Environmental Management Division

PFAS Technical Advisory Group

December 13, 2019

PFAS Technical Advisory Group

Welcome and Agenda

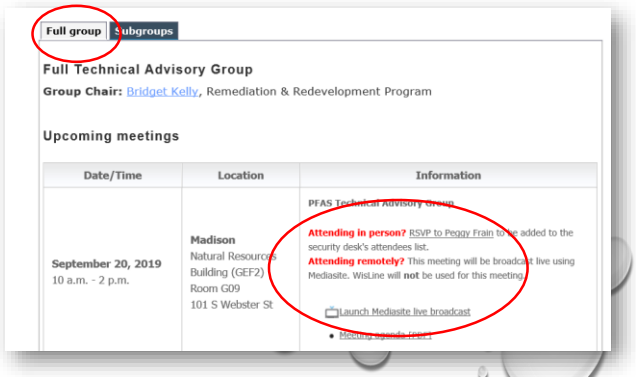
Bridget Kelly

Meeting Logistics

MEETING AVAILABLE FOR LIVE BROADCAST

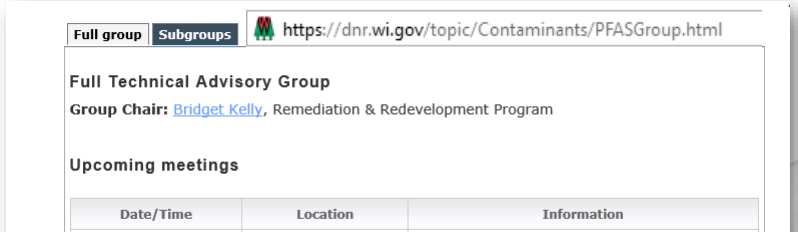
****Attendees Joining Remotely: Type questions in side-bar**

- **Meeting Website**:
  - DNR Home page: Search '*PFAS GROUP*'
  - click on *PFAS Technical Advisory Group*



PFAS TAG Information

- Quarterly ***'Full Group' Meetings*** – Environmental Management Division + Others From Agency
  - Remediation and Redevelopment
  - Drinking water and Groundwater
  - Water Quality
  - Waste and Materials Management
  - Air Management
  - Office of Great Waters
- ***Subgroup Meetings*** – in-between quarterly meetings – individual bureaus
- Subscribe for email updates: https://public.govdelivery.com/accounts/WIDNR/subscriber/new?topic_id=WIDNR_922



Purpose and Scope

- DNR will facilitate meetings that will focus on a variety of topics including the what, where, when, and how of PFAS assessment.

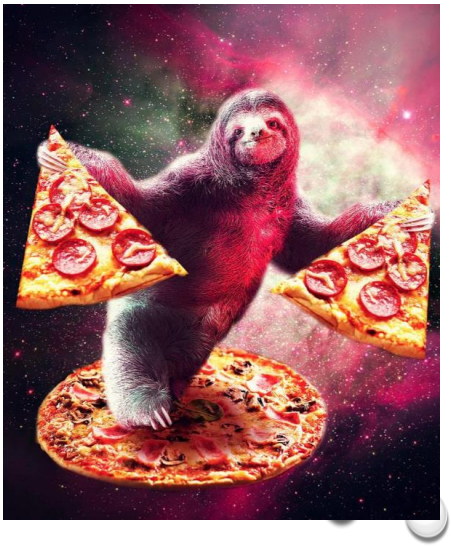
- Our goal is to:
  - Identify current and proposed practices for assessment and treatment
  - Strategize on issues requiring solutions
  - Share concerns
  - Communicate about PFAS Initiatives

Agenda

- Welcome and Agenda – *Bridget Kelly*
- State of PFAS in WI – *Bridget Kelly*
- PFAS Initiatives – *Jennifer Semrau + Jenna Soyer*
- Navigating Analytical and Sampling Options for PFAS – *Taryn McKnight*
- Lab Cert Updates – *Tom Trainor*
- *Lunch Break*
- EPA Action Plan – *Andrew Gillespie*
- Drinking Water and Groundwater – *Adam DeWeese*
- Water Quality Bureau – *Adrian Stocks*
- Closing Remarks

Meeting Logistics

Lunch Break 12:00 -12:35pm



PFAS Technical Advisory Group

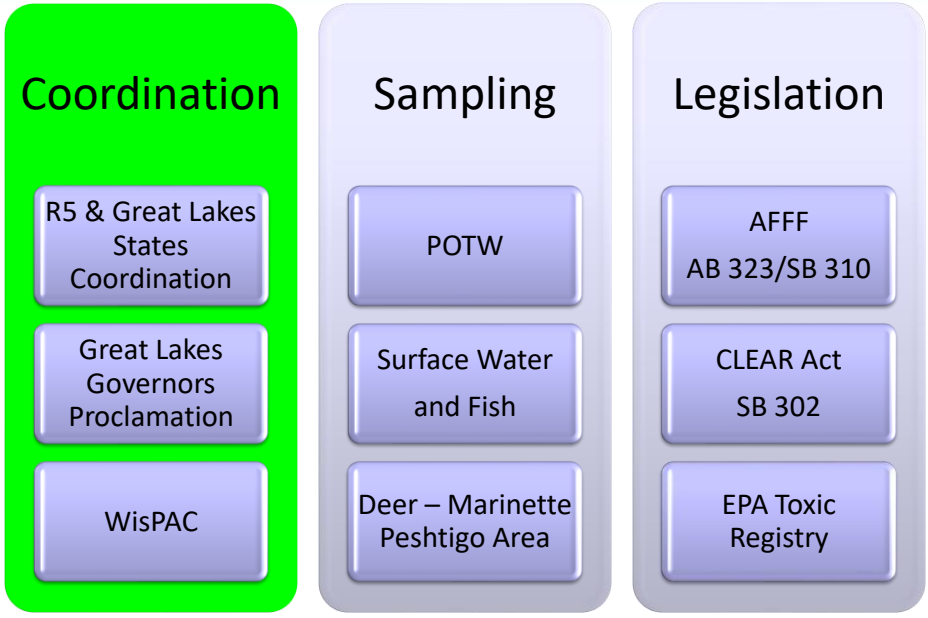
State of PFAS in WI

Bridget Kelly

Executive Order #40

- Directed PFAS Action in State
  i. Develop interagency coordinating council by DNR, DHS and DATCP, including other state agencies.
  ii. Develop a public information website for PFAS.
  iii. Expand monitoring of fish and wildlife.
  iv. Develop regulatory standards.
  v. Modify the Voluntary Party Liability Exemption (within the NR 700 rule series) to protect state tax payers.
  vi. Assess opportunities for using natural resources damage claims for PFAS.

The Year of Clean Drinking Water



PFAS Technical Advisory Group

State & Regional Coordination

Bridget Kelly

R5 + Great Lakes States PFAS Coordination

GREAT LAKES ST. LAWRENCE GOVERNORS & PREMIERS

Milwaukee, Wisconsin
June 14, 2019

Great Lakes St. Lawrence Governors & Premiers PFAS Strategy Coordination

WHEREAS, the Great Lakes and St. Lawrence are natural wonders of the world contributing significantly to the region's shared history, culture and economic vitality in addition to providing drinking water to over 105 million residents; and,

Great Lakes/Region 5

WI MI IL IN
OH MN ON QC
NY PA + EPA

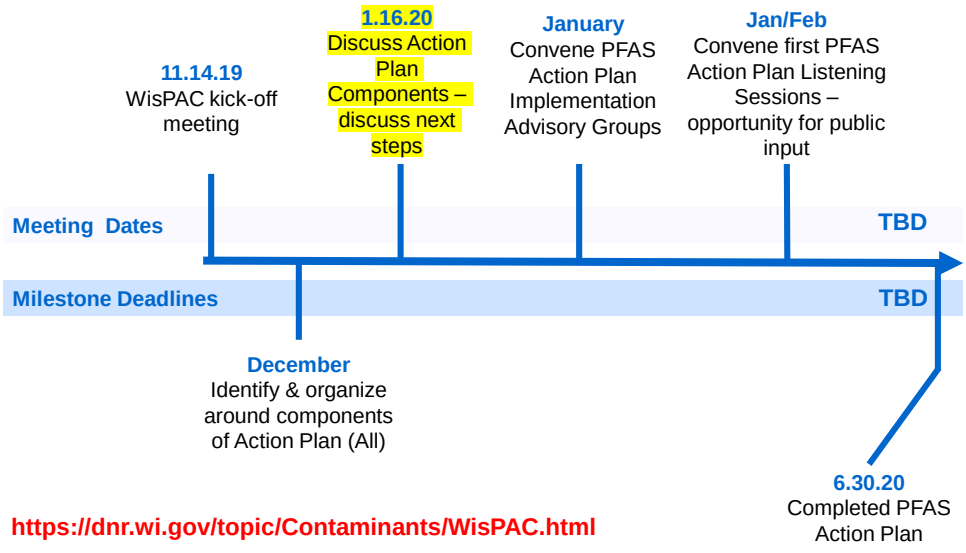
Ad hoc

WISCONSIN PFAS ACTION COUNCIL

WisPAC's Charge

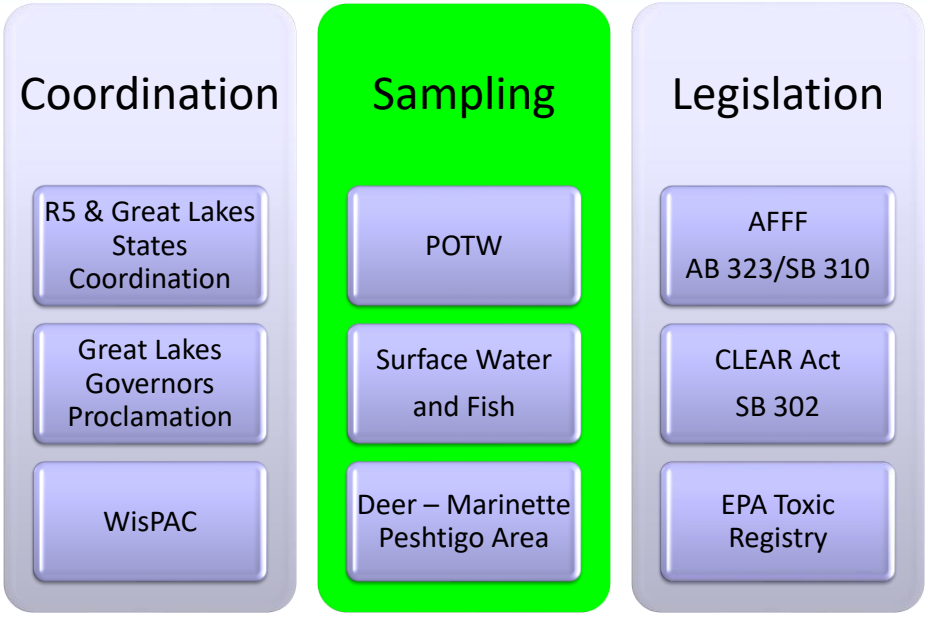
Create	Create a multi-agency PFAS action plan
Develop	Develop protocols to inform, educate and engage public
Identify	Identify likely sources & add to action plan
Find	Find best practices for PFAS sources & add to action plan
Develop	Develop standard, cost-effective and effective testing & treatment protocols with stakeholders
Engage	Engage academic institutions and other experts
Explore	Explore funding avenues to assist state & local governments, and private parties

