DERP Forum

Strengthening Relationships with our Regulatory Partners

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US EPA's Science-Based Approach to Understanding and Managing Environmental Risk from PFAS

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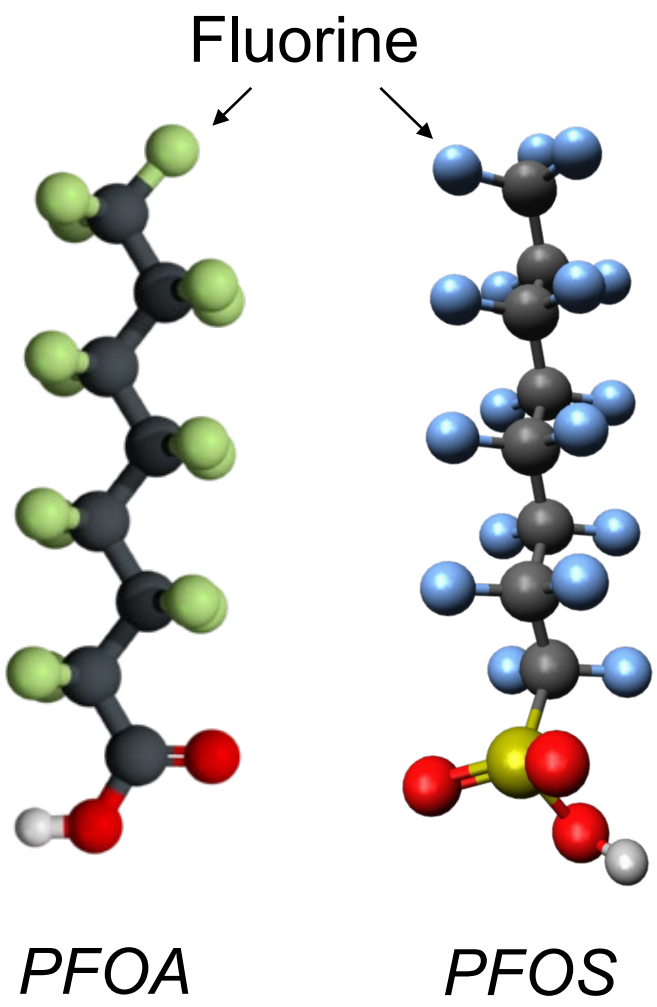
Per- & Polyfluoroalkyl Substances (PFAS)



PFOA *PFOS*

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

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

EPA PFAS Action Plan - Research

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

Research – Human Health

- **Problem**: Lack of human toxicity information for many PFAS of interest
- **Action**:
  - Initial search of published toxicity data for 31 PFAS of interest
  - Conduct assessments, fill gaps through tiered testing
    - Initial assessment using in vitro, high throughput approaches (Tier 0/1)
    - Follow-up assessment using targeted in vivo approaches (Tier 2 and beyond)
    - Toxicity testing on high priority PFAS using both rodent and zebrafish systems
- **Results**:
  - Draft toxicity assessments available for HFPO-DA (GenX) and PFBS
  - Draft IRIS assessments underway for PFBA, PFHxS, PFHxA, PFNA and PFDA
  - High throughput assays underway for 150 PFAS representative of chemical space to support prioritization, chemical grouping, read across, relative toxicity and mixtures assessment
- **Impact**: Stakeholders will have PFAS toxicity information to inform risk management decisions and risk communication

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
- **Results**:
  - Ecotoxicity data for ~60 PFAS obtained and collated in public ECOTOX system
  - Research getting underway
- **Impact**: Stakeholders will have PFAS ecotoxicity information to support risk management decisions and risk communication

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
- **Results**:
  - Updated analytical Method 537.1 for drinking water which includes 4 additional PFAS (18 total, including HFPO-DA and ADONA)
  - Developing new DW Method for ~26 PFAS including shorter chains
  - Developing and testing Direct Injection and Isotope Dilution methods for 24 PFAS in surface water, ground water, and solids
  - Developing methods for air emission sampling and analysis
  - Continued development of HR mass spec methods to discover unknown PFAS
- **Impact**: Stakeholders will have reliable analytical methods to test for known and new PFAS in water, solids, and air

