Addressing the Proposed PFAS Rule at BWW

ADEM Surface Water Meeting

BWW
October 2023

Presentation Agenda

1. Rule Summary: Proposed MCLs, Anticipated Timeline
2. Prevalence of PFAS: Alabama, UCMR 3, UCMR 5
3. Planning and Monitoring Considerations at BWW
4. Treatment Options and Considerations
5. Potential Cost of Treatment
6. Proactive Preparation Steps for Utilities

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EPA's Proposed PFAS Rule Requirements for Public Water Systems

1. Monitor for these PFAS;

- Initial monitoring must be completed in the three years between the rule promulgation date (anticipated end of 2023) and the rule effective date (anticipated end of 2026).
- Initial monitoring results will determine the ongoing compliance monitoring requirements.

2. Treat to reduce the levels of these PFAS in drinking water if they exceed the proposed standards regulatory standards.

- Through treatment to remove PFAS
- Switching to alternative water supply that meets standards

3. Notify the public of the levels of these PFAS

- If the levels of regulated PFAS exceed the proposed MCL, EPA is proposing a "Tier 2" notification be issued:
  - This would require notice as soon as possible, but within 30 days of the violation to public
- Through annual Consumer Confidence Reports (CCRs)

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EPA's Proposed PFAS Rule Requirements for Public Water Systems

1. **EPA is proposing Maximum Contaminant Levels (MCLs), for six PFAS in drinking water.**
   - PFOA and PFOS as individual contaminants, and
   - PFHxS, PFNA, PFBS, and HFPO-DA (commonly referred to as GenX Chemicals) as a PFAS mixture

2. **EPA is also proposing health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these six PFAS.**
   - MCLGs are the maximum level of a contaminant in drinking water where there are no known or anticipated negative health effects allowing for a margin of safety

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EPA's Proposed MCLs for PFAS

Compound	Proposed MCLG	Proposed MCL (enforceable levels)
PFOA	0 ppt*	4.0 ppt*
PFOS	0 ppt*	4.0 ppt*
PFNA	1.0 (unitless) Hazard Index	1.0 (unitless) Hazard Index
PFHxS		
PFBS		
HFPO-DA (commonly referred to as GenX Chemicals)		

The Hazard Index is a tool used to evaluate potential health risks from exposure to chemical mixtures.

*ppt = parts per trillion (also expressed as ng/L)

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Additional PFAS Requirements Related to UCMR 5

- Who is required to conduct UCMR 5 sampling?

Size Category (Number of People Served)	Monitoring Design (CWSs and NTNCWSs)[2]	Total # of Systems per Size Category
Small Systems[1] (fewer than 3,300)	Nationally representative sample	800
Small Systems[1] (3,300-10,000)	All systems, if confirmed by EPA	5,147[3]
Large Systems (10,001 and over)	All systems	4,364[3]
Total		10,311

1. This requirement is based on the availability of appropriations and sufficient laboratory capacity
2. Community Water Systems (CWSs), Non-Transient Non-Community Water Systems (NTNCWSs)
3. Counts are approximate

- Samples will be collected at each entry point to the distribution system (EPTDS).
- Timeline:
  - The 5-year UCMR 5 cycle spans 2022 – 2026, with preparations in 2022, sample collection from 2023 – 2025, and completion of data reporting in 2026.

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UCMR 5 - *Full List of Compounds, Minimum Reporting Levels (MRLs), EPA Methods*

= Included in Proposed PFAS NPDWR

* = UCMR 3

Contaminant	UCMR5 MRL	Units	Method ID
9Cl-PF3ONS	0.002	µg/L	EPA 533
PFMPA	0.004	µg/L	EPA 533
8:2 FTS	0.005	µg/L	EPA 533
PFHpA*	0.003	µg/L	EPA 533
PFOA*	0.004	µg/L	EPA 533
PFDA	0.003	µg/L	EPA 533
PFTA	0.008	µg/L	EPA 537.1
PFPeS	0.004	µg/L	EPA 533
PFDoA	0.003	µg/L	EPA 533
PFOS*	0.004	µg/L	EPA 533
PFMBA	0.003	µg/L	EPA 533
PFNA*	0.004	µg/L	EPA 533
PFPeA	0.003	µg/L	EPA 533
PFHxA	0.003	µg/L	EPA 533
NMeFOSAA	0.006	µg/L	EPA 537.1

UCMR 5 - *Full List of Compounds, Minimum Reporting Levels (MRLs), EPA Methods (cont.)*

■ = Included in Proposed PFAS NPDWR

* = UCMR 3

Contaminant	UCMR5 MRL	Units	Method ID
4:2 FTS	0.003	µg/L	EPA 533
PFEESA	0.003	µg/L	EPA 533
6:2 FTS	0.005	µg/L	EPA 533
PFBS*	0.003	µg/L	EPA 533
PFUnA	0.002	µg/L	EPA 533
NEtFOSAA	0.005	µg/L	EPA 537.1
PFTrDA	0.007	µg/L	EPA 537.1
PFHxS*	0.003	µg/L	EPA 533
ADONA	0.003	µg/L	EPA 533
PFBA	0.005	µg/L	EPA 533
lithium	9	µg/L	EPA 200.7
PFHpS	0.003	µg/L	EPA 533
HFPO-DA (GenX)	0.005	µg/L	EPA 533
11Cl-PF3OUdS	0.005	µg/L	EPA 533
NFDHA	0.02	µg/L	EPA 533

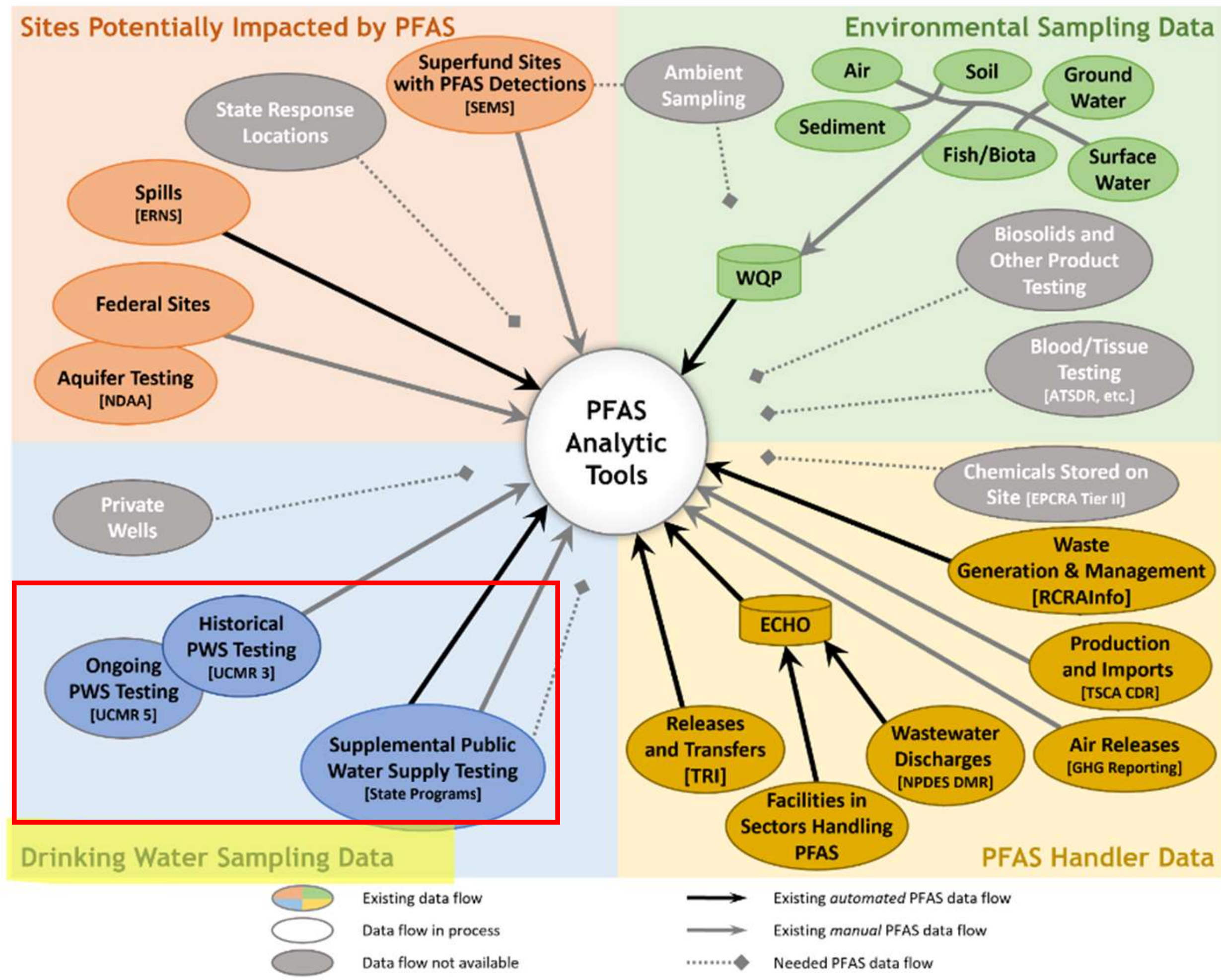
EPA PFAS Analytic Tools – Data Inputs

Source: https://awsedap.epa.gov/public/extensions/PFAS_Tools/PFAS_Tools.html

Drinking Water Sampling Data

1. UCMR 3
2. Supplemental Public Water Supply testing (State Programs)
3. UCMR 5*

* Ongoing and integrated incrementally



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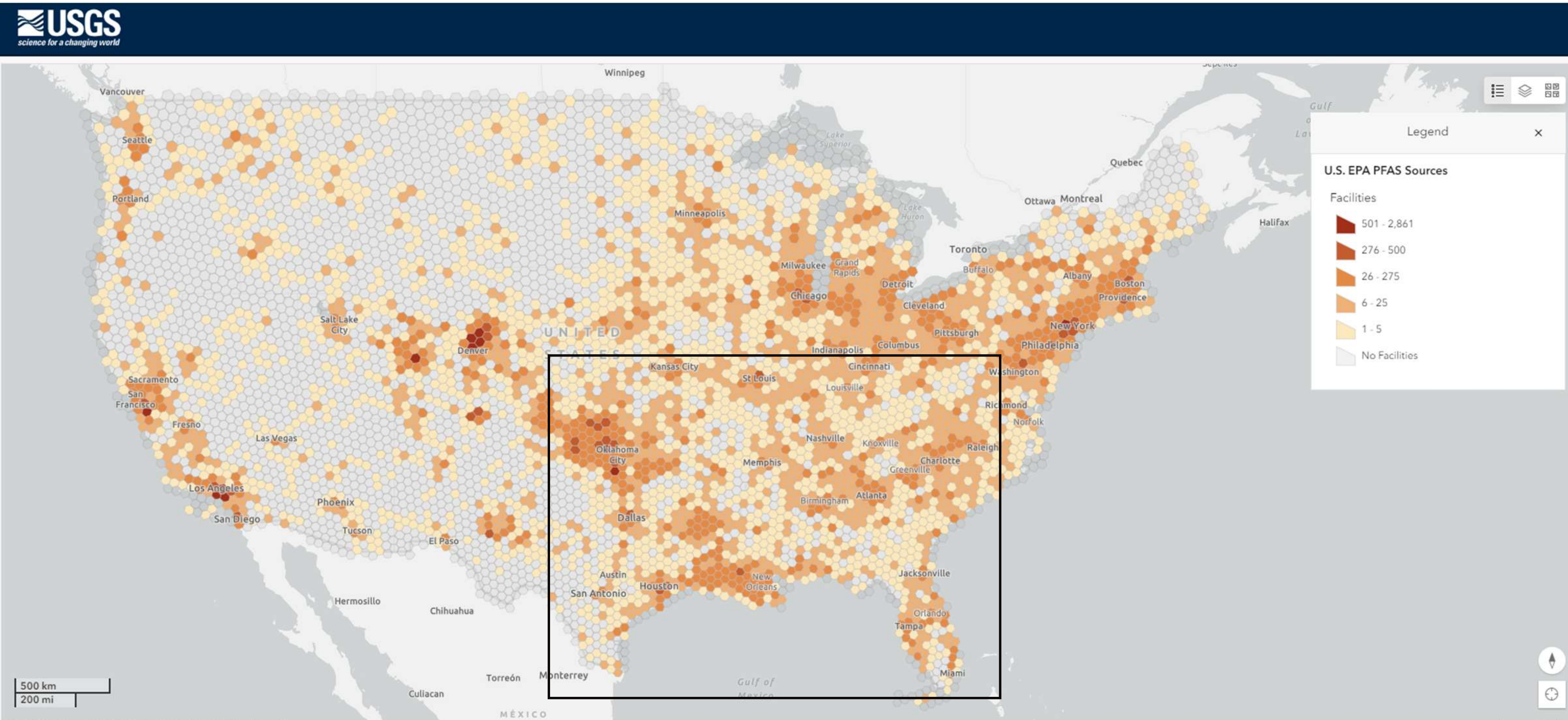
US EPA PFAS Sources- Count of Facilities by State