WisPAC Action Plan - Big Picture



https://dnr.wi.gov/topic/Contaminants/WisPAC.html

The Year of Clean Drinking Water



PFAS Technical Advisory Group

DNR PFAS Sampling Initiatives

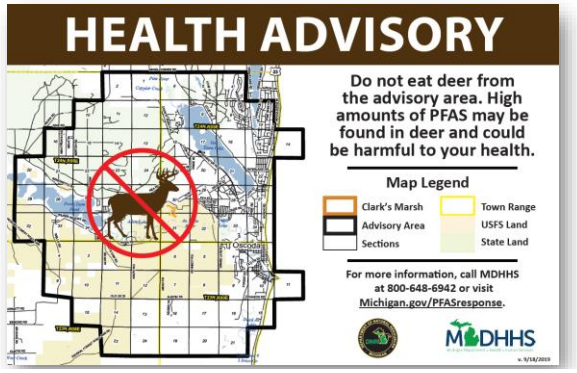
Bridget Kelly

Sampling

- Several sampling events in 2019
- POTWs
- Surface water
- Fish
- More to come

PFAS in Deer

- What do we know?
  - Michigan has reported results on nearly 150 deer
  - Many from sites contaminated with PFAS
  - Only 1 deer had PFAS levels that warranted an advisory



PFAS in Deer

- The DNR is working with partners to sample approximately 20 in/around the JCI complex
- Samples will be collected in winter of 2020
- Work with DHS to interpret results and evaluate need for any advisory

PFAS Initiatives – Deer

Environmental Toxicologist

Sean Strom
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The Year of Clean Drinking Water

Coordination	Sampling	Legislation
R5 & Great Lakes States Coordination	POTW	AFFF AB 323/SB 310
Great Lakes Governors Proclamation	Surface Water and Fish	CLEAR Act SB 302
WisPAC	Deer – Marinette Peshtigo Area	EPA Toxic Registry

PFAS Technical Advisory Group

Legislative Update

Bridget Kelly

Update on WI PFAS Legislation

- AB 323/SB 310 – AFFF
  - Prohibit use of Class B fire fighting foam
  - Exemptions for Intentionally added PFAS
    - Emergency fire fighting
    - Testing, if appropriate containment
- Update
  - Introduced on July 3, 2019
  - Latest amendment offered on 12/12/19 by Senator Cowles to correct “release” to “discharge”

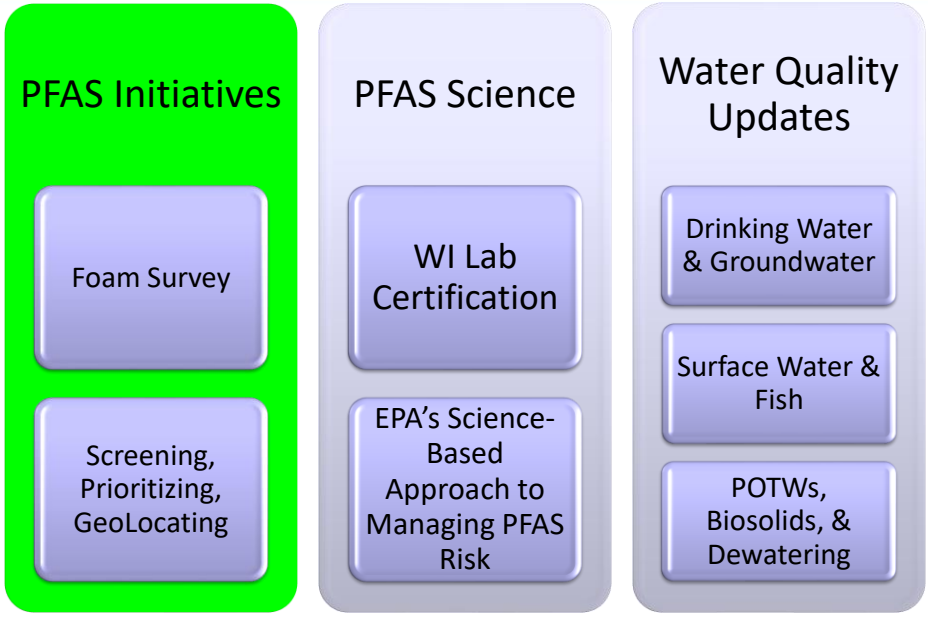
Update on WI PFAS Legislation

- AB 321 /SB 302– Clear Act
  - Would allow DNR to establish, by rule, the following:
    - acceptable levels and standards;
    - monitoring requirements;
    - required response actions for any PFAS DETECTIONS;
    - applies to all media
  - Provides DNR and DHS with staff and funding support to carry out these initiatives.
- Update
  - Introduced June 21, 2019
  - DNR provided fiscal estimate to LRB in August

EPA Toxic Release Inventory

- EPA proposing to add PFAS to Toxic Release Inventory (TRI)
- Advanced rule making notice (public comment period) now open through February 3, 2020
- Requesting comment on which PFAS should be evaluated for listing, how to list them, and what would be appropriate reporting thresholds given their persistence and bioaccumulation potential
- https://www.epa.gov/toxics-release-inventory-tri-program/advance-notice-proposed-rulemaking-adding-certain-pfas-tri

The Year of Clean Drinking Water



PFAS Technical Advisory Group

Firefighting Foam Survey Group

Jennifer Semrau

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

- Purpose
  - Determine where PFAS containing foams have been used, stored, trained with – State Survey
  - Develop protocols to help in reducing use of PFAS-containing foams – BMPs + Fire Responder Health and Safety
  - Assess feasibility of a potential statewide collection and disposal effort for PFAS-containing foams
- Resources
  - Allocated $50,000 in FY20 from Env Management Acct

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

- Inter-agency Subgroup
  - Meeting ~weekly since late August
  - Includes WA, RR, DG, Forestry & DOT Aeronautics
- Firefighting Foam Survey
  - Similar efforts conducted in MI, MN, NY, ME, VT & NH
  - Team reached out to other states for survey instruments and 'lessons learned'
  - Present focus: firefighter survey
  - Utilizing UW-Survey Center

UWSC
UNIVERSITY of WISCONSIN
SURVEY CENTER

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

- Firefighter Survey
  - Drafted survey instrument
  - Solicited review from external stakeholders including: WI Fire Chiefs Assoc, WI State Firefighters Assoc, WI Dept of Safety & Professional Services, WI Technical College System Fire Training Center & others
  - Electronic and paper survey
  - Will be mailed/emailed to ~825 fire departments (FDs)

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

- Anticipated Firefighter Survey Timeline
  - Dec: Electronic survey programming
  - Mid Jan: Advance notice letter sent to FDs
  - Late Jan-Mid Feb: Email notification/reminders to FDs
  - Late Feb: Paper survey sent to non-respondents
  - Late Mar: UW-Survey compiles results
  - Early Apr: Results delivered to DNR
  - Apr: DNR begins survey follow-up

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

- Airport Survey
  - Working with DOT Aeronautics
  - 9 commercial airports
  - Local FDs service airports/landing strips

Photo credit: ATSDR

- Future Next Steps
  - Develop BMPs in multiple formats (factsheet, poster, etc.)
  - Compile fluorinated foam inventory for possible Clean Sweep; develop Clean Sweep white paper

Department PFAS Initiatives

Firefighting Foam Survey; BMPs; Possible Clean Sweep

Committee Co-Chairs:

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Barry Ashenfelter

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PFAS Technical Advisory Group

Screening, Prioritization and GIS (SPGeo) Group

Jenna Soyer

Department PFAS Initiatives

Screening, Prioritization and GIS (SPGeo) Group

- Purpose
  - Coordinate collection of PFAS sampling data and tools for analysis
  - Develop external GIS viewer for display of data and site information
  - Develop protocols to help screen and prioritize sites for sampling
- Resources
  - Allocated $150,000 in FY20 from Env Management Acct

Department PFAS Initiatives

Screening, Prioritization and GIS (SPGeo) Group

- PFAS Data & GIS Viewer
  - Hired GIS contractor to:
    - inventory influx of PFAS data,
    - develop and maintain PFAS database,
    - develop and maintain GIS viewer of PFAS sampling locations/sites
  - Update
    - Meeting with the various programs to inventory data
    - Beginning backend production of database

Department PFAS Initiatives

Screening, Prioritization and GIS (SPGeo) Group

- PFAS Site Screening & Prioritization
  - Hired selected through RFP process to:
    - Develop comprehensive list and GIS layer of potential sites in Wisconsin that currently or may have historically used PFAS substances within a one mile radius of a pilot list of municipal wells
    - Develop a framework that extends the pilot to the entire state; includes an implementation strategy and template CSMs for most common industries
  - Update
    - Meeting with the various programs to inventory data
    - Beginning backend production of database

Department PFAS Initiatives

Screening, Prioritization and GIS (SPGeo) Group

- PFAS Site Screening & Prioritization
  - Update
    - Completed initial screening of industries
    - Working on identifying smaller subset of wells to complete QA of industry data before expanding to full list
    - GIS layer and Expanded Framework to be complete in second half of FY20

Department PFAS Initiatives

Screening, Prioritization and GIS (SPGeo) Group

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WISCONSIN DNR Department of Natural Resources

The Year of Clean Drinking Water

PFAS Initiatives	PFAS Science	Water Quality Updates
Foam Survey	WI Lab Certification	Drinking Water & Groundwater
Screening, Prioritizing, GeoLocating	EPA's Science-Based Approach to Managing PFAS Risk	Surface Water & Fish
		POTWs, Biosolids, & Dewatering

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Navigating Analytical and Sampling Options for PFAS

Taryn McKnight – Product Manager

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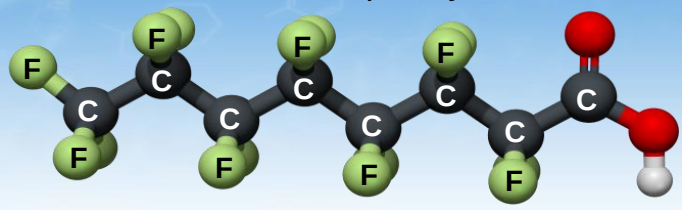
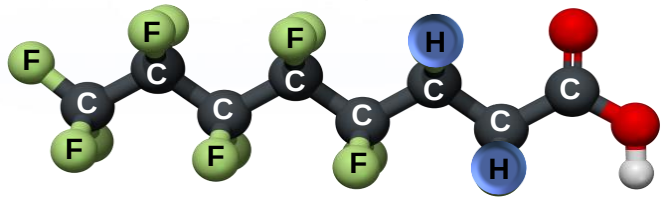
Per and Poly?