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
- **Results**:
  - Developing exposure models for identifying, quantifying PFAS sources, fate and transport pathways, and exposures
  - Developing and evaluating sampling and site characterization approaches to identify sources and extent of contamination
- **Impact**: Stakeholders will be able to identify and assess potential PFAS sources and exposures, and identify key exposure pathways for risk management

Research – Drinking Water Treatment

- **Problem**: Lack of water treatment technology performance and cost data for PFAS removal
- **Action**:
  - Review PFAS performance data from available sources (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 a range of system sizes – large full-scale utility options to home treatment systems
- **Results**:
  - EPA's **Drinking Water Treatability Database** updated for 22 PFAS, including HFPO-DA (GenX chemicals), 6:2 and 8:2 FTS, and PFAS of 4 to 13 C chain length
  - Use state-of-the-science models to extrapolate existing treatment studies to other conditions
- **Impact**: Utilities will be able to identify cost effective treatment strategies for removing PFAS from drinking water

Research – Contaminated Site Remediation

- **Problem:** PFAS-contaminated sites require remediation and clean up to protect human health and the environment

- **Action:**
  - Characterize sources of PFAS such as fire training and emergency response sites, manufacturing facilities, production facilities, disposal sites
    - No complete inventory of sources, locations – PFAS very widely used
    - Different sources => different mixtures of PFAS + other contaminants
    - Need to understand precursors, potential transformations, transport in order to plan for remediation

Research – Contaminated Site Remediation

- **Action:**
  - Evaluate treatment technologies for remediating PFAS-impacted soils, waters, and sediments
    - Many possible strategies – In-place stabilization, treatment and removal
    - Need to consider ultimate disposal
    - Promise of new technologies – thermal, chemical, physical, electrical, biological
  - Generate performance and cost data with collaborators to develop models and provide tools to determine optimal treatment choices

- **Results:** Tools, data and guidance regarding cost, efficacy, and implementation for remedy selection and performance monitoring

- **Impact:** Responsible officials will know how to reduce risk of PFAS exposure and effects at contaminated sites, and to repurpose sites for beneficial use

Research – Materials Management

- **Problem**: Lack of knowledge regarding end-of-life management of PFAS-containing consumer and industrial products
- **Action:**
  - Characterize end-of-life disposal streams (e.g. municipal, industrial, manufacturing, landfills, incinerators, recycled waste streams) contributing PFAS to the environment
  - Evaluate efficacy of waste management technologies (e.g. landfilling, thermal treatment, composting, stabilization) to manage PFAS at end-of-life disposal
  - Evaluate performance and cost data with collaborators to manage these materials and manage environmental PFAS releases
- **Results**: Provide technologies, data and tools to manage end-of-life streams
- **Impact**: Responsible officials will be able to manage effectively end-of-life disposal of PFAS-containing products

Technical Assistance

- **Problem**: State, tribes and communities often lack 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
- **Results**: Many examples of past and ongoing technical assistance
  - **Cape Fear River, NC** – Significant reductions in PFAS in source and finished water
  - **Manchester, NH** – Collaboration on air and water sampling
  - **Oscoda, MI** – Advice on foam sampling and dermal exposure risk on a recreational lake
- **Impact**: Enable states, tribes and communities to 'take action on PFAS'

