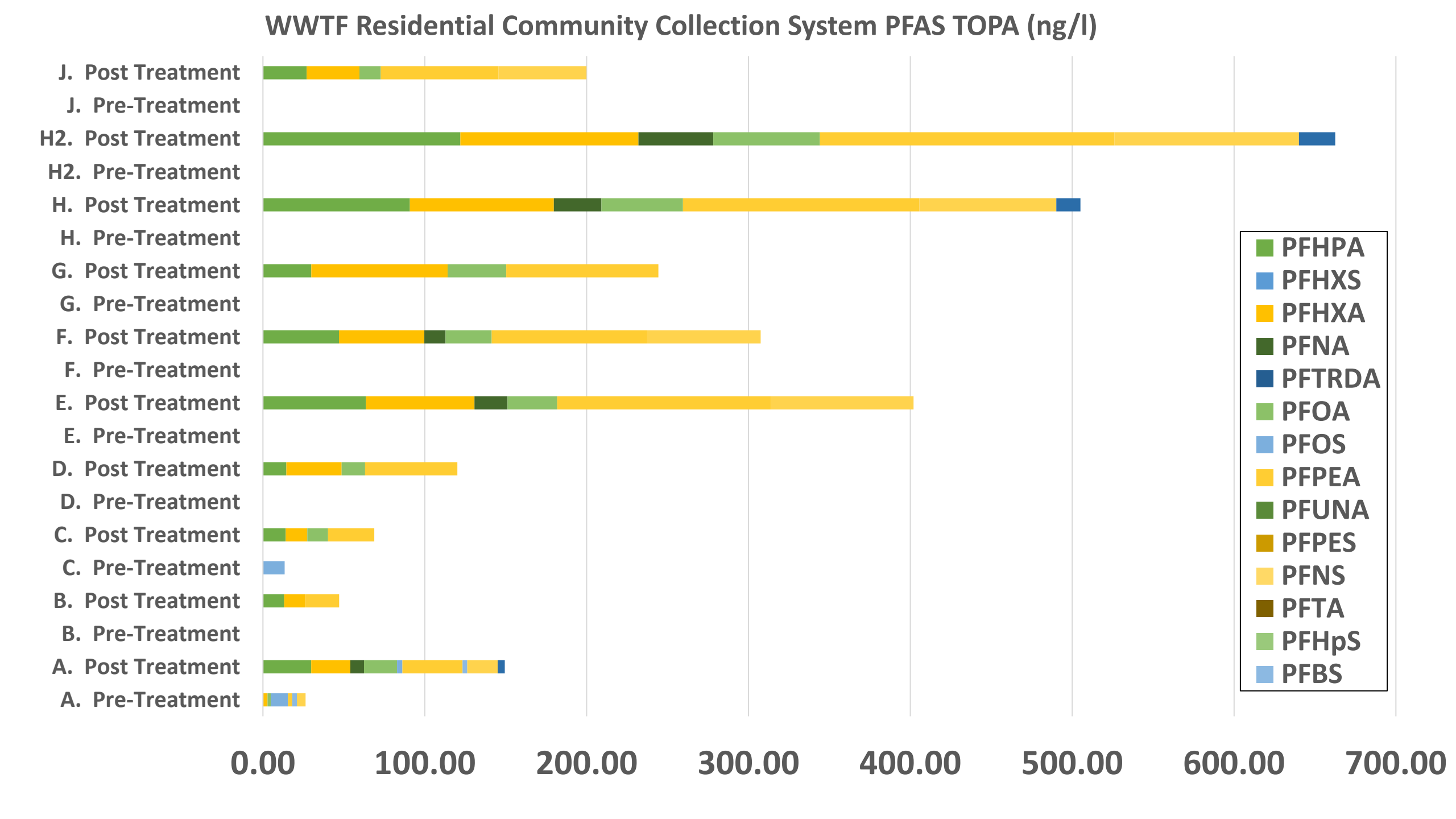
NEW HAMPSHIRE DEPARTMENT OF Environmental Services

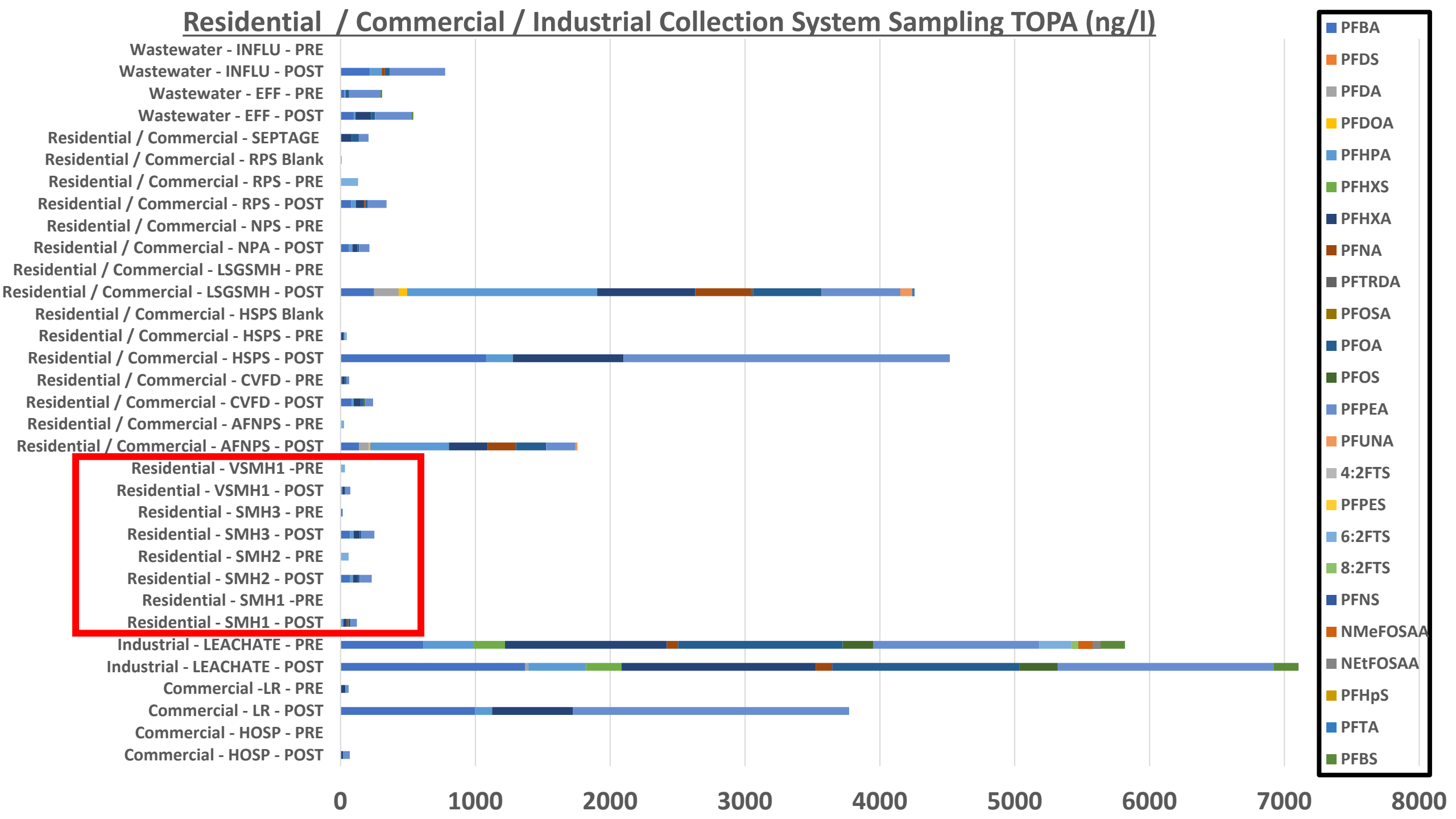
Average Annual NH Sludge, Septage, and Leachate

- **NH Biosolids Recycled to Land Application : >40,000 wet tons**
- **NH Sludge that was disposed at a landfill : >50,000 wet tons**
- **NH Sludge that was incinerated : >17,500 wet tons**
- **Over >100,000,000 gallons of septage is managed in NH annually**
- **6 Operating lined landfills in NH : ~100,000,000 gallons of leachate**
  - **~80,000,000 gallons managed at WWTFs within state**
  - **~20,000,000 gallons managed at WWTFs out of state**

2018 reporting values *Sludge managed to lagoon systems not accounted for **NH WWTF ONLY, no paper mill or drinking water treatment sludge accounted for

NEW HAMPSHIRE DEPARTMENT OF Environmental Services


WWTF Residential Community Collection System PFAS TOPA (ng/l)
J. Post Treatment
J. Pre-Treatment
H2. Post Treatment
H2. Pre-Treatment
H. Post Treatment
H. Pre-Treatment
G. Post Treatment
G. Pre-Treatment
F. Post Treatment
F. Pre-Treatment
E. Post Treatment
E. Pre-Treatment
D. Post Treatment
D. Pre-Treatment
C. Post Treatment
C. Pre-Treatment
B. Post Treatment
B. Pre-Treatment
A. Post Treatment
A. Pre-Treatment
0.00
100.00
200.00
300.00
400.00
500.00
600.00
700.00
PFHPA
PFHXS
PFHXA
PFNA
PFTRDA
PFOA
PFOS
PFPEA
PFUNA
PFPES
PFNS
PFTA
PFHpS
PFBS