Perfluorinated = Completely Fluorinated



Polyfluorinated = Incompletely Fluorinated



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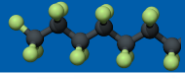
Chemical Structure

Chain Length	• ≥8 carbon atom PFCAs • ≥6 carbon atom PFSAs
Carbon backbone 	• Inert, Persistent & Bioaccumulative
Functional Group 	• Our ability to capitalize on the desirable qualities

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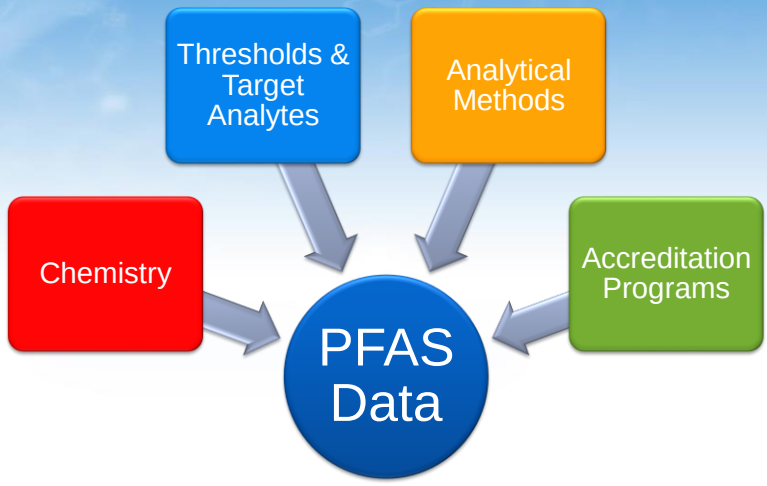
Elements Impacting PFAS Data Acquisition



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Surfactant Properties

Fluorocarbon "Tail" = Hydrophobic, Oleophobic

Functional Group "Head" = Hydrophilic

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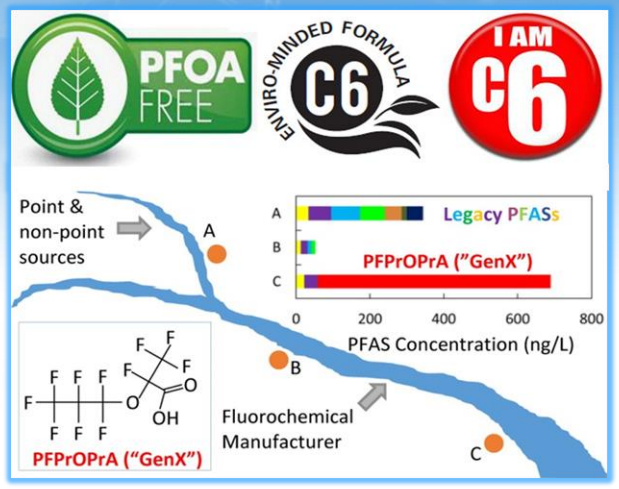
Replacement Chemicals



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Replacement Chemicals

	Legacy Manufacturers		
Original Chemical	PFOA	PFOS	PFOS
Replacement Chemical	HFPO-DA "GenX"	DONA	F-53B

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Analyte Description
Perfluorobutanoic acid (PFBA)
Perfluoropentanoic acid (PFPeA)
Perfluorohexanoic acid (PFHxA)
Perfluoroheptanoic acid (PFHpA)
Perfluorooctanoic acid (PFOA)
Perfluorononanoic acid (PFNA)
Perfluorodecanoic acid (PFDA)
Perfluoroundecanoic acid (PFUnA)
Perfluorododecanoic acid (PFDoA)
Perfluorotridecanoic Acid (PFTriA)
Perfluorotetradecanoic acid (PFTeA)
Perfluorobutanesulfonic acid (PFBS)
Perfluorohexanesulfonic acid (PFHxS)
Perfluoroheptanesulfonic Acid (PFHpS)
Perfluorooctanesulfonic acid (PFOS)
Perfluorodecanesulfonic acid (PFDS)
Perfluorooctane Sulfonamide (FOSA)
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)
Perfluoro-1-pentanesulfonate (PFPeS)
Perfluoro-1-nonanesulfonate (PFNS)
6:2FTS
8:2FTS
4:2FTS
DONA
HFPO-DA (GenX)
F-53B Major
F-53B Minor

NPW & Solids

EPA Draft Target Analyte List

Replacement Chemicals

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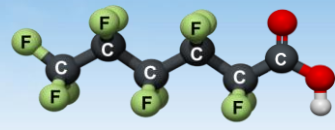
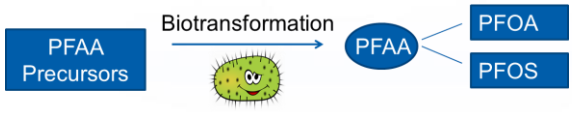
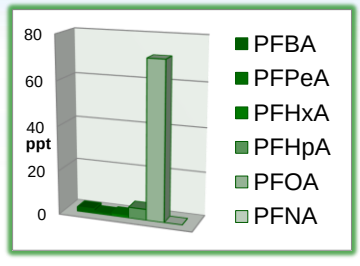
Total Oxidizable Precursor (TOP) Assay

Precursors = Incompletely Fluorinated

Terminal = Completely Fluorinated







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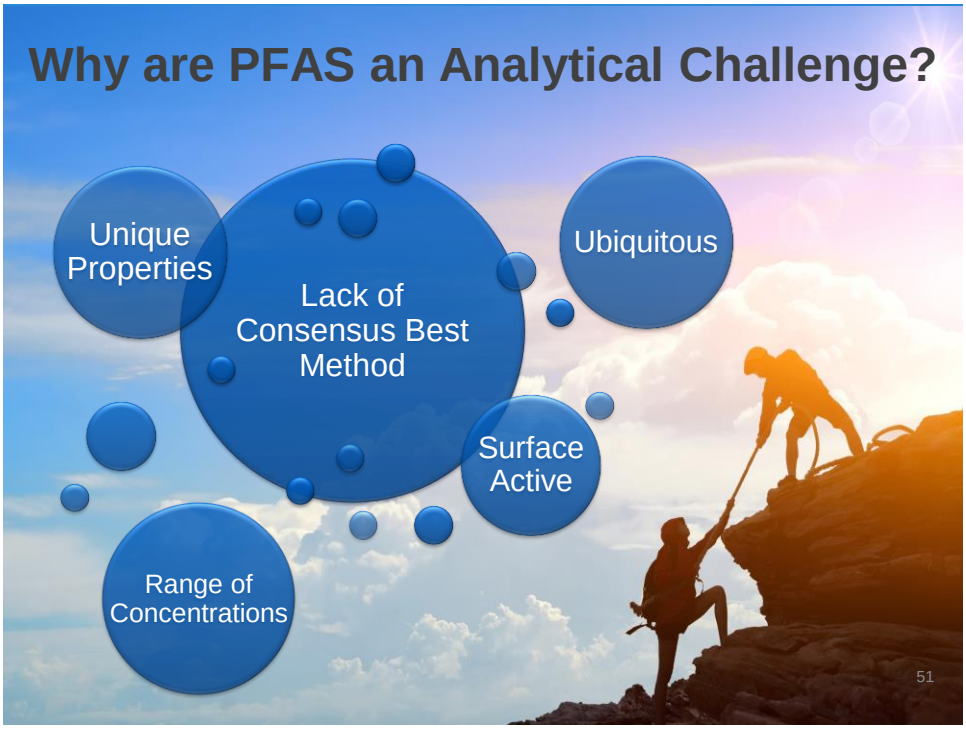
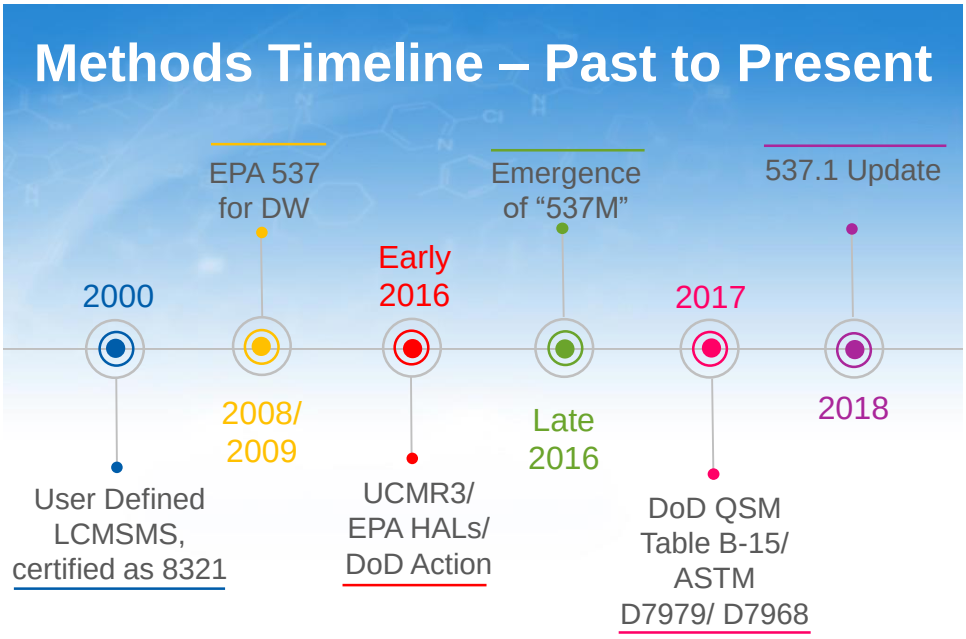
Why are PFAS an Analytical Challenge?



Methods Timeline – Past to Present



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EPA Method 537.1
"A Drinking Water Method Only"

Method 537.1
Drinking Water
14 + 4 replacement chemicals
250 mls
Solid Phase Extraction (SPE)
LCMSMS
Internal standard quantitation
2 ppt - 40 ppt reporting limit range

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Groundwater, Soil, Tissue?

What method do we use for non-potable water & solid matrices?