Source: PFAS in US Tap water Interactive Dashboard (usgs.gov)



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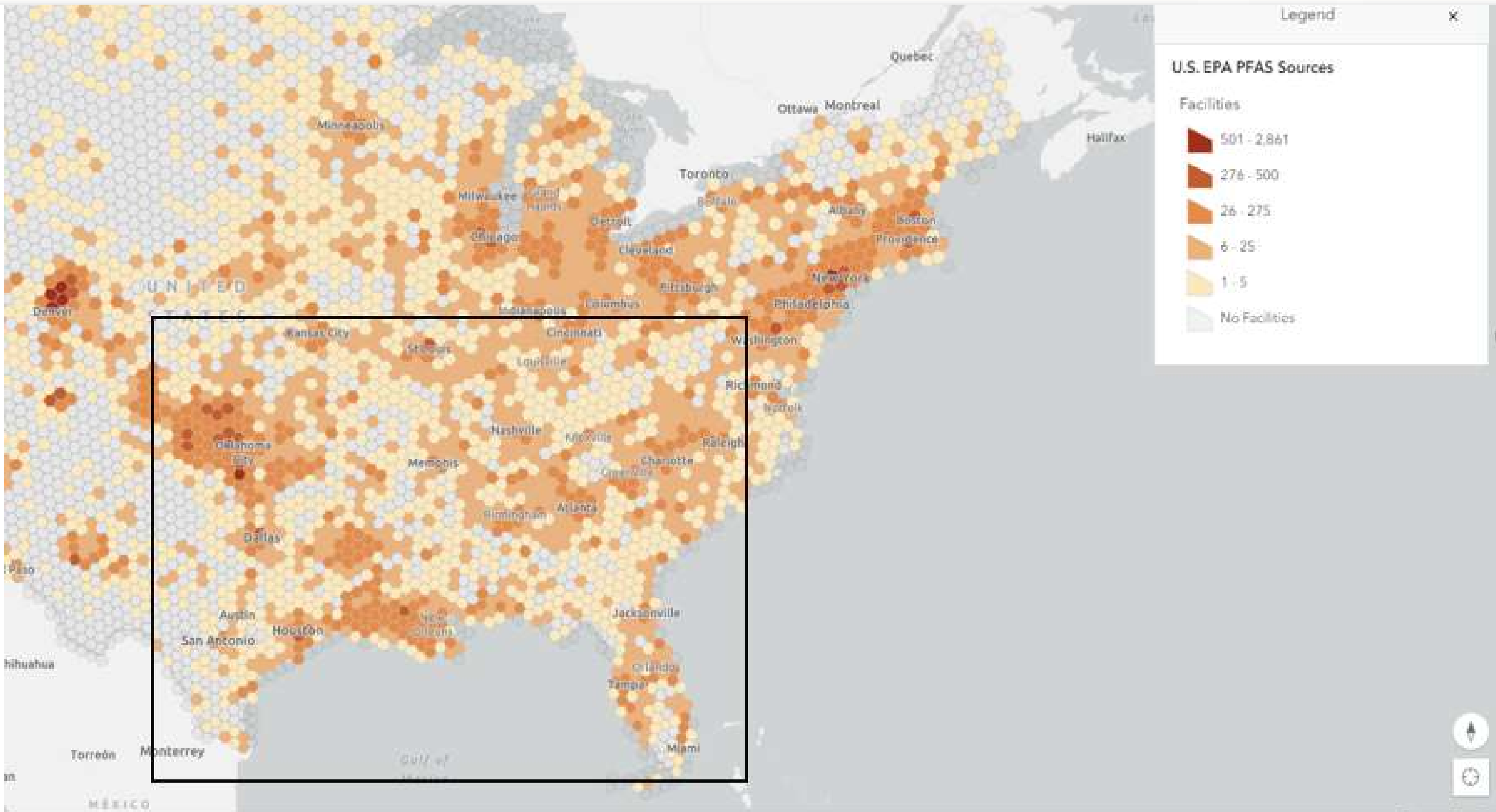
USGS
science for a changing world



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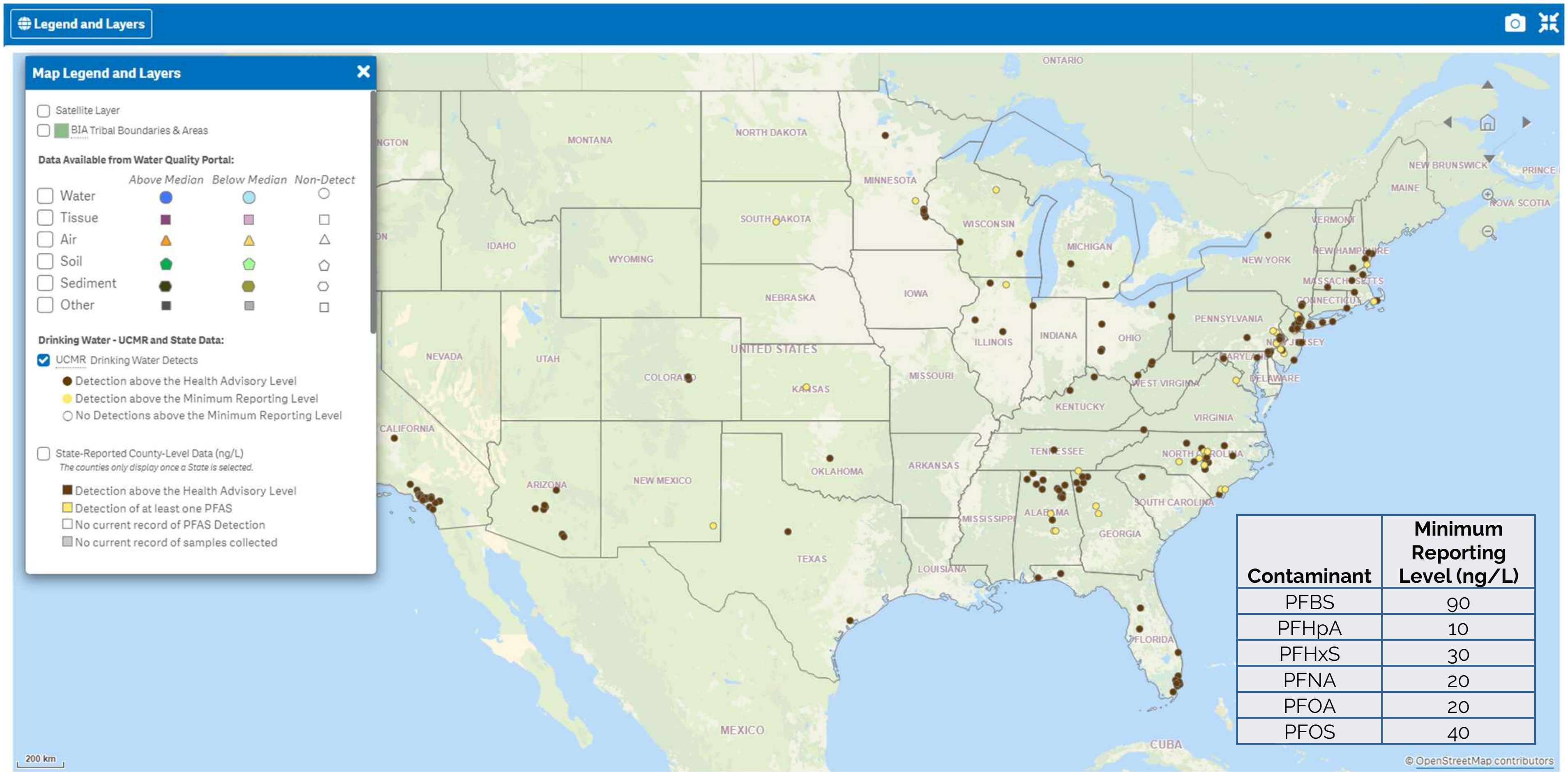
UCMR 3 Drinking Water Detects Across US

Source: https://awsedap.epa.gov/public/extensions/PFAS_Tools/PFAS_Tools.html

UCMR3 required all large systems and a representative sample of small systems to monitor for six PFAS compounds.



Contaminant	Minimum Reporting Level (ng/L)
PFBS	90
PFHpA	10
PFHxS	30
PFNA	20
PFOA	20
PFOS	40

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What about UCMR 5?

- **From UCMR 3 to UCMR 5, MRLs for PFAS compounds have reduced 3-30x, depending on the species**

Contaminant under UCMR 3	UCMR 3 Minimum Reporting Level (ng/L)	Interim/Final HALs (ppt, ng/L)*	UCMR 5 Minimum Reporting Level (ng/L)
PFBS	90	Final: 2000 ppt	3
PFHpA	10		3
PFHxS	30		3
PFNA	20		4
PFOA	20	Interim: 0.004 ppt	4
PFOS	40	Interim: 0.02 ppt	4
Gen X*		**Final: 10 ppt**	5

*Final HAL exists for GenX (HFPO-DA) at a level of 10 ppt, but GenX was not part of the UCMR 3 assessment. GenX is included in the current UCMR 5 endeavor.

UCMR 5 - *Full List of Compounds, Minimum Reporting Levels (MRLs), EPA Methods*

= Included in Proposed PFAS NPDWR

* = UCMR 3

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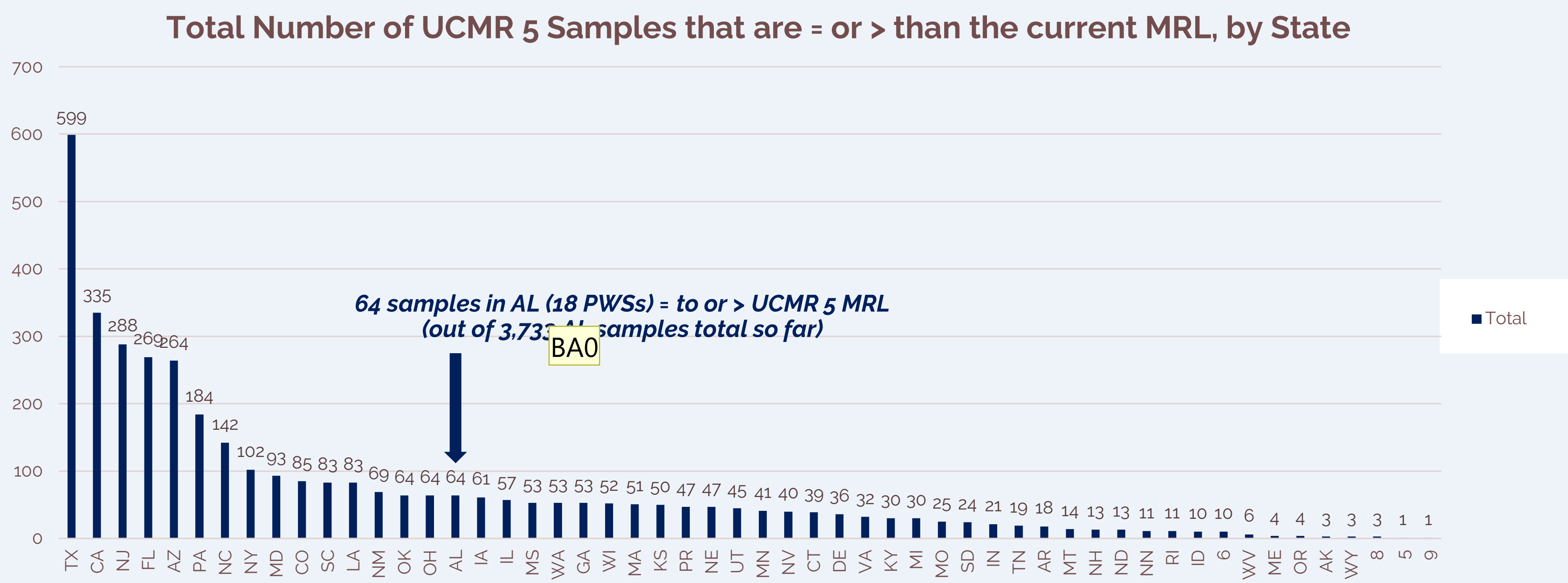
NFDHA	0.02	µg/L	EPA 533

UCMR 5 To date –
AL tied for 13th highest, based on 7% of UCMR 5 data received

Source: Occurrence Data from the Unregulated Contaminant Monitoring Rule | US EPA



