Development of Adsorbable Organic Fluorine (AOF) Screening Method with Detection by Combustion Ion Chromatography (CIC)

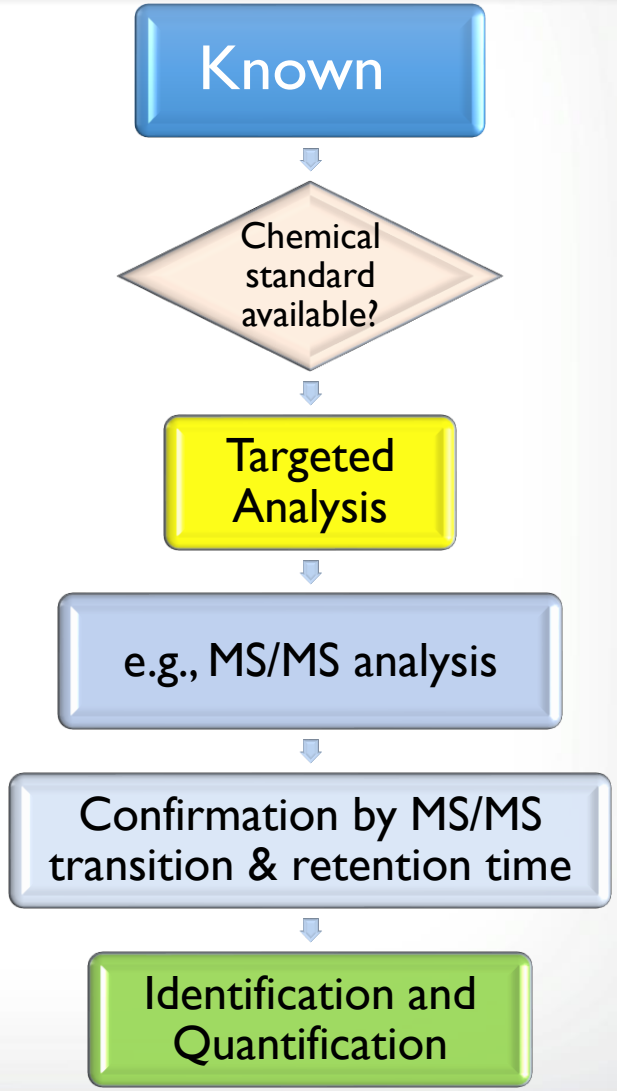
Jody A. Shoemaker and Jenifer L. Jones
Center for Environmental Solutions and Emergency Response
Office of Research and Development

Executive Meeting | Board of Scientific Counselors
September 29-30, 2021

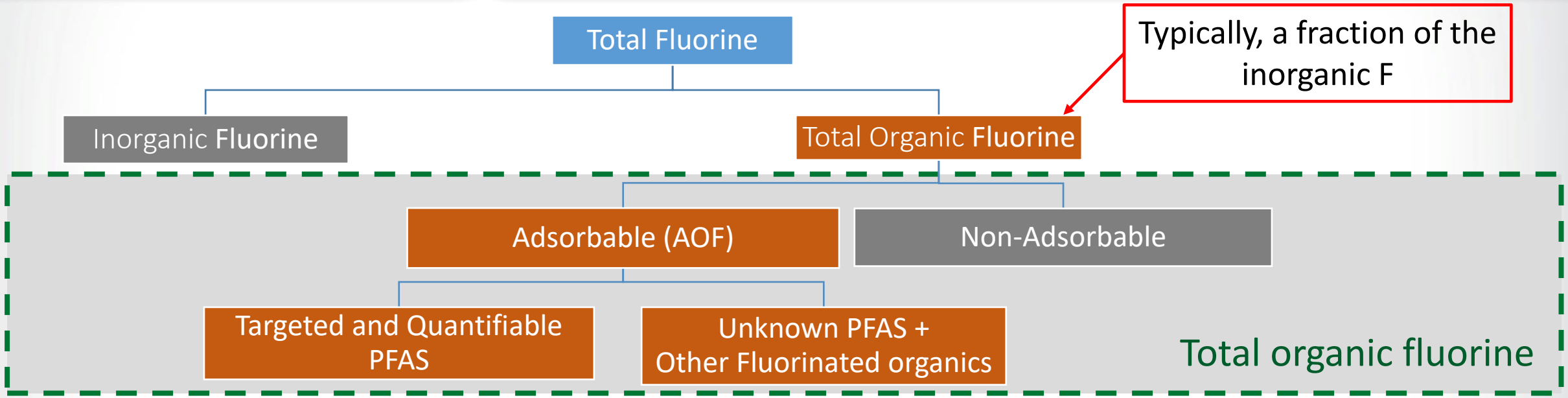
Why "Total PFAS" Methods?