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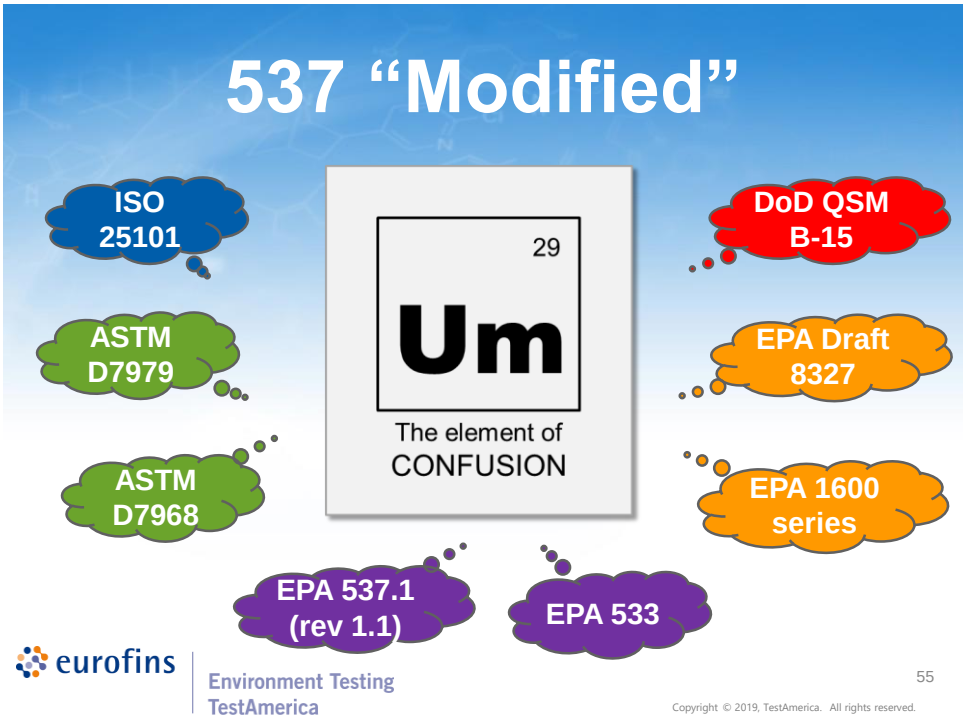
537 "Modified"
ISO 25101
ASTM D7979
ASTM D7968
29
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The element of CONFUSION
DoD QSM B-15
EPA Draft 8327
EPA 1600 series
EPA 537.1 (rev 1.1)
EPA 533
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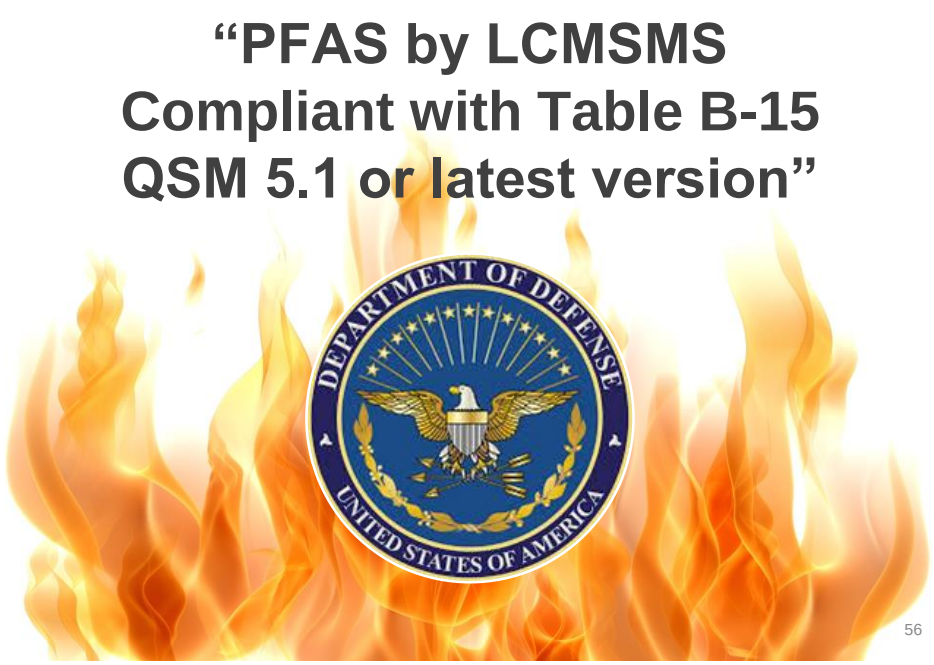
"PFAS by LCMSMS
Compliant with Table B-15
QSM 5.1 or latest version"
DEPARTMENT OF DEFENSE
UNITED STATES OF AMERICA
56

Available vs. Future

7979	• Non-potable water • No SPE, Direct Inject, External Standard
8327	• Non-potable water • No SPE, Direct Inject, External Standard
537M	• All Matrices • SPE, Isotope Dilution, Comparable to DoD
1600s	• All Matrices other than DW • SPE, Isotope Dilution, Comparable to DoD
537.1	• Drinking Water Only • SPE, Internal Standard
533	• Drinking Water, possibly non-potable • SPE, Isotope Dilution and/or Internal Standard, TBD

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Future EPA Methods

EPA DRAFT 8327	EPA 1600…	EPA 533
Direct Injection	SPE	SPE
External Standard	Isotope Dilution	*Internal Standard or Isotope Dilution
Non-potable Water	Non-potable Water & Solids	*Potable & Non-potable Water

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Potentially, method is still under development

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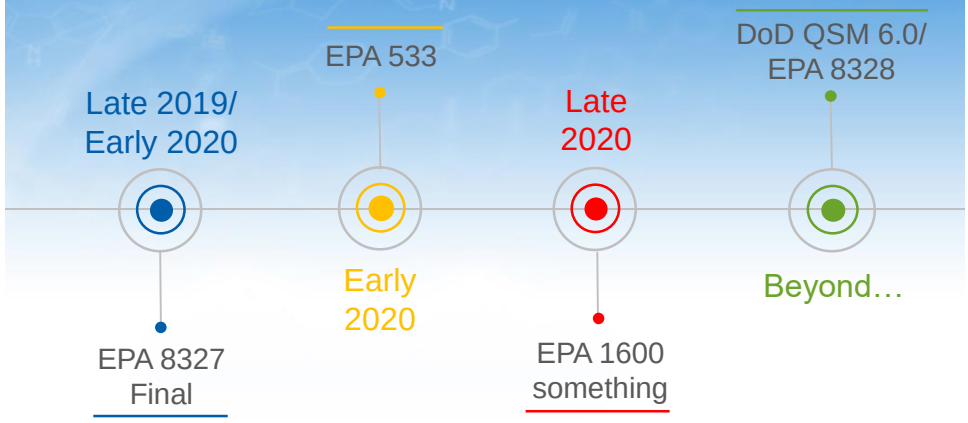
Methods Timeline – Possible Future



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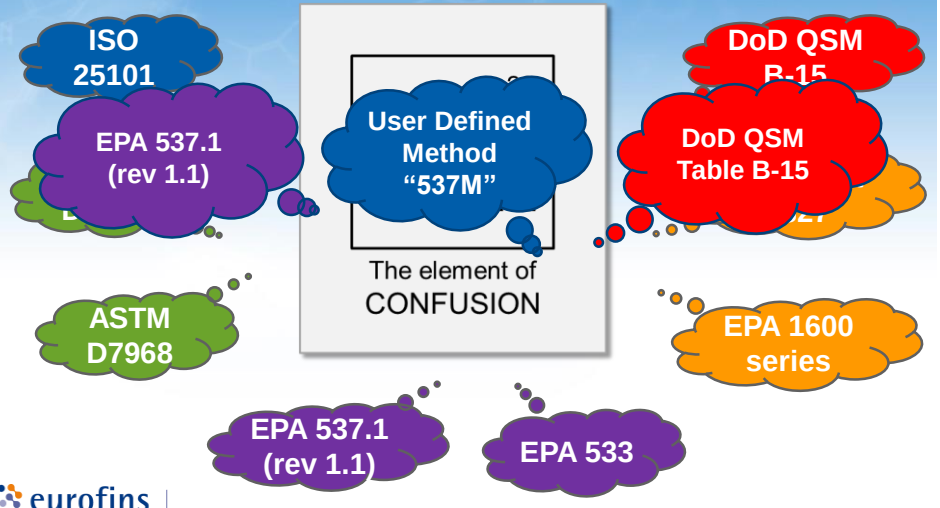
537 "Modified"



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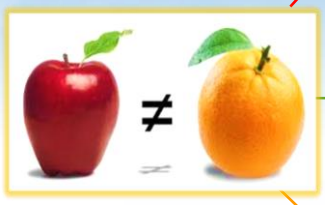
Key Elements in Reducing Variability

Preparation
- Cleanups
- Rigorous Extraction
- Use of IDAs prior to prep



Quantitation
- Isotope Dilution
- Branched and Linear
- Secondary Ion Transitions

Experience
- Years of LCMSMS experience
- Redundancy and control measures applied
- Complex matrix approach

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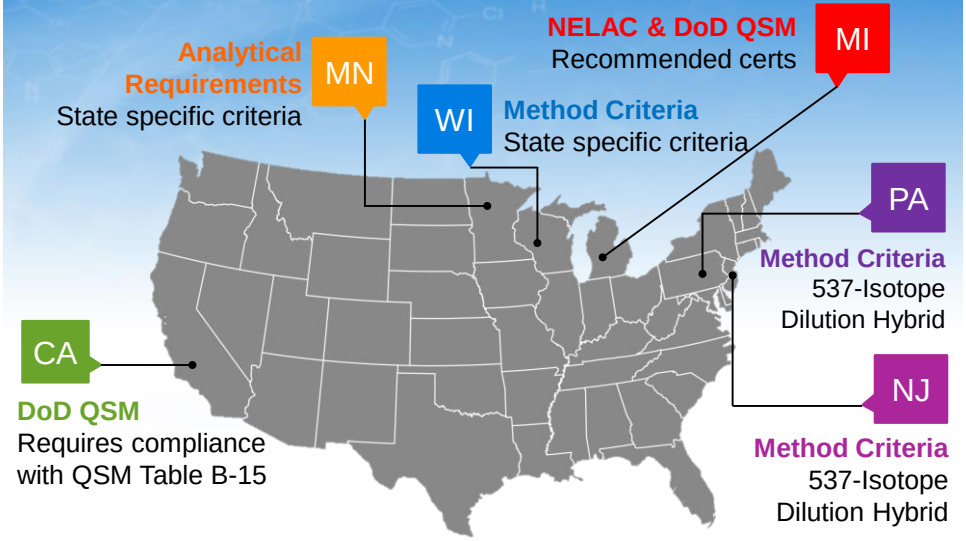
What Have the States Done?



