August, 2024

PFAS Occurrence: What We Have Learned from UCMR5

Bruce Li

Eurofins Eaton Analytical, LLC

eurofins | Environment Testing

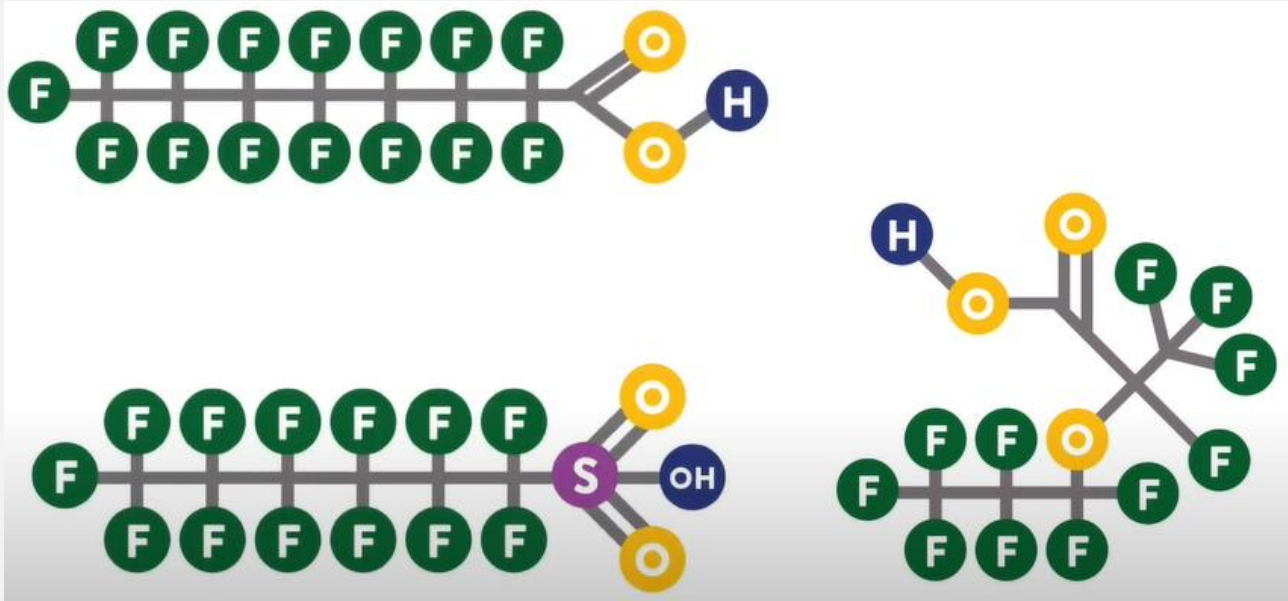
Presentation Outline

- PFAS Introduction
- PFAS Regulations
- UCMR5 Scope
- UCMR5 Occurrence Data
- Conclusions

eurofins | Environment Testing

PFAS Introduction & Regulations

PFAS = Per- and Polyfluroralkyl Substances



Courtesy to Minnesota Pollution Control Agency

PFAS: 1940s to 2020s

PFAS Drinking Water Regulations

- The Third Unregulated Contaminant Monitoring Rule (UCMR3)
  - **Assessment Monitoring (2013 to 2015)**
  - **6 priority PFAS**
- ~ 22 states have had drinking water programs or regulations for 11 PFAS. Some regulations are more stringent than the others.
  - **NJ MCLs: 13 ng/L PFNA, 14 ng/L PFOA, and 13 ng/L PFOS.**
  - **MA MCL: PFOA + PFHxS + PFOS + PFHpA + PFNA + PFDA = 20 ng/L**
- The Ongoing Fifth Unregulated Contaminant Monitoring Rule (UCMR5)
  - **Assessment Monitoring (2023 to 2025)**
  - **29 commonly analyzed PFAS**

Final PFAS NPDWR (April 10, 2024)

eurofins | Environment Testing

PFAS	MCLG (ng/L)	MCL (ng/L)	Significant Figure
PFOA	0	4.0	2
PFOS	0	4.0	2
PFHxS	10	10	1
PFNA	10	10	1
HFPO-DA (GenX Chemicals)	10	10	1
Mixture of 2 or more: PFHxS, PFNA, HFPO-DA, and PFBS	Hazard Index of 1 (unitless)	Hazard Index of 1 (unitless)	1

Hazard Index (HI) Calculation

- The HI is calculated as a sum of fractions of the measured sample concentration divided by the health-based water concentration (HBWC) for each of PFHxS, PFNA, HFPO-DA, and PFBS.

PFAS	PFHxS	PFNA	HFPO-DA	PFBS
HBWC (ng/L)	**10**	**10**	**10**	**2,000**

- Equation (sample concentrations are measured as ng/L):

$$HI\ (unitless) = \frac{PFHxS\ Conc}{10} + \frac{PFNA\ Conc}{10} + \frac{HFPO-DA\ Conc}{10} + \frac{PFBS\ Conc}{2000}$$

PFAS MCL Promulgation Timeline

eurofins | Environment Testing

- Effective Date – 06/25/2024
- Initial Monitoring – 06/25/2024 to 06/26/2027
- Ongoing Compliance Monitoring – By 06/26/2029
- Compliance – Starting 2029 (June 27?)

UCMR5 Scope (2023 – 2025)

UCMR 5 Applicability to PWSs per AWIA

System[1] Size (# of people served)	National Sample: Assessment Monitoring Design	Total # of Systems per Size Category
Small Systems (25 – 3,299)	800 randomly selected systems (CWSs and NTNCWSs)	800
Small Systems (3,300 – 10,000)	All systems (CWSs and NTNCWSs)	~5,100
Large Systems (10,001 and over)	All systems (CWSs and NTNCWSs)	~4,400
TOTAL		**~10,300**

[1] Systems provide water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year

# systems (25 – 3,300 pop.)	61,884
Pop. Served	29,663,222
% of systems	87.2%
% of pop.	10.1%

~13% of the very small CWS and NTNCWS will be monitored.

eurofins | Environment Testing

UCMR5: 29 PFAS and MRLs (2023 – 2025)

EPA 533 (2 – 5 ng/L)	PFBA 5	PFPeA 3	PFHxA 3	PFHpA 3 (10 for UCMR3)	PFOA 4 (20 for UCMR3)
	PFNA 4 (20 for UCMR3)	PFDA 3	PFUnA 2	PPDoA 3	PFBS 3 (90 for UCMR3)
	PFPeS 4	PFHxS 3 (30 for UCMR3)	PFHpS 3	PFOS 4 (40 for UCMR3)	PFEESA 3
	4:2 FTS 3	6:2 FTS 5	8:2 FTS 5	HFPO-DA 5	ADONA 3
	9Cl-PF3ONS 2	11Cl-PF3OUdS 5	PFMBA 3	PFMPA 4	NFDHA 20
EPA 537.1 revision 2.0 (5 – 8 ng/L)		MMeFOSAA 6	NEtFOSAA 5	PFTrDA 7	PFTeDA 8