Residential / Commercial / Industrial Collection System Sampling TOPA (ng/l)
Wastewater - INFLU - PRE
Wastewater - INFLU - POST
Wastewater - EFF - PRE
Wastewater - EFF - POST
Residential / Commercial - SEPTAGE
Residential / Commercial - RPS Blank
Residential / Commercial - RPS - PRE
Residential / Commercial - RPS - POST
Residential / Commercial - NPS - PRE
Residential / Commercial - NPA - POST
Residential / Commercial - LSGSMH - PRE
Residential / Commercial - LSGSMH - POST
Residential / Commercial - HSPS Blank
Residential / Commercial - HSPS - PRE
Residential / Commercial - HSPS - POST
Residential / Commercial - CVFD - PRE
Residential / Commercial - CVFD - POST
Residential / Commercial - AFNPS - PRE
Residential / Commercial - AFNPS - POST
Residential - VSMH1 -PRE
Residential - VSMH1 - POST
Residential - SMH3 - PRE
Residential - SMH3 - POST
Residential - SMH2 - PRE
Residential - SMH2 - POST
Residential - SMH1 -PRE
Residential - SMH1 - POST
Industrial - LEACHATE - PRE
Industrial - LEACHATE - POST
Commercial -LR - PRE
Commercial - LR - POST
Commercial - HOSP - PRE
Commercial - HOSP - POST
0
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2000
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4000
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6000
7000
8000
PFBA
PFDS
PFDA
PFDOA
PFHPA
PFHXS
PFHXA
PFNA
PFTRDA
PFOSA
PFOA
PFOS
PFPEA
PFUNA
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PFPES
6:2FTS
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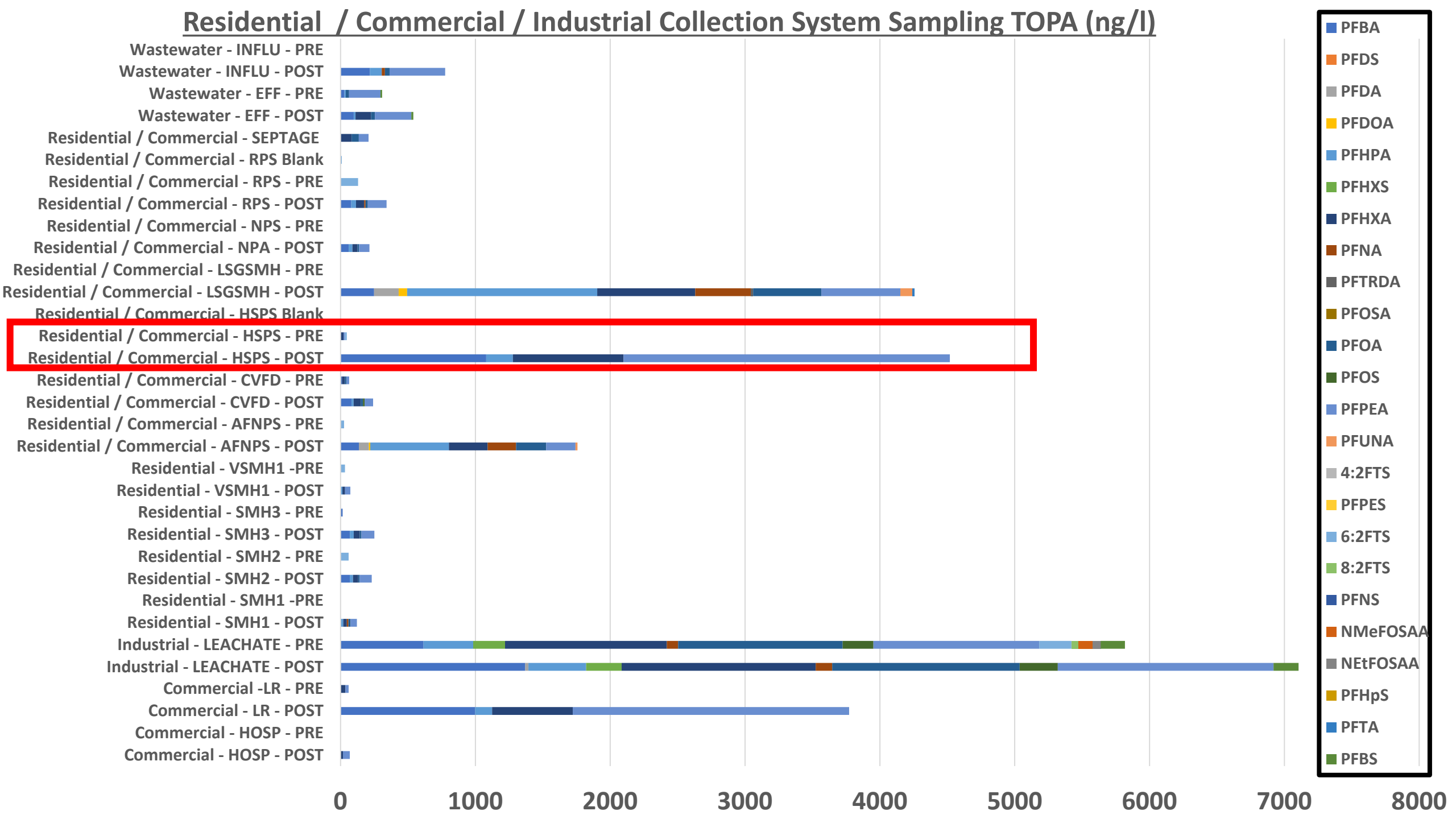
PFNS
NMeFOSAA
NEtFOSAA
PFHpS
PFTA
PFBS


Residential / Commercial / Industrial Collection System Sampling TOPA (ng/l)
Wastewater - INFLU - PRE
Wastewater - INFLU - POST
Wastewater - EFF - PRE
Wastewater - EFF - POST
Residential / Commercial - SEPTAGE
Residential / Commercial - RPS Blank
Residential / Commercial - RPS - PRE
Residential / Commercial - RPS - POST
Residential / Commercial - NPS - PRE
Residential / Commercial - NPA - POST
Residential / Commercial - LSGSMH - PRE
Residential / Commercial - LSGSMH - POST
Residential / Commercial - HSPS Blank
Residential / Commercial - HSPS - PRE
Residential / Commercial - HSPS - POST
Residential / Commercial - CVFD - PRE
Residential / Commercial - CVFD - POST
Residential / Commercial - AFNPS - PRE
Residential / Commercial - AFNPS - POST
Residential - VSMH1 -PRE
Residential - VSMH1 - POST
Residential - SMH3 - PRE
Residential - SMH3 - POST
Residential - SMH2 - PRE
Residential - SMH2 - POST
Residential - SMH1 -PRE
Residential - SMH1 - POST
Industrial - LEACHATE - PRE
Industrial - LEACHATE - POST
Commercial -LR - PRE
Commercial - LR - POST
Commercial - HOSP - PRE
Commercial - HOSP - POST
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7000
8000
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PFDS
PFDA
PFDOA
PFHPA
PFHXS
PFHXA
PFNA
PFTRDA
PFOSA
PFOA
PFOS
PFPEA
PFUNA
4:2FTS
PFPES
6:2FTS
8:2FTS
PFNS
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NEtFOSAA
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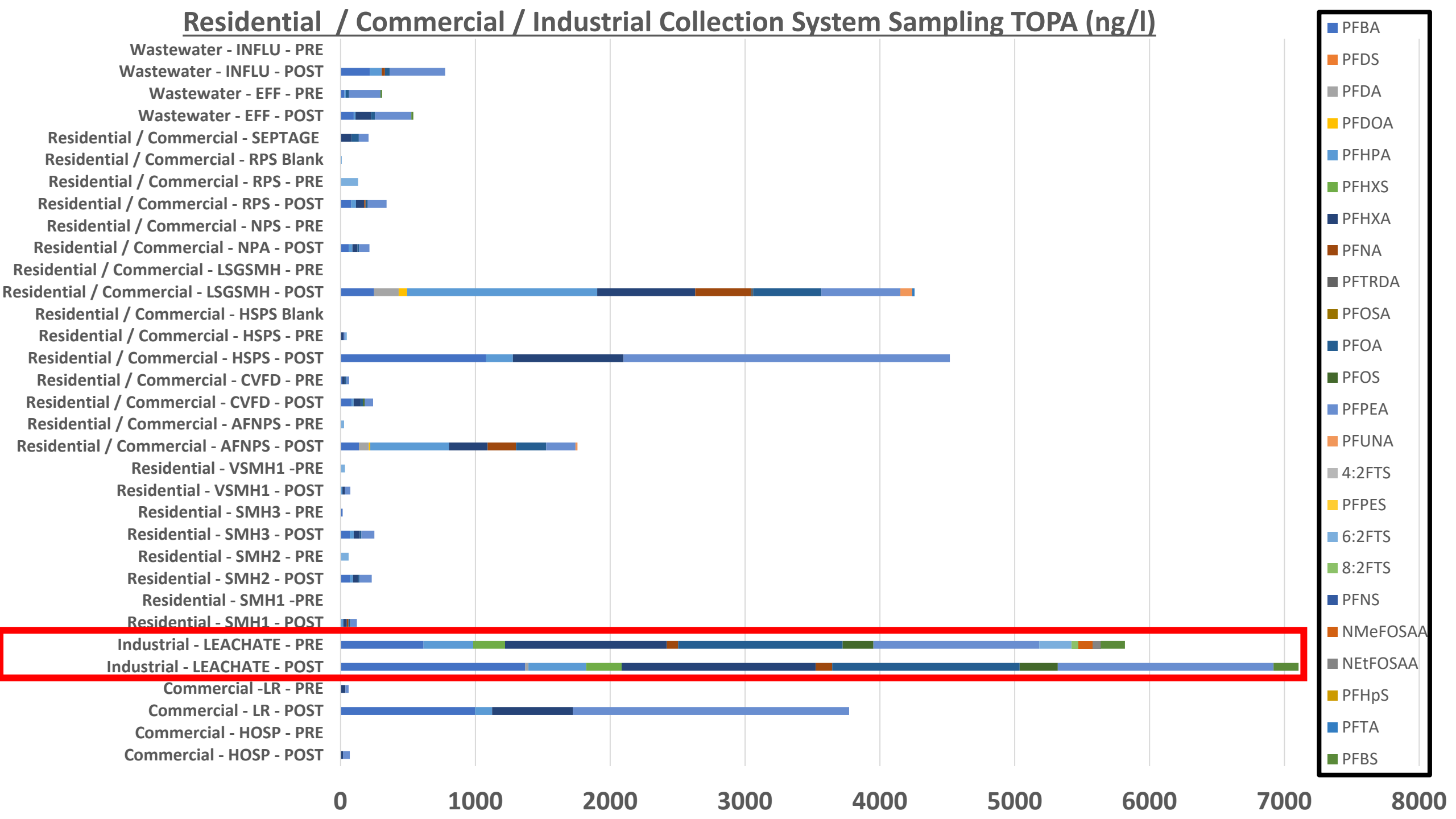
PFBS