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Wisconsin DNR – Lab Program

THE PROBLEM

- No EPA referenced method to accredit to for non-potable water

THE GOAL

- Set standards to ensure high quality data are generated and the data are comparable

THE SOLUTION

- Establish performance based criteria, much like the Department of Defense has done

Method Criteria Details

Title	Public Comment	Key Components
Wisconsin PFAS Aqueous (Non-Potable Water) and Non-Aqueous Matrices Method Criteria	Sept 16th – Oct 7th	Comparable to DoD & Legacy Isotope Dilution Methods Includes SPE, Isotope Dilution, Cleanups, Confirmation Ions

WDNR Target Analyte List

13 Carboxylic Acids
PFBA
PFPeA
PFHxA
PFHpA
PFOA
PFNA
PFDA
PFUnA
PFDoA
PFTriA
PFTeA
PFHxDA
PFODA

12 Sulfonic Acids
PFBS
PFPeS
PFHxS
PFHpS
PFOS
PFNS
PFDS
4:2 FTS
6:2 FTS
8:2 FTS
10:2 FTS
PFDoS

4 Replacement Chemicals
HFPO-DA
DONA
9Cl-PF3ONS
11CL-PF3OUdS

3 Sulfonamides
FOSA
NMeFOSA
NEtFOSA

2 Sulfomidoacetic acids
NMeFOSAA
NEtFOSAA

2 Sulfonamidoethanols
NMeFOSE
NEtFOSE

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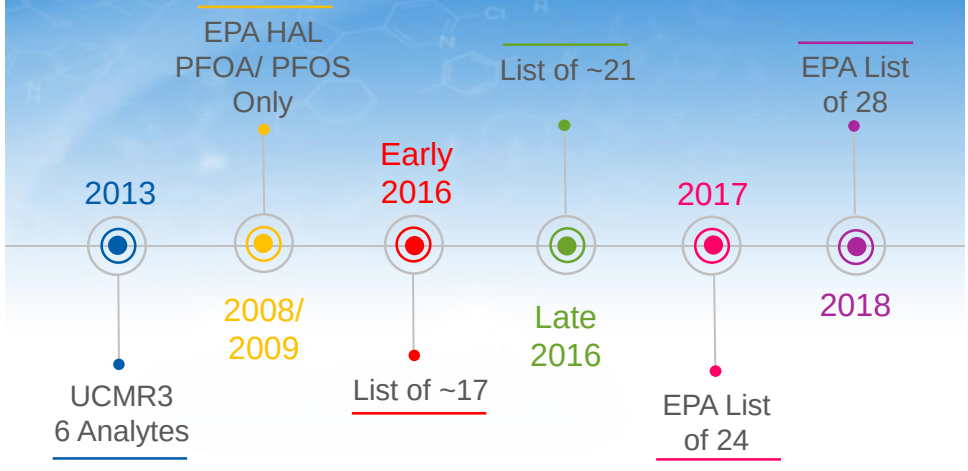
Evolution of Target Analyte Lists



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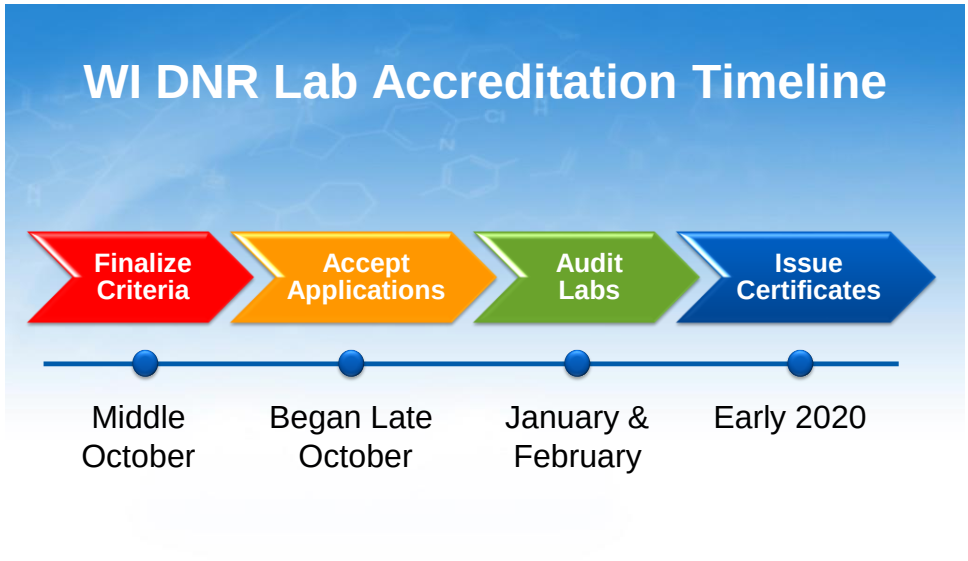


eurofins | Environment Testing TestAmerica

WISCONSIN DNR Department of Natural Resources

PFAS Technical Advisory Group

Wisconsin PFAS Certification

Tom Trainor

WISCONSIN DEPT. OF NATURAL RESOURCES

WI Lab PFAS Certification

- Potable water certification

  EPA 537.1

- Non-potable water and solid matrices

  Lab method plus WI PFAS Guidance Document

WI Lab PFAS Certification

- Accepting PFAS applications 10.29.19
- Final WI PFAS Guidance Document 12.16.19
- https://dnr.wi.gov/news/input/GuidanceFinal.html
- Section “Environmental Analysis”
- Document EA-19-0001

WI Lab PFAS Certification

6 PFAS APPLICATIONS RECEIVED SO FAR

- Eurofins Eaton Analytical - South Bend, In [DW]
- Pace Analytical Services – Ormond Beach, FL [DW]

- Eurofins TestAmerica - West Sacramento, CA [ALL]
- GEL - Charleston, SC [ALL]
- Wisconsin State Lab of Hygiene [ALL]
- Vista Analytical [ALL]

WI Lab PFAS Certification

10 MORE PFAS APPLICATIONS EXPECTED

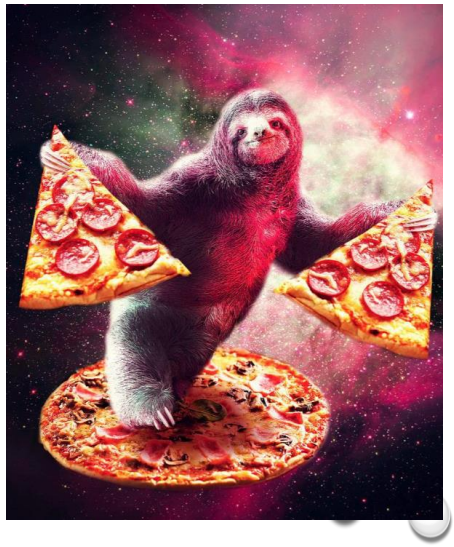
- Advanced Technology Laboratories – Signal Hill, CA
- ALS – Holland, MI
- Ann Arbor Technical Services – Ann Arbor, MI
- Bureau Veritas Laboratories – Ontario, Canada
- Eurofins Lancaster Laboratories - Lancaster, PA
- Northern Lakes Services - Crandon, WI
- Pace Analytical Services – Green Bay, WI
- Pace Analytical Services – Madison, WI
- Pace Analytical Services – Minneapolis, WI
- SGS – Orlando, FL

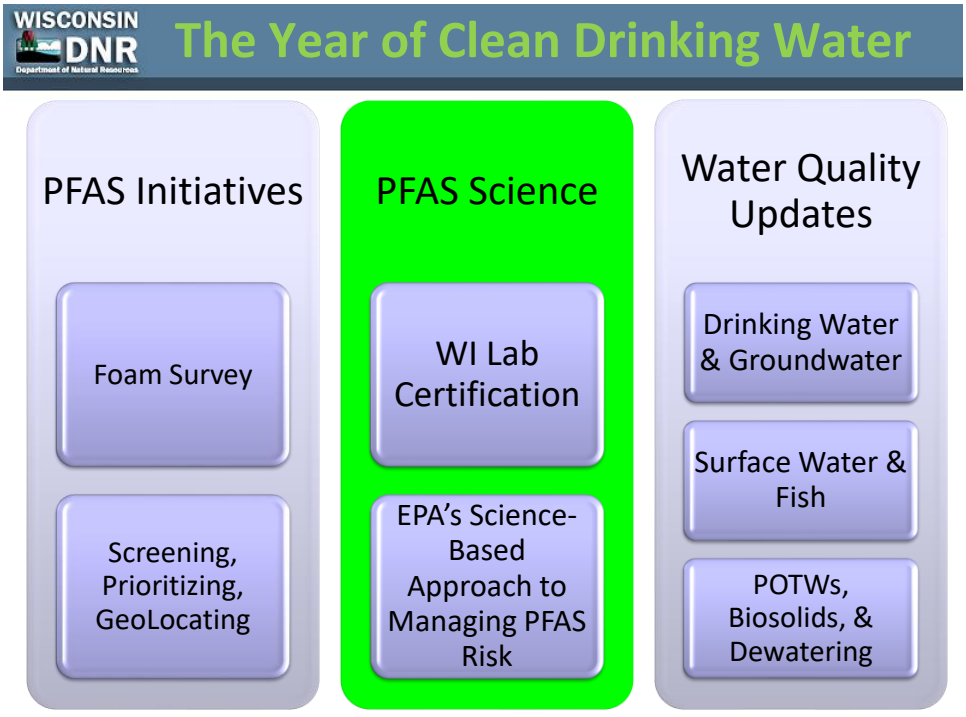
WI Lab PFAS Certification

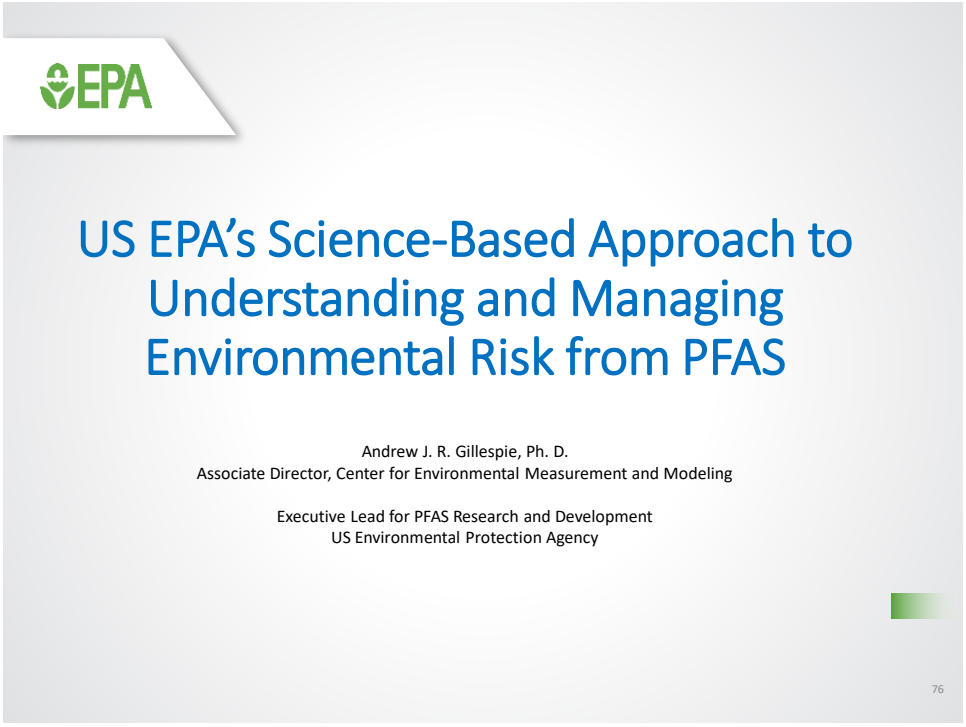
- WI PFAS certified labs - Lab Cert Website
- https://dnr.wi.gov/regulations/labcert/

Questions?