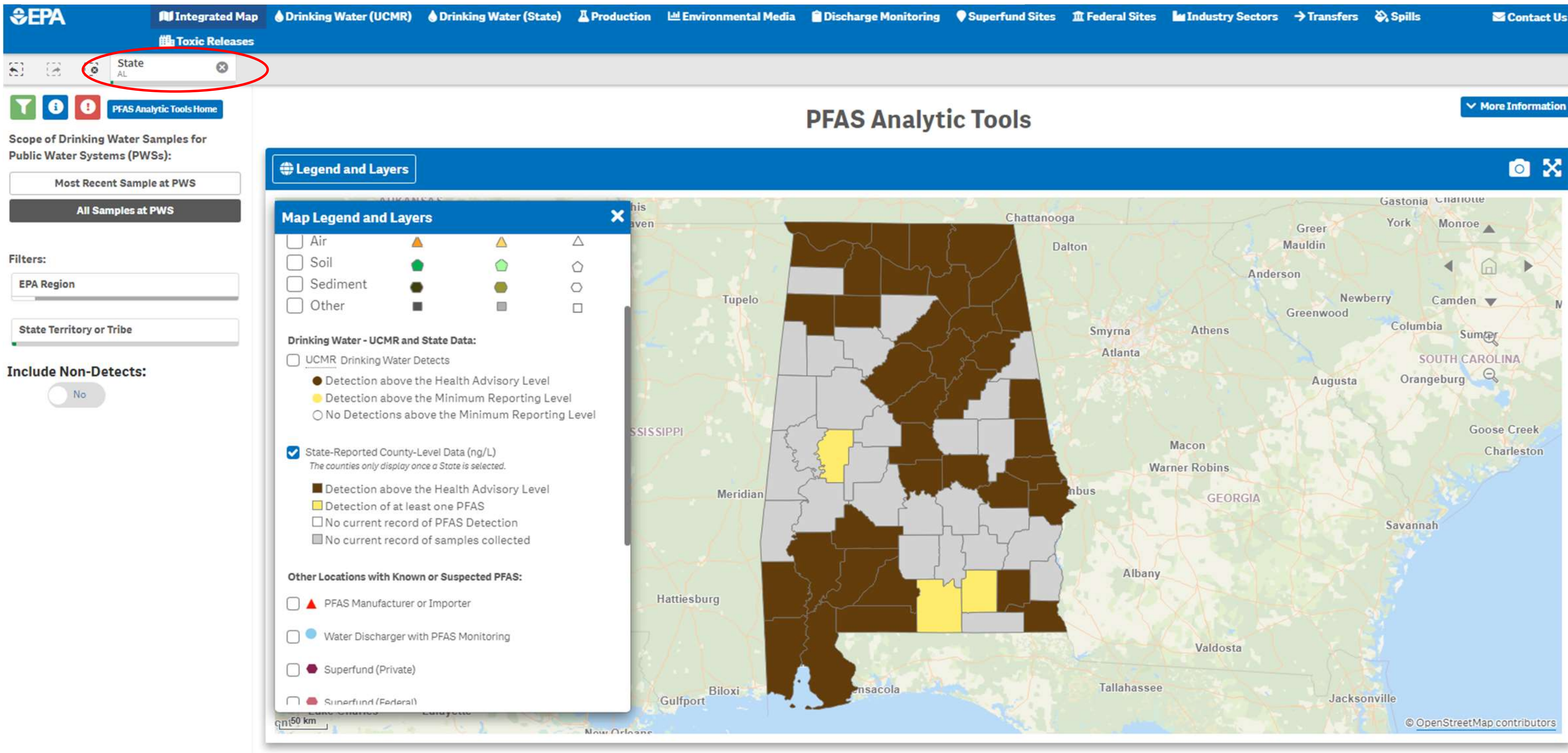
This data release represents approximately 7% of the total results that EPA expects to receive. Occurrence data will be updated on a quarterly basis until completion of data reporting in 2026. Data are added and possibly removed or updated over the course of this reporting cycle following further review by analytical laboratories, public water systems (PWSs), states, and EPA.

BA0 How many utilties within this 64*

What percentage of overall samples by AL are within the 64
Beciragic, Alma, 2023-10-10T15:35:25.699

State-Reported County-Level PFAS Data - AL

Source: https://awsedap.epa.gov/public/extensions/PFAS_Tools/PFAS_Tools.html



Supplemental Public Water Supply PFAS Monitoring

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Source: https://awsedap.epa.gov/public/extensions/PFAS_Tools/PFAS_Tools.html

EPA | Integrated Map | Drinking Water (UCMR) | Drinking Water (State) | Production | Environmental Media | Discharge Monitoring | Superfund Sites | Federal Sites | Industry Sectors | Transfers | Contact Us | Spills | Toxic Releases

State AL

PFAS Analytic Tools Home

Scope of Drinking Water Samples for Public Water Systems (PWSs):

Most Recent Sample at PWS

All Samples at PWS

Filters:

Summary Table

Contamina...	PWSs	Results	PWSs with Detections
Totals	127	835	127
PFOS	91	210	91
PFBS	64	150	64
PFOA	64	134	64
PFHXA	54	114	54
PFHXS	50	103	50
PFHPA	31	63	31
PFNA	6	9	6
PFDA	6	8	6
PFDOA	5	6	5
PFTRDA	5	6	5
PFUNA	5	6	5
NETFOSAA	5	5	5
11CL-PF3OUDS	4	5	4
HFPO-DA	4	5	4
NMEFOSAA	4	4	4
9CL-PF3ONS	3	3	3
ADONA	2	2	2
PFTA	2	2	2

Recent (state reported) data suggests more frequent detections affecting greater # of PWSs.

As MRLs decrease, the frequency of detections is likely to increase

About the Dataset:

- *835 samples in AL, across 127 PWSs*
- *Concentrations reported ranging from 0.2 – 210 ng/L*
- *Data representing 2020 – 2022*
- *Most samples measured via EPA Method 537.1 (monitors 18 PFAS)*

Key Points:

- *127 PWSs in AL in the dataset*
- *91 PWSs (71.6%) detected PFOS*
  - *Of those, 74 PWSs had PFOS concentrations ≥3.4 ng/L and 66 PWSs had PFOS concentrations ≥4.1 ng/L.*

Time is of the Essence

- Tightening Regulations
- Short Implementation Timeframe
- Need to Assess Treatability

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PFAS Drinking Water Regulatory Timeline

2013 - 2015
UCMR 3 monitoring for 6 PFAS

May 2016
Health Advisory (HA) for PFOA and PFOS set at a combined 70 ng/L

October 2021
USEPA Strategic Roadmap released

June 2022
Four drinking water PFAS HAs issued, including much lower levels for PFOA and PFOS and new HAs for PFBS and GenX

March 2023
Proposed National Primary Drinking Water Regulations (NPDWRs) for six PFAS species (PFOA, PFOS, PFNA, PFHxS, PFBS, and GenX)

Present

December 2023 (Expected)
Final NPDWRs for six PFAS

2023 - 2025
UCMR 5 monitoring for 29 PFAS

2023 – 2026
Initial Monitoring for the proposed PFAS NPDWR must be completed between the rule promulgation and the rule effective date

2023 (Expected)
Final designation of PFOA and PFOS as "hazardous substances under CERCLA"

2025 (Expected)
Listing PFOA, PFOS, PFBS, and GenX as "hazardous substances under RCRA"

December 2026 (Expected)
PFAS NPDWR Effective Date (3 years following rule promulgation)

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Planning and Monitoring Considerations

1) Start Early!

- Tightening Regulations & Demanding Timelines
- Public Perception

2) Consider PFAS monitoring at a higher frequency than required by UCMR 5

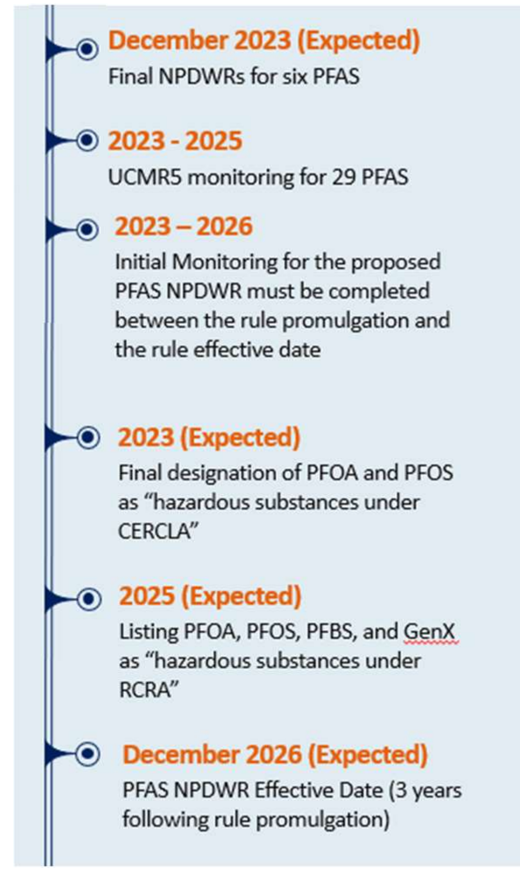
- More granular data
- Better able to understand seasonal and weather variations

3) Define PFAS Concentration Targets and Safety Factors

- EPA has requested comment on establishing the proposed rule trigger levels at 1/3 of the proposed MCLs vs. alternative trigger levels such as 1/2 of the proposed MCLs

4) Monitor source waters throughout relevant watersheds

- Understand fluctuations in source waters
- Be Proactive: Work toward identifying PFAS sources throughout watersheds



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BWW's Ongoing Monitoring Plan and Compliance Roadmap

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Workstream 1: Strategic Finished & Raw Water Sampling

Workstream 2: Source Water Assessment

Workstream 3: Data Characterization & Visualization

Workstream 4: Treatability Assessments

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BWW's Ongoing Monitoring Plan and Compliance Roadmap

- **Workstream 1**: **Strategic Finished & Raw Water Sampling**
  - ADEM requiring quarterly monitoring at 1 filter plant
  - Finished at all four filter plants
  - Raw at all four intakes
  - Monthly sampling for 3 months. If ND for all species, consider monitoring that site quarterly
  - Researching possible contributions of treatment processes, and exploring PFAS in solids

- **Workstream 2: Source Water Assessment**
  - Start profiling priority watersheds that have prior indications of PFAS presence
    - Cahaba River: 4 Sites in the watershed monitored monthly
  - Continue to refine sampling locations & frequency to identify PFAS sources
  - Review publicly available data on PFAS sources, users, NPDES permits

- **Workstream 3: Data Characterization & Visualization**

- **Workstream 4: Treatability Assessments** based on data collected & proceed with bench/pilot scale testing, as necessary

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BWW's
PFAS Data & Key Findings to Date

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Mapping of PFAS Data

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PFOA

Between 2019 and 2022, both PFOA and PFOS has been detected in the BWW raw/finished water.

Average of Result (ng/L) by PFAS Species , Lat and Long

Year	Quarter	Month	PFAS Species	Result (ng/L)	Sampling Site
2022	Qtr 3	August	Perfluorooctanoic acid (PFOA)	3.50	Cahaba Pump Station - Raw Water:
2022	Qtr 3	August	Perfluorooctanoic acid (PFOA)	3.40	Shades Mountain FP - Finished Water:
2022	Qtr 4	November	Perfluorooctanoic acid (PFOA)	2.40	Shades Mountain FP - Finished Water:
2019	Qtr 4	Novem	Perfluorooctanoic acid (PFOA)	2.20	Shades Mountain FP - Finished

Number of Detections

5

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Mapping of PFAS Data

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Between 2019 and 2022, both PFOA and PFOS has been detected in the BWW raw/finished water.