Residential / Commercial / Industrial Collection System Sampling TOPA (ng/l)
Wastewater - INFLU - PRE
Wastewater - INFLU - POST
Wastewater - EFF - PRE
Wastewater - EFF - POST
Residential / Commercial - SEPTAGE
Residential / Commercial - RPS Blank
Residential / Commercial - RPS - PRE
Residential / Commercial - RPS - POST
Residential / Commercial - NPS - PRE
Residential / Commercial - NPA - POST
Residential / Commercial - LSGSMH - PRE
Residential / Commercial - LSGSMH - POST
Residential / Commercial - HSPS Blank
Residential / Commercial - HSPS - PRE
Residential / Commercial - HSPS - POST
Residential / Commercial - CVFD - PRE
Residential / Commercial - CVFD - POST
Residential / Commercial - AFNPS - PRE
Residential / Commercial - AFNPS - POST
Residential - VSMH1 -PRE
Residential - VSMH1 - POST
Residential - SMH3 - PRE
Residential - SMH3 - POST
Residential - SMH2 - PRE
Residential - SMH2 - POST
Residential - SMH1 -PRE
Residential - SMH1 - POST
Industrial - LEACHATE - PRE
Industrial - LEACHATE - POST
Commercial -LR - PRE
Commercial - LR - POST
Commercial - HOSP - PRE
Commercial - HOSP - POST
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8000
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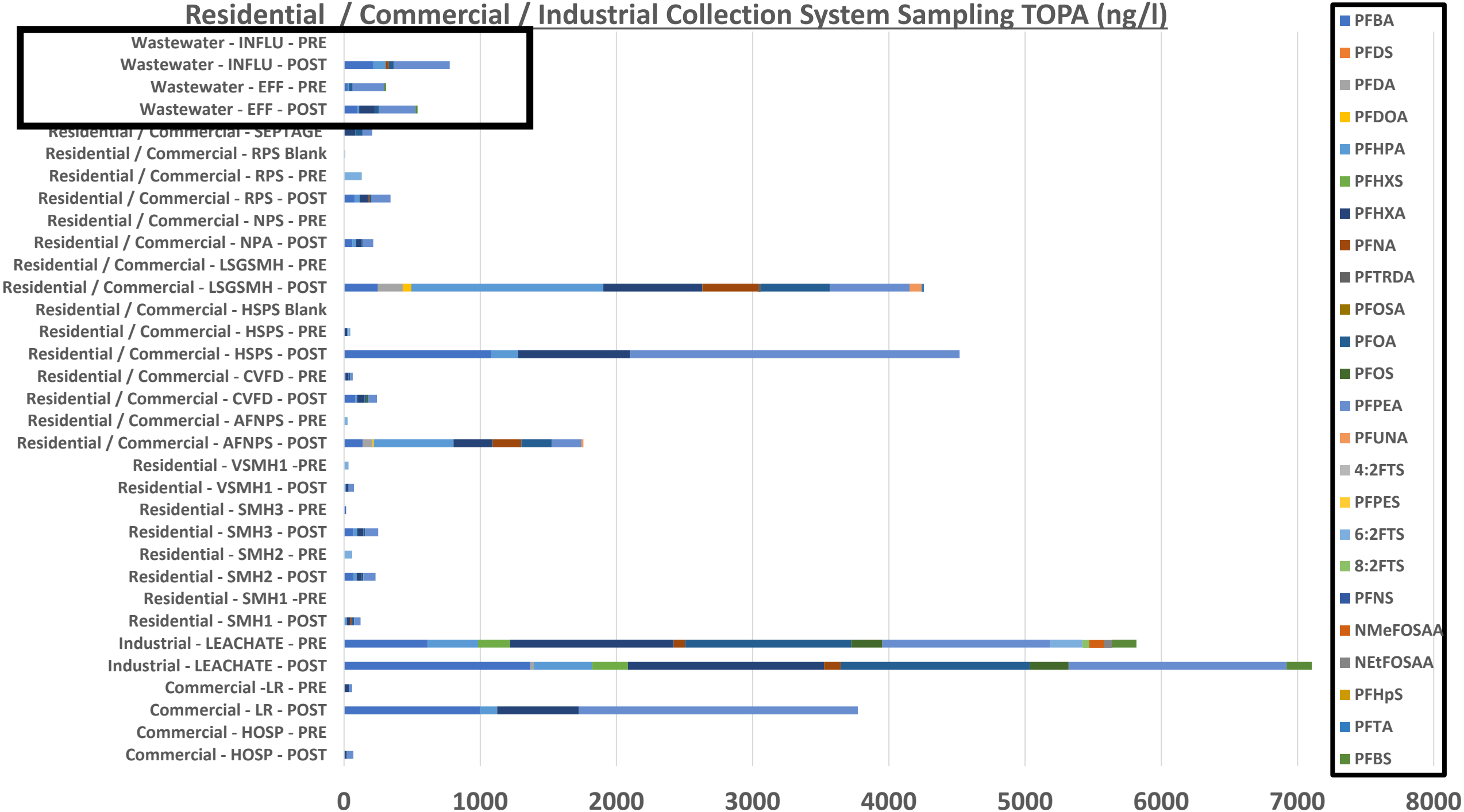
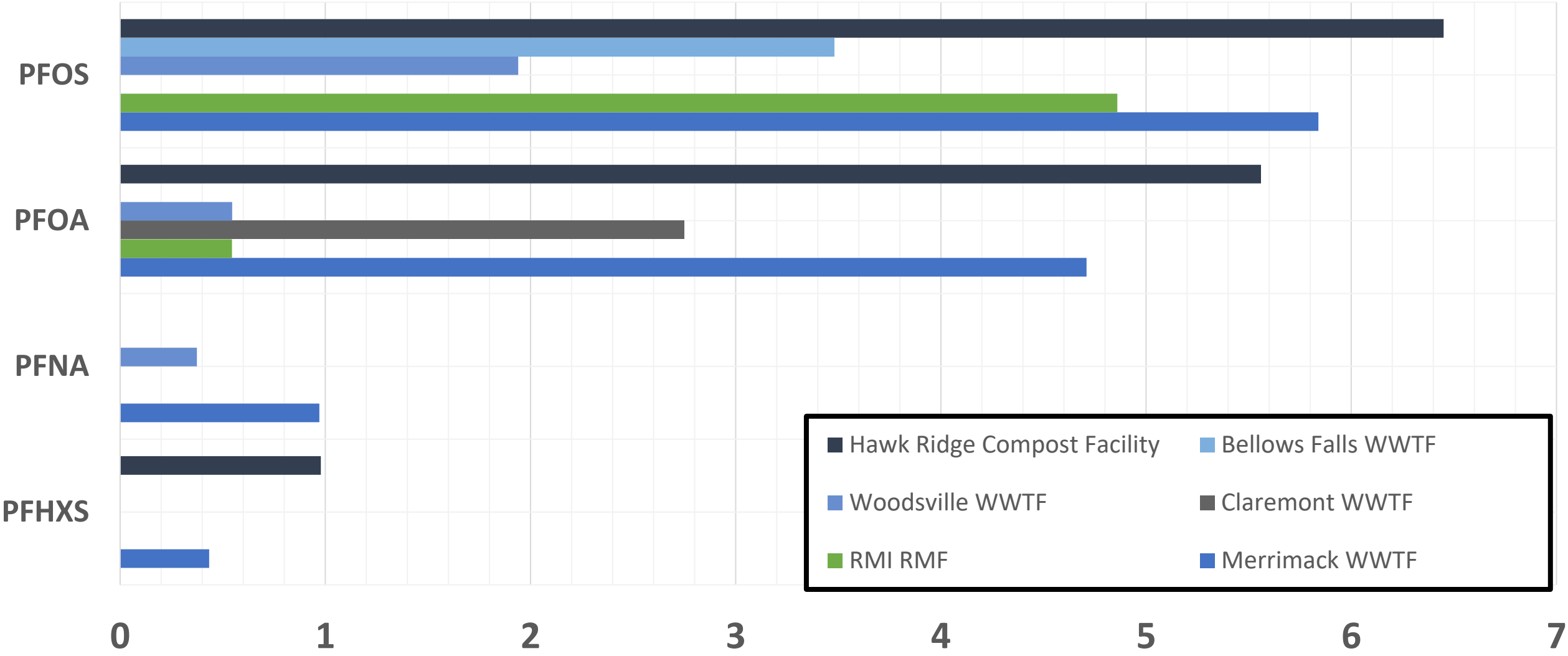
PFDS
PFDA
PFDOA
PFHPA
PFHXS
PFHXA
PFNA
PFTRDA
PFOSA
PFOA
PFOS
PFPEA
PFUNA
4:2FTS
PFPES
6:2FTS
8:2FTS
PFNS
NMeFOSAA
NEtFOSAA
PFHpS
PFTA
PFBS

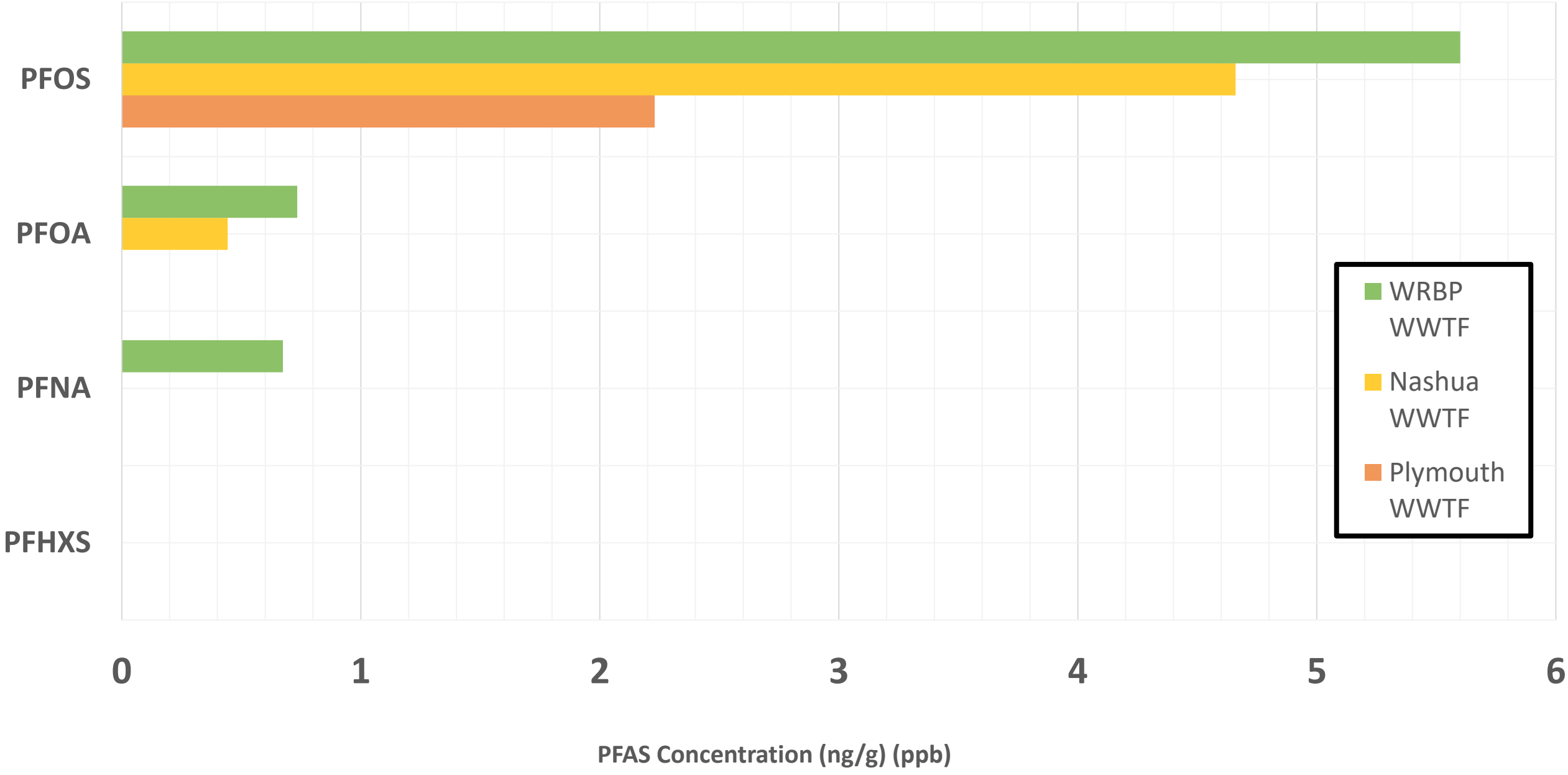
Residential / Commercial / Industrial Collection System Sampling TOPA (ng/l)