eurofins | Environment Testing

UCMR5 Occurrence Data

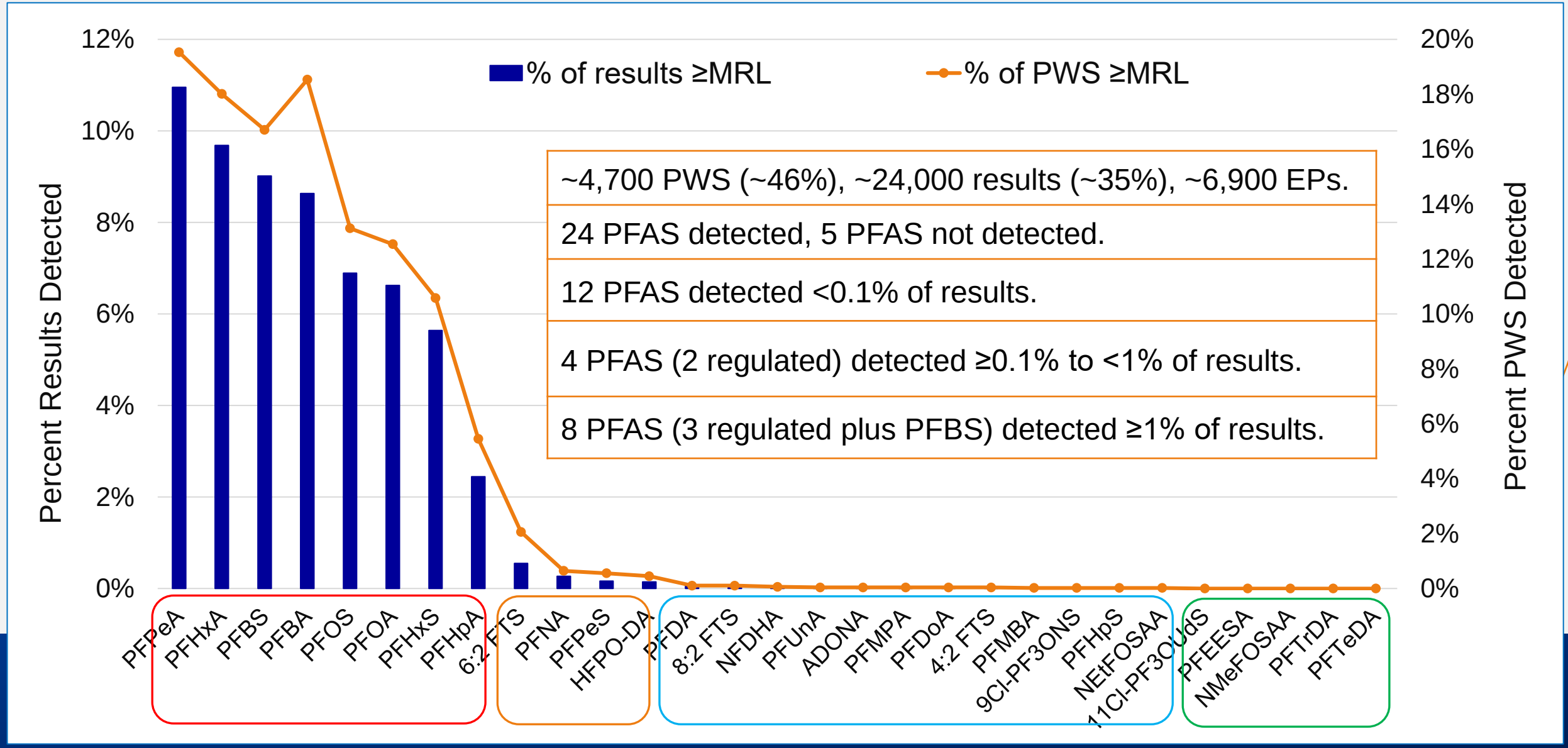
A	G	L	M	N	O	P	Q	R	S	T
PWSID	SamplePointID	CollectionDat	SampleID	Contaminant	MRL	Units	Metho	Analyti	AnalyticalResultVa	SampleEventCode
40000002	NONTCREP	4/5/2023	102782P	PFOA	0.004	µg/L	EPA 533	<		SE1
40000002	NONTCREP	4/5/2023	102782P	PFOS	0.004	µg/L	EPA 533	<		SE1
40000002	NONTCREP	4/5/2023	102782P	PFNA	0.004	µg/L	EPA 533	<		SE1
40000002	NONTCREP	4/5/2023	102782P	HFPO-DA	0.005	µg/L	EPA 533	<		SE1
40000002	NONTCREP	4/5/2023	102782P	PFBS	0.003	µg/L	EPA 533	<		SE1
40000002	NONTCREP	4/5/2023	102782P	PFHxS	0.003	µg/L	EPA 533	<		SE1
40000002	NONTCREP	10/3/2023	108525P	PFOS	0.004	µg/L	EPA 533	<		SE2
40000002	NONTCREP	10/3/2023	108525P	PFHxS	0.003	µg/L	EPA 533	<		SE2
40000002	NONTCREP	10/3/2023	108525P	HFPO-DA	0.005	µg/L	EPA 533	<		SE2
40000002	NONTCREP	10/3/2023	108525P	PFNA	0.004	µg/L	EPA 533	<		SE2
40000002	NONTCREP	10/3/2023	108525P	PFOA	0.004	µg/L	EPA 533	<		SE2
40000002	NONTCREP	10/3/2023	108525P	PFBS	0.003	µg/L	EPA 533	<		SE2

UCMR5 Occurrence Data

- Published in EPA's National Contaminant Occurrence Database (NCOD) as April, 2024.
- Represented ~35% of total UCMR5 results and ~47% of all UCMR5 PWSs.
- Included ~24,000 PFAS results, ~4,860 PWSs, and ~6,900 EPs.
- The presented findings may be slightly deviated from the final UCMR5 results.

eurofins | Environment Testing

UCMR5: Frequencies of PFAS Detection (April, 2024)



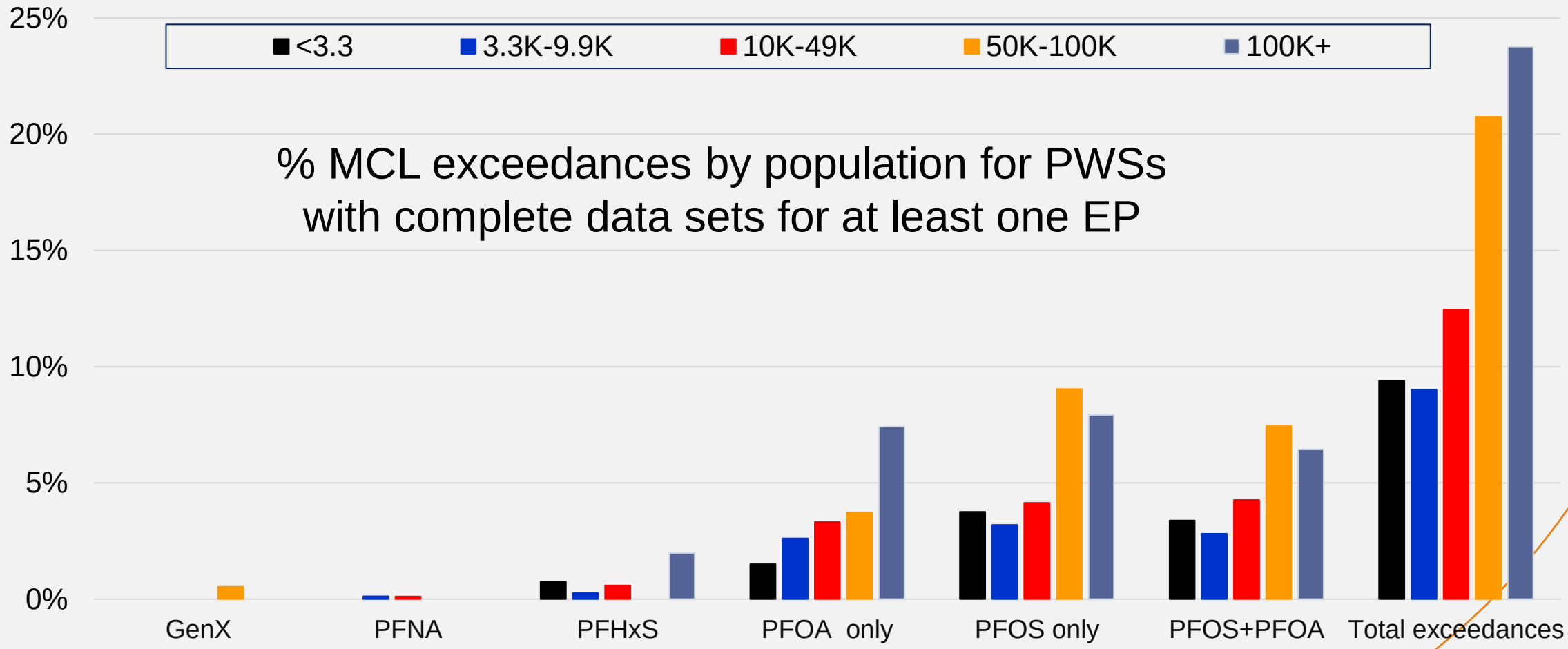
PFAS Co-occurrence and MCLs (April, 2024)

eurofins | Environment Testing

- To date, ~66% of the sampling locations with at least one PFAS detected ≥ the UCMR5 MRL have reported results for multiple PFAS ≥ the UCMR5 MRLs.
- To date, ~10% of the PWSs that have reported a full set of UCMR5 results for at least one location had an average for one or more of the newly regulated PFAS that were greater than the respective MCLs.

