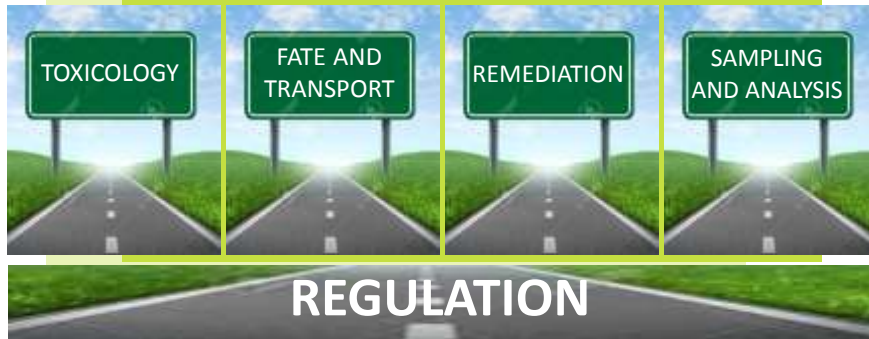


## CONCLUSIONS: KEY KNOWLEDGE GAPS AND PATH FORWARD

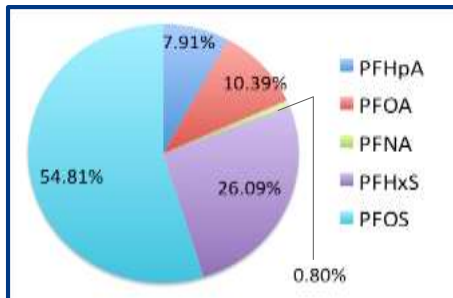
Jennifer Guelfo, PhD  
State Agencies Liaison, Brown SRP  
May 23, 2016



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## KNOWLEDGE GAPS: SOURCE ANALYSIS

EPA 2013-2015 UCMR Data, Region 1

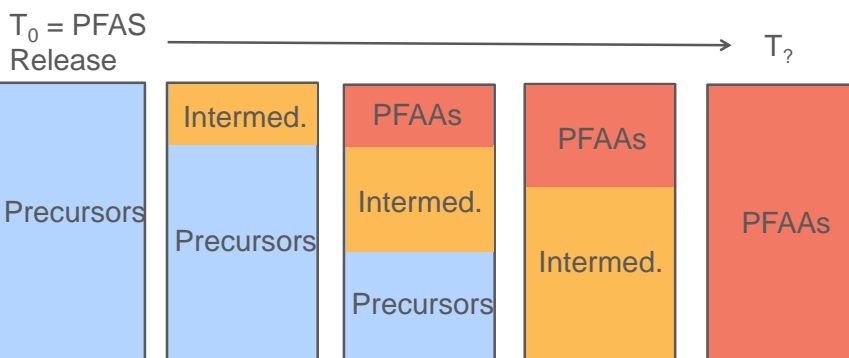


Analyte	n/23	min	max
PFBS	0	NA	NA
PFHpA	15	0.011	0.058
PFOA	14	0.01	0.081
PFNA	1	0.035	
PFHxS	12	0.032	0.27
PFOS	15	0.05	0.43

- PFAS detects in 4 states, 12 districts, 16 sampling points
- PFBS not detected, PFBA, PFPeA not measured
- 5 districts > 0.07 ng/L PFOS + PFOA LHA
- Changes with time as PFAS usage evolves?
- Forensics info: which source types lead to which PFAS?

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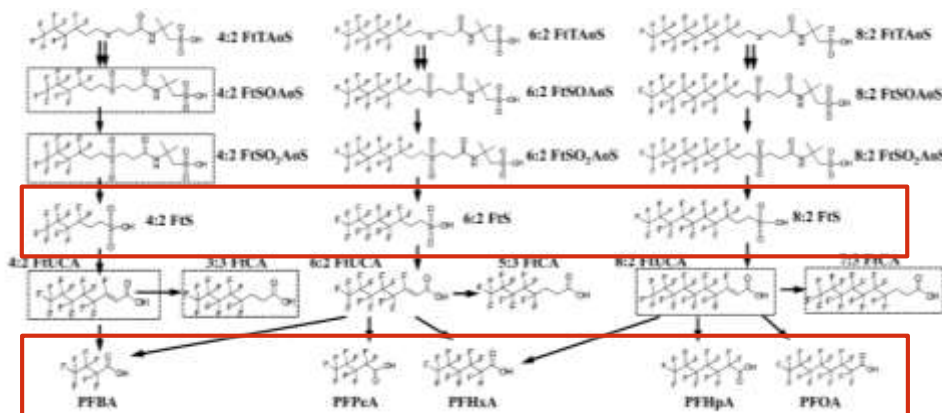
## KNOWLEDGE GAPS: FATE AND TRASPOT



- Extent/rate of transformation, pathways, and intermediates?
- Role of sorption to soil of polyfluoroalkyl precursors/intermediates?
- Toxicology of precursors/intermediates?

