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It can be done

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NAC-SETAC Webinar

Navigating the Complexities of PFAS Analysis, a Laboratory Perspective


Analytical Services


Health Assessment


Novel Chemistries


Remediation & Treatment


Site Characterization


Toxicology

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Today's Presentation

- Published methods
- Regulatory guidance
- Target analytes
- Accreditations
- State level regulations and requirements
- The laboratory perspective
- Upcoming method changes
- Conclusions

Current Methods

- ASTM D7979 (water)
- ASTM D7968 (soil)
- EPA Drinking water method 537.1
- EPA SW-846 Method 8327
- EPA Drinking water method 533
- USDA – CLG-PFAS 2.02
- FDA – C-010.01
- CDC – 6304.09

DoD Guidance Documents

- DoD Quality System Manual
  - 5.0 – July 2013
  - 5.1 – January 2017
  - 5.2 – January 2019
  - 5.3 – May 2019

UCMR 3 (6 analytes)

PFCAs

-
-
-
- PFHpA
- PFOA
- PFNA
-
-
-
-
-
-
-

PFASs

- PFBS
-
- PFHxS
-
- PFOS
-
-
-

FOSAs

-
-
-

FOSEs

-
-

FOSAAs

-
-

FTSs

-
-
-
-

FTCAs

-
-
-

PFTA and FTUAs

-
-
-

-
-

Replacements

-
-
-
-

Short Chain

-
-
-
-

EPA 537 (14 analytes) and EPA 537.1 (18 analytes)

PFCAs

-
-
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
-
-

PFASs

- PFBS
-
- PFHxS
-
- PFOS
-
-
-

FOSAs

-
-
-

FOSEs

-
-

FOSAAs

- MeFOSAA
- EtFOSAA

FTSs

-
-
-
-

FTCAs

-
-
-

PFTA and FTUAs

-
-
-

-
-

Replacements

- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain

-
-
-
-

DoD 24 and DoD 28

PFCAs
- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
-
-

PFASs
- PFBS
- PFPeS
- PFHxS
- PFHpS
- PFOS
- PFNS
- PFDS
-

FOSAs
-
-
- PFOSA

FOSEs
-
-

FOSAAs
- MeFOSAA
- EtFOSAA

FTSs
- 4:2FTS
- 6:2FTS
- 8:2FTS
-

FTCAs
-
-
-

PFTA and FTUAs
-
-
-

-
-

Replacements
- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain
-
-
-
-

NY List (25 analytes)

PFCAs
- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
-
-

PFASs
- PFBS
-
- PFHxS
- PFHpS
- PFOS
-
- PFDS
-

FOSAs
-
-
- PFOSA

FOSEs
-
-

FOSAAs
- MeFOSAA
- EtFOSAA

FTSs
-
- 6:2FTS
- 8:2FTS
-

FTCAs
-
-
-

PFTA and FTUAs
-
-
-

-
-

Replacements
- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain
-
-
-
-

CA List (31 analytes + 11 “suggested”)

PFCAs

- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
- PFHxDA
- PFODA

PFASs

- PFBS
- PFPeS
- PFHxS
- PFHpS
- PFOS
- PFNS
- PFDS
-

FOSAs

- NMeFOSA
- NEtFOSA
- PFOSA

FOSEs

- NMeFOSE
- NEtFOSE

FOSAAs

- MeFOSAA
- EtFOSAA

FTSs

- 4:2FTS
- 6:2FTS
- 8:2FTS
- 10:2FTS

FTCAs

- 3:3FTCA
- 5:3FTCA
- 7:3FTCA

PFTA and FTUAs

-
-
-
-
-

Replacements

- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain

- NFDHA
- PFEESA
- PFMPA
- PFMBA

EPA 533 (25 analytes)

PFCAs

- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
-
-
-
-

PFASs

- PFBS
- PFPeS
- PFHxS
- PFHpS
- PFOS
-
-
-

FOSAs

-
-
-

FOSEs

-
-

FOSAAs

-
-

FTSs

- 4:2FTS
- 6:2FTS
- 8:2FTS
-

FTCAs

-
-
-

PFTA and FTUAs

-
-
-

-
-

Replacements

- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain

- NFDHA
- PFEESA
- PFMPA
- PFMBA

ASTM List (19 Analytes)