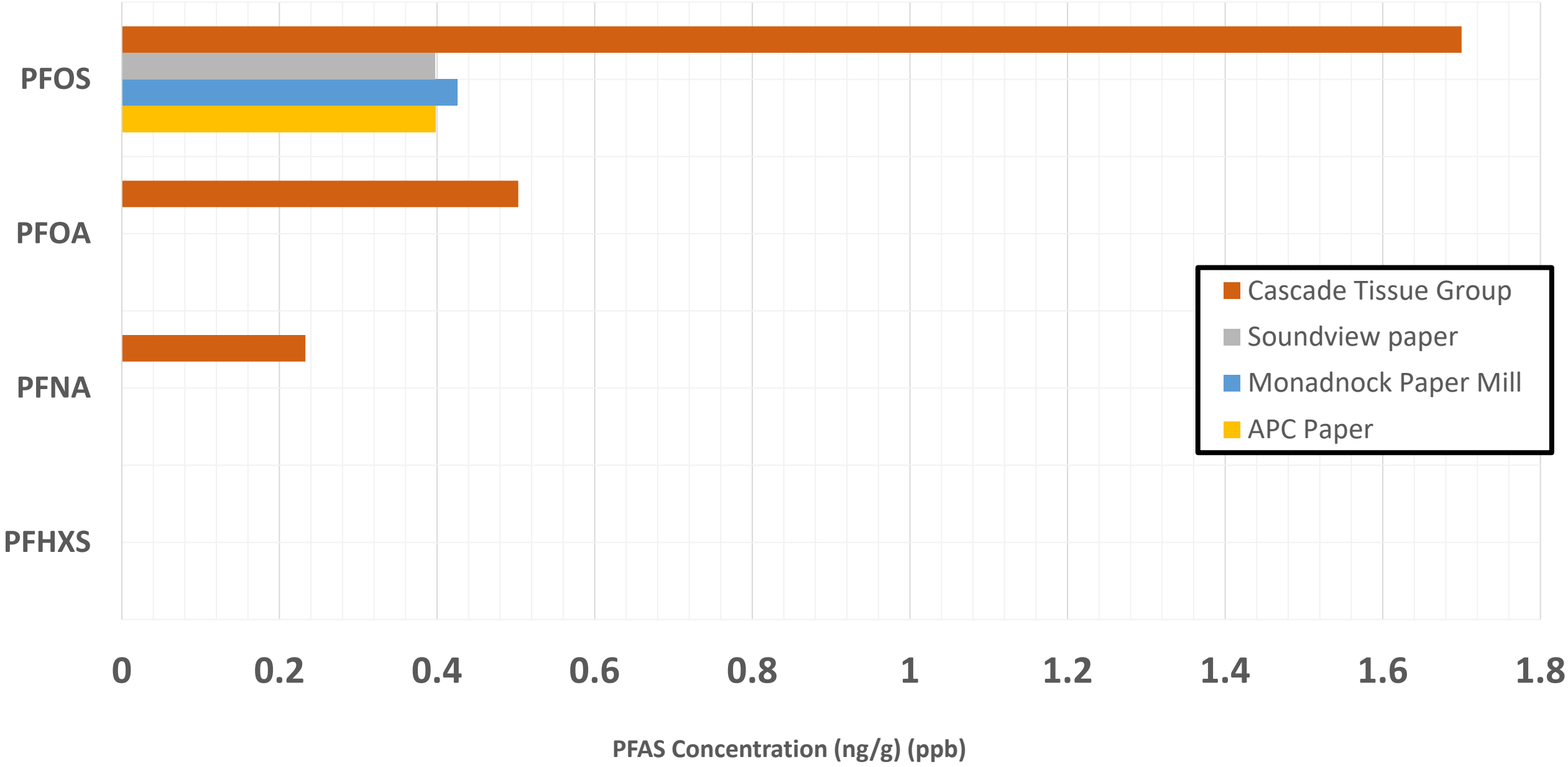
2022 NHDES RMS SQC Class A Biosolids PFAS Investigation Data

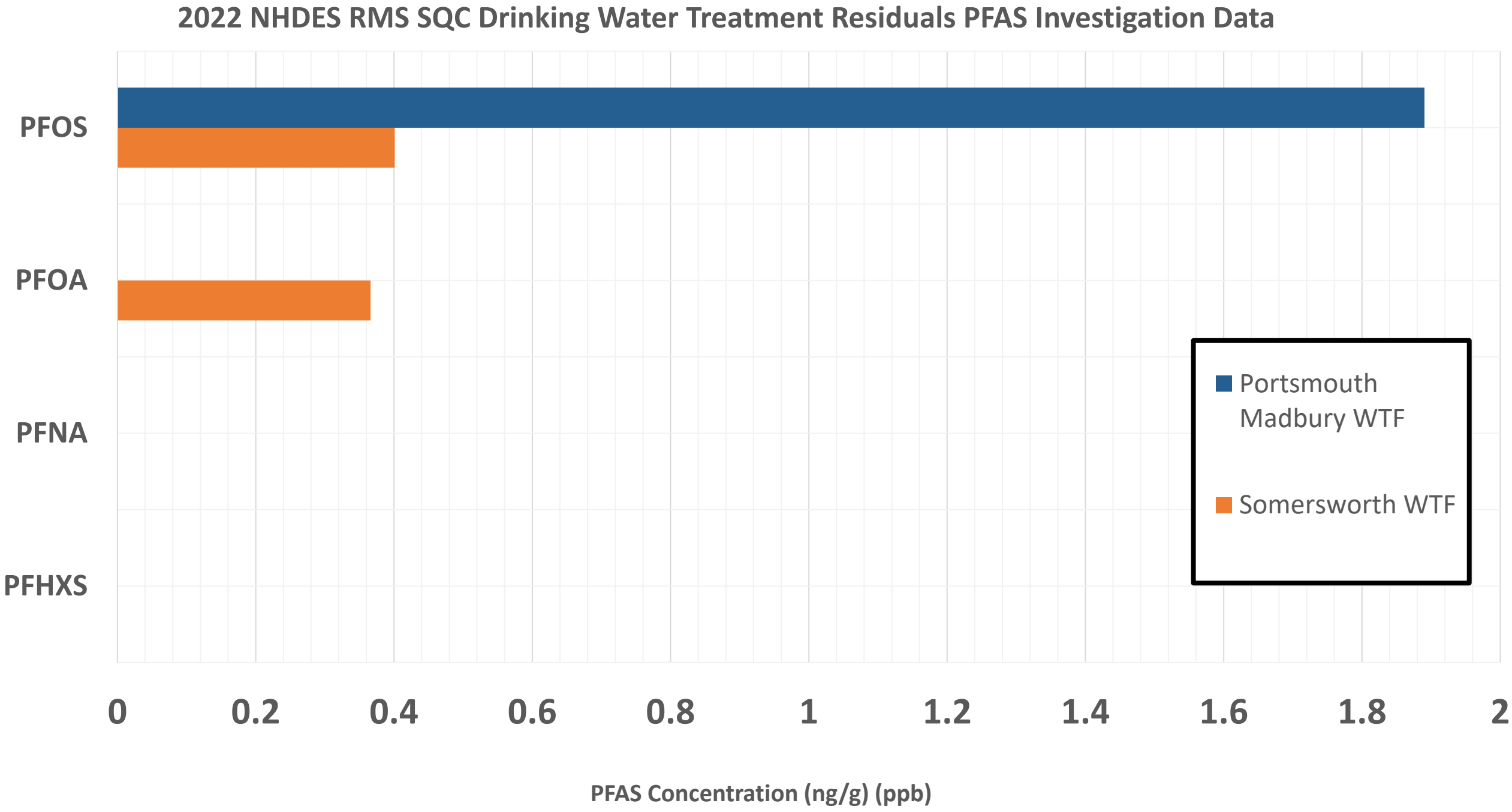


2022 NHDES RMS SQC Class B Biosolids PFAS Investigation Data

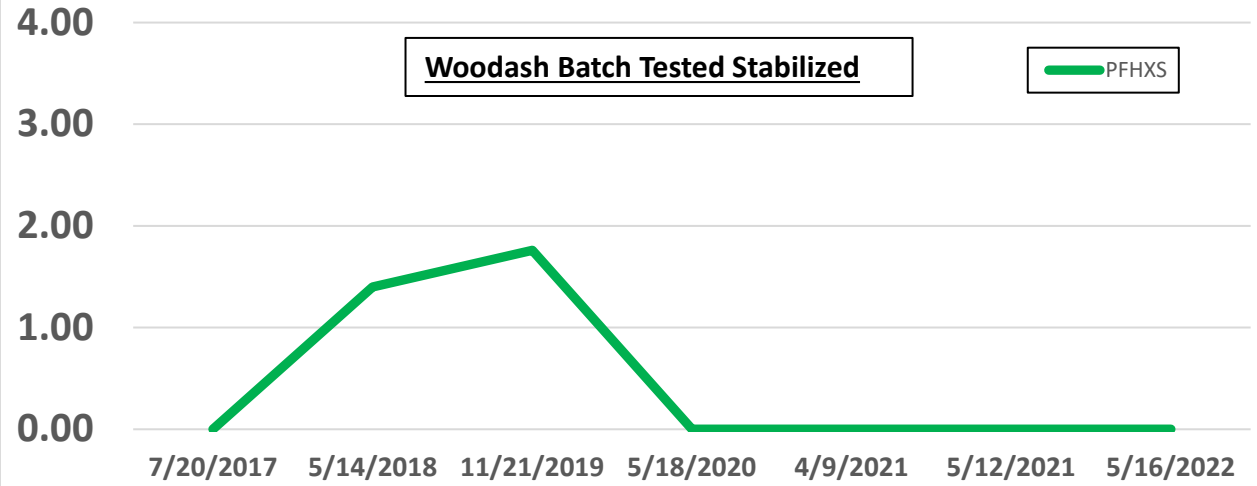


2022 NHDES RMS SQC Short Paper Fiber PFAS Investigation Data

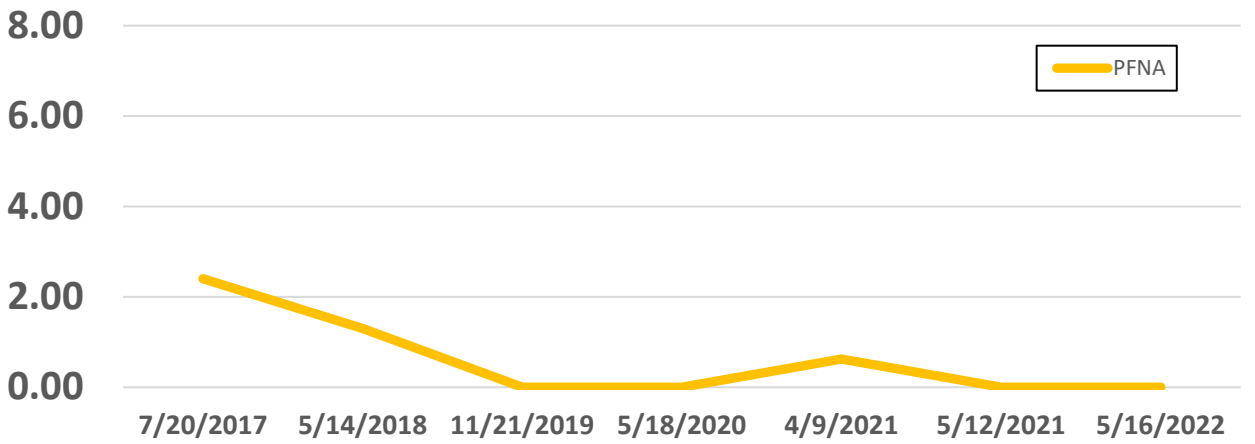



2022 NHDES RMS SQC Drinking Water Treatment Residuals PFAS Investigation Data
PFOS
PFOA
PFNA
PFHXS
Portsmouth Madbury WTF
Somersworth WTF
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
PFAS Concentration (ng/g) (ppb)

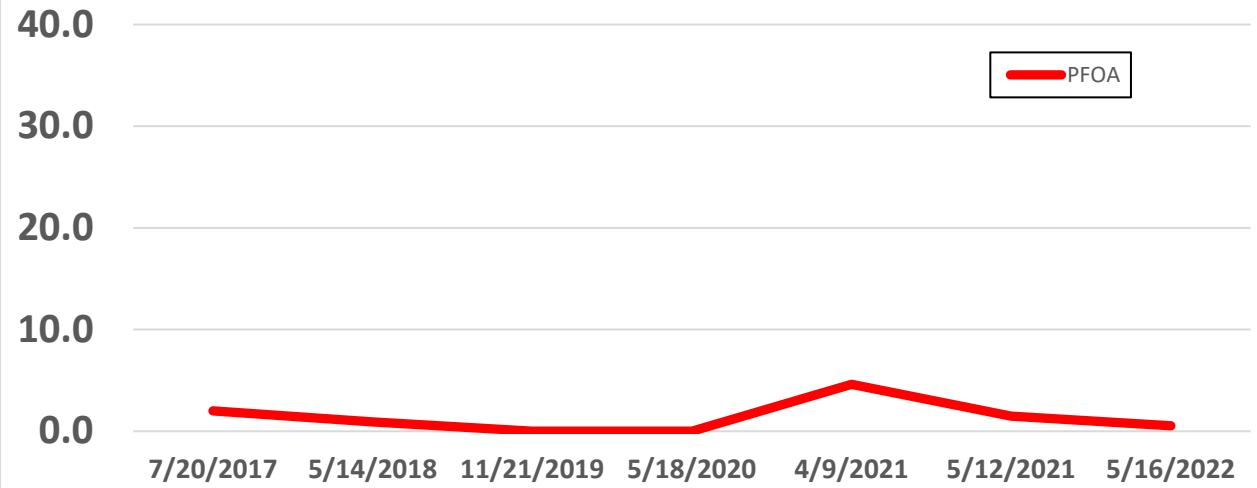
RMI - RMF (SQC13002) PFAS Concentrations (NH4) (ng/g) 2017 - present