Lunch Break 12:00 -12:35pm




WISCONSIN DNR
Department of Natural Resources
The Year of Clean Drinking Water
PFAS Initiatives
Foam Survey
Screening, Prioritizing, GeoLocating
PFAS Science
WI Lab Certification
EPA's Science-Based Approach to Managing PFAS Risk
Water Quality Updates
Drinking Water & Groundwater
Surface Water & Fish
POTWs, Biosolids, & Dewatering


EPA
US EPA's Science-Based Approach to Understanding and Managing Environmental Risk from PFAS
Andrew J. R. Gillespie, Ph. D.
Associate Director, Center for Environmental Measurement and Modeling
Executive Lead for PFAS Research and Development
US Environmental Protection Agency
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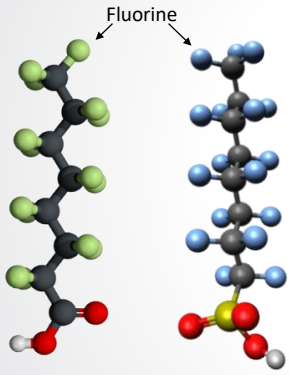
Per- & Polyfluoroalkyl Substances (PFAS)



- **A class of man-made chemicals**
  - **Chains** of carbon (C) atoms surrounded by fluorine (F) atoms, with different terminal ends
  - **Complicated chemistry** – thousands of different variations exist in commerce
  - **Widely used** in industrial processes and in consumer products
  - **Some** PFAS are known to be **PBT**:
    - **Persistent** in the environment
    - **Bioaccumulative** in organisms
    - **Toxic** at relatively low (ppt) levels

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Recent EPA Actions on PFAS

- National PFAS Leadership Summit - May 2018
  - Share information, identify actions, risk communication
- Near Term EPA Actions Announced at Summit
  - Develop groundwater cleanup recommendations for PFOA/PFOS (OLEM)
  - Examine options for listing PFOA/PFOS as Hazardous Substances (OLEM)
  - Release draft toxicity assessments for GenX and PFBS by fall 2018 (OW & ORD)
- Community Events June-Sept 2018
  - Series of 6 public meetings on PFAS concerns
- EPA PFAS Action Plan - February 14 2019
  - Building on lessons learned from Summit, Engagements, Docket

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EPA PFAS Action Plan

- **Drinking Water** – The EPA is committed to following the MCL rulemaking process as established by SDWA. EPA will propose a regulatory determination for PFOA and PFOS by the end of this year, and propose nationwide drinking water monitoring for PFAS under the next UCMR monitoring cycle.
- **Cleanup** – Initiating the regulatory process for designating PFOA and PFOS as Hazardous Substances, set interim groundwater cleanup recommendation
- **Toxics** – Consider including PFAS in Toxics Release Inventory (TRI), initiate proposal to prohibit the uses of certain PFAS chemicals through the TSCA new chemicals program
- **Research** – Rapidly expand scientific foundation for understanding and managing PFAS risk
- **Enforcement** – Use enforcement tools, where appropriate, to address PFAS exposures in the environment and assist states in enforcement activities
- **Risk Communications** – Work with partners to develop a risk communication toolbox to support federal, state, tribal, and local partners for communicating with their constituents

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PFAS Action Plan - Research

- The EPA is rapidly expanding the scientific foundation for understanding and managing risk from PFAS.
- This research is organized around:
  - understanding **toxicity**
  - understanding **exposure**
  - assessing **risk**
  - identifying effective **treatment and remediation** actions

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Recent Advances to Support States

- Published updated Method 537.1 for 18 PFAS in Drinking Water
- Posted draft SW-846 Method 8327 for 24 PFAS in non potable water
- Published High Resolution Mass Spec methods to discover unknown PFAS
- Established PFAS library of 430 reference samples to enable consistent analysis
- Updated ECOTOX knowledgebase: 437 references, 96 PFAS, 264 species, 889 effect meas.
- Draft toxicity assessments for GenX, PFBS posted for public comment
- Updated Drinking Water Treatability Database to include data on 22 PFAS
- Tested POE water filters for PFAS removal
- Technical Assistance analytical reports provided to NH, NJ, NC

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Research – Human Health

- **Problem**: Lack of human toxicity information for many PFAS of interest
- **Action**: 2-prong strategy
  - Develop standard toxicity assessments (e.g. IRIS) where data are available
  - Use in vitro, high throughput screening approaches to fill in gaps, support prioritization for further tox testing, chemical grouping, read across, relative toxicity and mixtures assessment
- **Near Term Research Products:**
  - Post final toxicity assessments for PFBS, HFPO-DA (2020)
  - Post public review draft IRIS assessments for PFDA, PFBA, PFHxA PFNA, and PFHxS (2020)
  - Post bioactivity analysis of (~150 different PFAS) x (7 sets of assays) (2020)
- **Impact**: Stakeholders will have PFAS toxicity information to inform risk management decisions and risk communication

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Research – Ecological Toxicity

- **Problem**: Lack of ecological toxicity information for PFAS of concern
- **Action**:
  - Systematic review of literature, assembled in the ECOTOX database
  - Developing research plan including identification of sensitive taxa, bioaccumulation, benchmarks, and thresholds
  - Use Adverse Outcome Pathways (AOP) as organizational framework
- **Near Term Research Products:**
  - Research getting underway in 2020
- **Impact**: Stakeholders will have PFAS ecotoxicity information to support risk management decisions (e.g. aquatic life criteria)

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Research – Analytical Methods

- **Problem**: Lack of standardized/validated analytical methods for measuring PFAS
- **Action**: Develop and validate analytical methods for detecting, quantifying PFAS in water, air, and solids
- **Near Term Research Products:**
  - Developing new **DW** Method 533 for ~26 PFAS including shorter chains (2020)
  - Validating Isotope Dilution methods for 24 PFAS in **surface water, ground water, soils, sediments, and biosolids** (2020)
  - Developing methods for **air emission** sampling and analysis (2021)
  - Developing methods for Total Organic Fluorine (TOF) (2020)
- **Impact**: Stakeholders will have reliable analytical methods to test for known and discover new PFAS in water, solids, and air

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Research – Exposure

- **Problem**: Lack of knowledge on sources, site-specific concentrations, fate and transport, bioaccumulation, and human and ecological exposure
- **Action**: Develop and test methods, models, and databases to characterize PFAS sources and exposures
- **Near Term Research Products:**
  - Developing **exposure models** for identifying, quantifying PFAS sources, fate and transport pathways, and exposures (2022)
  - Developing and evaluating **sampling and site characterization approaches** to identify sources and extent of contamination, develop remediation plan (2022)
- **Impact**: Stakeholders will be able to identify and assess potential PFAS sources and exposures, and identify key pathways for risk management

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Research – Drinking Water Treatment

- **Problem**: Lack of water treatment technology performance and cost data for PFAS removal
- **Action**:
  - Review PFAS performance, cost data from different configurations and range of system sizes (collaborative with utilities, industry, DoD, academia, international)
  - Test commercially available granular activated carbons (GACs) and ion exchange (IX) resins for effectiveness over a range of PFAS under different water quality conditions
  - Evaluate technologies for GAC and IX regeneration or disposal
- **Near Term Research Products:**
  - Updates to DW Treatability Database (ongoing)
  - Publish updated treatment performance, cost models and data (2020)
  - Reports on reactivation/thermal treatment of spent GAC and IX (2021)
- **Impact**: Utilities will be able to identify cost effective treatment strategies for removing PFAS from drinking water

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Research – Contaminated Site Remediation

- **Problem**: PFAS-contaminated sites require remediation and clean up to protect human health and the environment
- **Action**:
  - Characterize PFAS sources such as fire training/emergency response sites, manufacturing facilities, production facilities, disposal sites
  - Evaluate technologies for remediating PFAS-impacted soils, waters, and sediments
  - Generate performance and cost data with collaborators to develop models and provide tools to determine optimal treatment choices
- **Near Term Research Products:**
  - Publish groundwater remediation performance, cost models and data (2020)
  - Report on thermal treatment of contaminated soils (2020)
  - Report on land application of PFAS-contaminated biosolids (2021)
- **Impact**: Responsible officials will know how to reduce risk of PFAS exposure and effects at contaminated sites, and to repurpose sites for beneficial use

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Research – PFAS Disposal

- **Problem**: Lack of knowledge regarding end-of-life management and disposal of PFAS-containing materials
- **Action:**
  - Characterize end-of-life PFAS disposal streams (e.g. municipal, industrial, manufacturing, recycled waste streams)
  - Evaluate efficacy of disposal technologies (e.g. landfilling, incineration, composting, stabilization) to manage end-of-life disposal
  - Evaluate performance and cost data with collaborators to manage these materials and avoid environmental PFAS re-releases following disposal
- **Near Term Research Products:**
  - Publication on PFAS presence in different types of landfills and leachates in FL (2019)
  - Synthesis of state-of-science on thermal treatment of PFAS (2020)
  - Model for predicting PFAS behavior in incineration environments (2020)
  - Reports on thermal treatment, e-beam treatment of wastewater and biosolids (2021)
- **Impact**: Responsible officials will be able to manage effectively end-of-life disposal of PFAS-containing materials

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Technical Assistance

- **Problem**: State, tribes and communities often lack some capabilities for managing PFAS risk
- **Action:**
  - Make EPA technical staff available to consult on PFAS issues
  - Utilize applied research while also providing technical support to site managers
  - Summarize and share lessons learned from technical support activities
- **Examples of Projects and Impacts:**
  - **NC** – Enabled State action to reduce novel PFAS in source and finished water
  - **NH, NJ** – Informed State of previously unknown PFAS impacting air and water
  - **MI** – Characterizing PFAS emissions from a chrome plating facility
  - **AK** – Testing emissions from permitted soil thermal treatment operation
- **Impact**: Enable states, tribes and communities to 'take action on PFAS'

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Collaboration

PFAS is a topic of interest to many different organizations, and EPA is committed to leveraging partnerships and collaborations to achieve results. Some examples:

- Collaborating with the **National Toxicology Program** (NTP) on high throughput toxicology testing
- Collaborating with **DOD** on analytical method development, treatment/remediation approaches, and participation in the Strategic Environmental Research and Development Program (SERDP)
- Collaborating with **states and public utilities** in testing and applying PFAS measurement and treatment methods
- Collaborating with the **academic community** via EPA's Science to Achieve Results (STAR) competitive grant program

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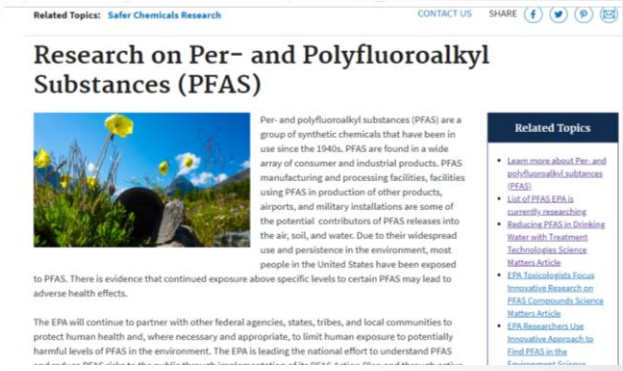
EPA PFAS Data and Tools

- Links to data and tools that include information related to PFAS and are available on EPA's website:


Related Topics: Safer Chemicals Research CONTACT US SHARE

Research on Per- and Polyfluoroalkyl Substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals that have been in use since the 1940s. PFAS are found in a wide array of consumer and industrial products. PFAS manufacturing and processing facilities, facilities using PFAS in production of other products, airports, and military installations are some of the potential contributors of PFAS releases into the air, soil, and water. Due to their widespread use and persistence in the environment, most people in the United States have been exposed to PFAS. There is evidence that continued exposure above specific levels to certain PFAS may lead to adverse health effects.