PFCAs
- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
-
-

PFASs
- PFBS
-
- PFHxS
-
- PFOS
-
-
-

FOSAs
-
-
-

FOSEs
-
-

FOSAAs
-
-

FTSs
-
-
-
-

FTCAs
-
-
-

PFTA and FTUAs
- PHEA
- FOEA
- FDEA
- FOUEA
- FHUEA

Replacements
-
-
-
-

Short Chain
-
-
-
-

UCMR 5 (29 analytes)

PFCAs
- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
-
-

PFASs
- PFBS
- PFPeS
- PFHxS
- PFHpS
- PFOS
-
-
-

FOSAs
-
-
-

FOSEs
-
-

FOSAAs
- MeFOSAA
- EtFOSAA

FTSs
- 4:2FTS
- 6:2FTS
- 8:2FTS
-

FTCAs
-
-
-

PFTA and FTUAs
-
-
-

-
-

Replacements
- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain
- NFDHA
- PFEESA
- PFMPA
- PFMBA

Target Analytes (43 analytes)

PFCAs

- PFBA
- PFPeA
- PFHxA
- PFHpA
- PFOA
- PFNA
- PFDA
- PFUnA
- PFDoA
- PFTrDA
- PFTeDA
- PFHxDA
- PFODA

PFASs

- PFBS
- PFPeS
- PFHxS
- PFHpS
- PFOS
- PFNS
- PFDS
- PFDoS

FOSAs

- NMeFOSA
- NEtFOSA
- PFOSA

FOSEs

- NMeFOSE
- NEtFOSE

FOSAAs

- MeFOSAA
- EtFOSAA

FTSs

- 4:2FTS