PFOS

Average of Result (ng/L) by PFAS Species , Lat and Long

Year	Quarter	Month	PFAS Species	Result (ng/L)	Sampling Site
2022	Qtr 3	August	Perfluorooctanesulfonic acid (PFOS)	4.50	Cahaba Pump Station - Raw Water:
2022	Qtr 3	August	Perfluorooctanesulfonic acid (PFOS)	4.40	Shades Mountain FP - Finished Water:
2020	Qtr 1	January	Perfluorooctanesulfonic acid (PFOS)	2.60	Cahaba Pump Station - Raw Water:

Number of Detections

8

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Workstream 2: Source Water Assessment

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Additional Sampling locations

- Build Baseline
- Isolate parts of Cahaba Watershed
- Process of Elimination
- Sample Large Tributaries
- Locations in Cahaba

Consider Facilities That May Handle PFAS

- Landfills
- Wastewater Treatment Plants
- Airports
- Fire training Facilities
- Chemical Manufacturing
- Furniture & Carpet Manufacturing
- https://app.adem.alabama.gov/eFile/

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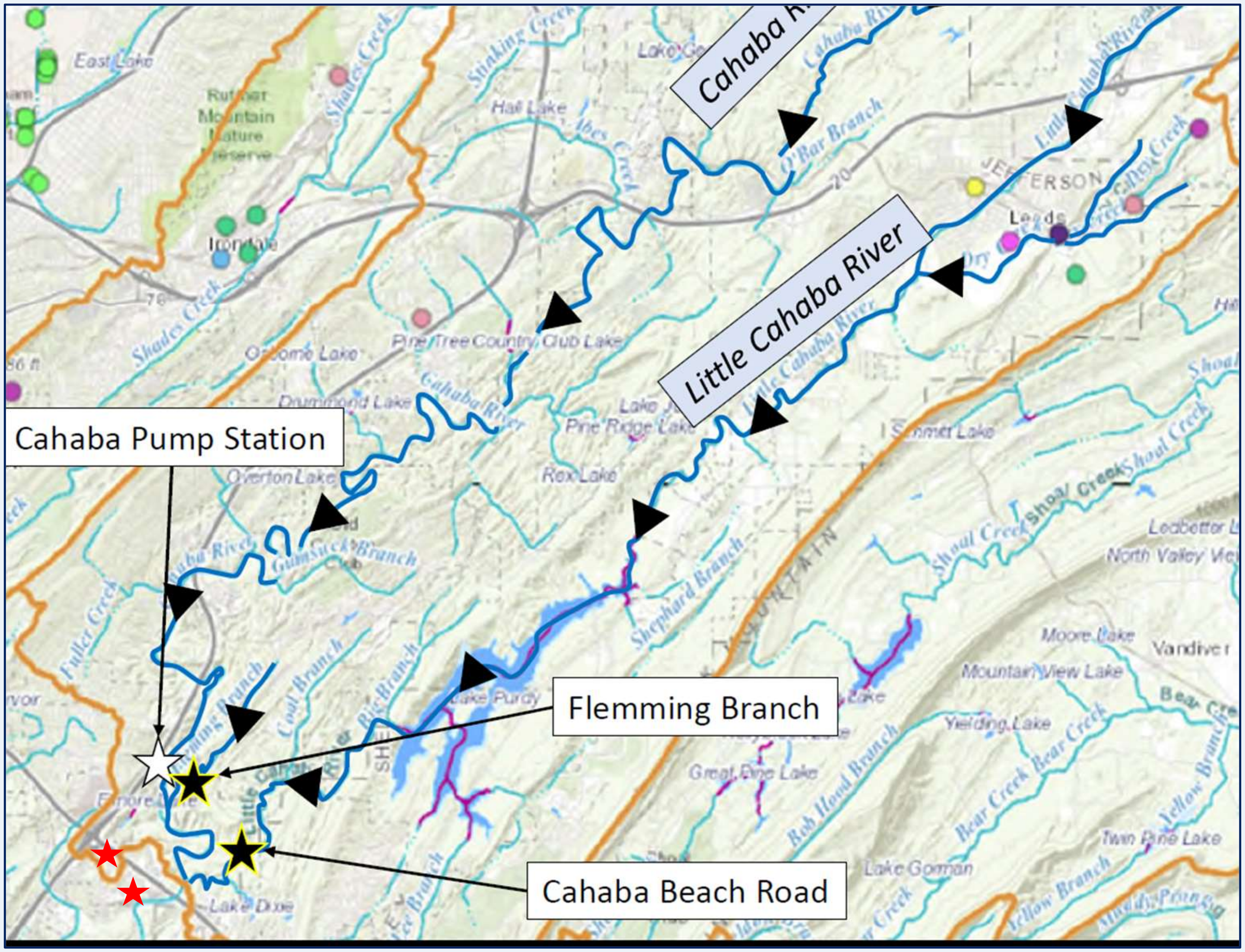
Ongoing Sampling in the Cahaba River Watershed



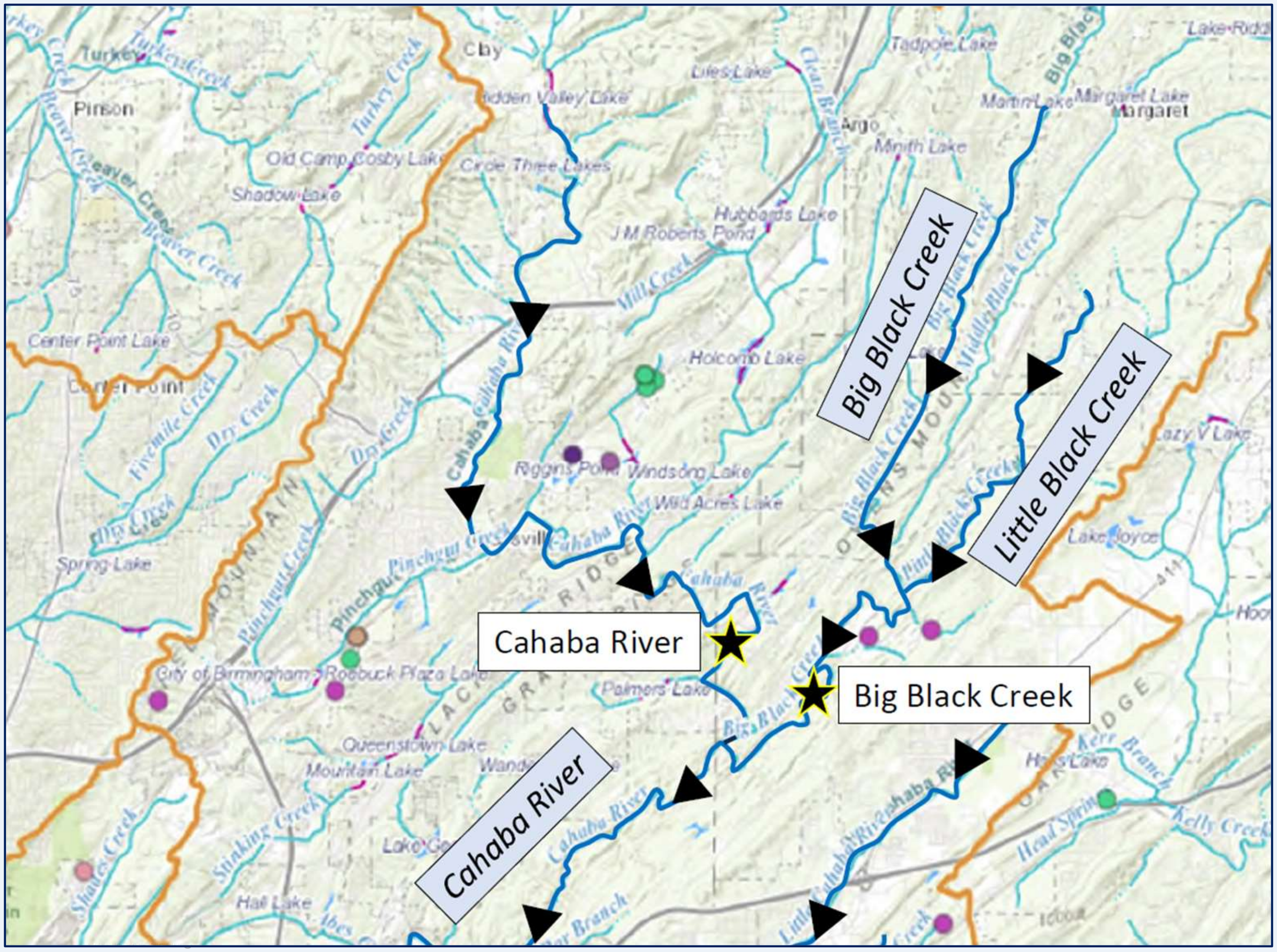
Facilities That May Handle PFAS - Legend

- Metal Coating
- Metal Machinery Mfg
- Mining and Refining
- National Defense
- Oil and Gas
- Paints and Coatings
- NA
- Airports
- Airports (Part 139)
- Cement Mfg
- Chemical Mfg
- Cleaning Product Mfg
- Paper Mills and Products
- Petroleum
- Plastics and Resins
- Printing
- Textiles and Leather
- Waste Management
- Consumer Products
- Electronics Industry
- Fire Training
- Furniture and Carpet
- Glass Products
- Industrial Gas

Legend

- ★ August 2023 Watershed Sampling Locations
- ▲ Surface Water Flow Direction
- Surface Water Body/River/Creek

Ongoing Sampling in the Cahaba River Watershed



Facilities That May Handle PFAS - Legend

Metal Coating	Paper Mills and Products
Metal Machinery Mfg	Petroleum
Mining and Refining	Plastics and Resins
National Defense	Printing
Oil and Gas	Textiles and Leather
Paints and Coatings	Waste Management
NA	Consumer Products
Airports	Electronics Industry
Airports (Part 139)	Fire Training
Cement Mfg	Furniture and Carpet
Chemical Mfg	Glass Products
Cleaning Product Mfg	Industrial Gas

Legend

- ★ August 2023 Watershed Sampling Locations
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- Surface Water Body/River/Creek

BWW: Raw Vs. Finished Water PFOS Over Time

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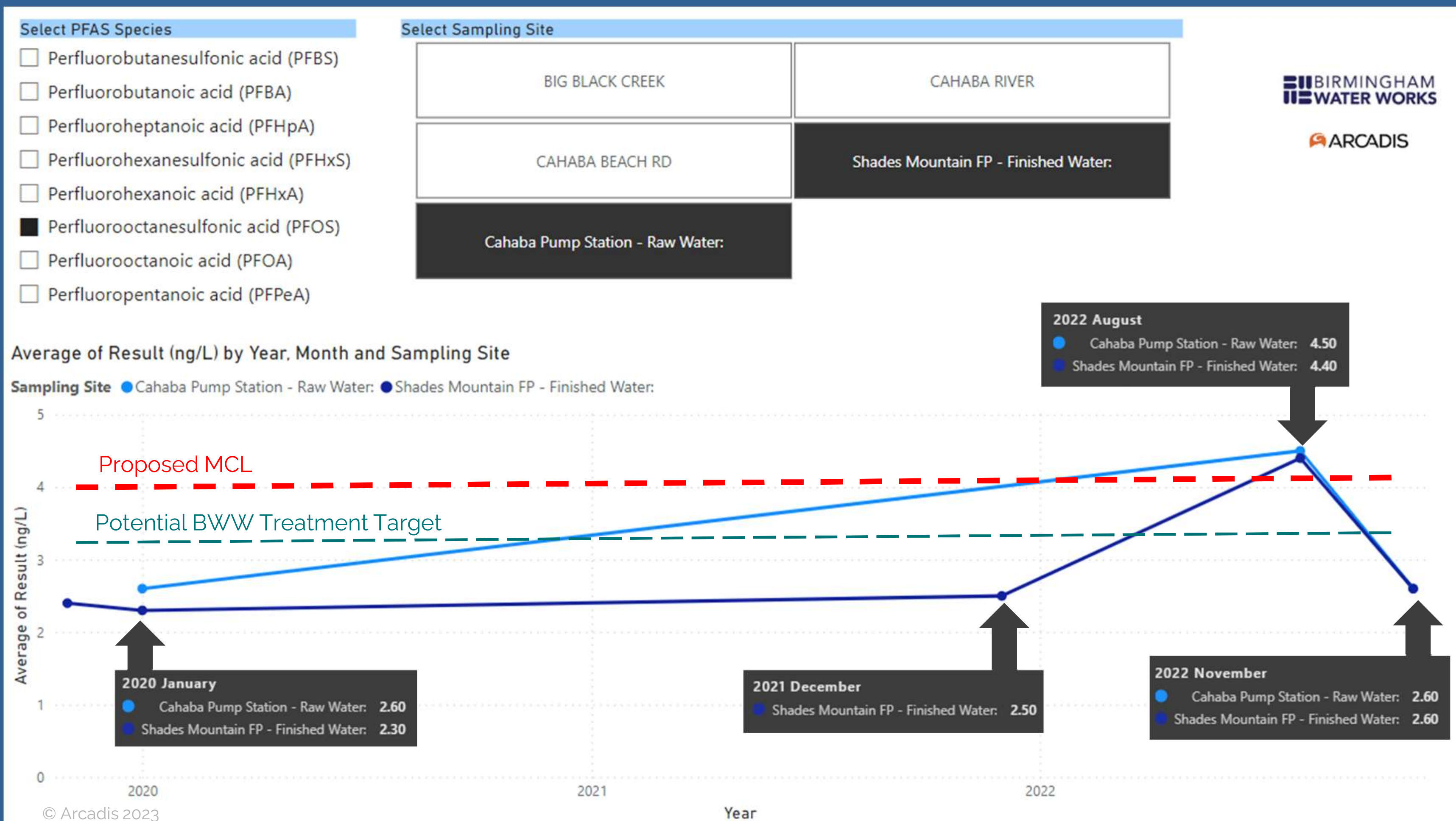