Currently, most common PFAS detection technique is mass spectrometry (MS) using targeted analysis

- **Targeted Analysis:**
  - methods applicable to a specific defined set of known analytes
  - analytical standards exist for quantitation
  - methods only measure for analytes on the targeted list; once the analysis is complete, you can't look for other analytes.
  - >4000 PFAS in existence



Goals

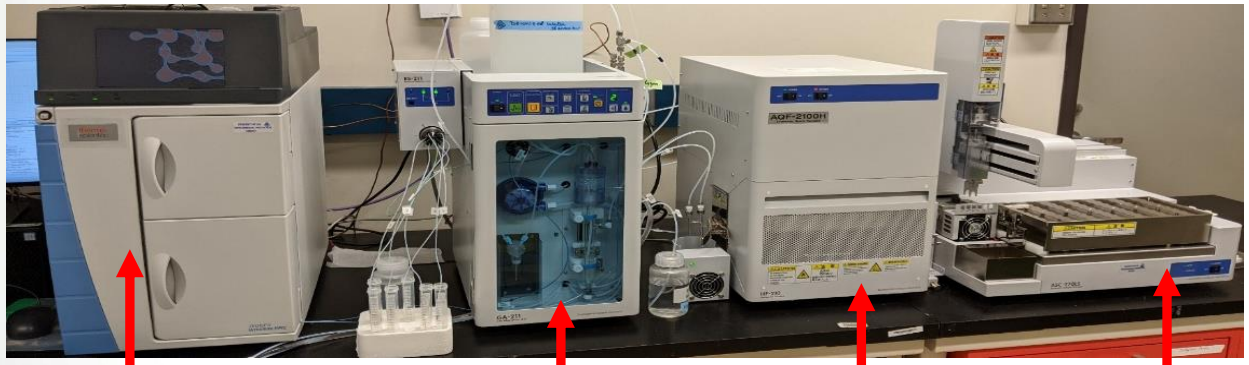


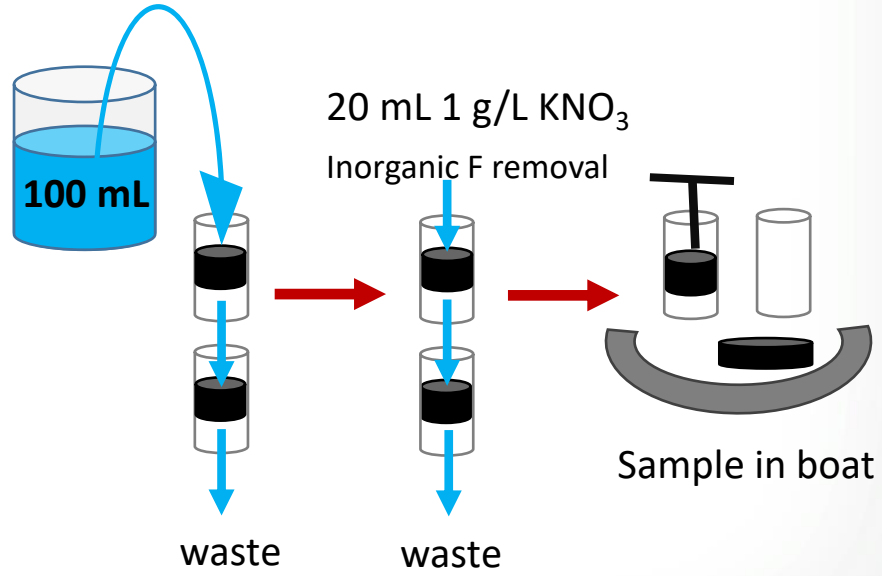
- Develop a screening method for wastewaters that measures adsorbable organic fluorine (AOF)
- Aid in screening for PFAS contamination or assessing removal of organofluorine contaminants in treatment streams
- AOF measurements must address removal of inorganic fluorine
- AOF measurements will include all adsorbable organic fluorine, e.g., fluorinated pharmaceuticals, agrochemicals

Approach – AOF/CIC

How:

- Screening method adsorbs contaminants onto granular activated carbon, removal of inorganic fluoride with nitrate solution, followed by combustion of the carbon
- Organofluorine compounds are converted to fluoride in the combustion process and measured by ion chromatography





Method Detection Limit: 1.4 - 2.2 µg/L

Current Status – AOF/CIC

Status:

- Recovery data for 35 PFAS, 2 PFAS mixtures, 4 fluorinated pesticides and pharmaceuticals
- Spiked recovery data in 14 wastewaters and 2 surface waters
- Delivery of draft wastewater screening method to OW by October 2021
- Multi-lab validation to be conducted by OW
- Submit manuscript for publication of AOF/CIC research by December 2021

Total Organic Fluoride for PFAS

Potential Future Work:

- To evaluate options that would lead to lower detection levels for the AOF/CIC method
- To keep an eye on other approaches that may come closer to capturing all PFAS within the method while not capturing inorganic fluoride or fluoride associated with other organic molecules (e.g., pesticides)
- Evaluate AOF/CIC technique for other matrices

Contributors

- Office of Research and Development

  Jody Shoemaker, Jenifer Jones, Marc Mills, Tom Speth and Chris Impellitteri

- Office of Water
  - Sarah Burket and Adrian Hanley

Supported by Safe and Sustainable Water Resources