- 6:2FTS
- 8:2FTS
- 10:2FTS

FTCAs

- 3:3FTCA
- 5:3FTCA
- 7:3FTCA

PFTA and FTUAs

-
-
-
-
-

Replacements

- HFPO-DA
- Adona
- 11Cl-PF3OUdS
- 9Cl-PF3ONS

Short Chain

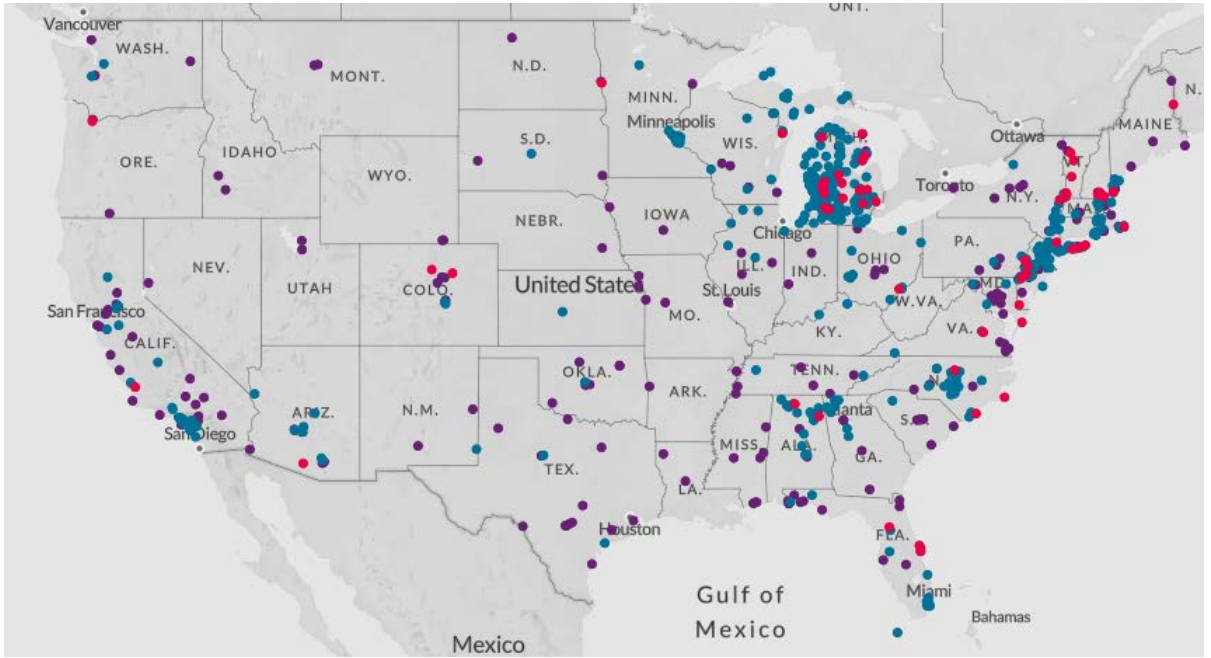
- NFDHA
- PFEESA
- PFMPA
- PFMBA

Accreditations

- Not all states offer accreditation or certification in PFAS
- Some states offer only drinking water
- Constantly changing
- Need to constantly follow up with states to verify offerings

State Level Criteria

- EPA health advisory limit of 70 PPT in drinking water for PFOS/PFOA
- States are setting action limits for PFAS independently of federal government
- States not all using the same analytes for health advisories or action limits



https://www.ewg.org/release/mapping-pfas-contamination-crisis-new-data-show-610-sites-43-states

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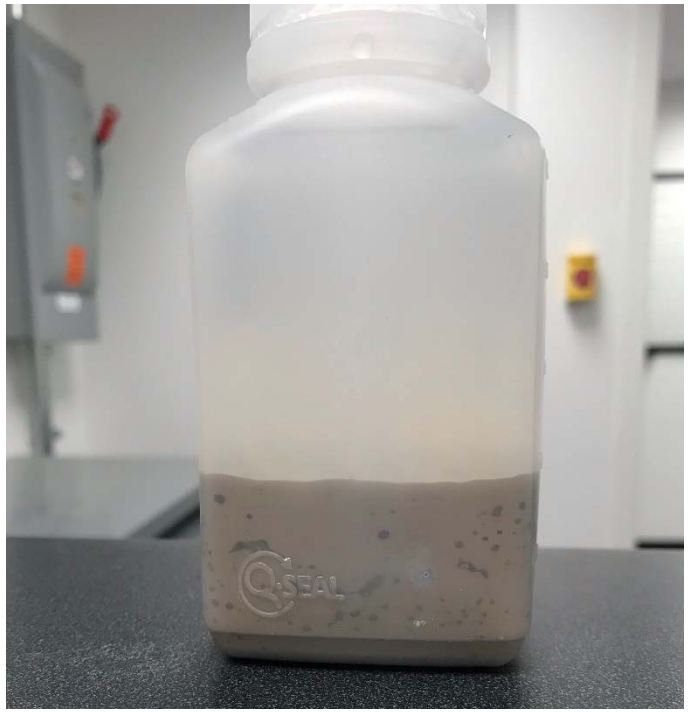
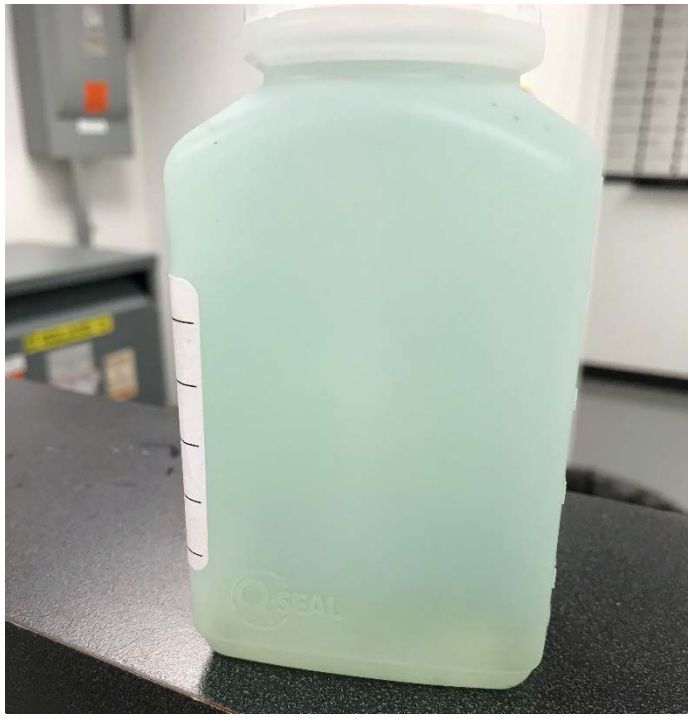
Laboratory Perspective