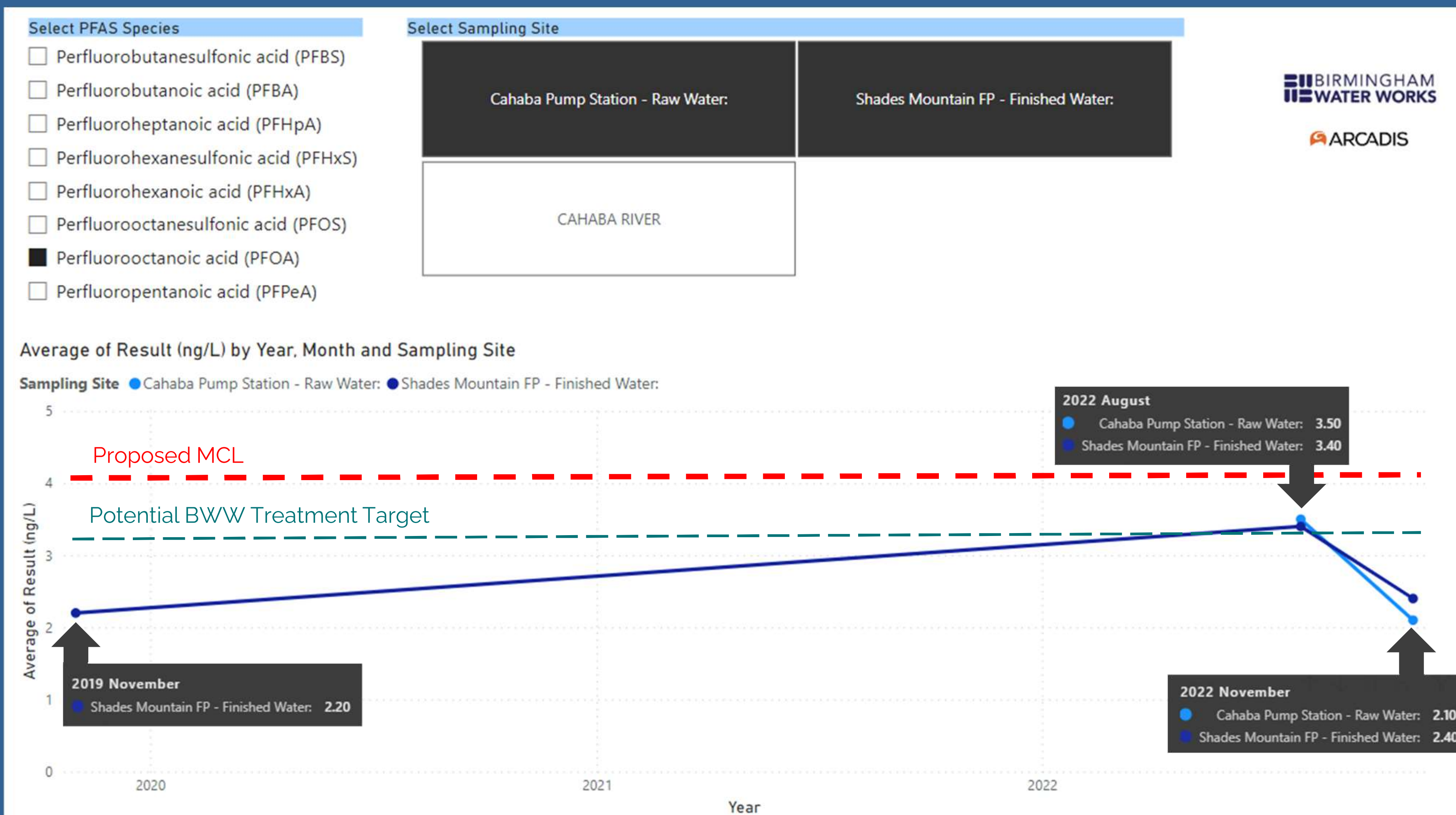
SMFP is the only Finished Water where PFOS was detected.

One sample above the MCL but annual average below MCL

Note temporal variability of data

Concentrations of PFOS in raw and finished water trend together.

BWW: Raw Vs. Finished Water PFOA Over Time



SMFP is the only Finished Water where PFOA was detected.

No samples above the MCL, one sample above potential target but annual average below

Note temporal variability of data

Concentrations of PFOA in raw and finished water trend together.

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PFAS Treatment Technologies and Considerations

- **EPA assumes actions to comply with the rule, including installation of treatment technologies, will occur by 2026.**

- EPA has identified the following as **best available technologies** (BATs):
  - **Granular activated carbon (GAC)**
  - **Anion Exchange (AIX)**
  - **Membranes: Nanofiltration (NF), Reverse Osmosis (RO)**

- EPA found that all of **BATs (GAC, IX, RO, and NF) can exceed treatment removal efficiencies > 99%** and can achieve concentrations below analytical detection limits.
  - **BATs have inherent differences in the degrees to which they remove various PFAS species.**
  - **"Longer Chain" PFAS are typically easier to remove (e.g. PFOA, PFOS);** shorter chain PFAS are typically more challenging (e.g. PFBS).
  - **Pilot testing of select technologies can offer additional insight into which treatment option(s) are most suitable for a specific water quality.**
    - Limited full-scale studies have been completed to date

- **Consider site specific limitations and system footprints as well as residual handling**

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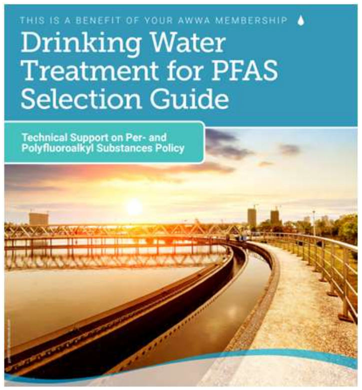
AWWA Resource



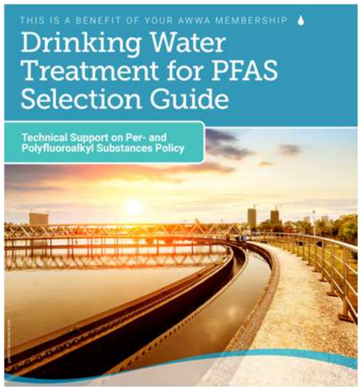
AWWA Source Water Protection

Table 17 - Treatment Technology Summary

TREATMENT TECHNOLOGY	RELATIVE COST	SHORT-CHAIN PFAS REMOVAL	LONG-CHAIN PFAS REMOVAL	WASTE STREAMS AND PFAS ENDPOINTS	ADDITIONAL OBSERVATIONS
PAC Adsorption[b]	Moderate	< 40%	> 80%	PAC residuals removed via settling or filtration	• Useful for intermittent use. • Increases residuals loading and decreases dewaterability. • PFAS removal is dependent on PAC type and dose. • Performance impacted by competition for adsorption sites on carbon.
GAC Adsorption[a,b,c,e]	Moderate to High	< 96%	40% to 96%	Backwash stream or GAC media	• Media disposal will be required. • PFAS removal decreases as adsorption sites become exhausted, and there will be no removal once breakthrough is reached. • PFAS will compete for sites with other organic compounds. • Less economically feasible at higher concentrations (mg/L) due to relatively quick PFAS breakthrough.
Ion Exchange[a,b,e]	Moderate to High	< 95%	55% to 97%	Backwash stream or IX resin	• Resin can be specialized specifically for PFAS, allowing for a higher capacity than activated carbon (site-specific). • Resin disposal will be required. • Removal decreases as IX and adsorption sites become exhausted, and there will be no removal once breakthrough is reached. • PFAS will compete for sites with other organics. • Less economically feasible at high concentrations (mg/L) due to relatively quick PFAS breakthrough.

[a]Appleman et al., 2014; [b]Rahman et al., 2014; [c]Takagi et al., 2011; [d]Thompson et al., 2011,; [e]Franke et al., 2019; [f]Soriano et al., 2017.

AWWA Resource



[AWWA Source Water Protection](#)

Table 17 - Treatment Technology Summary (Cont.)

TREATMENT TECHNOLOGY	RELATIVE COST	SHORT-CHAIN PFAS REMOVAL	LONG-CHAIN PFAS REMOVAL	WASTE STREAMS AND PFAS ENDPOINTS	ADDITIONAL OBSERVATIONS
Nanofiltration[a,b,e,f]	High	> 95%	> 95%	Concentration stream	• NF concentrate will contain high PFAS concentrations and will require disposal, which can be costly. • Post-treatment may be required for corrosion mitigation, depending on the type of NF membrane used. • High energy requirements.
Reverse Osmosis[a,b,d]	High	> 99%	> 99%	Concentrate stream	• RO concentrate will contain high PFAS concentrations and will require disposal, which can be costly. • Post-treatment will be required for corrosion mitigation to restabilize RO permeate. • Highest energy requirements. • Likely not necessary for the sole purpose of treating PFAS.

[a]Appleman et al., 2014; [b]Rahman et al., 2014; [c]Takagi et al., 2011; [d]Thompson et al., 2011,; [e]Franke et al., 2019; [f]Soriano et al., 2017.

PFAS Treatment: GAC, Pros vs. Cons

GAC ADVANTAGES	GAC DISADVANTAGES
• High removal of long-chain PFAS and moderate removal of short-chain compounds • Reliable PFAS removal • Vessels/filter systems do not require large footprint • Opportunities to retrofit conventional sand filters for GAC • Provides additional constituent removal, such as taste and odor compounds, TOC (and associated DBP reduction), and CECs • Can be temporarily installed for short-term PFAS removal applications	• Potential competitive adsorption reduces PFAS removal efficacy • O&M costs can be a burden if GAC is replaced/reactivated frequently • Desorption of PFAS or other contaminants is possible • Backwash water must be disposed of (or recycled), although backwash is relatively infrequent compared to traditional media filters; PFAS concentrations in backwash streams are not well characterized • Potential for nitrification within the GAC system or within the distribution system • GAC media will need to be reactivated or disposed and future regulatory requirements for air emissions from reactivation and disposal are uncertain

Overview of Drinking Water Treatment Technologies | US EPA

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

AWWA Source Water Protection

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PFAS Treatment: GAC

PFAS Species in Proposed Rule	# of Carbons	# of Bench Studies	# of Pilot Studies	# of Full Scale Studies	Maximum Removal Efficiency	PFAS Type
PFOA	8	23	9	17	<99.8	Carboxylate, Long Chain
PFOS	8	24	10	15	99.7	Sulfonate, Long Chain
PFNA	9	6	3	8	<99	Carboxylate, Long Chain
PFHxS	6	13	7	11	99.5	Sulfonate, Long Chain
PFBS	4	13	7	8	99.5	Sulfonate, Short Chain
HFPO-DA (Gen X)	6	1	1	1	93	Other, Short Chain

BA0

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Slide 39

BA0 Perhaps remove these last two columns . If we decide to do so, the same is needed for slides 48 and 50 below
Beciragic, Alma, 2023-10-11T23:35:55.285

PFAS Treatment: IX

PFAS Species in Proposed Rule	# of Carbons	# of Bench Studies	# of Pilot Studies	# of Full Scale Studies	Maximum Removal Efficiency	PFAS Type
PFOA	8	15	7	4	99.3	Carboxylate, Long Chain
PFOS	8	16	8	4	99.7	Sulfonate, Long Chain
PFNA	9	6	3	2	>99	Carboxylate, Long Chain
PFHxS	6	11	7	4	>99	Sulfonate, Long Chain
PFBS	4	12	8	4	99.3	Sulfonate, Short Chain
HFPO-DA (Gen X)	6	4	1	0	99.3	Other, Short Chain

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

PFAS Treatment: RO/NF Membranes

PFAS Species in Proposed Rule	# of Carbons	# of Bench Studies	# of Pilot Studies	# of Full Scale Studies	Maximum Removal Efficiency NF	Maximum Removal Efficiency RO	PFAS Type
PFOA	8	4	4	5	99.9	99.9	Carboxylate, Long Chain
PFOS	8	6	4	5	>99.9	99.9	Sulfonate, Long Chain
PFNA	9	2	1	4	99	>98	Carboxylate, Long Chain
PFHxS	6	2	4	4	>99	>99	Sulfonate, Long Chain
PFBS	4	3	4	3	99.8	99.8	Sulfonate, Short Chain
HFPO-DA (Gen X)	6	0	1	0	-	>64.2	Other, Short Chain

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

Presentation Agenda

1. Rule Summary: Proposed MCLs, Anticipated Timeline
2. Prevalence of PFAS: Alabama, UCMR 3, UCMR 5
3. Planning and Monitoring Considerations at BWW
4. Treatment Options and Considerations
5. **Potential Cost of Treatment**
6. Proactive Preparation Steps for Utilities

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Economic Analysis of the Proposed Rule

- EPA expects roughly 66,000 water systems to be subject to the rule, with approximately 3,400-6,300 systems anticipated to exceed one or more MCL.
- Benefits are assessed as avoided cases of illness and deaths associated with exposure to the six PFAS in the NPDWR.