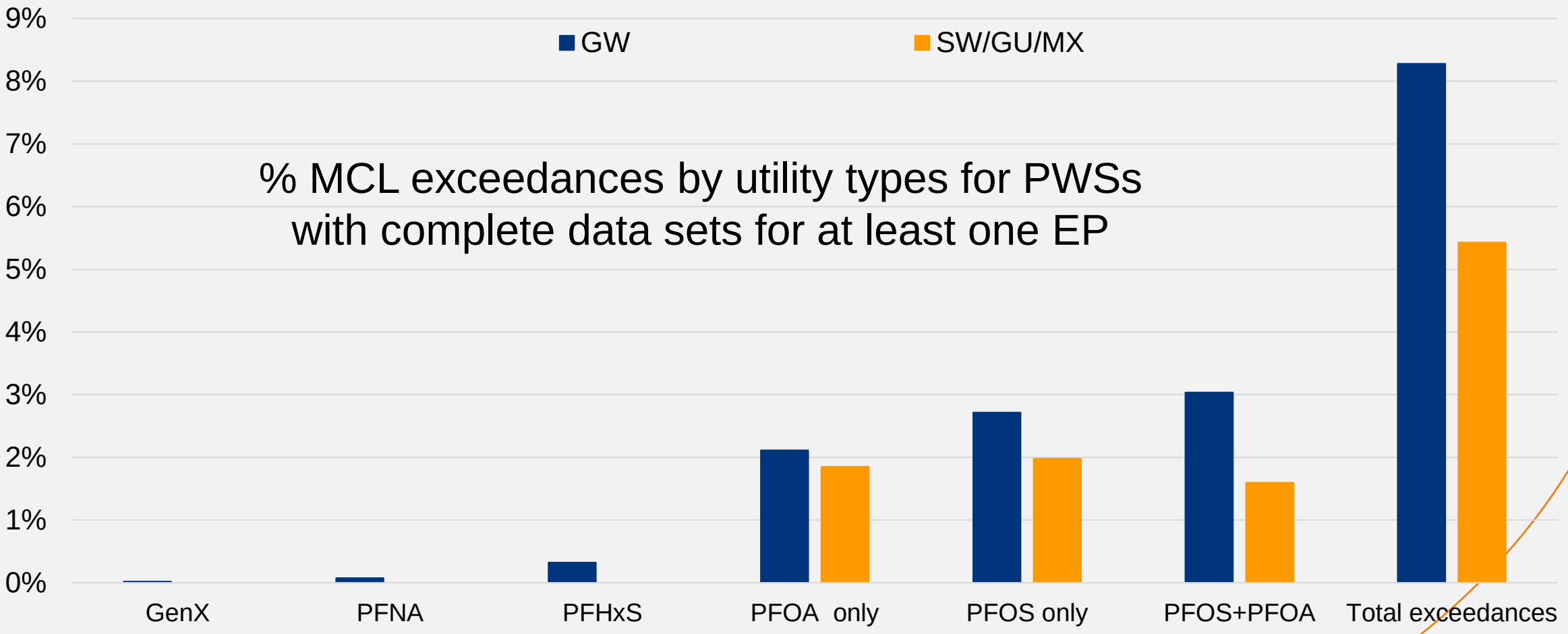
UCMR5 PFAS	MCL (ng/L)	%PWS MCL Exceedance
PFOA	4.0	6.4
PFOS	4.0	7.9
PFHxS	10	0.6
PFNA	10	0.1
HFPO-DA (GenX Chemicals)	10	0.0
Hazard Index	1 (unitless)	0.7

UCMR5: Large PWSs indicated more MCL violations.