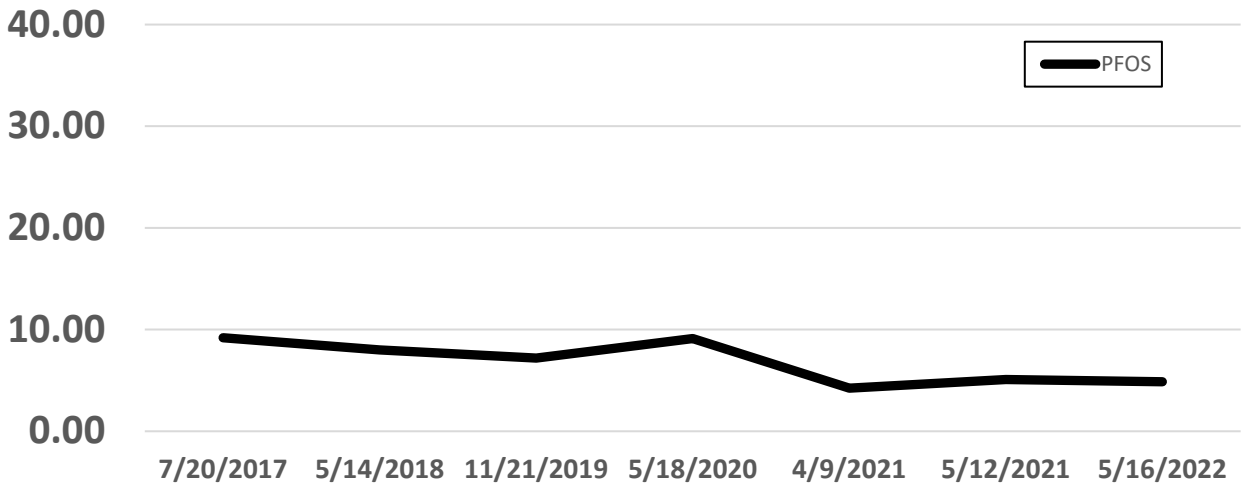
RMI - RMF (SQC13002) PFAS Concentrations (NH4) (ng/g) 2017 - present



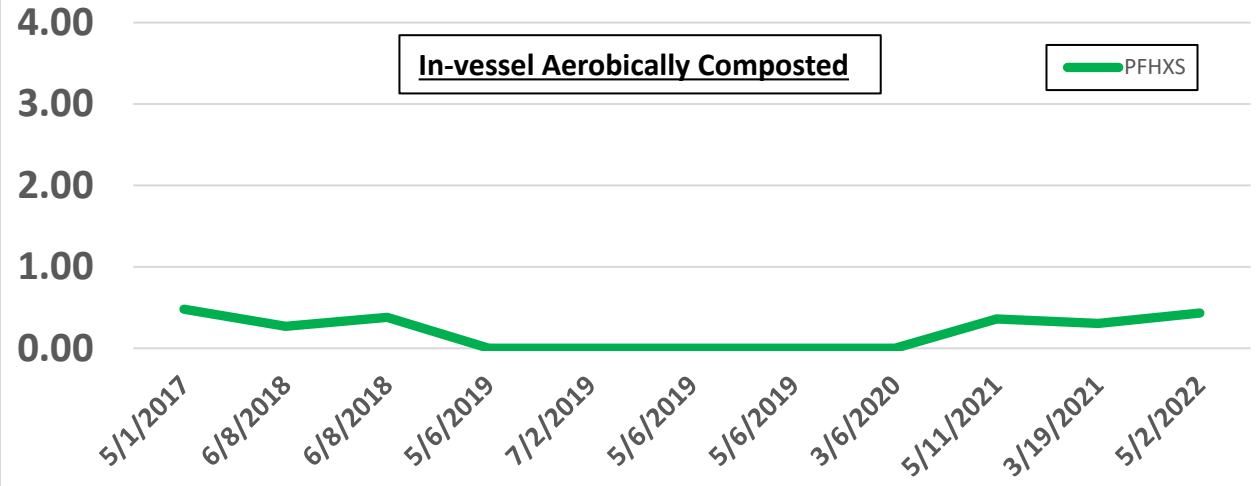
RMI - RMF (SQC13002) PFAS Concentrations (NH4) (ng/g) 2017 - present



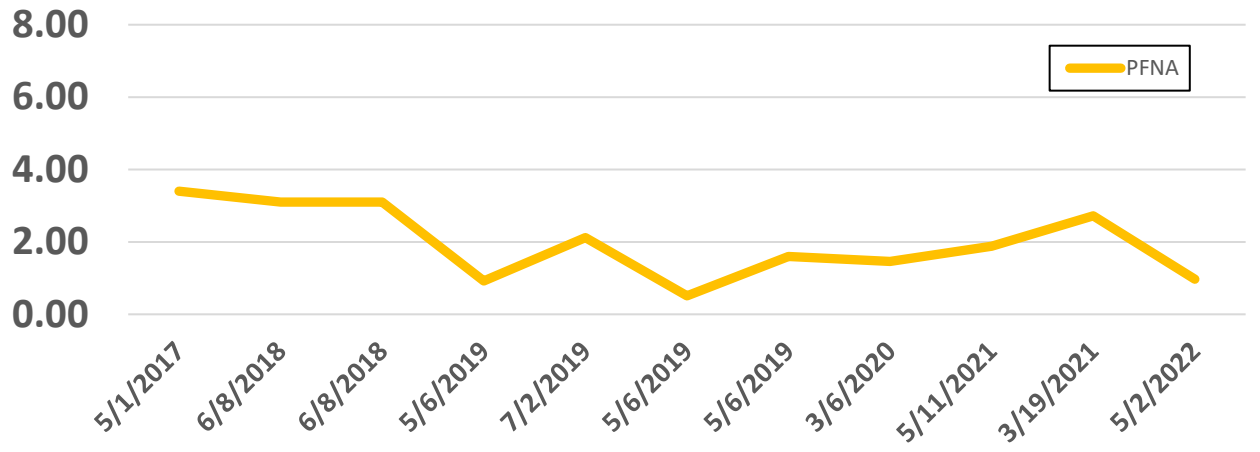
RMI - RMF (SQC13002) PFAS Concentrations (NH4) (ng/g) 2017 - present



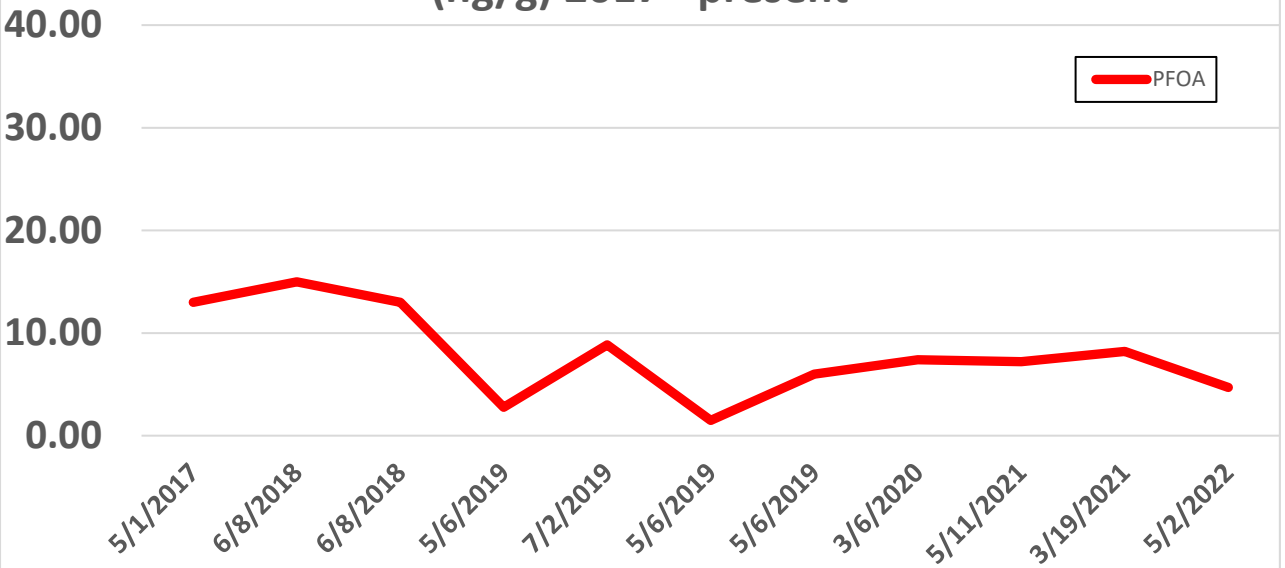
Merrimack WWTF (SQC9901) PFAS Concentrations (ng/g) 2017 - present



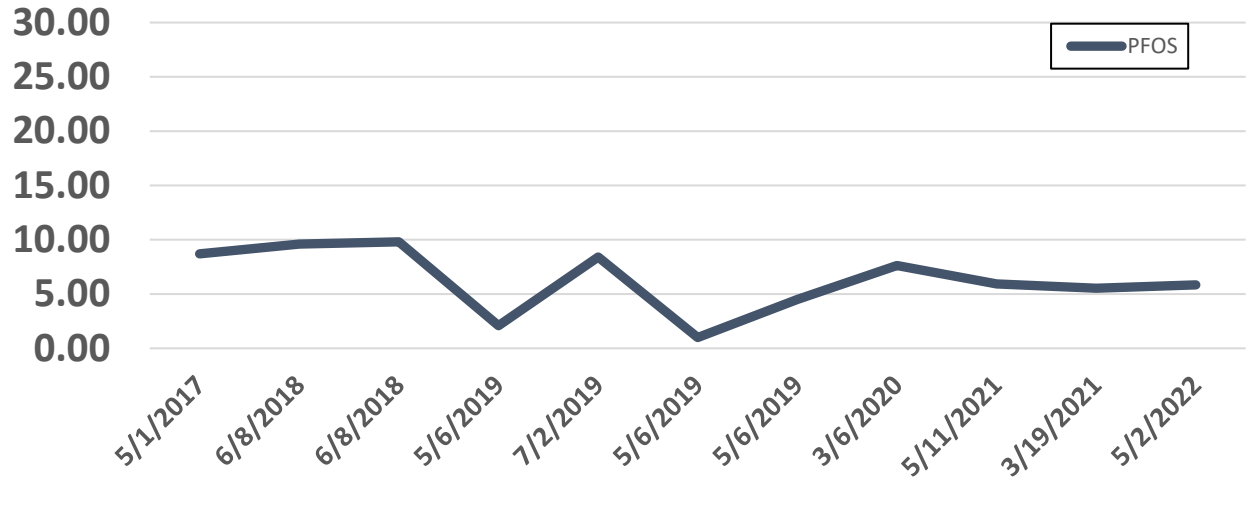
Merrimack WWTF (SQC9901) PFAS Concentrations (ng/g) 2017 - present