Annualized Quantified Rule Benefits (i.e., per year)	3% Discount Rate	7% Discount Rate
	$1.23 billion	**$908 million**

- Costs are assessed as the expenses incurred by public water systems to monitor for the six PFAS included in the NPDWR, install and operate treatment technologies, inform consumers, and perform record-keeping and reporting responsibilities. State (or primacy agency) costs are assessed as expenses incurred to administer and implement the rule.

Annualized Quantified Rule Costs (i.e., per year)	3% Discount Rate	7% Discount Rate
	$772 million	**$1.20 billion**

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EPA vs. AWWA Cost Estimate Variability

The EPA expects the annualized national compliance cost of $1.2 billion, at 7% discount rate.

Annualized Quantified Rule Costs (i.e., per year)	3% Discount Rate	7% Discount Rate
	$772 million	**$1.20 billion**

Independent analysis performed by AWWA estimates a cost to comply with the PFAS Rule in excess of $54 billion, which equates to an annualized cost of over $2.7 billion **(approximately 230% of the number estimated by EPA).**

Capital Cost Estimates & Annual O&M Cost Estimates

- EPA developed dozens of Work Breakdown Structure cost equations for treatment at surface and ground water systems across the range of bed life (5,000 to 150,000 BVs) and residuals management scenarios (hazardous and non-hazardous), including high, mid, and low-cost levels.

Cost Equation Parameters for GAC

GW/SW	Size Category	Comp Level	Design Type	Bed Volumes	Spent Media	Cost Type	Useful Life	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10
SW	Large	High	Gravity	15000	non-haz	Total Capital	36.16	0	0	0	0	0	0	5.6223	-1710.516	521096.6523	2907817.876
SW	Small	Low	Gravity	20000	non-haz	Total Capital	30.1	0	0	0	0	0	0	-680031.2794	1164826.093	90173.9878	597169.993
SW	Medium	Low	Gravity	20000	non-haz	Total Capital	33.63	0	0	0	0	0	0	0	-7950.5001	602521.8341	1183038.547
SW	Large	Low	Gravity	20000	non-haz	Total Capital	35.48	0	0	0	0	0	0	4.3917	-1341.5372	448854.6103	2202911.504
SW	Small	Mid	Gravity	20000	non-haz	Total Capital	29.67	0	0	0	0	0	0	-695944.7967	1222380.028	101334.0925	675311.7916
SW	Medium	Mid	Gravity	20000	non-haz	Total Capital	33.55	0	0	0	0	0	0	0	-8934.2012	639221.518	1290503.976
SW	Large	Mid	Gravity	20000	non-haz	Total Capital	35.6	0	0	0	0	0	0	4.6871	-1390.9422	444653.951	2694131.733
SW	Small	High	Gravity	20000	non-haz	Total Capital	31.39	0	0	0	0	0	0	-706894.5843	1215653.443	325669.8495	877408.3651
SW	Medium	High	Gravity	20000	non-haz	Total Capital	34.95	0	0	0	0	0	0	1181.859	-31797.4456	827544.4019	1609823.945
SW	Large	High	Gravity	20000	non-haz	Total Capital	36.16	0	0	0	0	0	0	5.6223	-1710.516	521096.6523	2907817.876
SW	Small	Low	Gravity	25000	non-haz	Total Capital	30.1	0	0	0	0	0	0	-680031.2794	1164826.093	90173.9878	597169.993
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SW	Small	Mid	Gravity	25000	non-haz	Total Capital	29.67	0	0	0	0	0	0	-695944.7967	1222380.028	101334.0925	675311.7916
SW	Medium	Mid	Gravity	25000	non-haz	Total Capital	33.55	0	0	0	0	0	0	0	-8934.2012	639221.518	1290503.976
SW	Large	Mid	Gravity	25000	non-haz	Total Capital	35.6	0	0	0	0	0	0	4.6871	-1390.9422	444653.951	2694131.733
SW	Small	High	Gravity	25000	non-haz	Total Capital	31.39	0	0	0	0	0	0	-706894.5843	1215653.443	325669.8495	877408.3651
SW	Medium	High	Gravity	25000	non-haz	Total Capital	34.95	0	0	0	0	0	0	1181.859	-31797.4456	827544.4019	1609823.945
SW	Large	High	Gravity	25000	non-haz	Total Capital	36.16	0	0	0	0	0	0	5.6223	-1710.516	521096.6523	2907817.876
SW	Small	Low	Gravity	5000	non-haz	Annual O&M	30.1	0	0	0	0	0	0	1675545.867	-963611.7556	632356.4623	26119.9012

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Why a Correction Factor of 2.8?

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Cost of GAC Treatment for SMFP:
EPA Estimate vs. Estimate from Current Comparable Project

Filter Plant	Design Capacity (MGD)	Design Type	Capital Cost based on USEPA's model (2020 dollars)	O&M based on USEPA's model – Non-Hazardous Waste (2020 dollars)	Capital Cost Based on USEPA's Model (in 2023 dollars, 1.32)	O&M Cost Based on USEPA's Model (in 2023 dollars, x1.32)
SMFP	80	Gravity	$31,764,212.93	$4,509,321.67	$41,928,761.07	$5,952,304.60

Correction Factor btw Gilbert & EPA
= 2.8 x

Table A2. Construction Costs (2022 Q4 dollars) for Gilbert GAC Facility and Backwash Pump Station

Backwash Pump Station	$5,334,001
GAC Facility	$72,674,760
Total Direct Cost	$78,008,761
Subtotal 1	$83,562,985
Subtotal 2	$88,576,764
Subtotal 3	**$90,658,318**
Subtotal 3 (CCI Corrected) (2022 Q4 dollars)	**$97,992,001**

Plant	Design Capacity	Construction Costs
Gilbert	*65 MGD*	*$97,992,001.43*
SMFP	80 MGD	$120,605,540.22
WFP	60 MGD	$90,454,155.16

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Cost Estimate Case Study: a System in AL Serving ~ 50,000 ppl

- **What are the potential costs associated with GAC treatment for this System?**
  - Information needed to determine potential costs associated with GAC:
    - Water source: Ground Water
    - Design flow: **10 MGD**, Size Category: Large
    - Average flow: **Assume 5 MGD**
    - Assume Pressure GAC
    - Range of costs presented, in the absence of RSSCT/pilot testing data to speak to appropriate GAC Bed Volumes (BVs)
      - Bed volume:
        - EPA presents BV's ranging from 5,000 – 150,000.
        - Enveloped BVs of 25,000 – 75,000 as most representative
    - Assume: Mid- level estimate (EPA presents low, mid, and high comps)
    - Estimates for both Capital and O&M costs presented
    - Spent media: Assume non-hazardous waste

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Cost Estimate Case Study: a System in AL Serving ~ 50,000 ppl

Appendix A. Cost Equations

Notes:

- Cost equations presented here take one of the following forms, identified by which coefficients (C1 through C10) are nonzero:

$$Cost = C1\ Q^{C2}$$

or $$Cost = C3\ Ln(Q) + C4$$

or $$Cost = C5\ e^{(C6\ Q)}$$

or $$Cost = C7\ Q^3 + C8\ Q^2 + C9\ Q + C10$$

  where Q is design flow in MGD for total capital costs, or average flow in MGD for annual O&M costs. Resulting costs are in 2020 dollars.

- Equations are designated as for small, medium, or large systems. These equations apply as follows:
  - Small system equations apply where design flow (Q) is less than 1 MGD
  - Medium system equations apply where design flow (Q) is 1 MGD or greater, but less than 10 MGD
  - Large system equations apply where design flow (Q) is 10 MGD or greater

  Note: although the independent variable Q in the O&M equations is average flow, selection between O&M equations for small, medium, and large systems is made of design flow.

- EPA developed each equation using the method described in Section 7.1.
- For GAC, equations are not presented for gravity designs for groundwater systems, because groundwater systems are unlikely to use this design type.
- For POU RO, costs do not vary by component level input (high, mid, low); equations are not presented for medium and large systems.
- For Nontreatment, medium system size curves are valid only up to 3.536 MGD design flow (1.417 MGD groundwater average flow and 1.345 MGD surface water average flow); equations are not presented for systems of greater size.

Bed Volumes	Estimated Capital Cost (in 2020 Dollars)	Estimated O&M Cost (in 2020 Dollars)	Estimated Capital Cost (in 2023 Dollars) (x1.32)	Estimated O&M Cost (in 2023 Dollars) (x1.32)	Capital Cost EPA Estimate Likely an Underestimation → 2.8x Correction Factor
25,000		$772,356.33		$1,019,510.35	
50,000	$7,792,348.12	$547,846.36	$10,285,899.52	$723,157.19	$28,800,518.65
75,000		$481,183.98		$635,162.85	

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

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Funding & Affordability

- **Estimated costs of treatment far outweigh funding that is available for utilities**
  - The federal support available to local utilities is likely considerably limited, as projects focusing on other contaminants are also eligible for the same funding.
    - Clean Water State Revolving Fund (CWSRF)
      - $1 billon (over 5 years FY2022 – FY2026) allocation for PFAS and/or other emerging contaminants
      - Eligible projects: wastewater, reuse, and stormwater
    - Drinking Water State Revolving Fund (DWSRF)
      - $4 billon allocation for PFAS and/or contaminants on the Contaminant Candidate List (CCL)
      - Eligible projects: drinking water
    - Emerging Contaminants in Small or Disadvantaged Communities Grant Program
      - $5 billion allocation for PFAS and/or other contaminants
      - Eligible projects: drinking water

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Cost Estimates & Class Action Settlements Available to Utilities

Cost Estimates	BWW - SMFP	5 MGD Example
EPA Capital Cost	$41,928,761.07	$10,285,899.52
BWW Cost Estimate	$120,605,540.22	N/A
Estimated Allocations		
3M	$7,714,149 - $12,901,569	$1,021,550 - $2,468,269
DuPont	$740,001 - $1,237,656	$97,995 - $236,782
Total:	$8,454,150 - $14,139,225	$1,119,545 - $2,705,051

Notes:

- Cost estimates are based on assumptions, where necessary, regarding average/max flow rates
- Calculations consider PFAS data available to date
- DuPont/3M allocations: Per Impacted Water Source (ie. above estimate for Cahaba)

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Important Dates and Deadlines: DuPont and 3M Settlements

	DuPont	3M
Deadline to Submit 'Opt-Out' Requests	12/4/2023	12/11/2023
Court's Final Fairness Hearing	12/14/2023	2/2/2024
Phase One Public Water System Settlement Claims Form	60 Days After the Effective Date	60 Days After the Effective Date

Any Questions? Please Contact Mark Parnell, Parnell Thompson, LLC: parnell@ptlawllc.com

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Public Water System Settlements - DuPont & 3M

Presentation Agenda

1. Rule Summary: Proposed MCLs, Anticipated Timeline
2. Prevalence of PFAS: Alabama, UCMR 3, UCMR 5
3. Planning and Monitoring Considerations at BWW
4. Treatment Options and Considerations
5. Potential Cost of Treatment
6. **Proactive Preparation Steps for Utilities**

Proactive Preparation Steps for Utilities

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1. Start UCMR5 sampling as soon as possible
   - Allows for early assessment of treatment needs
   - Results cover initial PFAS Rule monitoring requirements
2. Identify potential sources
   - Work with dischargers / responsible parties to eliminate contamination
   - Consult legal counsel if/as appropriate
3. Prepare communications strategy
   - UCMR5 results are published in CCRs
   - Consider **any** PFAS detection a potential PR challenge
4. Conduct pilot- / bench-scale testing strategically
   - Evaluate all UCMR5 compounds
   - Plan for the possibility of future PFAS regulations
5. Consider treatment design for unregulated PFAS

Proactive Preparation Steps for Utilities

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6. Seek state and federal funding
   - Bipartisan Infrastructure Law/ Clean Water State Revolving Fund (CWSRF), Drinking Water State Revolving Fund (DWSRF), Emerging Contaminants in Small or Disadvantaged Communities Grant Program
   - Possible cost recovery funds from State / direct litigation against PFAS dischargers
7. Develop a residuals management plan
   - Account for the possibility of hazardous designation under CERCLA and/or RCRA
   - Budget appropriately

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Thank you!