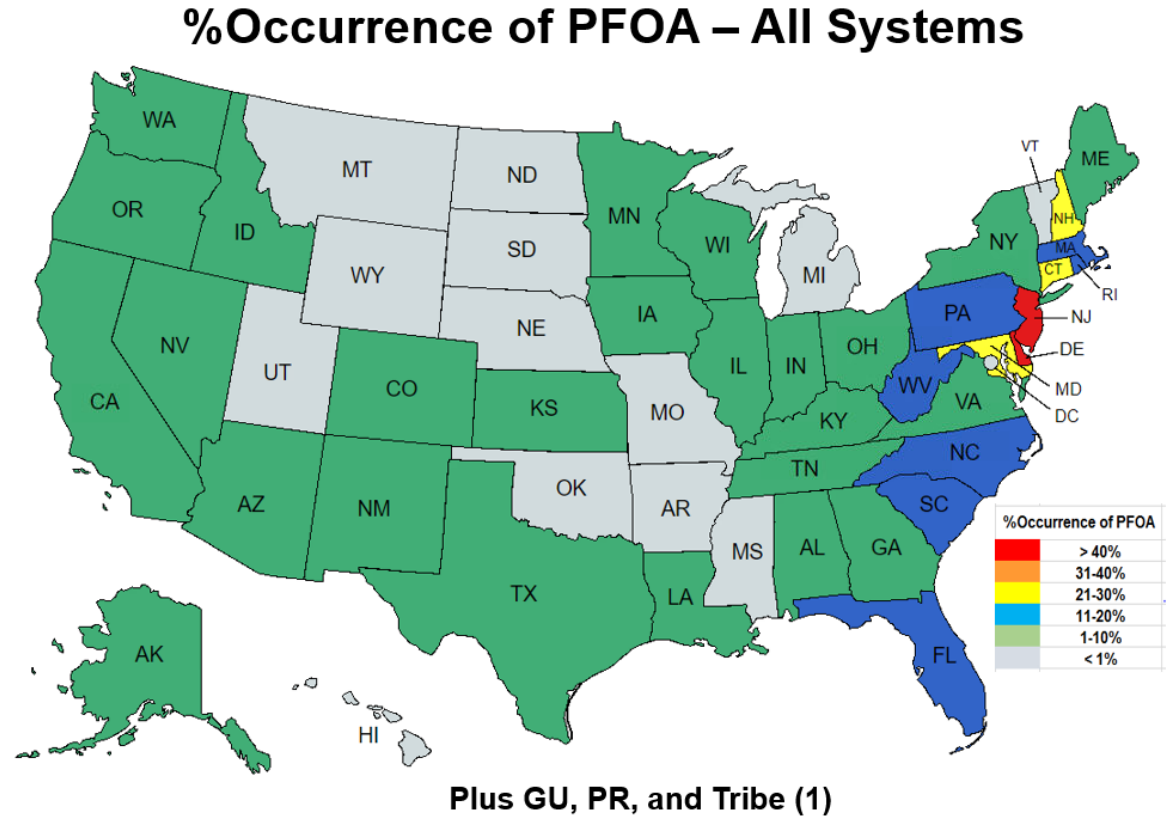
eurofins | Environment Testing

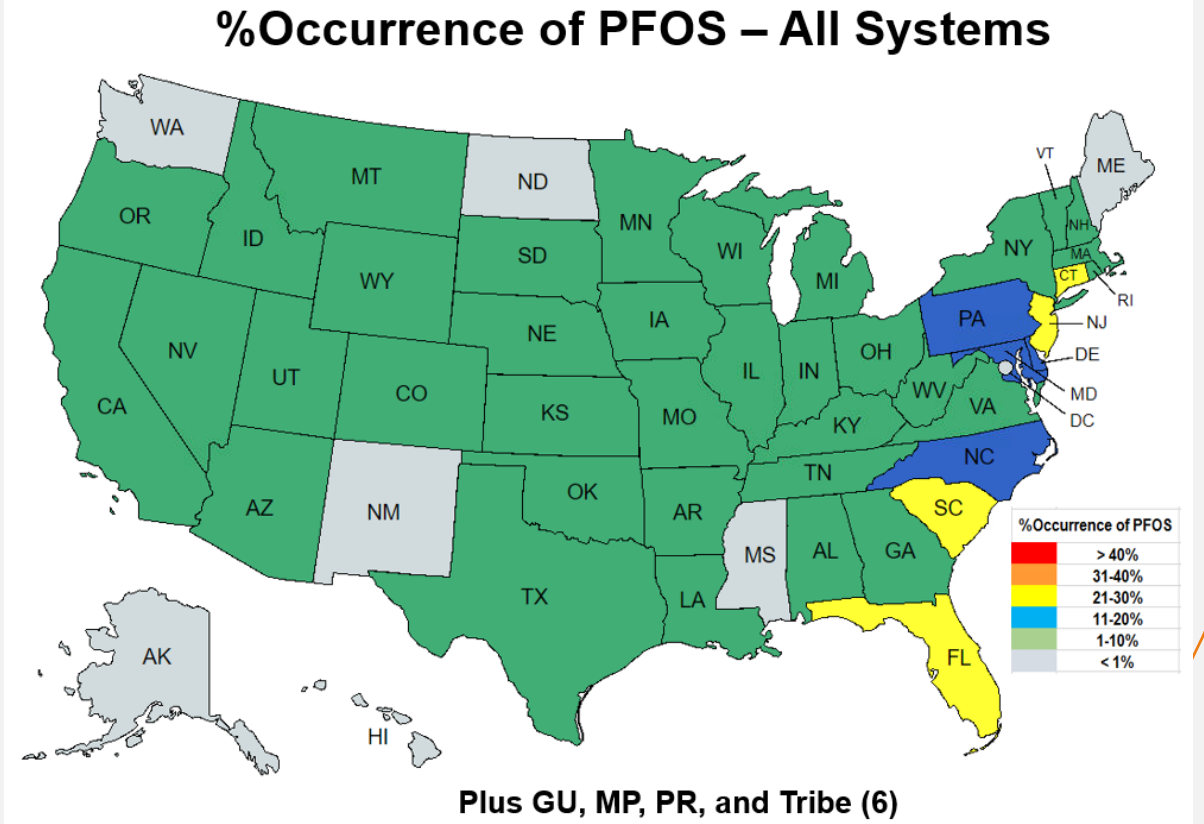
UCMR5: GW PWSs indicated more MCL violations.



eurofins | Environment Testing

Occurrence of PFOA & PFOS (April, 2024)