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## KNOWLEDGE GAPS: FATE AND TRASPOT<sup>1</sup>

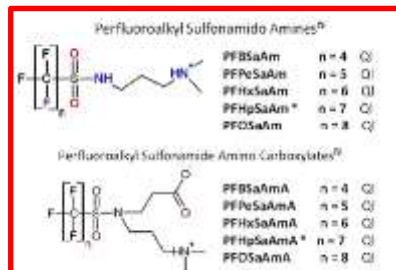
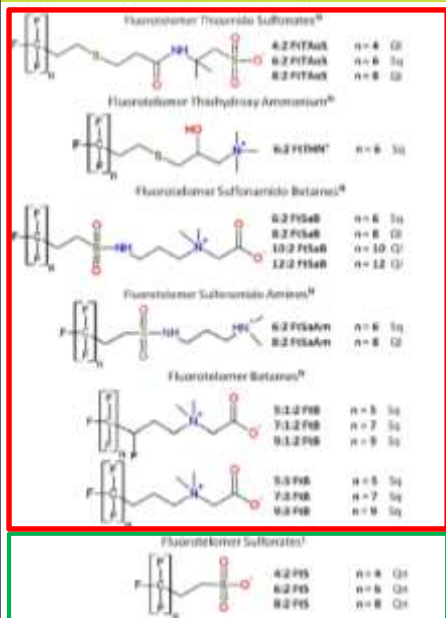


- Aerobic biotransformation of fluorotelomer thioether amido sulfonate (Lodyne)
- Proves transformation potential to FtS, FtCA, FtUCA, and PFCAs

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<sup>1</sup>Harding-Marianovic, Katie C., et al. *Environmental science & technology* 49.13 (2015): 7666-7674.

## KNOWLEDGE GAPS: SAMPLING AND ANALYSIS



Standard available

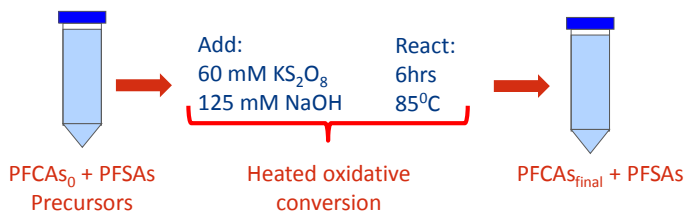
No commercial standard

For **known** precursors, availability of standards is a limitation

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## KNOWLEDGE GAPS: SAMPLING AND ANALYSIS

Commercial availability of total oxidizable precursor sample preparation?



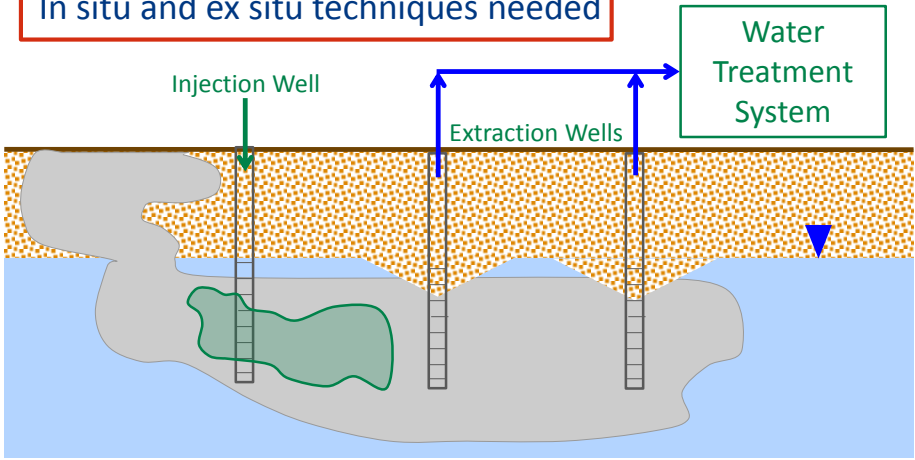
$$\text{Total Precursors} = \text{PFAA}_{\text{final}} - \text{PFAA}_0$$

Houtz, Erika F., and David L. Sedlak. "Oxidative conversion as a means of detecting precursors to perfluoroalkyl acids in urban runoff." *Environmental science & technology* 46.17 (2012): 9342-9349.

Houtz, Erika F., et al. "Persistence of perfluoroalkyl acid precursors in AFFF-impacted groundwater and soil." *Environmental science & technology* 47.15 (2013): 8187-8195.

## KNOWLEDGE GAPS: REMEDIATION

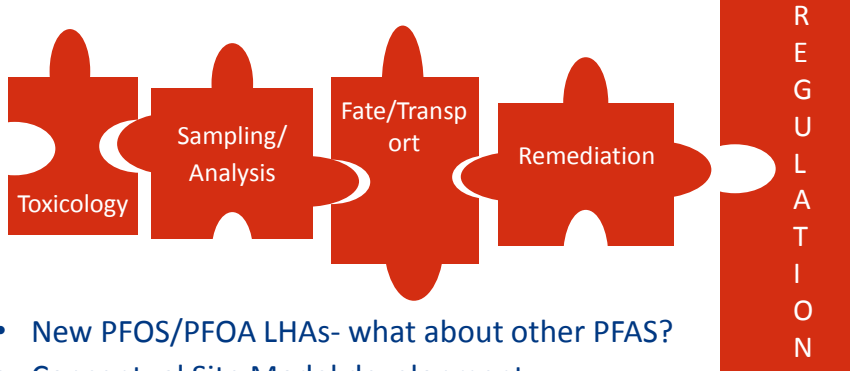
In situ and ex situ techniques needed



- Impacts of legacy remediation of PFAS distribution
- Understand impacts on whole PFAS load (short chain, precursors)
- Need method for full destruction of PFAS to avoid costly disposal
- Understand matrix and co-contaminant effects


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## KNOWLEDGE GAPS: REGULATORY GUIDANCE



- New PFOS/PFOA LHAs- what about other PFAS?
- Conceptual Site Model development
- Sampling & analysis protocol
- Guide to remediation incl. cost-benefit analysis
- Guidance on PFAS product management

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TOXICANT EXPOSURES IN RHODE ISLAND:  
Past, Present, and Future



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