BWW
October 2023

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UCMR 3 Data – Average Concentrations & Species across AL (units: ng/L)

Sample Above or Equal to MRL	Yes					
Average of Analytical Result Value (ng/L)	**Column Label**					
Row Labels	**PFBS**	**PFHpA**	**PFHxS**	**PFNA**	**PFOA**	**PFOS**
AL	**126.67**	**14.19**			**32.81**	**60.87**
Albertville Utilities Board		**12.50**			**20.00**	
New Plant (9 MGD)		15.00			20.00	
Old Plant (12 MGD)		10.00			20.00	
Boaz Water & Sewer Board		**10.00**			**20.00**	
Albertville Utilities Intertie		10.00			20.00	
Clanton Water Department		**10.00**			**20.00**	
Clanton Water Treatment Plant		10.00			20.00	
Colbert County Rural Water System					**30.00**	**42.50**
Cherokee					20.00	50.00
Muscle Shoals					20.00	40.00
Water Treatment Plant						40.00
West Lawrence					40.00	40.00
Florence Water-Wastewater Department					**20.00**	**50.00**
Cypress Creek + Treatment Plant						60.00
Wilson Lake + Treatment Plant					20.00	40.00
Gadsden Waterworks & Sewer Board		**17.50**			**30.00**	**46.67**
Water Treatment Plant		17.50			30.00	46.67
Northeast Alabama Water System	**140.00**	**15.00**			**32.00**	**56.67**
Albertville Water		10.00			20.00	
Centre Water	140.00	17.50			35.00	56.67
Rainbow City Utilities Board	**100.00**	**13.33**			**30.00**	**60.00**
Gadsden Water Intertie	100.00	13.33			30.00	60.00
Shelby County Water System		**10.00**				
Talladega/Shelby WTP		10.00				
Southside Waterworks		**13.33**			**30.00**	**45.00**
Gadsden Water Intertie		13.33			30.00	45.00
Tri Community Water System		**10.00**				
5 Star WSD Intertie		10.00				
Well 3 + Treatment Plant		10.00				
VAW Water System, Inc.		**20.00**			**43.33**	**80.00**
West Morgan-East Lawrence Water Intertie		20.00			43.33	80.00
Waterworks Board of Prattville		**13.33**				
Autauga Hills Well & TP		10.00				
Five Star Water Intertie		20.00				
Treatment Plant 2 (Wells 14 & 15)		10.00				
West Lawrence Water Co-op		**10.00**			**40.00**	**85.00**
West Morgan-East Lawrence Water Intertie		10.00			40.00	85.00
West Morgan - East Lawrence Water Authority		**30.00**			**100.00**	**90.00**
Tennessee River + Treatment Plant		30.00			100.00	90.00

[yellow] = Included in Proposed PFAS NPDWR

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UCMR 5 Data so Far –
Average Concentrations & Species across AL (units: ug/L)

Source: Occurrence Data from the Unregulated Contaminant Monitoring Rule | US EPA

- ***63 PWSs in AL reporting UCMR 5 data so far***
  - *18 PWSs (28.5%) with samples = to or > UCMR 5 MRL*
  - *7 (11.1%) with proposed PFAS rule MCL exceedance for PFOA and/or PFOS*

Row Labels	6:2 FTS	HFPO-DA	lithium	PFBA	PFBS	PFDA	PFHpA	PFHxA	PFHxS	PFNA	PFOA	PFOS	PFPeA	PFPeS
⊟ **AL**			**20.9250**	**0.0073**	**0.0163**		**0.0047**	**0.0074**			**0.0093**	**0.0089**	**0.0143**	
⊟ **ASBURY WATER SYSTEM**				**0.0083**	**0.0031**		**0.0047**	**0.0043**			**0.0091**	**0.0058**	**0.0035**	
Entry Point Facility				0.0083	0.0031		0.0047	0.0043			0.0091	0.0058	0.0035	
⊟ **BELFOREST WATER SYSTEM**				**0.0074**	**0.0030**									
BELFOREST WATER SYSTEM				0.0074	0.0030									
⊟ **BEULAH UTILITIES DISTRICT**				**0.0077**				**0.0049**			**0.0077**	**0.0042**	**0.0030**	
Consecutive Connection				0.0077				0.0049			0.0077	0.0042	0.0030	
⊟ **BREWTON WATER WORKS**			**15.1750**											
BREWTON WATER WORKS			15.1750											
⊟ **BRIDGEPORT UTILITIES BOARD**					**0.0031**									
Bridgeport Utilities Board					0.0031									
⊟ **ECLECTIC WATER WORKS & SEWER BOARD**				**0.0062**										
Entry Point Facility				0.0062										
⊟ **GILBERTOWN (UTILITIES BOARD OF TOWN OF)**			**37.7333**											
GILBERTOWN (UTILITIES BOARD OF TOWN OF)			37.7333											
⊟ **GREENVILLE WATER WORKS**			**9.7000**											
GREENVILLE WATER WORKS			9.7000											
⊟ **HANCEVILLE (THE WWSB OF THE CITY OF)**			**11.0000**		**0.0033**									
HANCEVILLE (THE WWSB OF THE CITY OF)			11.0000		0.0033									
⊟ **HOLTVILLE WATER SYSTEM**				**0.0075**	**0.0560**		**0.0046**	**0.0131**			**0.0141**	**0.0148**	**0.0226**	
HOLTVILLE WATER SYSTEM				0.0075	0.0560		0.0046	0.0131			0.0141	0.0148	0.0226	
⊟ **HUNTSVILLE UTILITIES**				**0.0059**	**0.0044**							**0.0090**		
Guntersville Lake (SE) & TP				0.0062	0.0033									
Tennessee River (SW) & TP				0.0056	0.0038									
Williams Well					0.0062							0.0090		
⊟ **LANETT WATER WORKS**				**0.0050**	**0.0070**									
Connection to Veolia Treatment Plant				0.0050	0.0070									
⊟ **MARBURY WATER SYSTEM, INC.**				**0.0130**	**0.0730**		**0.0065**	**0.0190**			**0.0140**	**0.0170**	**0.0320**	
Five Star				0.0130	0.0730		0.0065	0.0190			0.0140	0.0170	0.0320	
⊟ **OPELIKA UTILITIES**								**0.0035**			**0.0070**	**0.0060**		
R.A. Betts Water TP								0.0037			0.0070	0.0060		
Saugahatchee Water TP								0.0030						
⊟ **RIVERVIEW WATER WORKS**			**14.0000**											
Well #2 TP			14.0000											
⊟ **SOUTH MARENGO CO WATER & FIRE PRO AUTH**			**19.0000**											
Entry Point Facility			19.0000											
⊞ **TAYLOR WATER SYSTEM**			**12.0000**											
⊞ **THOMASVILLE WATER WORKS & SEWER BOARD**					**0.0262**		**0.0030**	**0.0073**			**0.0062**	**0.0086**	**0.0102**	

UCMR 5 Data so Far –
Average Concentrations Per Species within AL (units: ug/L)

Source: Occurrence Data from the Unregulated Contaminant Monitoring Rule | US EPA