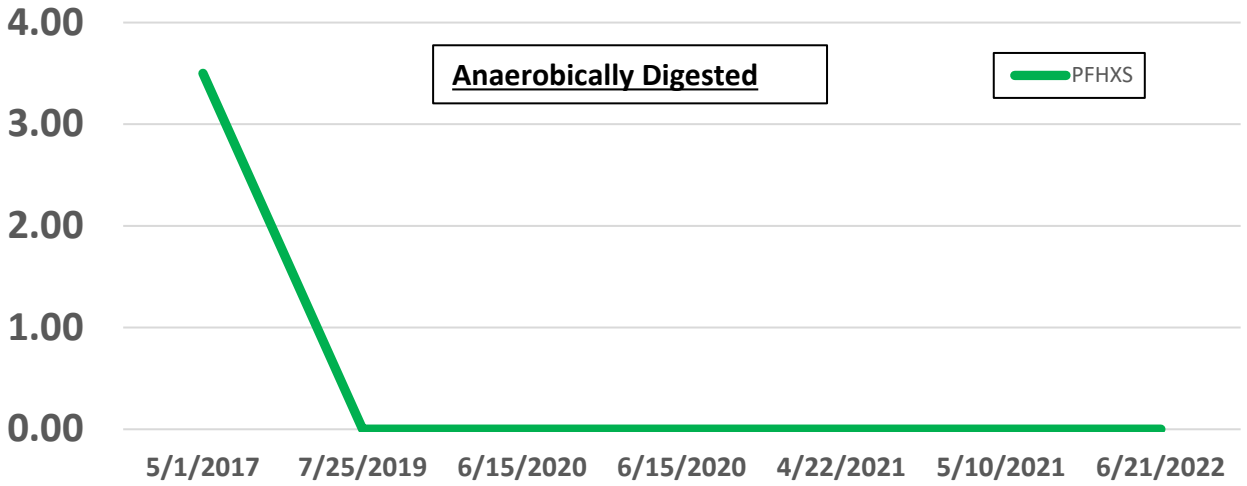
Merrimack WWTF (SQC9901) PFAS Concentrations (ng/g) 2017 - present



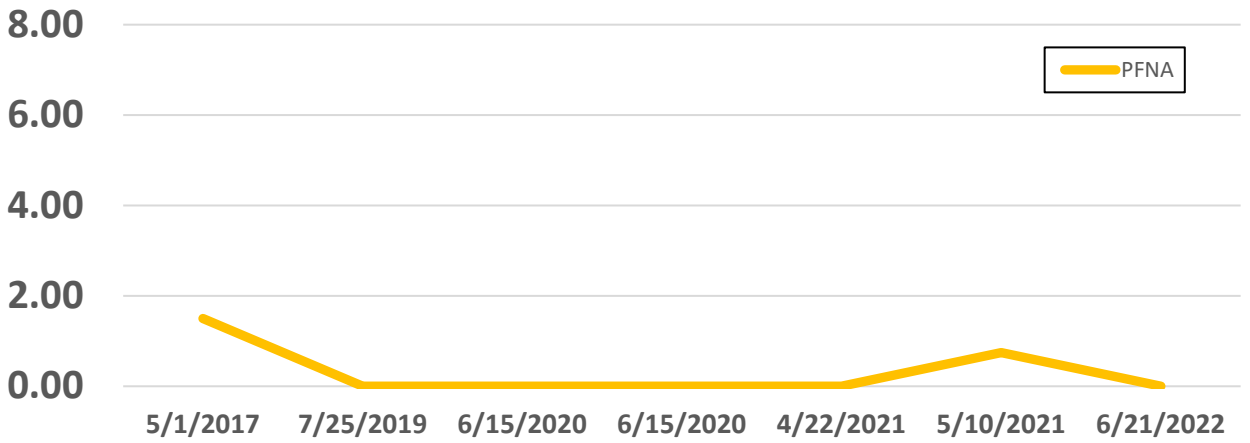
Merrimack WWTF (SQC9901) PFAS Concentrations (ng/g) 2017 - present



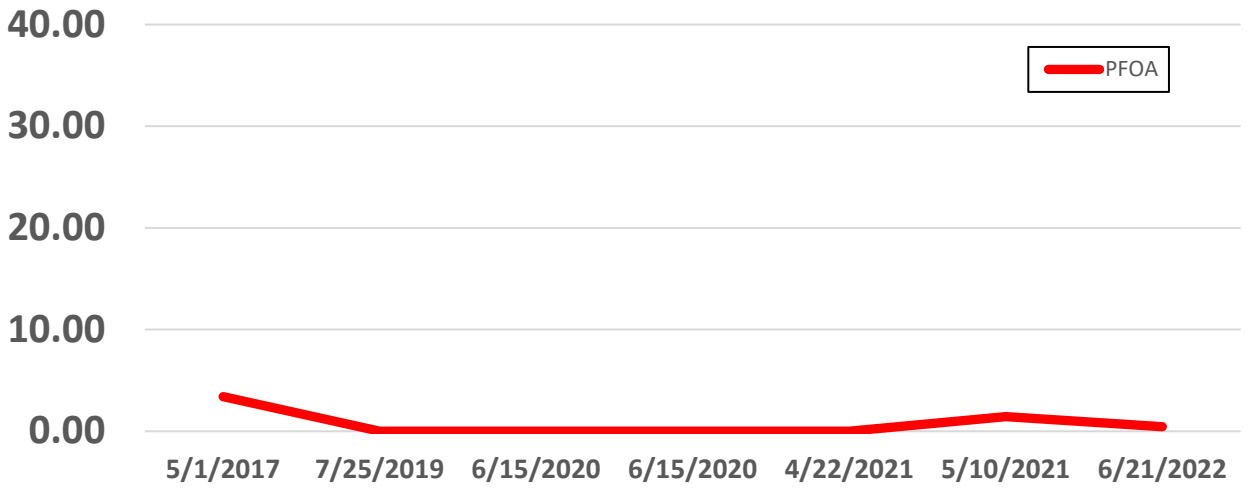
Nashua WWTF (SQC9908) PFAS Concentrations (ng/g) 2017 - present



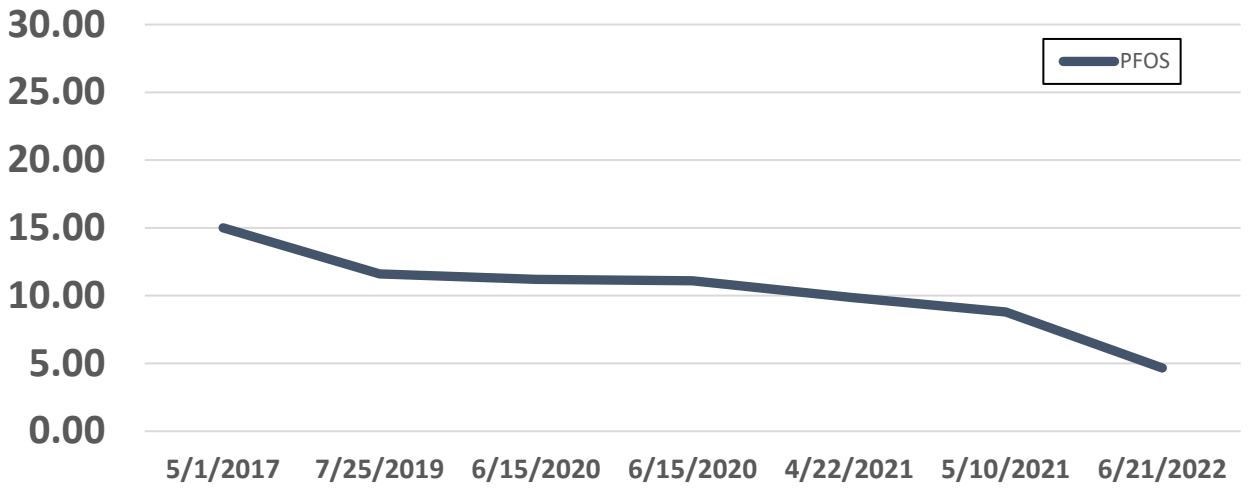
Nashua WWTF (SQC9908) PFAS Concentrations (ng/g) 2017 - present