The EPA will continue to partner with other federal agencies, states, tribes, and local communities to protect human health and, where necessary and appropriate, to limit human exposure to potentially harmful levels of PFAS in the environment. The EPA is leading the national effort to understand PFAS

Related Topics

- Learn more about Per- and polyfluoroalkyl substances (PFAS)
- List of PFAS EPA is currently researching
- Reducing PFAS in Drinking Water with Treatment Technologies Science Matters Article
- EPA Toxicologists Focus Innovative Research on PFAS Compounds Science Matters Article
- EPA Researchers Use Innovative Approach to Find PFAS in the

https://www.epa.gov/pfas

https://www.epa.gov/chemical-research/research-and-polyfluoroalkyl-substances-pfas

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For More Information

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ORD Executive Lead for PFAS R&D
US EPA Office of Research and Development

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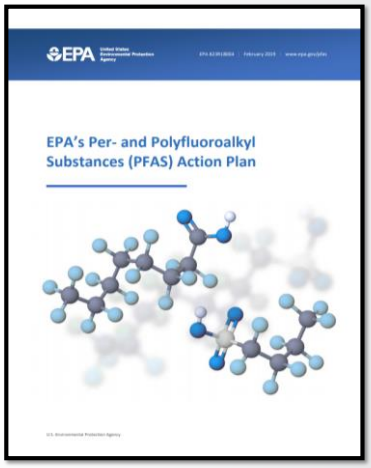
(919) 541-3655

The views expressed in this presentation are those of the individual author and do not necessarily reflect the views and policies of the US EPA



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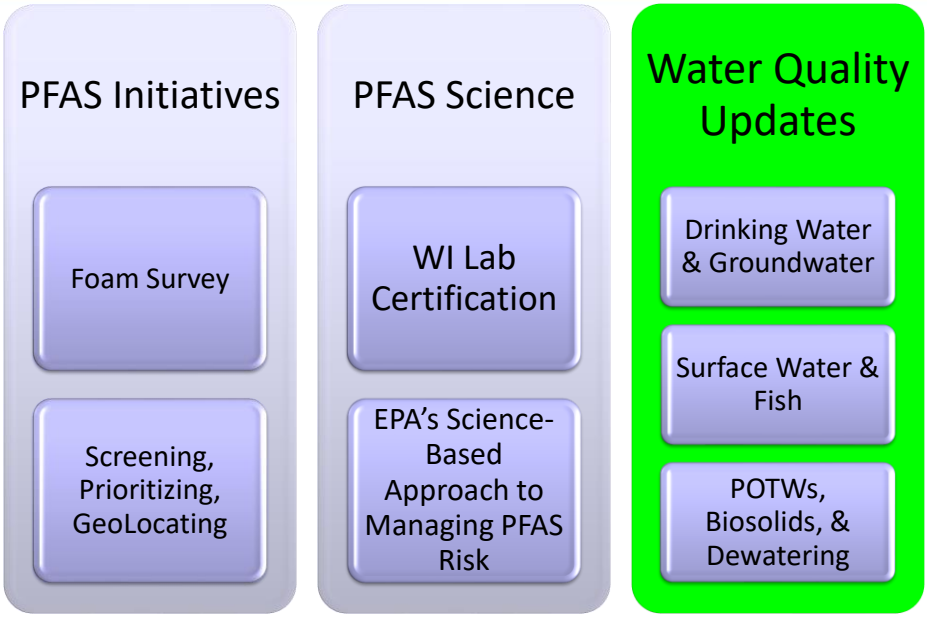
The Year of Clean Drinking Water



PFAS Technical Advisory Group

Drinking Water and Groundwater

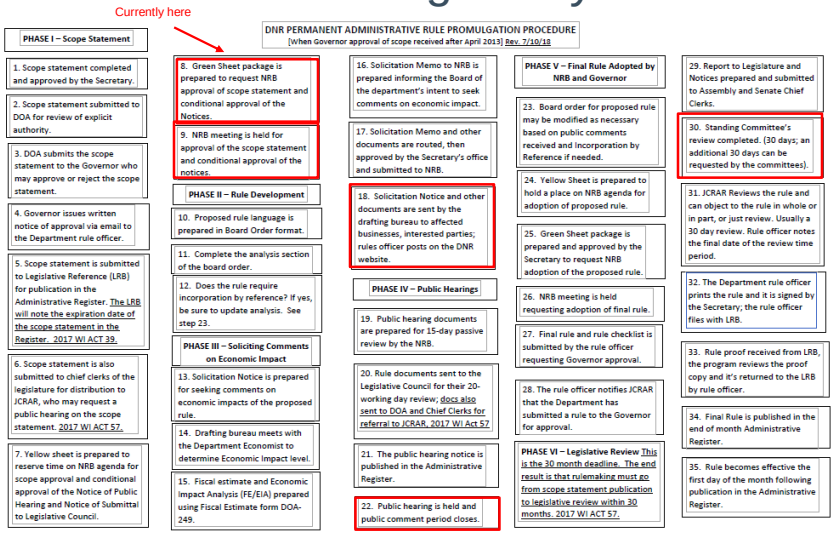
Adam DeWeese

Drinking Water and Groundwater Standards

- DHS recommended DNR set standard for:
  - Perfluorooctanoic acid (PFOA)
  - Perfluorooctane sulfonic acid (PFOS)
- Groundwater enforcement standards (ES)
- Public drinking water Maximum Contaminant Level (MCL)

Developing Standards:

Rulemaking Today



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Drinking Water and Groundwater Standards

Rulemaking: Public Input & Transparency

- Each rule will have several formal public input points.
- DNR will host advisory meetings with stakeholders.

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Drinking Water and Groundwater Standards

NR 809 Rulemaking Timeline

Summer 2019
- Statement of Scope [PDF]

↓

Fall 2019
- Natural Resources Board (NRB) authorization to hold public hearing on scope statement
- Public hearing on scope statement
- Preliminary comments on scope statements [PDF]

Video: 11/12/19 Public Hearing [exit DNR]

← (We are here)

↓

Winter 2020
- NRB scope approval
- Begin rule drafting
- Advisory workgroups

↓

Winter 2021
- Preparation of proposed rule
- Solicitation of information for economic impact analysis (EIA)
- Draft EIA

↓

Summer 2021
- Public hearings on proposed rule

↓

Winter 2021/2022
- NRB meeting for adoption
- Rule approved by governor
- Legislative review

↓

Spring 2022
- Rule signed by DNR Secretary

↓

Summer 2022
- Rule becomes effective

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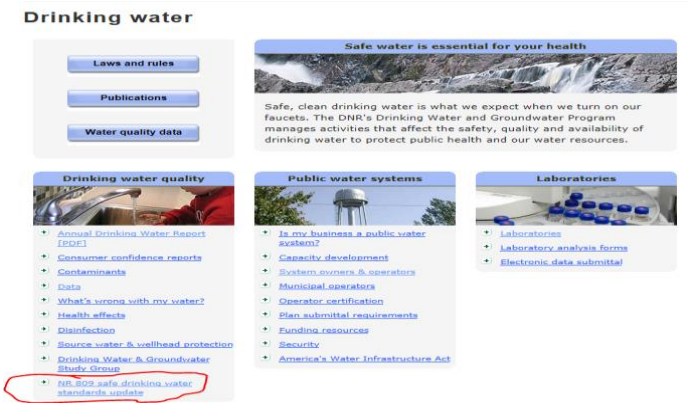
Drinking Water and Groundwater Standards

Scope Statement Comments



Link: Wisconsin Department of Natural Resources
Type “NR 140” or “NR 809” in search box

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Drinking Water and Groundwater Standards

Preliminary Public Hearing

- 11/12 hearing held in Madison, Green Bay and Eau Claire
  - 30 attendees, 5 testified
- Approximately 60 comments received during open comment period

Commenter Type	Number*
Individual	25
Group	19
Municipality	1
Industry	1

*Several commented on one or more rules

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Drinking Water and Groundwater Standards

Summary of Comments

- ~4:1 in Favor of Rulemaking

Support	Opposed
Keep scope broad to include other PFAS	Limit scope to only PFOA and PFOS
Regulate as a class/group	Regulate individual substances
Need regulations now. Cannot wait for EPA	Wait for EPA
Establish stakeholder group	Establish stakeholder group
Provide alternative compliance options	Provide cost/benefit analysis

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Drinking Water and Groundwater

What other States have PFAS Standards?

Type of Guidance	State	Status	Year	Drinking Water Limit ppt	
				PFOA	PFOS
Maximum Contaminant Level	Vermont (i)	Effective	May 2019	*	*
	New Hampshire	Effective	July 2019	12	15
	New Jersey	Effective	Sept 2018		
		Rulemaking Proposed	April 2019	14	13
	Massachusetts	Pre-Proposal Development Phase	June 2019	*	*
	Michigan (ii)		June 2019	8	16
	New York (iii)		Dec 2018	10	10
	Pennsylvania		Feb 2018	TBD	
	Washington		May 2019	TBD	

Type of Guidance	State	Status	Year	Drinking Water Limit (ng/L or ppt)										
				Combined PFAS	GenX	PFBA	PFBS	PFHpA	PFHxA	PFHxS	PFOA	PFOS	PFNA	PFDA
Maximum Contaminant Level	Vermont (i)	Effective	May 2019	20				*		*	*	*	*	
	New Hampshire	Effective	July 2019							18	12	15	11	
	New Jersey	Effective	Sept 2018										13	
		Rulemaking Proposed	April 2019								14	13		
	Massachusetts	Pre-Proposal Development Phase	June 2019	20				*		*	*	*	*	*
	Michigan (ii)		June 2019		370		420		400,000	51	8	16	6	6
	New York (iii)		Dec 2018								10	10		
	Pennsylvania		Feb 2018	Specific PFAS Targeted Not Yet Announced										
	Washington		May 2019	Specific PFAS Targeted Not Yet Announced										

Drinking Water and Groundwater Standards

Questions?