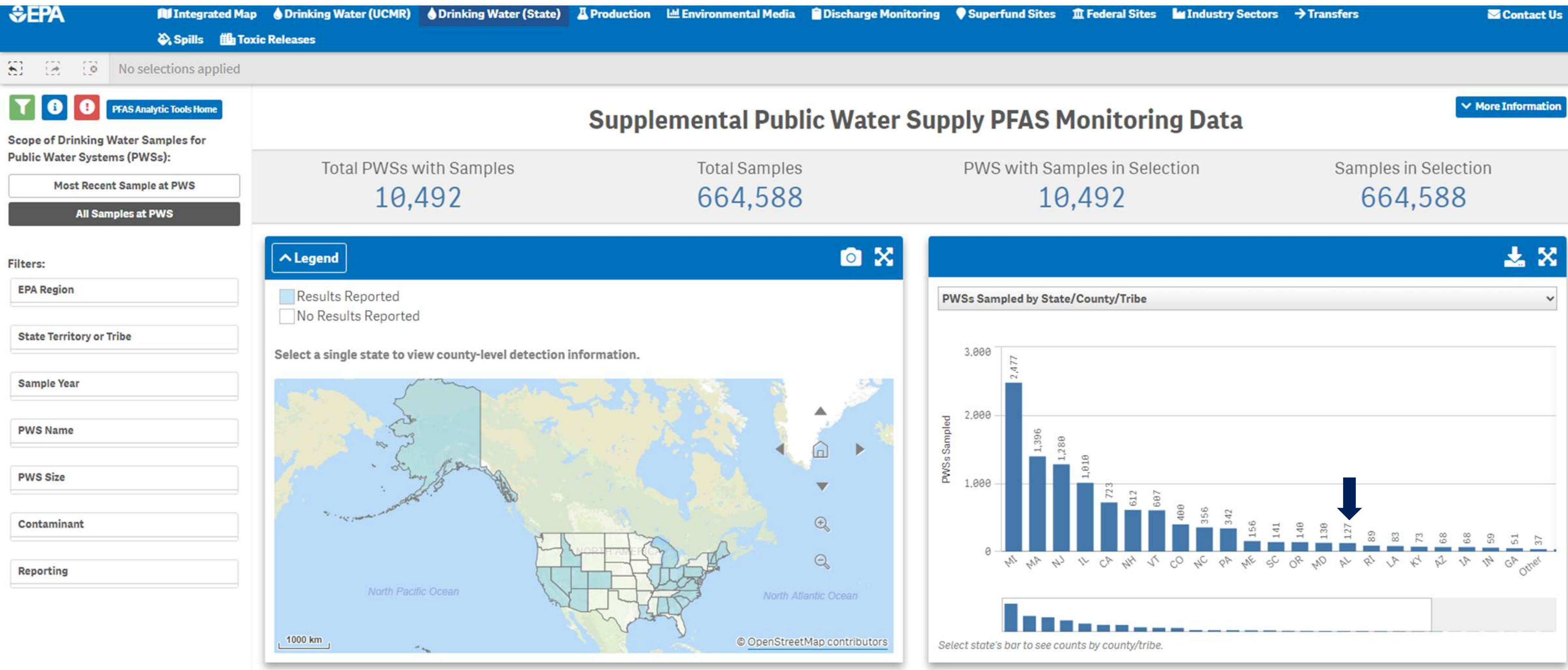
AnalyticalResultsSign	=
State	AL

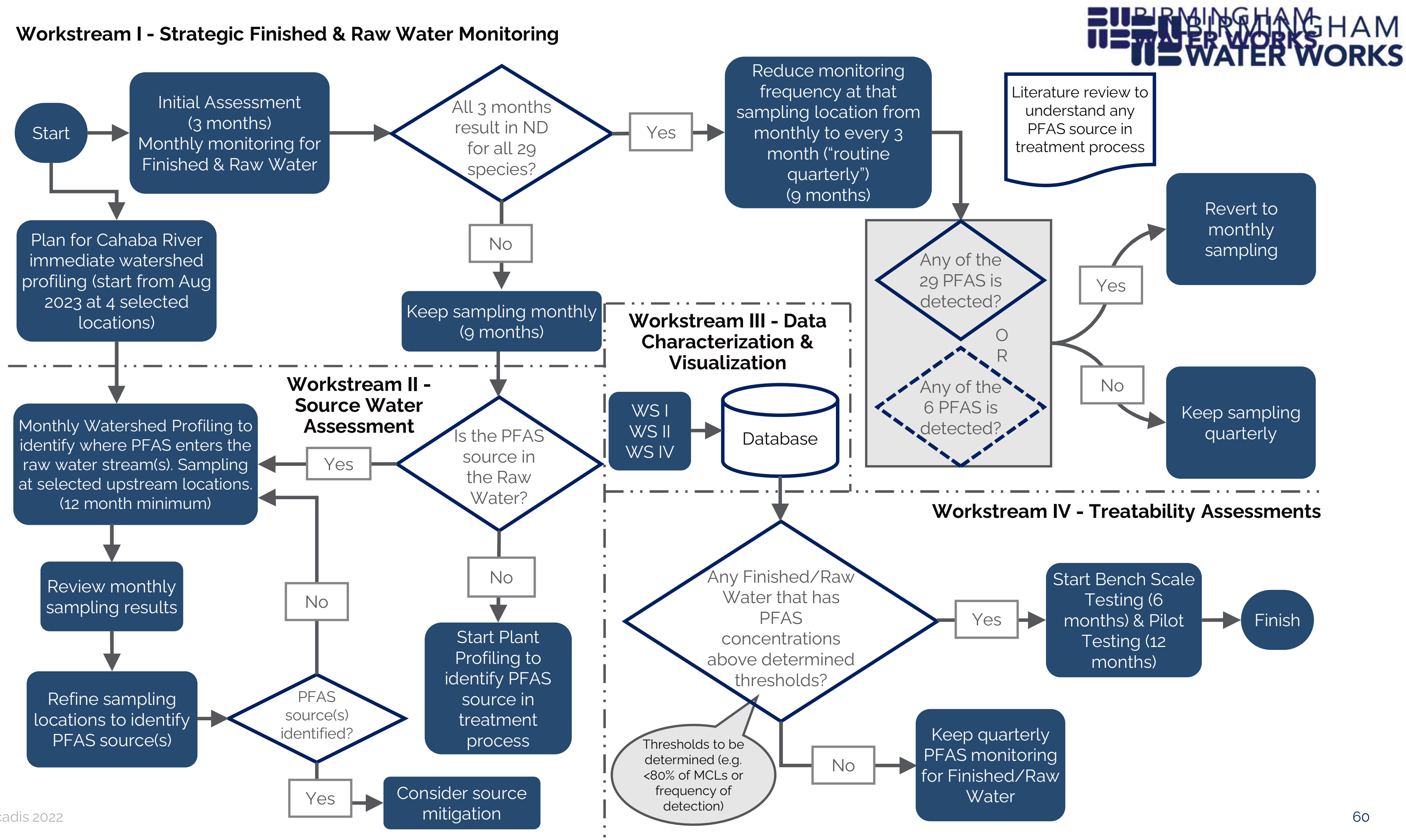
Average of AnalyticalResultValue / Row Labels	Column Labels: lithium	PFBA	PFBS	PFHpA	PFHxA	PFOA	PFOS	PFPeA
L		**0.0064**	**0.004075**		**0.003466667**	**0.00695**	**0.007**	
HUNTSVILLE UTILITIES		0.0059	0.004433333				0.009	
BELFOREST WATER SYSTEM		0.0074	0.003					
OPELIKA UTILITIES					0.003466667	0.00695	0.006	
S	**20.925**	**0.0077**	**0.0223375**	**0.0047**	**0.00972**	**0.01022**	**0.01008**	**0.01426**
GILBERTOWN (UTILITIES BOARD OF TOWN OF)	37.73333333							
SOUTH MARENGO CO WATER & FIRE PRO AUTH	19							
BREWTON WATER WORKS	15.175							
RIVERVIEW WATER WORKS	14							
TAYLOR WATER SYSTEM	12							
GREENVILLE WATER WORKS	9.7							
HANCEVILLE (THE WWSB OF THE CITY OF)	11		0.0033					
MARBURY WATER SYSTEM, INC.		0.013	0.073	0.0065	0.019	0.014	0.017	0.032
HOLTVILLE WATER SYSTEM		0.0075	0.056	0.0046	0.0131	0.0141	0.0148	0.0226
THOMASVILLE WATER WORKS & SEWER BOARD			0.0262	0.003	0.0073	0.0062	0.0086	0.0102
LANETT WATER WORKS		0.005	0.007					
ECLECTIC WATER WORKS & SEWER BOARD		0.0062						
ASBURY WATER SYSTEM		0.0083	0.0031	0.0047	0.0043	0.0091	0.0058	0.0035
BEULAH UTILITIES DISTRICT		0.0077			0.0049	0.0077	0.0042	0.003
BRIDGEPORT UTILITIES BOARD			0.0031					

Another Publicly Available Dataset:
Supplemental Public Water Supply PFAS Monitoring

BIRMINGHAM WATER WORKS

Source: PFAS Analytic Tools (epa.gov)





Workstream I - Strategic Finished & Raw Water Monitoring
BIRMINGHAM WATER WORKS
Start
Initial Assessment (3 months) Monthly monitoring for Finished & Raw Water
All 3 months result in ND for all 29 species?
Yes
Reduce monitoring frequency at that sampling location from monthly to every 3 month ("routine quarterly") (9 months)
Literature review to understand any PFAS source in treatment process
Plan for Cahaba River immediate watershed profiling (start from Aug 2023 at 4 selected locations)
No
Keep sampling monthly (9 months)
Any of the 29 PFAS is detected?
OR
Any of the 6 PFAS is detected?
Yes
Revert to monthly sampling
No
Keep sampling quarterly
Workstream III - Data Characterization & Visualization
WS I
WS II
WS IV
Database
Workstream II - Source Water Assessment
Monthly Watershed Profiling to identify where PFAS enters the raw water stream(s). Sampling at selected upstream locations. (12 month minimum)
Yes
Is the PFAS source in the Raw Water?
No
Start Plant Profiling to identify PFAS source in treatment process
Review monthly sampling results
No
Refine sampling locations to identify PFAS source(s)
PFAS source(s) identified?
Yes
Consider source mitigation
Workstream IV - Treatability Assessments
Any Finished/Raw Water that has PFAS concentrations above determined thresholds?
Yes
Start Bench Scale Testing (6 months) & Pilot Testing (12 months)
Finish
Thresholds to be determined (e.g. <80% of MCLs or frequency of detection)
No
Keep quarterly PFAS monitoring for Finished/Raw Water

PFAS Treatment: IX, Pros vs. Cons

IX ADVANTAGES	IX DISADVANTAGES
• PFAS-selective resins are available and research continues. • Reliable treatment process with high removal of long-chain PFAS and moderate to high removal of short-chain PFAS, although this selectivity is resin dependent. • Smaller footprint compared to GAC. • Moderate capital costs. • Potential removal of other contaminants. • Relatively short EBCTs compared to GAC. • Resin is not replaced as often as GAC media.	• Potential competitive exchange and fewer secondary water quality benefits compared to other processes. • O&M costs may be significant if frequent resin replacement is required. • Backwash water must be disposed of (or recycled), although backwash is relatively infrequent. • Piloting will be required prior to full-scale implementation. • IX resin is more costly on a pound-for-pound basis than GAC media, however generally less resin is required than GAC. • Future regulatory requirements for waste disposal is uncertain. • Spent media may need to be disposed of as a hazardous waste or low-level radioactive waste due to removal of co-occurring contaminants.

Overview of Drinking Water Treatment Technologies | US EPA

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

AWWA Source Water Protection

PFAS Treatment: RO/NF Membranes, Pros vs. Cons

RO/NF ADVANTAGES	RO/NF DISADVANTAGES
• Demonstrated removal of all PFAS tested and anticipated removal of PFAS broadly • Reliable and stable process • Compact systems provide smaller footprint • Additional contaminant removal including CECs, TOC, and pathogens	• Concentrate disposal challenges complicated by regulatory uncertainty • Post-membrane treatment necessary to ensure stable finished water • Pretreatment is important to avoiding membrane fouling or scaling and reduced finished water recovery • Energy intensive • Relatively high capital and O&M costs due to influent head pressure required and membrane module maintenance

Overview of Drinking Water Treatment Technologies | US EPA

Technologies and Costs for Removing PFAS from Drinking Water (EPA-822-P-23-011) (March 2023).pdf

AWWA Source Water Protection

DuPont Settlement

BIRMINGHAM WATER WORKS

SMFP:

<u>PFAS Score for SMFP: 8</u>
<u>Adjusted Flow Rate for SMFP: 47,730 gpm</u>

For illustration purposes only; not reflective of actual allocation awards

DuPont Entities Public Water Provider Settlement
Estimated Allocation Range Table

Each cell in the Table represents an estimated allocation *<u>PER IMPACTED WATER SOURCE (per groundwater well or surface water source)</u>*. The Settlement Class consists of Public Water Systems, which may and often do have multiple wells or water sources, each of which would be calculated individually and added up to arrive at the total.

<u>IMPACTED WATER SOURCE</u>
<u>means a Water Source that has a Qualifying Test Result showing a Measurable Concentration of PFAS.</u>
See the Settlement Agreement for defined terms.

		Adjusted Flow Rate (gpm)										
	0	100	250	500	1,000	1,500	5,000	10,000	25,000	50,000	100,000	300,000
	2	$3,477	$6,718	$11,059	$18,203	$24,363	$57,898	$95,296	$184,131	$303,025	$498,624	$1,097,427
PFAS SCORE	4	$13,985	$27,025	$44,483	$73,217	$97,995	$232,837	$383,160	$740,001	$1,217,072	$2,000,647	$4,389,631
	10	$14,814	$27,483	$45,237	$74,458	$99,655	$236,782	$389,650	$752,527	$1,237,656	$2,034,438	$4,647,953
	50	$15,802	$30,536	$50,263	$82,730	$110,726	$263,079	$432,912	$836,021	$1,374,849	$2,118,897	$4,955,178
	100	$17,777	$34,353	$56,545	$93,069	$124,564	$295,947	$486,981	$940,355	$1,546,248	$2,540,826	$5,568,648
	250	$23,703	$45,803	$75,391	$124,086	$166,073	$394,529	$649,126	$1,253,132	$2,059,840	$3,382,845	$7,401,258
	500	$33,578	$64,886	$106,798	$175,772	$235,242	$558,758	$919,169	$1,773,678	$2,913,810	$4,780,785	$10,429,847*
	750	$43,453	$83,968	$138,201	$227,450	$304,395	$722,895	$1,188,960	$2,293,293	$3,765,268	$6,171,986*	$13,426,677*
	1000	$53,328	$103,048	$169,601	$279,118	$373,532	$886,939	$1,458,501	$2,811,977	$4,614,226*	$7,556,497*	$16,392,242*

*While the available data has not revealed any Impacted Water Source with the values in the shaded cells, and any such Impacted Water Source would be an anomaly, the Table is designed to account for and estimate any scenario that could occur as a result of the Allocation Procedures.

DRAFT

[Aqueous Film-Forming Foam (AFFF) Product Liability Litigation (MDL 2873) – District Court for the District of South Carolina, Master Docket No. 2:18-mn-2873-RMG (pfaswaterprovidersettlement.com)]

[3M-Estimated-Allocation-Range-Table.pdf (pfaswaterprovidersettlement.com)]

3M Settlement

BIRMINGHAM WATER WORKS

SMFP:

PFAS Score for SMFP: 8

Adjusted Flow Rate for SMFP: 47,730 gpm

For illustration purposes only; not reflective of actual allocation awards

3M Public Water Provider Settlement
Estimated Allocation Range Table

Each cell in the Table represents an estimated allocation *PER IMPACTED WATER SOURCE (per groundwater well or surface water source)*. The Settlement Class consists of Public Water Systems, which may and often do have multiple wells or water sources, each of which would be calculated individually and added up to arrive at the total.

IMPACTED WATER SOURCE
means a Water Source that has a Qualifying Test Result showing a Measurable Concentration of PFAS.
See the Settlement Agreement for defined terms.

		Adjusted Flow Rate (gpm)										
	0	100	250	500	1,000	1,500	5,000	10,000	25,000	50,000	100,000	300,000
	2	$36,240	$70,013	$115,244	$189,694	$253,898	$603,369	$993,106	$1,918,881	$3,157,910	$5,196,296	$11,436,561
PFAS SCORE	4	$145,785	$281,723	$463,713	$763,253	$1,021,550	$2,427,216	$3,994,261	$7,714,149	$12,687,352	$20,855,641	$45,758,953
	10	$148,252	$286,489	$471,559	$776,166	$1,038,832	$2,468,269	$4,061,800	$7,844,507	$12,901,569	$21,207,290	$46,527,259
	50	$164,724	$318,320	$523,950	$862,394	$1,154,236	$2,742,397	$4,512,775	$8,714,863	$14,331,681	$23,554,481	$51,652,815
	100	$185,313	$358,108	$589,437	$970,176	$1,298,484	$3,085,022	$5,076,399	$9,802,456	$16,118,368	$26,485,901	$58,047,466
	250	$247,082	$477,467	$785,890	$1,293,499	$1,731,188	$4,112,663	$6,766,639	$13,062,886	$21,472,088	$35,263,074	$77,149,868
	500	$350,027	$676,390	$1,113,285	$1,832,294	$2,452,225	$5,824,623	$9,581,606	$18,489,120	$30,373,873	$49,834,987	$108,717,963*
	750	$452,968	$875,299	$1,440,643	$2,370,993	$3,173,089	$7,535,613	$12,393,952	$23,905,608	$39,249,406	$64,336,461*	$139,954,105*
	1000	$555,906	$1,074,195	$1,767,967	$2,909,596	$3,893,781	$9,245,635	$15,203,680	$29,312,376	$48,098,804*	$78,768,005*	$170,863,503*

*While the available data has not revealed any Impacted Water Source with the values in the shaded cells, and any such Impacted Water Source would be an anomaly, the Table is designed to account for and estimate any scenario that could occur as a result of the Allocation Procedures.

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