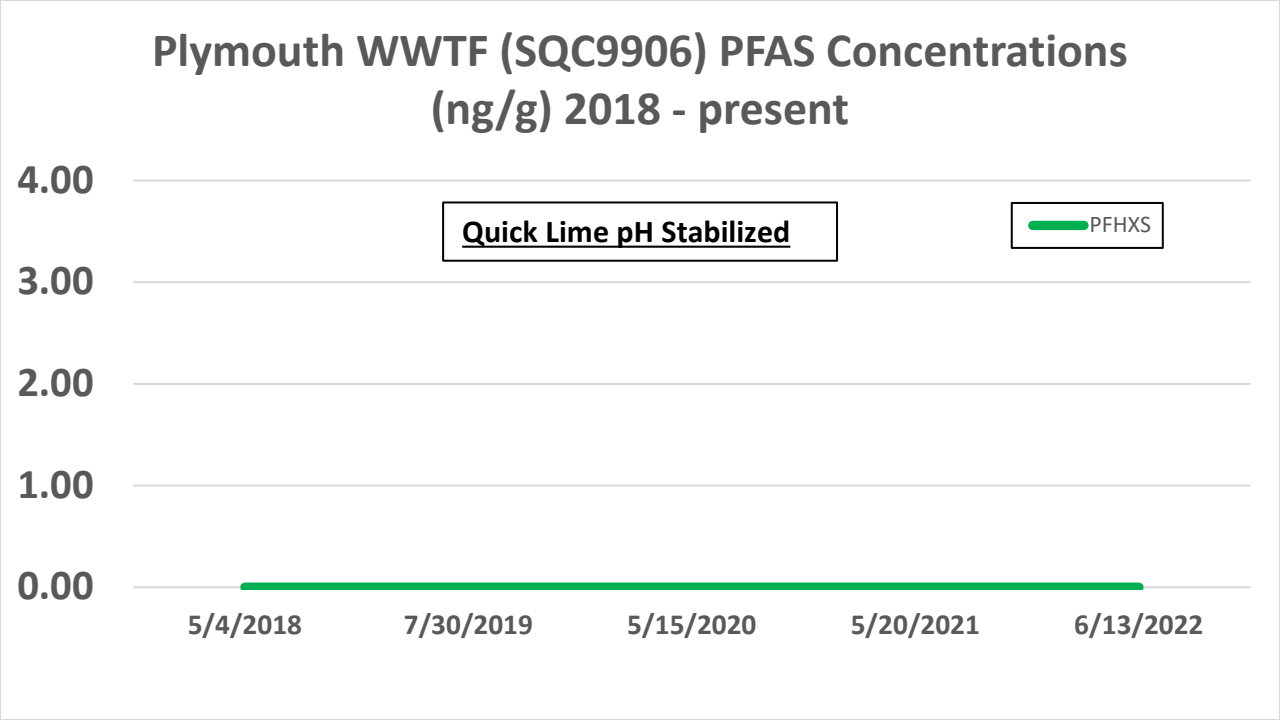


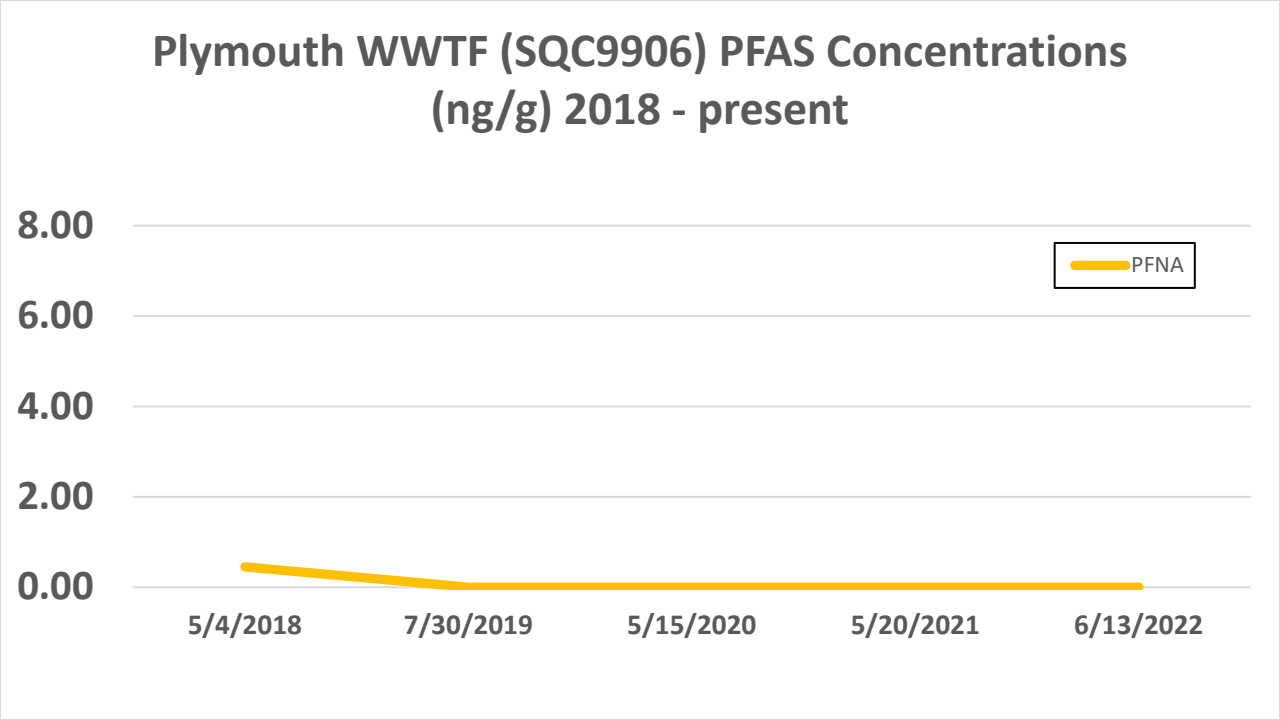
Nashua WWTF (SQC9908) PFAS Concentrations (ng/g) 2017 - present

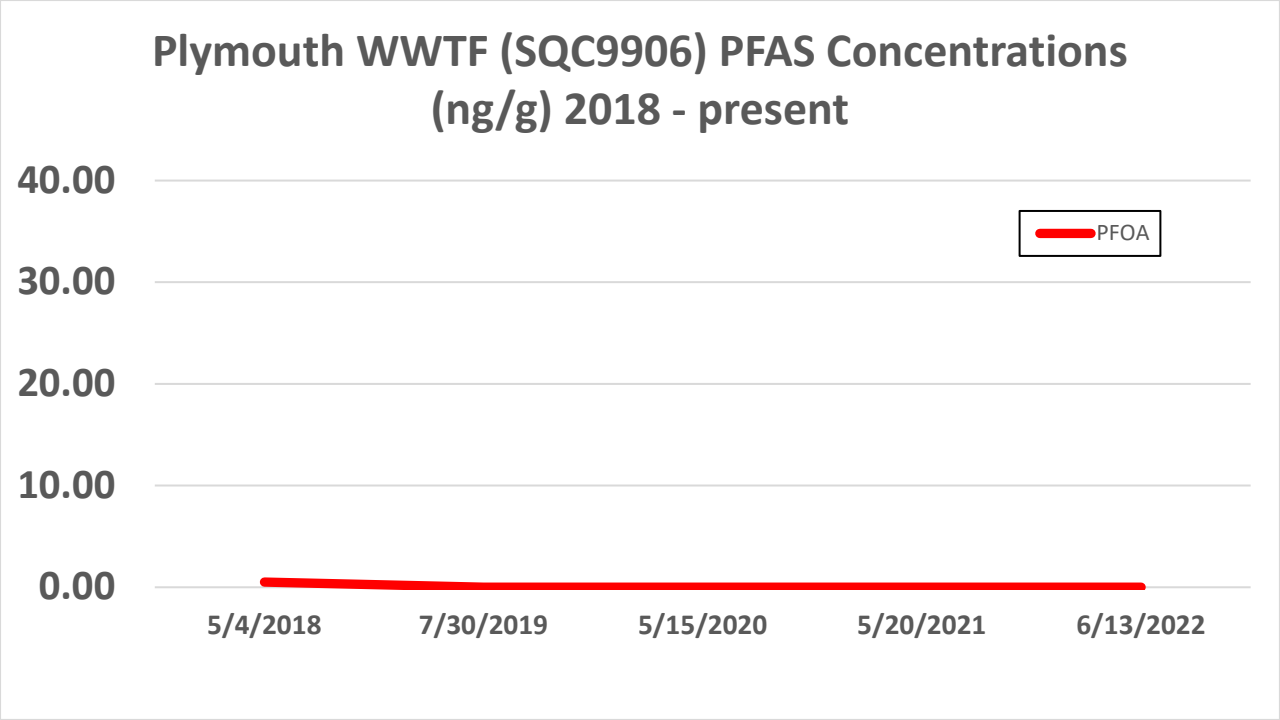


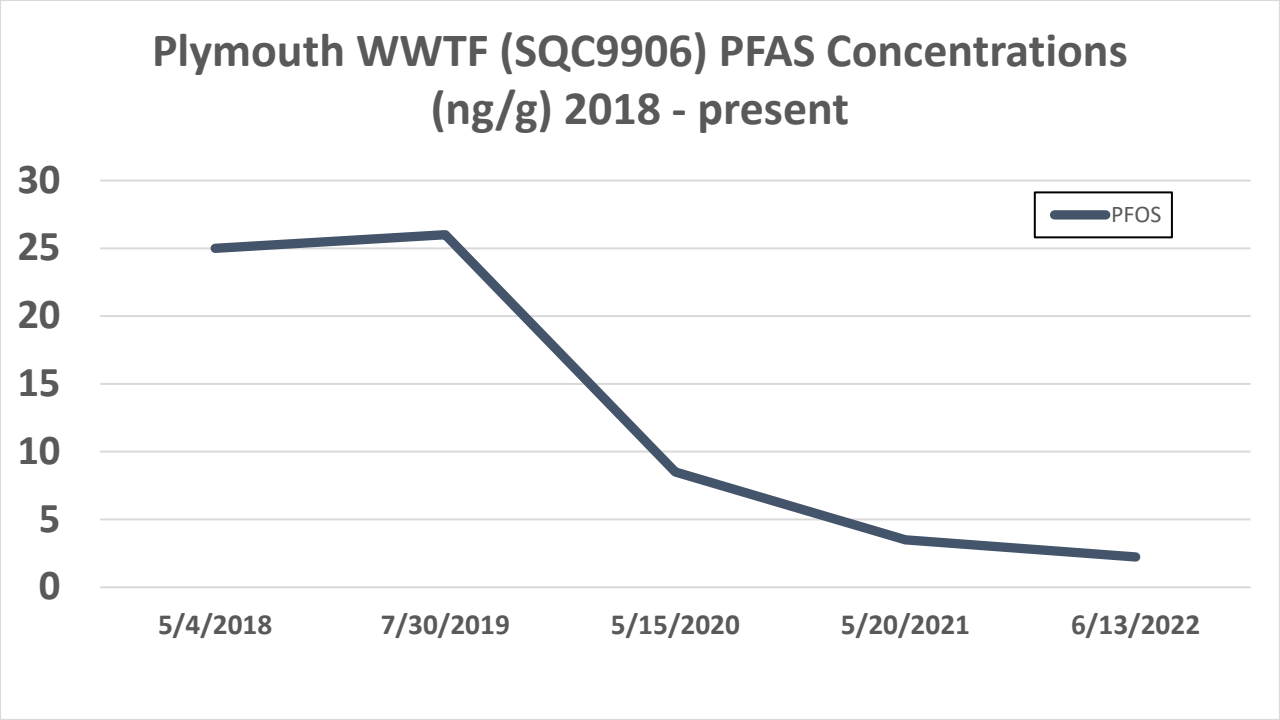
Nashua WWTF (SQC9908) PFAS Concentrations (ng/g) 2017 - present