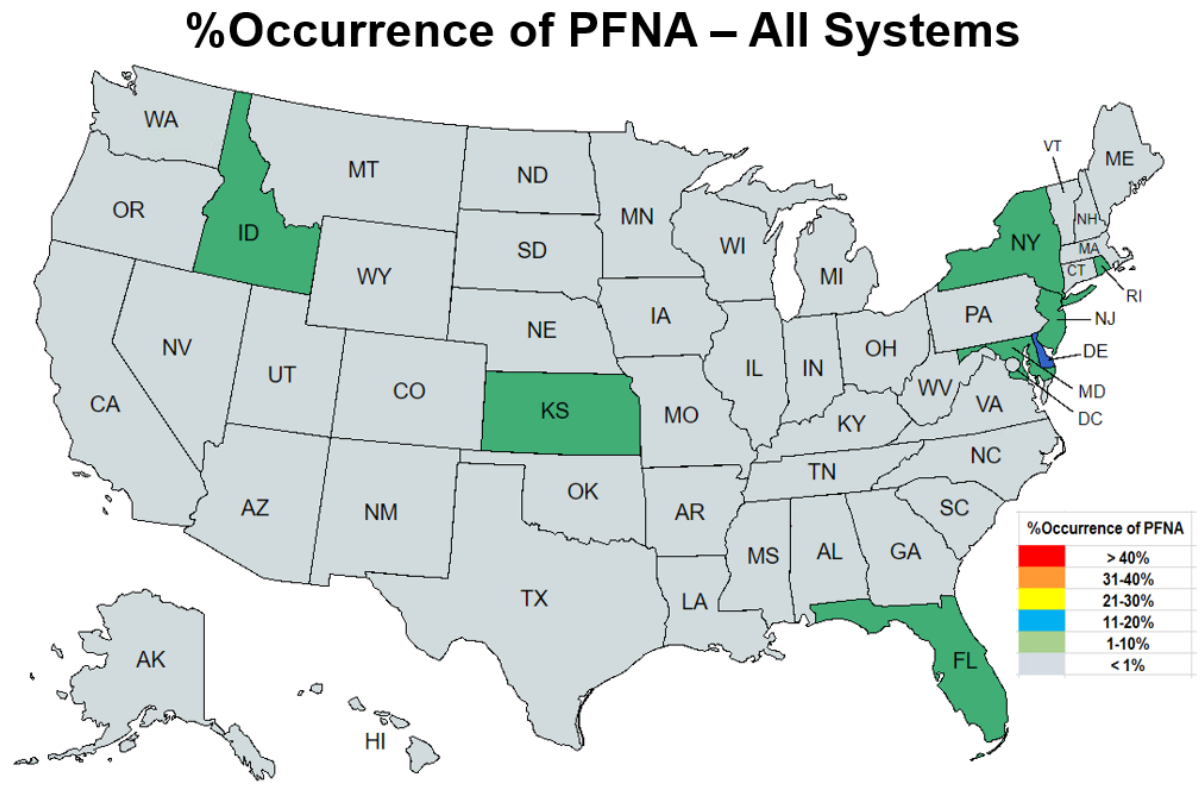


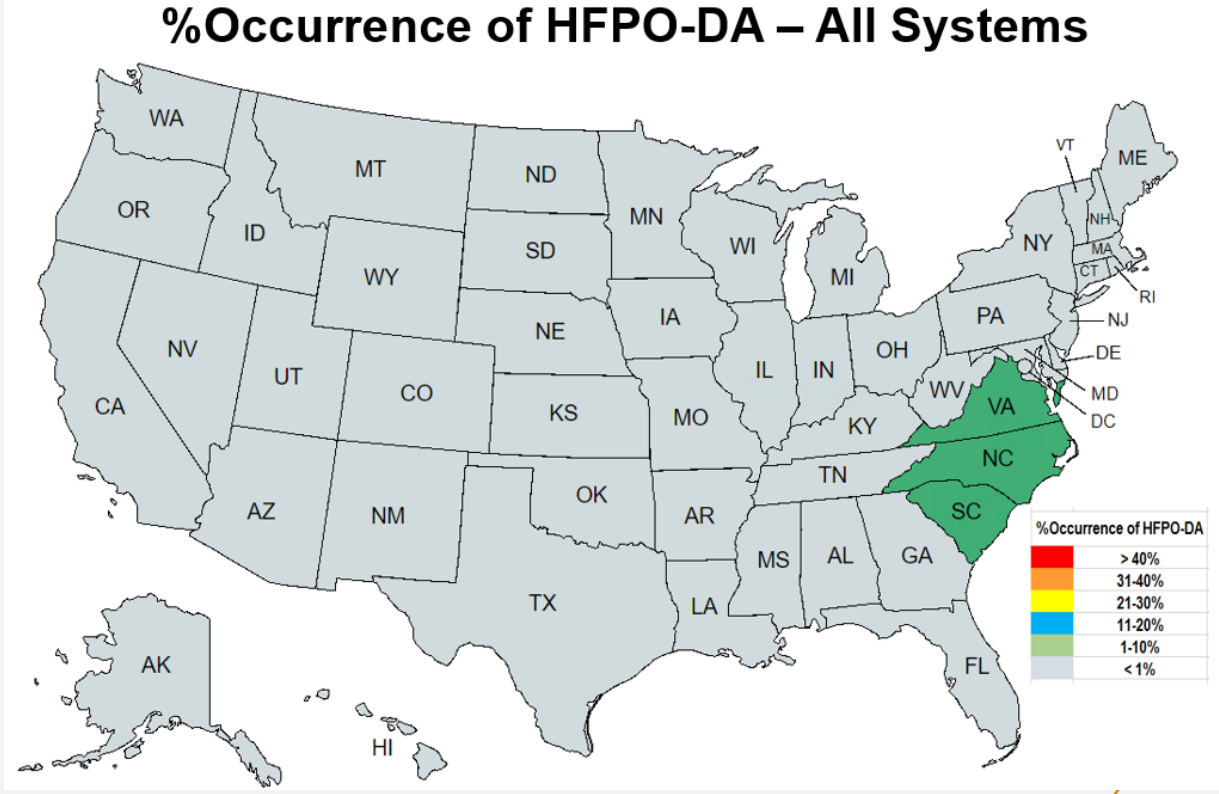


PFOA was detected in 38 states plus 3 territories and tribes. PFOS was detected in 44 states plus 4 territories and tribes. High occurrence was detected in serval eastern states.

eurofins | Environment Testing

Occurrence of PFNA & HFPO-DA (April, 2024)

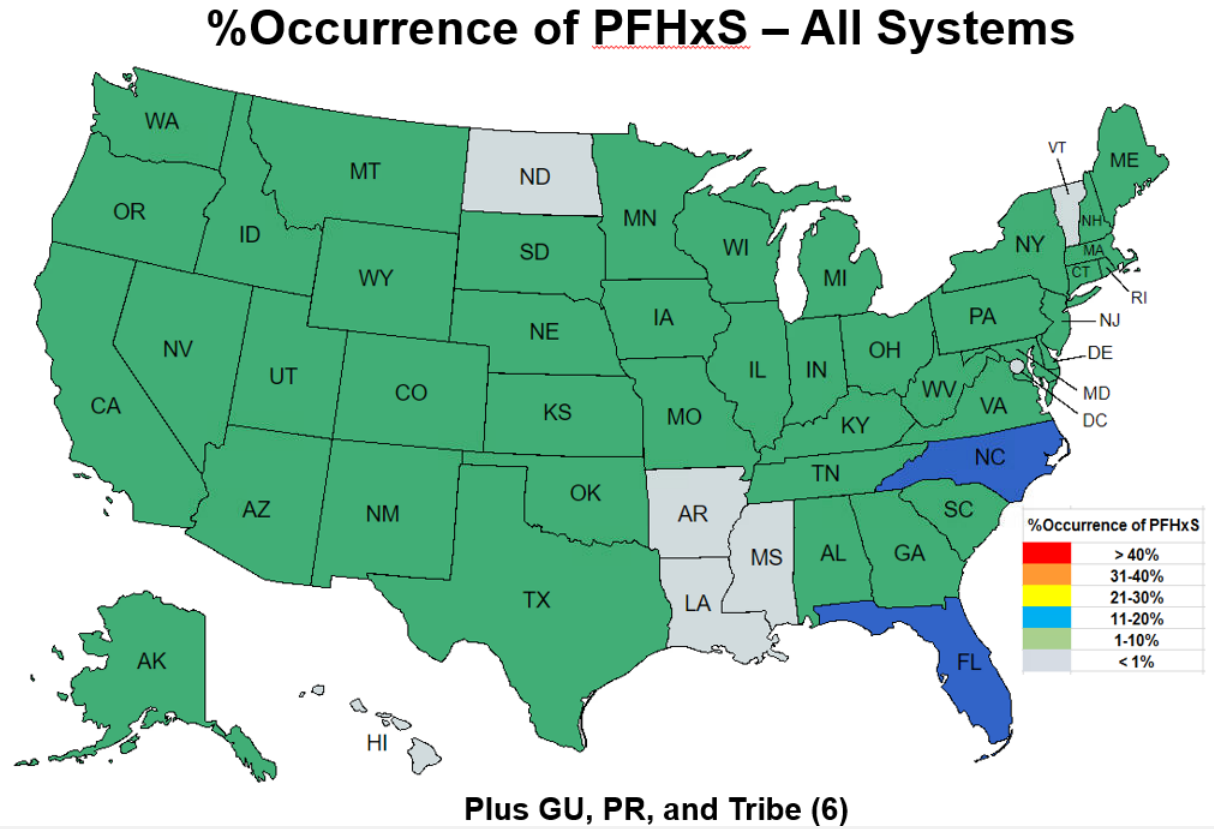


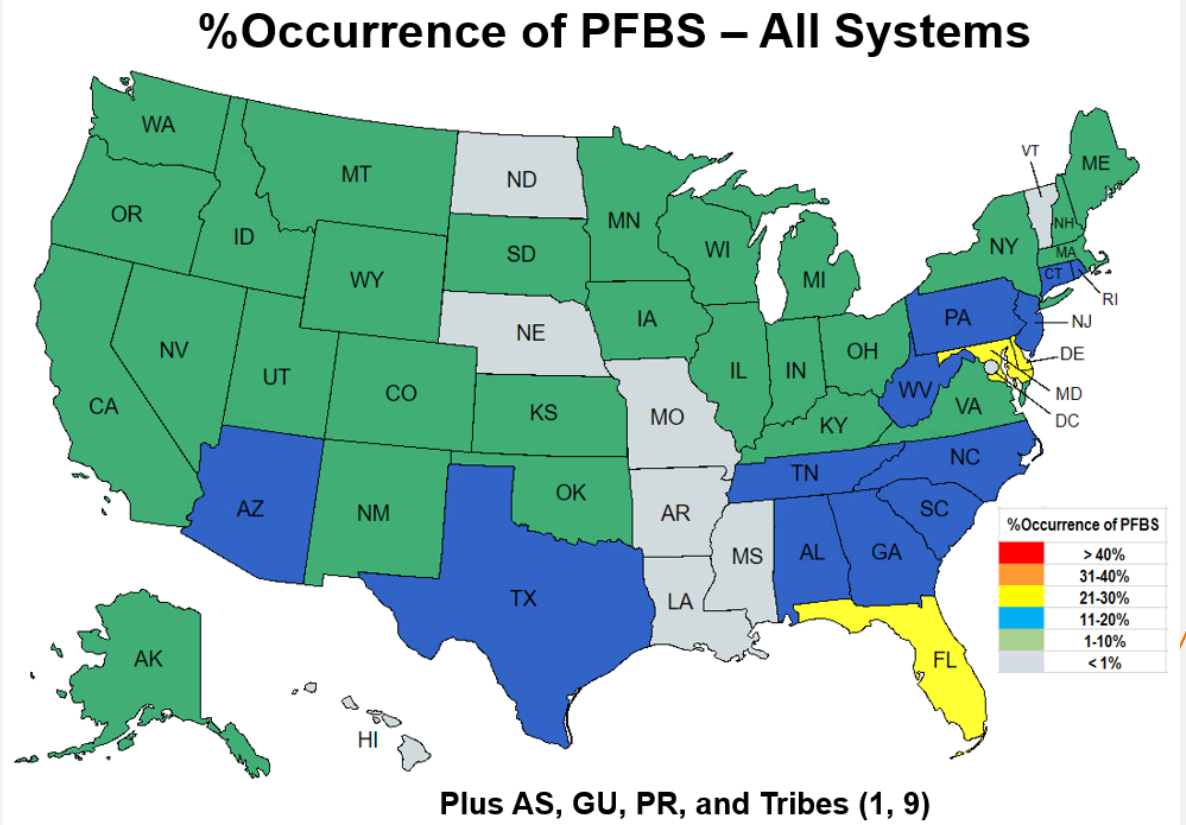


PFNA was detected in 12 states (primarily, DERI, ID, NJ, NY, and MD). HFPO-DA was detected in 6 states (primarily, VA, NC, and SC).