NR 809: Public Drinking Water

Adam DeWeese, Public Water Supply Section Chief

Adam.DeWeese@Wisconsin.gov

608-264-9229

NR 140: Groundwater Quality

Bruce Rheineck, Groundwater Section Chief

BruceD.Rheineck@wisconsin.gov

608-266-2104

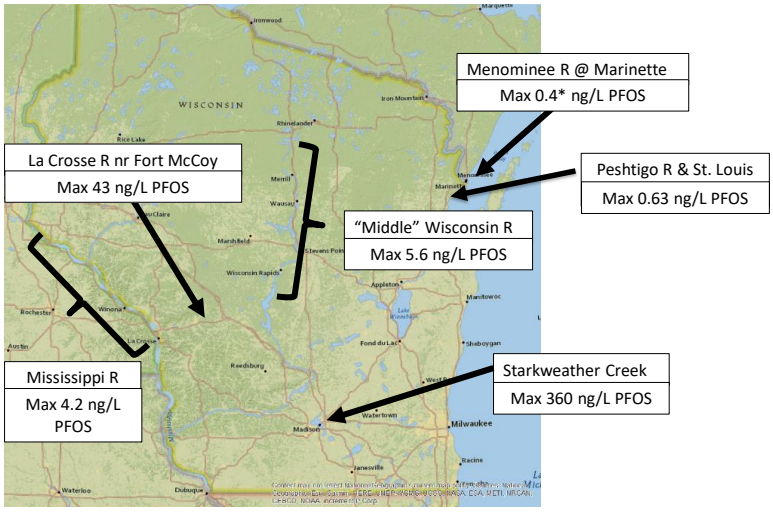
PFAS Technical Advisory Group

Water Quality Program Updates

Adrian Stocks

Surface Water and Fish tissues Monitoring

2019 WR Surface Water and Fish Tissue Monitoring

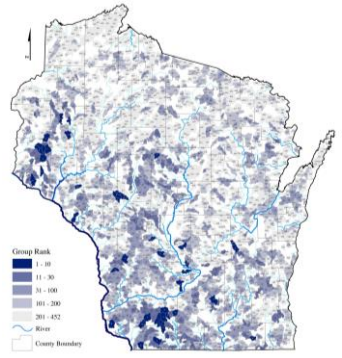


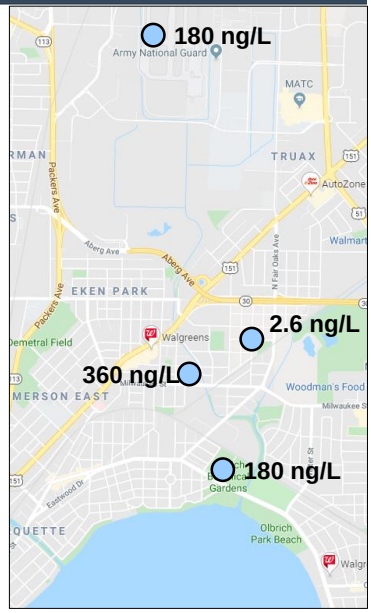
Surface Water and Fish tissues Monitoring

-Expanded sampling in Lake Monona and Starkweather Creek

-The water resources program intends to expand sampling to all Long-term Trend Sites

- 44 Rivers
- Drain 80% of state's area
- All proposed to be monitored in 2020





Values depict highest PFOS results

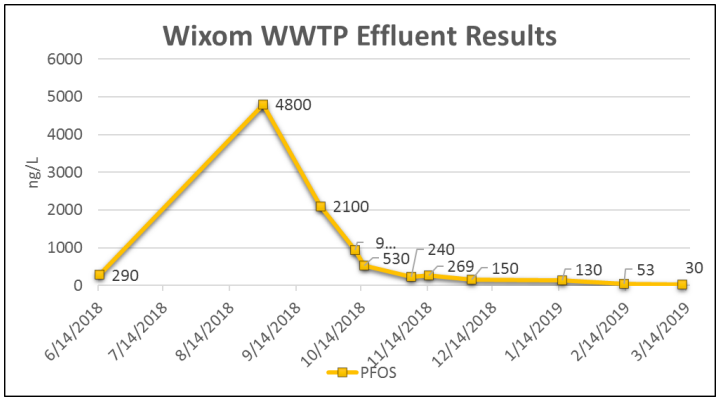
POTWs

POTWs

The department is working closely with representatives from municipalities to develop a strategy for identifying sources in the collection systems.

POTWs

The intended outcome of the letter is to scope the extent of the PFAS problem in Wisconsin and take source reductions measures.



Source: Michigan EGLE, "Michigan's IPP PFAS Initiative" (May 2019)

POTWs

Source control methods have been proven to work.

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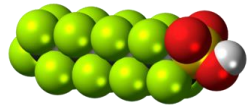
POTWs

Assessment of the Impacts of PFAS in Municipal Wastewater Effluents and Land-Spread Biosolids on Wisconsin Ground- and Surface Waters

Study Component A: Determine the TYPE and QUANTITIES of PFAS Associated with POTWs and Streams Receiving POTW Effluents

(a) Quantify PFAS within the POTW – dual emphasis **(a) retention** (influent – effluent); **(b) cycling**/**processing** of PFAS within the facility. Samples of influent and effluent streams as well as selected locations within the treatment facility, including sludges and biosolids slurries

(b) Quantify PFAS in the Stream Receiving the POTW Effluent. **Stream water** and **sediment** samples upstream of discharge, in the mixing zone, and downstream of mixing zone



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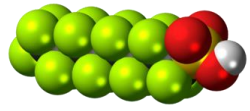
POTWs

Assessment of the Impacts of PFAS in Municipal Wastewater Effluents and Land-Spread Biosolids on Wisconsin Ground- and Surface Waters

Study Component B: Determine the Impacts to Soils, Surface- and Ground Waters of PFAS-Containing Municipal Biosolids Spread on Agricultural Fields

(a) Quantify PFAS within the fields receiving biosolids. Samples of **soils** and **soil-water**

(b) Quantify PFAS in groundwater samples near the agricultural field study sites and in regional deeper groundwater



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Biosolids

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Biosolids

Land application of municipal sludge or biosolids for beneficial reuse is a common practice.

Biosolids

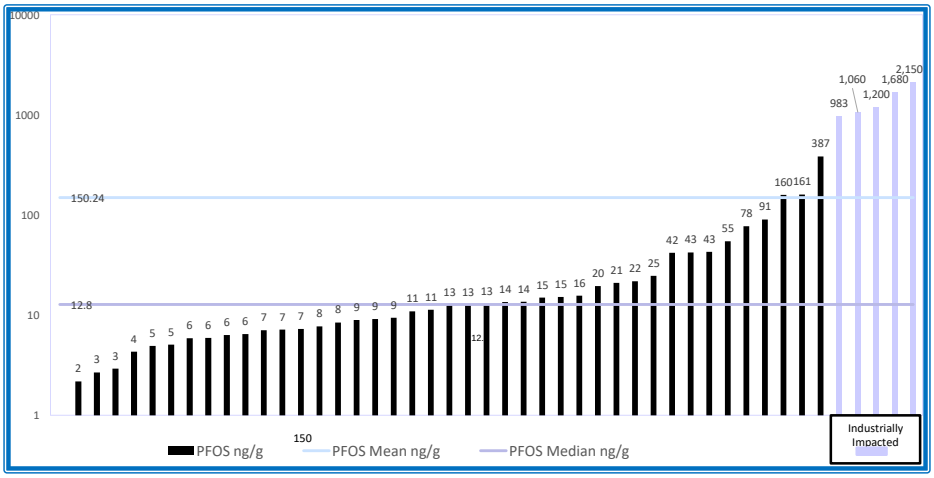
- Land application of biosolids may be a significant dispersal mechanism of PFAS compounds.

Biosolids

- Michigan: Study at 41 POTWs
  - Various sizes, treatment processes
  - Sampling biosolids and fields receiving biosolids
  - Goals
    - ID data gaps
    - Develop guidance to assist with biosolids management decisions
- UW Study: Part B
- Maine:
  - Hold biosolids if > 5.2 ppb PFOS

Biosolids

Statewide Study - WWTP Stabilized Sludge/Biosolids PFOS Results



Source: Michigan EGLE, “Michigan’s IPP PFAS Initiative” (May 2019)

Biosolids

Reducing sources of PFAS to WWTP will result in lower concentrations in biosolids.

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Dewatering & Other

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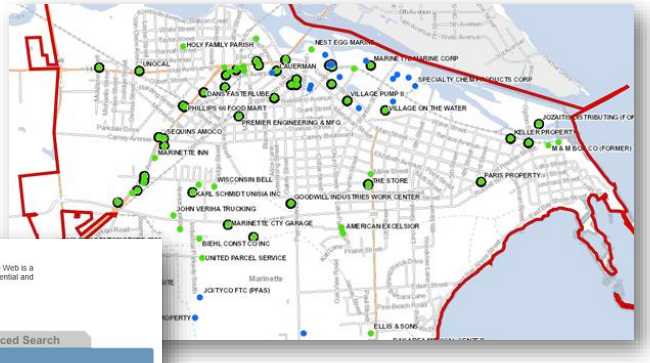
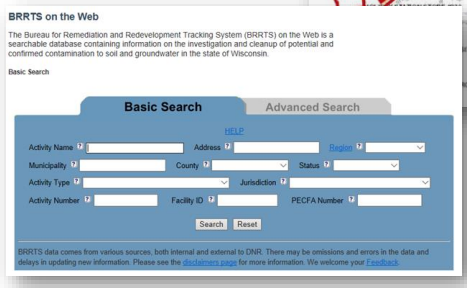
Dewatering Projects

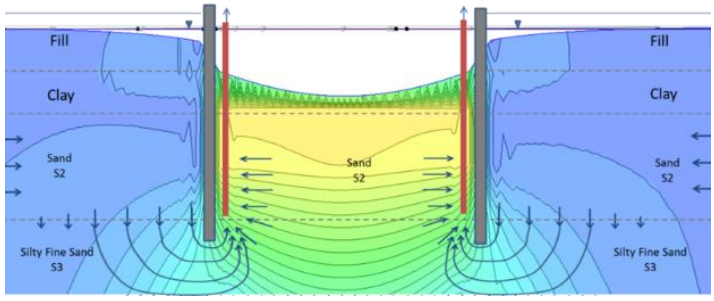
The program has developed an Interim strategy for dewatering projects.





Dewatering Projects

- Truax Sewer Interceptor Installation: Below screening levels
- Marinette Marine: treated to MI Standards
- Waupaca Foundry – Marinette: treated to MI Standards
- ATC Marinette: treated to MI Standards



Other Projects

- Husky Refinery
- Tyco Ditches A and B
- ATC Madison Transformer Explosions
- MSN Dane County Regional Airport
- MKE General Mitchell Airport

PFAS Technical Advisory Group

Closing Remarks

Bridget Kelly

Review of Meeting

- Recommendations for improvement
  - What went well
  - What could go better
- What do you want to hear about

The Year of Clean Drinking Water

- First Tag Meeting – Feb 1, 2019
- Great Lakes Governors Proclamation – June 2019
- PFAS Budget Allocation – July 2019
- Deer Study November 2019
- PFAS Initiatves
- EO #40 – June 2019
- POTW Study – July 2019
- Scopes for NR 140, 809, and 105 – Oct 2019
- Monthly Listening Sessions in Marinette Peshtigo
- Inaugural WisPAC meeting – Nov 2019
- Inaugural PFAS R5/Great Lakes Coordination Meeting – Dec 2019

A lot of accomplishments since February 2019…

Next Quarterly Meeting

- Subscribe for Updates – 2020 Meetings Scheduled Soon

Thanks For Participating