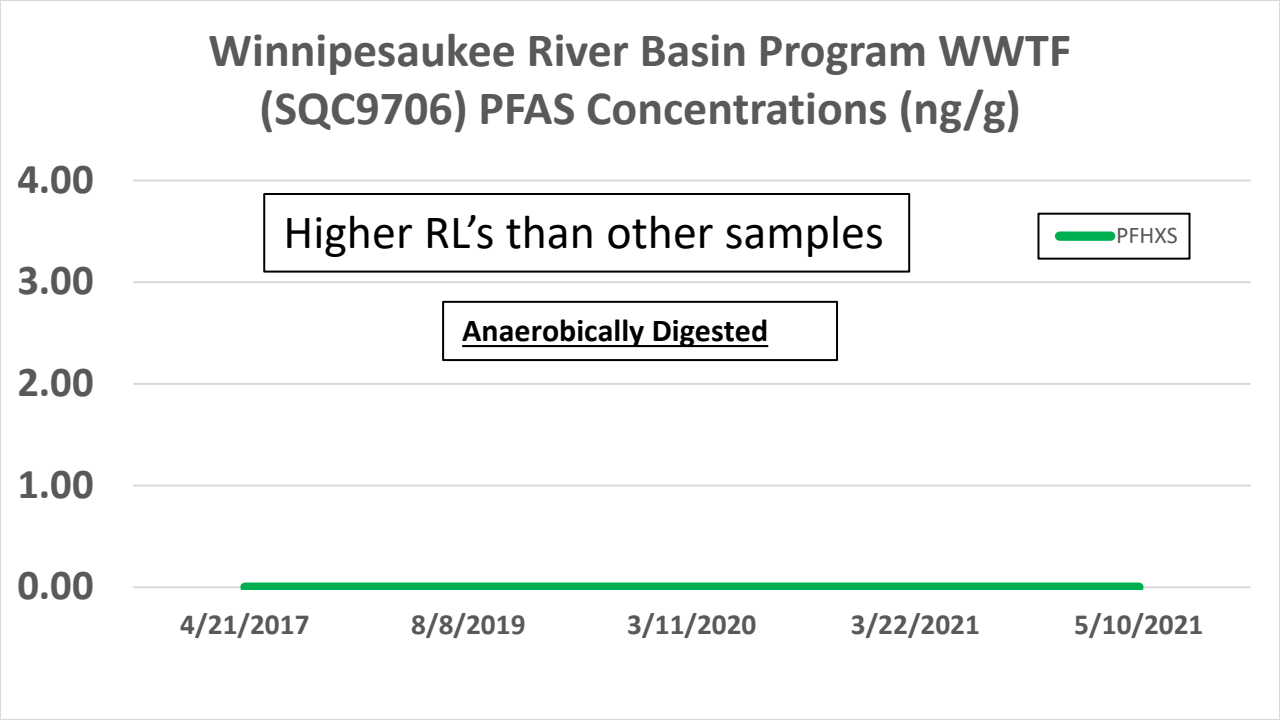


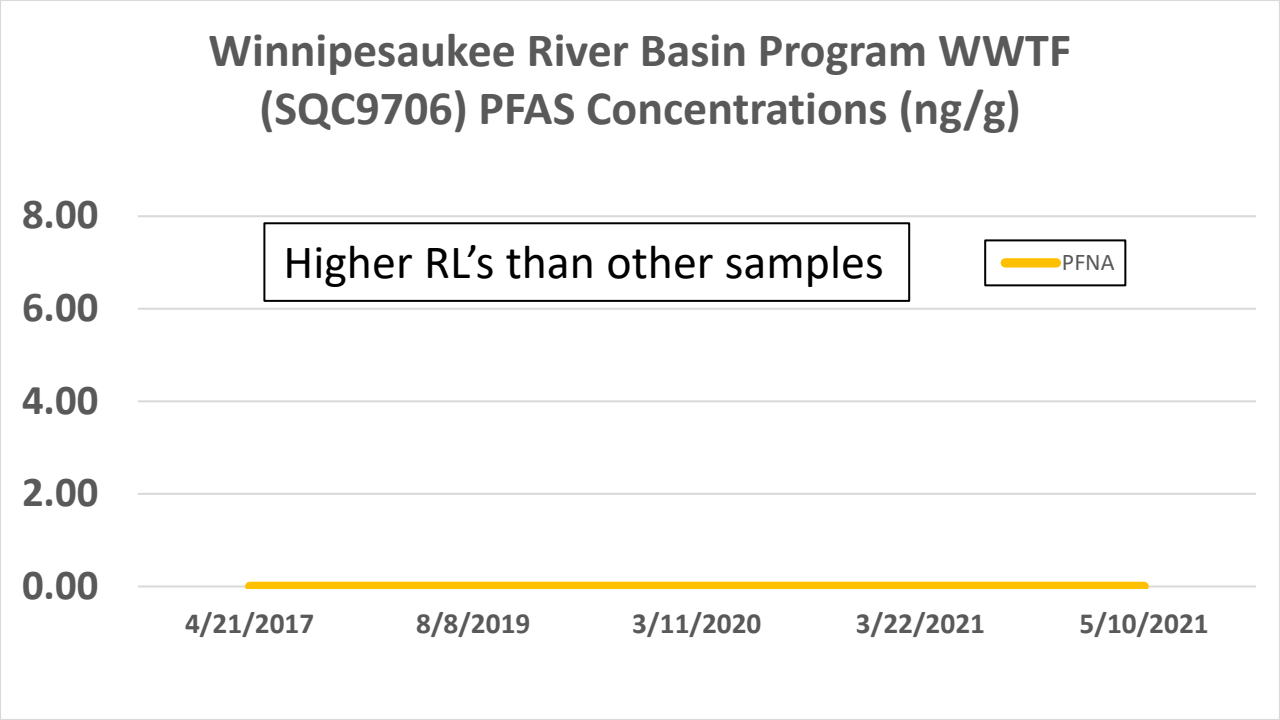

Plymouth WWTF (SQC9906) PFAS Concentrations (ng/g) 2018 - present
Quick Lime pH Stabilized
PFHXS
4.00
3.00
2.00
1.00
0.00
5/4/2018
7/30/2019
5/15/2020
5/20/2021
6/13/2022

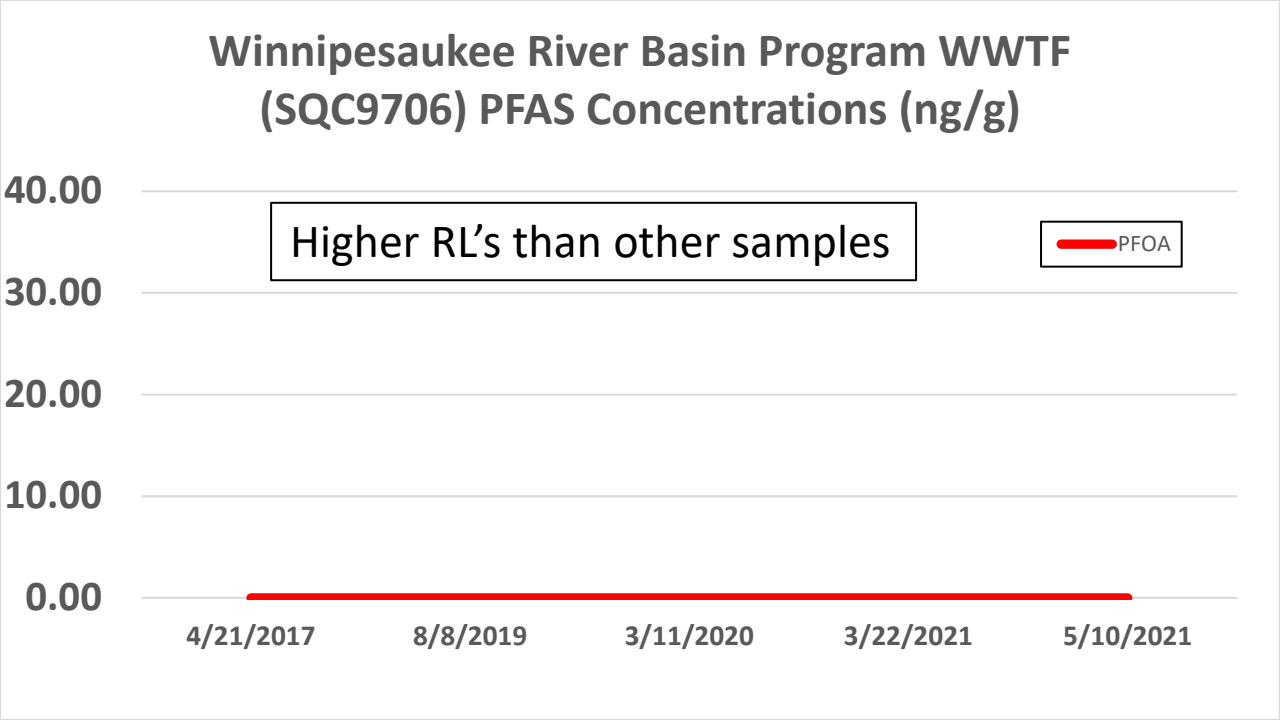

Plymouth WWTF (SQC9906) PFAS Concentrations (ng/g) 2018 - present
PFNA
8.00
6.00
4.00
2.00
0.00
5/4/2018
7/30/2019
5/15/2020
5/20/2021
6/13/2022

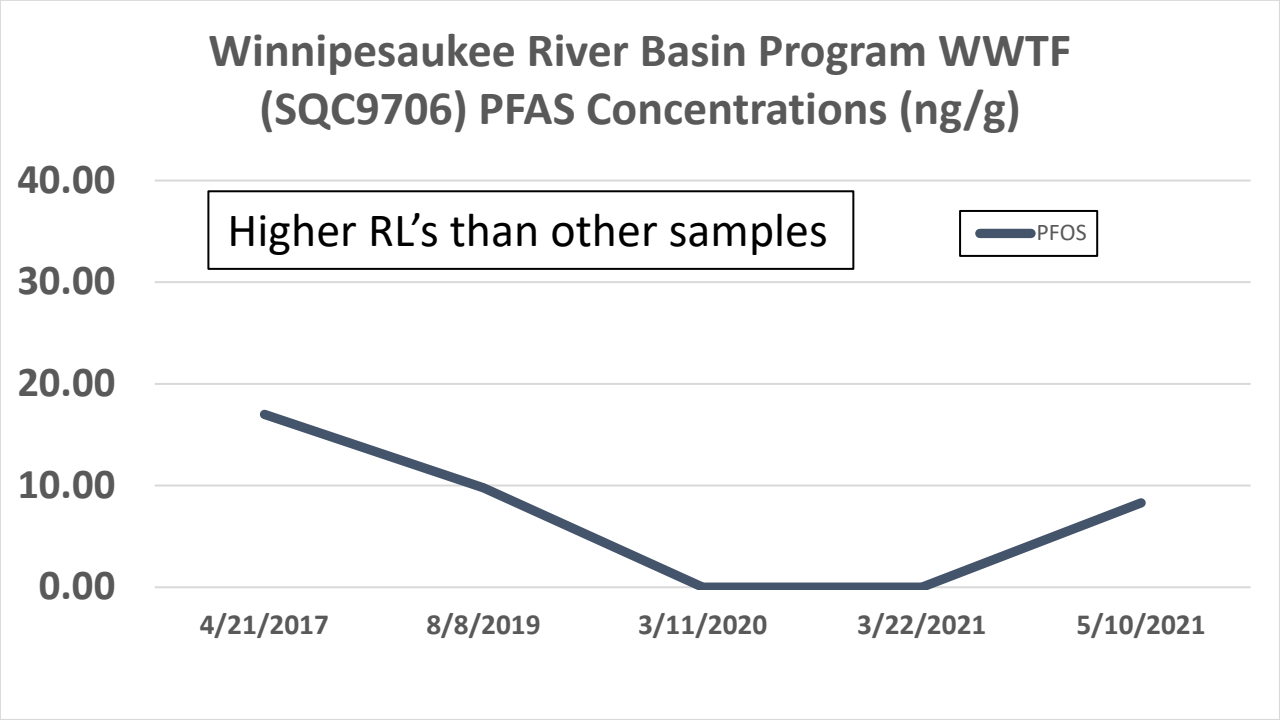

Plymouth WWTF (SQC9906) PFAS Concentrations (ng/g) 2018 - present
PFOA
40.00
30.00
20.00
10.00
0.00
5/4/2018
7/30/2019
5/15/2020
5/20/2021
6/13/2022


Plymouth WWTF (SQC9906) PFAS Concentrations (ng/g) 2018 - present
PFOS
30
25
20
15
10
5
0
5/4/2018
7/30/2019
5/15/2020
5/20/2021
6/13/2022


Winnipesaukee River Basin Program WWTF (SQC9706) PFAS Concentrations (ng/g)
4.00
3.00
2.00
1.00
0.00
Higher RL's than other samples
Anaerobically Digested
PFHXS
4/21/2017
8/8/2019
3/11/2020
3/22/2021
5/10/2021


Winnipesaukee River Basin Program WWTF (SQC9706) PFAS Concentrations (ng/g)
8.00
6.00
4.00
2.00
0.00
Higher RL's than other samples
PFNA
4/21/2017
8/8/2019
3/11/2020
3/22/2021
5/10/2021


Winnipesaukee River Basin Program WWTF (SQC9706) PFAS Concentrations (ng/g)
40.00
30.00
20.00
10.00
0.00
Higher RL's than other samples
PFOA
4/21/2017
8/8/2019
3/11/2020
3/22/2021
5/10/2021


Winnipesaukee River Basin Program WWTF (SQC9706) PFAS Concentrations (ng/g)
40.00
30.00
20.00
10.00
0.00
Higher RL's than other samples
PFOS
4/21/2017
8/8/2019
3/11/2020
3/22/2021
5/10/2021

The Future?

https://www.renewableenergymagazine.com/biomass/aries-clean-energy-receives-permits-for-worlda-20190716

https://rmirecycles.com/shincci-usa/

https://www.bioforcetech.com/

https://modernpumpingtoday.com/clean-energy-from-landfill-diversion-plus-the-bonus-of-biochar/

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

The Future?

https://www.google.com/url?sa=i&url=https%3A%2F%2Fwww.ec21.com%2Fproduct-details%2FElectrocoagulation-Water-Treatment-System--4324338.html&psig=AOvVaw13ecRf3aV4hqpGGOzuKemW&ust=1684603362541000&source=images&cd=vfe&ved=0CA8QjhxqFwoTCOjJ-93ygf8CFQAAAAAdAAAAABAa

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Thank You !

Any Questions?

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