Collaboration

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

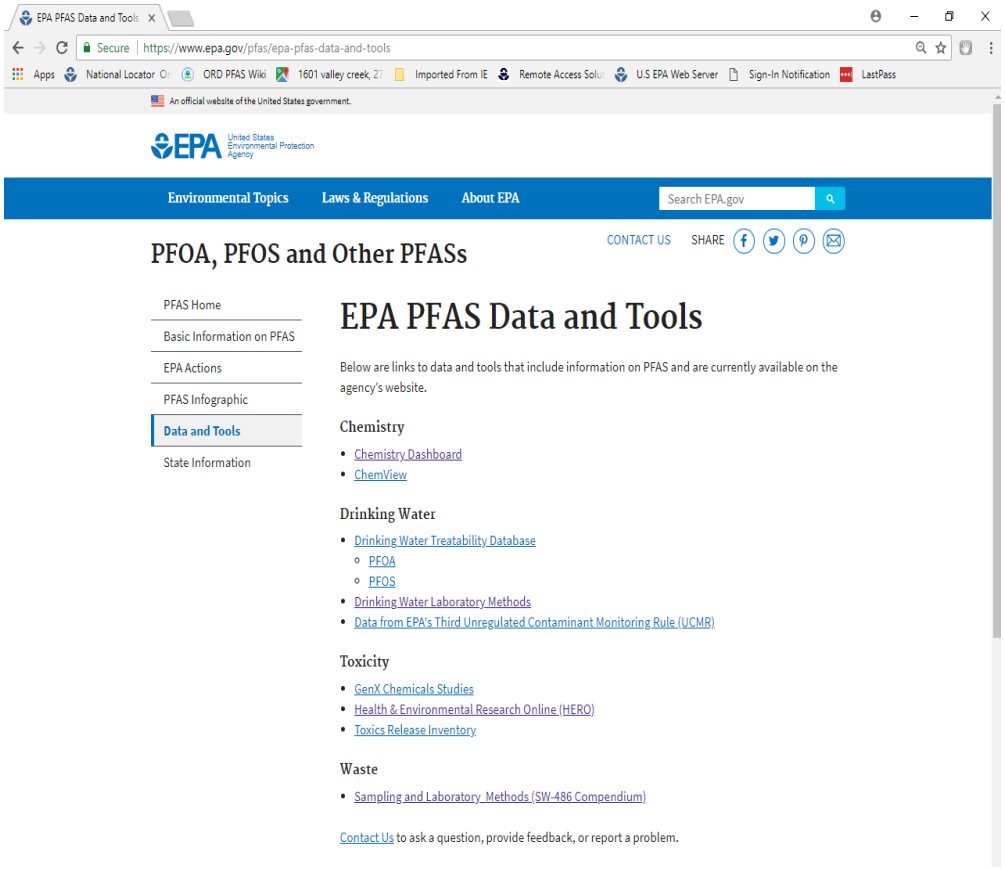
Some examples:

- 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 individual 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

EPA PFAS Data and Tools

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

https://www.epa.gov/pfas



For More Information

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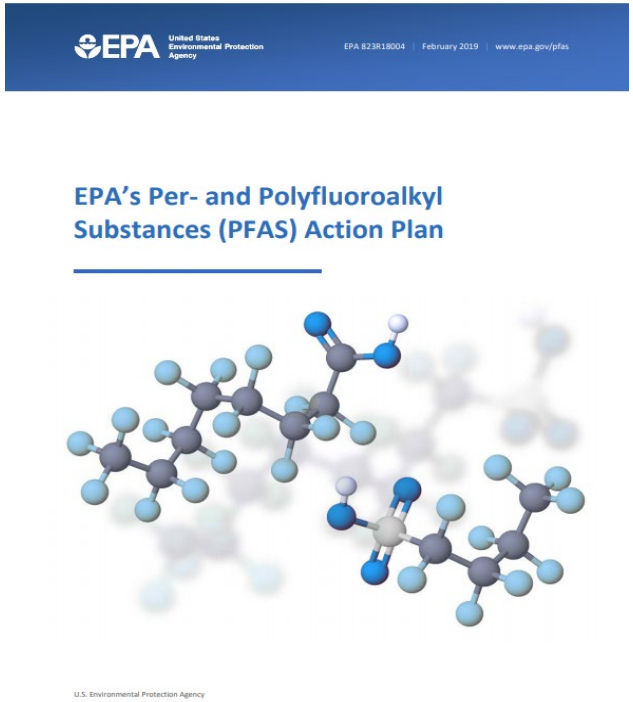

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