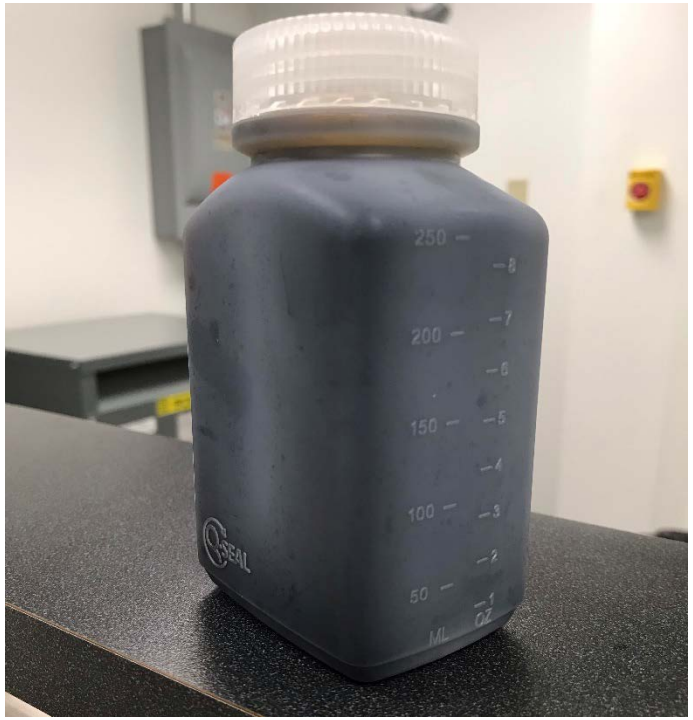
- Pre-certified HDPE and PP containers not available as certified “PFAS free”
- Sources of laboratory contamination
- Availability of PFAS free water
- Labeled standards
- Extraction process can be labor intensive
- Instrument redundancy

Laboratory Perspective

- Non-potable waters – not all waters are the same!







- Sediments, soils, and tissues – present other challenges

Laboratory Perspective

- High level of QC requirements on MQO, exceedances can lead to re-extraction
- LC/MS/MS vs GC/MS technology
  - External standard vs. internal standard vs. isotope dilution
  - compounds ionization influences by matrix

PFAS Analytical Landscape – What's on the Horizon?

PFAS Analytical Landscape – What's on the Horizon?

- EPA SW-846 (TBD)
  - Isotope dilution method
  - Collaboration with U.S. Department of Defense
  - Matrices include:
    - surface water, groundwater, wastewater, influent/effluent, landfill leachate
    - Fish tissues
    - Biosolids, soils, and sediments

PFAS Analytical Landscape – What's on the Horizon?

- Methods also in development for source (air) emissions (OTM-45)
- Ambient air
  - For ambient near-source
  - Semi-volatile PFAS
  - Volatile PFAS
- Total Organic Fluorine (TOF)
- Total Oxidizable Precursors (TOP)
- Non-targeted analysis

Conclusions

- Cross-contamination – pre-screening of non-potable waters can save you many headaches!
- Methodology and guidance has changed dramatically in the last several years and will continue to change
- Regulatory landscape changes quickly and continues to change
- Costs driven to lowest cost/sample for methods with highly specific QA requirements put labs in difficult position
- Can be difficult to add new analytes to select accreditations between site assessments, some changes require a new site assessment
- With new published methods, the landscape for accreditation will likely change, current laboratory accreditations will need to shift and/or modify accordingly!

Questions?

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