eurofins | Environment Testing

Occurrence of PFHxS & PFBS (April, 2024)

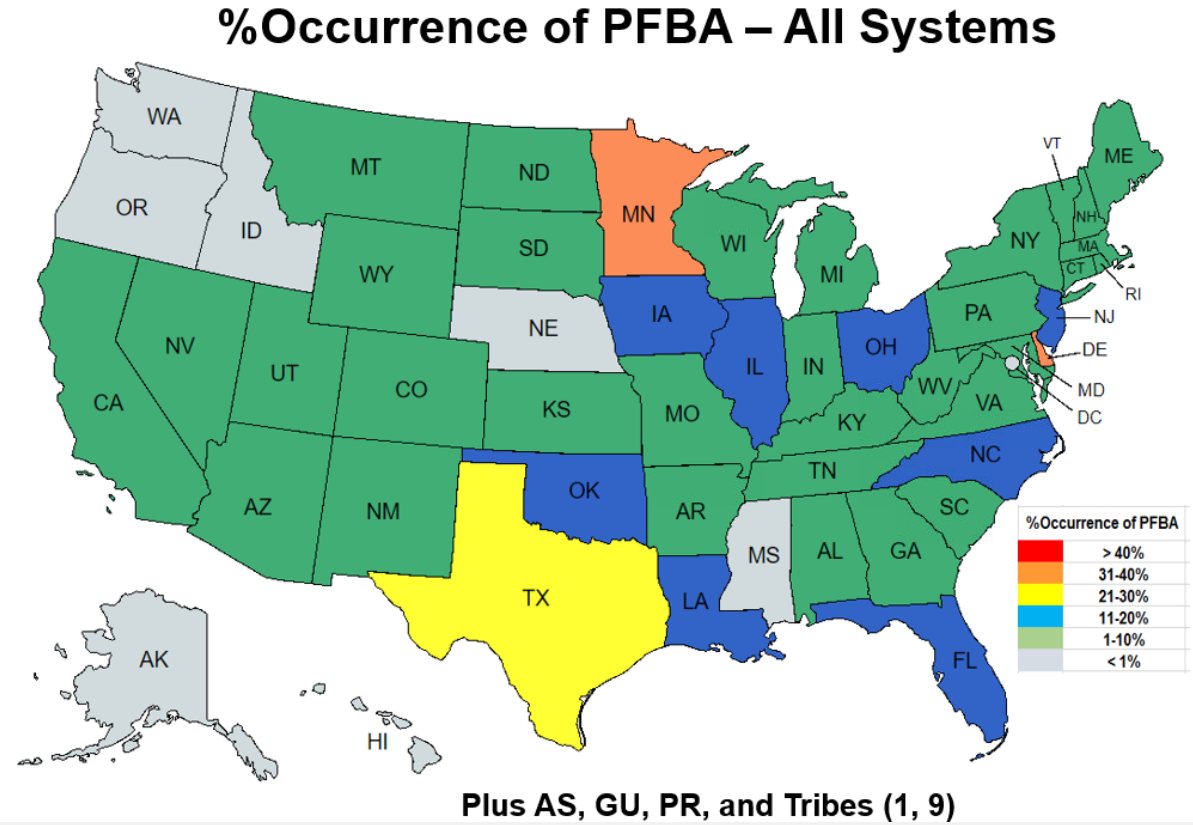


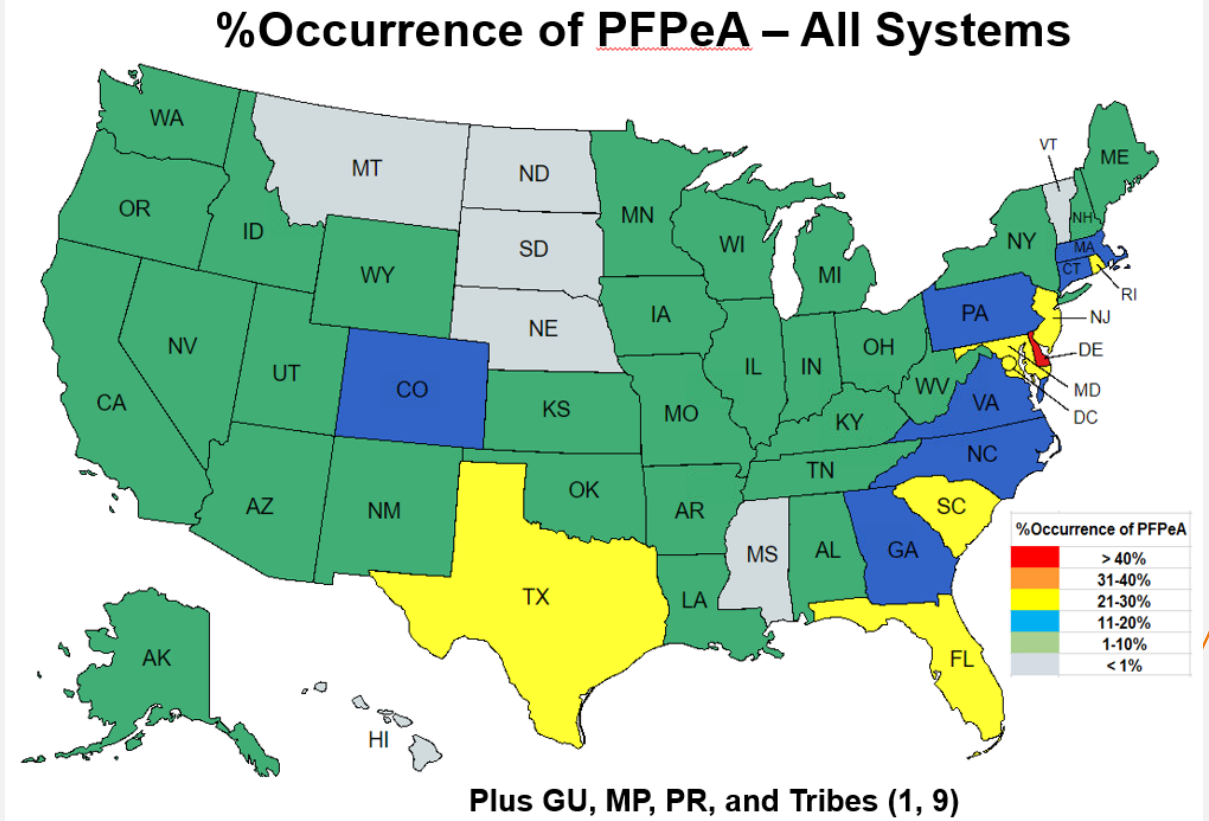


PFHxS was detected in 44 states plus 3 territories and tribes. PFBS was detected in 44 states plus 5 territories and tribes. High occurrence was detected in serval eastern states.

eurofins | Environment Testing

Occurrence of Unregulated PFBA & PFPeA (April, 2024)

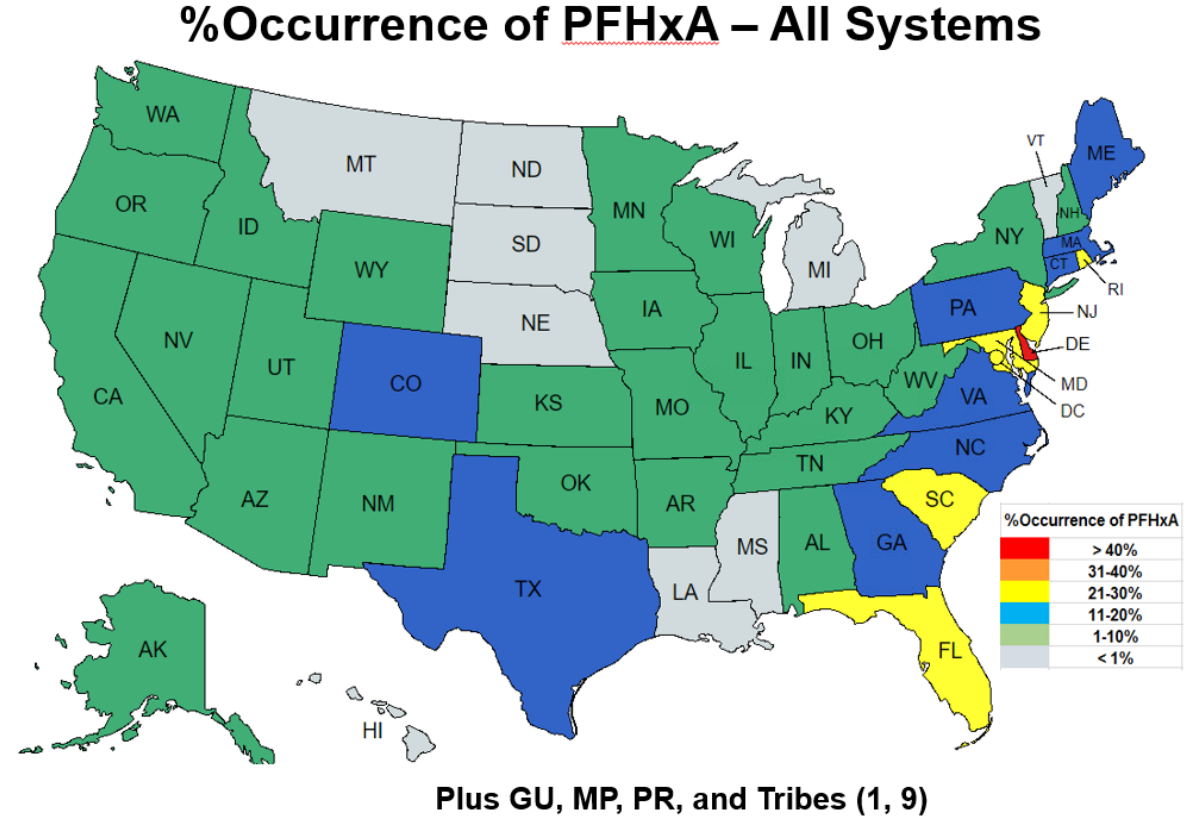


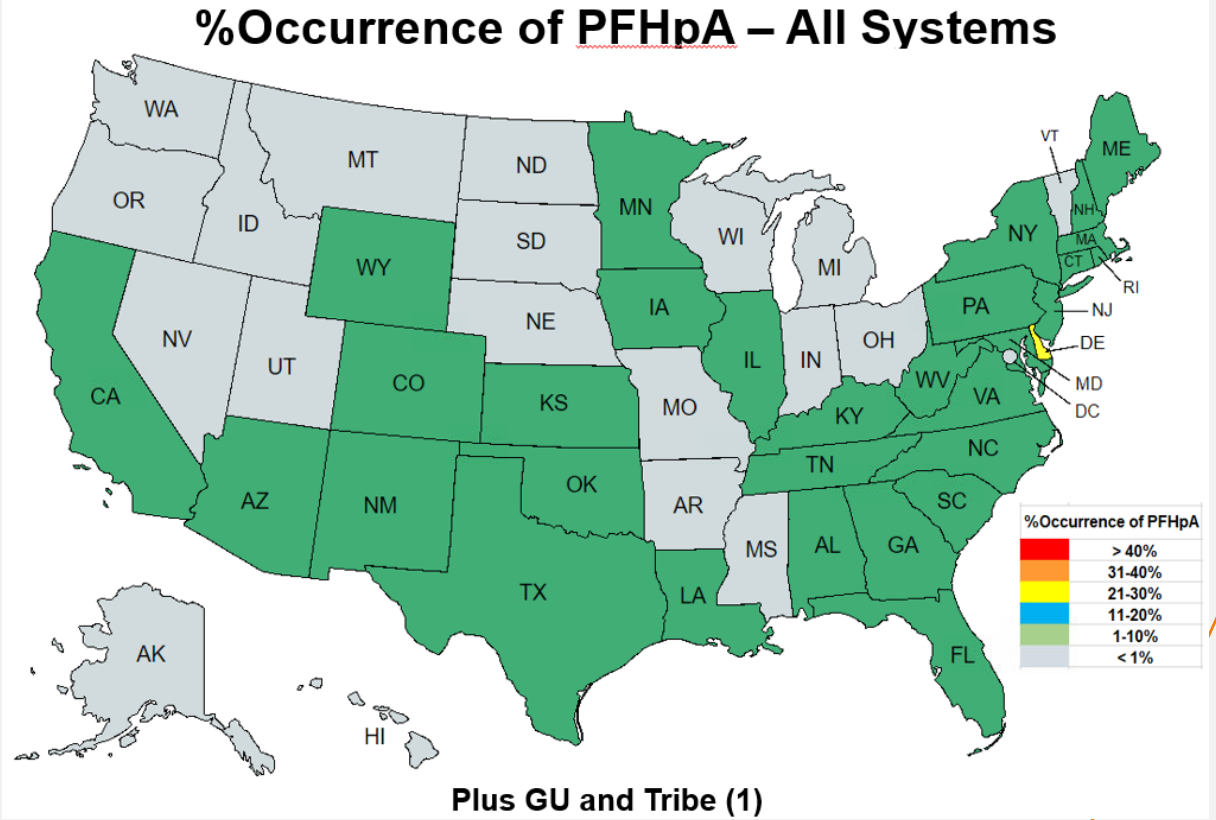


PFBA was detected in 45 states plus 5 territories and tribes (38% occurrence in MN and 32% occurrence in DE). PFPeA was detected in 46 states plus 5 territories and tribes (42% occurrence in DE).

eurofins | Environment Testing

Occurrence of Unregulated PFHxA & PFHpA (April, 2024)

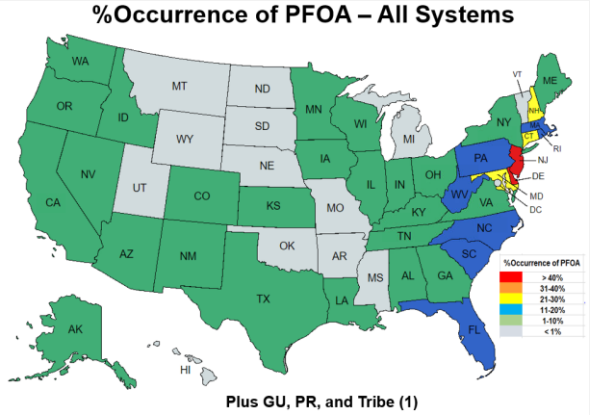


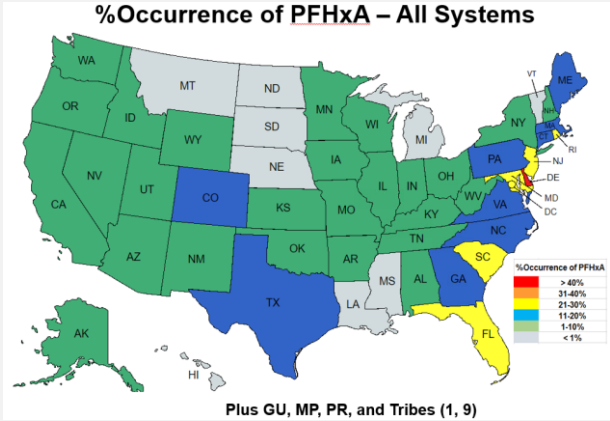


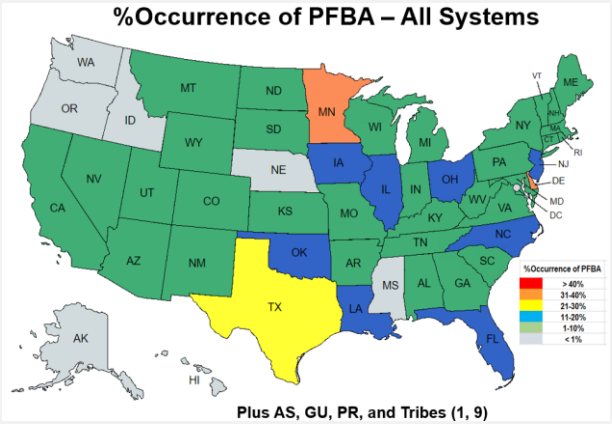
PFHxA was detected in 44 states plus 5 territories and tribes (42% occurrence in DE). PFHpA was detected in 39 states plus 2 territories and tribes (24% occurrence in DE).

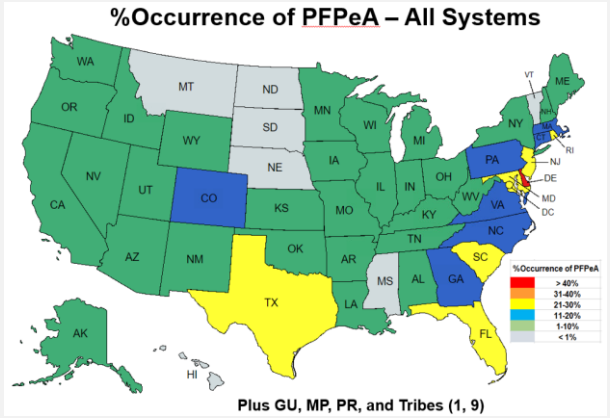
eurofins | Environment Testing

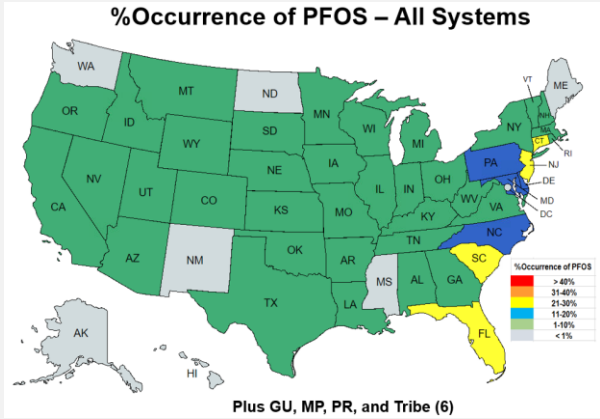
PFAS occurrence maps indicated co-occurrence (April, 2024)

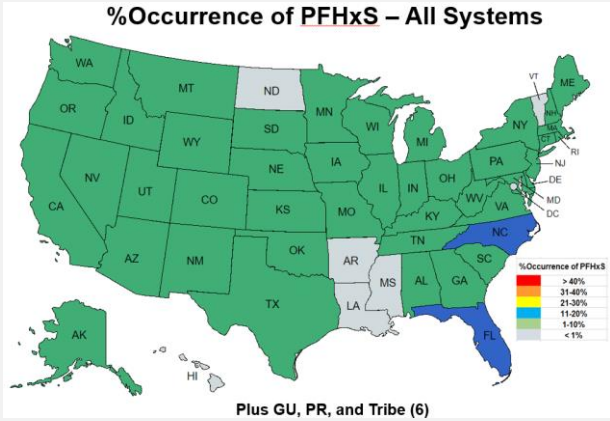


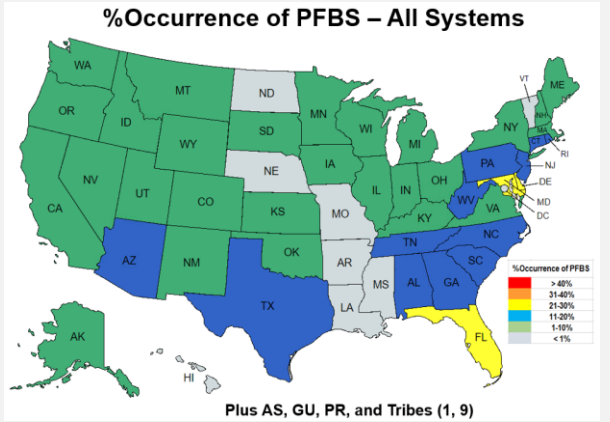


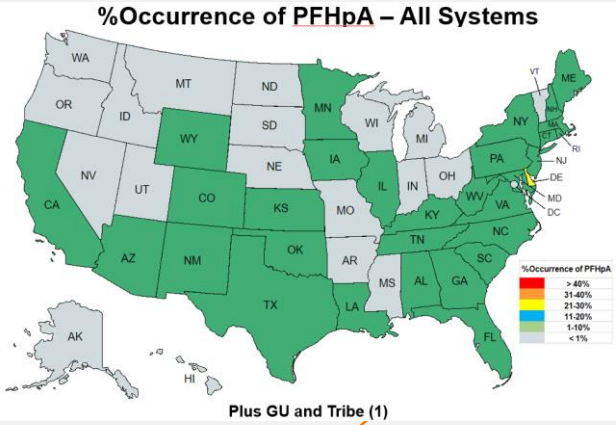












eurofins | Environment Testing

PFAS Co-occurrence Counts (April, 2024)

eurofins | Environment Testing

# of Unique PFAS ≥UCMR5 MRL	1	2	3	4	5	6	7	8	9	10	11
# of Sampling Locations with # or More PFAS	2,920	1,922	1,448	1,069	748	485	299	156	44	10	4
# of Unique PWS Associated with Sampling Locations	2,226	1,490	1,138	846	591	381	232	118	36	10	4

Overall %Occurrence of PFAS (April, 2024)

Top 10 States	NJ	DE	FL	SC	CT	NC	MD	RI	NH	PA
Top 20 States	MA	AZ	WV	GA	CA	AL	TN	WA	OH	TX
Top 30 States	NY	AK	VA	MN	KS	ME	CO	WI	ID	NV
Top 40 States	OK	IA	IN	KY	IL	OR	MO	NE	MT	NM
Top 50 States Plus DC	WY	UT	SD	MI	VT	LA	HI	ND	AR	MS

Conclusions

- To date, approximately two-third of the PFAS-detected sampling locations were detected with more PFAS at or above the UCMR5 MRLs.
  - 5 PFAS were not detected in the UCMR5 samples.
  - Among the 24 PFAS detected, 12 PFAS were detected in ≥0.1% of the samples, and 8 PFAS were detected in ≥1% of the samples.
  - The newly regulated PFOA, PFOS, PFHxS, PFNA and HFPO-DA were detected in 6.6%, 6.9%, 5.6%, 0.3% and 0.2% of the samples, respectively.
  - This new regulation does not include 4 frequently detected PFAS (PFBA, PFPeA, PFHxA, and PFHpA).

Conclusions (Cont'd)

- To date, ~10% of the systems that have reported a full set of UCMR5 results for at least one location had a Running Annual Average (RAA) for one or more of the regulated PFAS exceeding the respective MCLs.
  - Primary MCL exceedances include PFOS, PFOA, and PFHxS.
  - Large systems are expected to have more MCL exceedances than small systems.
  - GW systems are expected to have slightly more MCL exceedances than SW systems including GU and MX systems.
  - Due to PFAS co-occurrence, more than one MCL exceedance may be seen for some systems.

Yongtao (Bruce) Li

Yongtao.Li@ET.EurofinsUS.com

574.472.5562

THANK YOU

eurofins | Environment Testing