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

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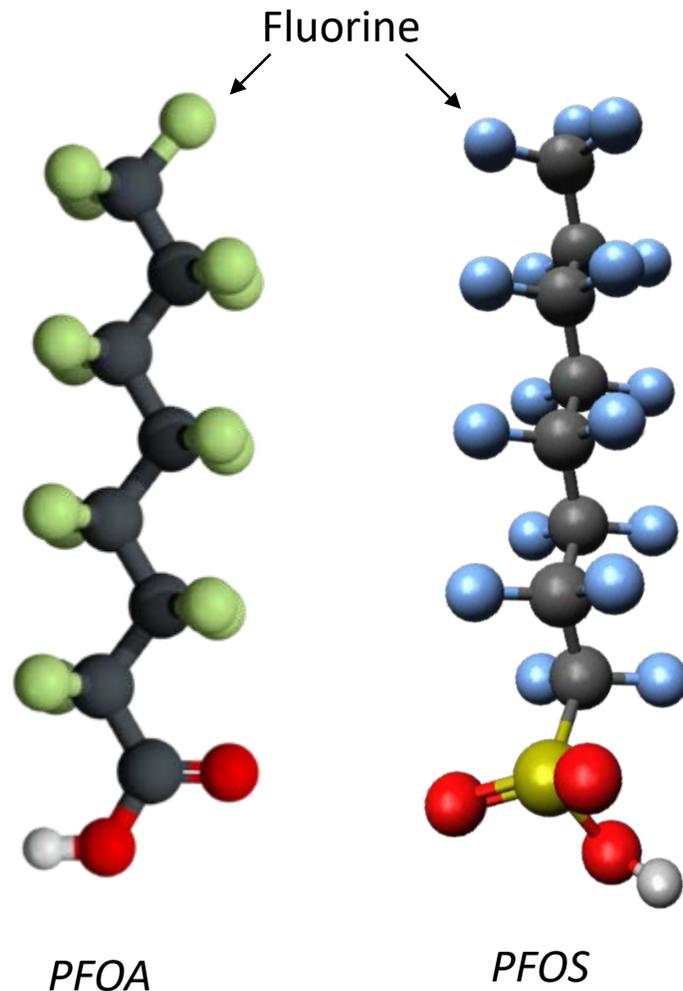
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Per- and Polyfluoroalkyl Substances (PFAS)



- **A class of man-made chemicals**

- **Chains** of carbon (C) atoms surrounded by fluorine (F) atoms, with different endings
- **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

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 toxicity assessments for GenX and PFBS by fall (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

EPA's PFAS Action Plan Purpose

- Provides EPA's first multi-media, multi-program, national research, management and risk communication plan to address a challenge like PFAS.
- Responds to the extensive public input the agency has received over the past year during the PFAS National Leadership Summit, multiple community engagements, and through the public docket.
- As a result of this unprecedented outreach, the Action Plan provides the necessary tools to assist states, tribes, and communities in addressing PFAS.

EPA PFAS Action Plan

- **Drinking Water** – Intends to establish a Maximum Contaminant Level (MCL) for PFOA and PFOS and is moving forward with the regulatory process; propose PFAS in next round of unregulated contaminant monitoring (UCMR5)
- **Cleanup** – Initiating the regulatory process for designating PFOA and PFAS 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 - Drinking Water

- The EPA intends to establish a Maximum Contaminant Level (MCL) for PFOA and PFOS—two of the most well-known and prevalent PFAS and is moving forward with the regulatory process.
- The Agency is also gathering and evaluating information to determine if regulation is appropriate for other chemicals in the PFAS family.
- The EPA is committed to following the Safe Drinking Water Act process for evaluating and establishing drinking water standards for PFAS chemicals.

EPA PFAS Action Plan - Cleanup

- The EPA will facilitate cleanup efforts by providing groundwater cleanup recommendations.
- The EPA is initiating the regulatory development process for listing certain PFAS as hazardous substances.

EPA PFAS Action Plan - Monitoring

- The EPA will propose nationwide drinking water monitoring for PFAS under the next Unregulated Contaminant Monitoring Rule (UCMR5) monitoring cycle.

EPA PFAS Action Plan - Toxics

- The EPA is considering the addition of PFAS chemicals to the Toxics Release Inventory (TRI)
- EPA is issuing a supplemental proposal to guard against the unreviewed reintroduction and new use, through domestic production or import, of certain PFAS chemicals in the United States.

EPA PFAS Action Plan

- **Enforcement**

- The EPA uses enforcement tools, when appropriate, to address PFAS exposure in the environment and assist states in enforcement activities.

- **Risk Communications**

- The EPA will work collaboratively to develop a risk communication toolbox that includes multi-media materials and messaging for federal, state, tribal, and local partners to use with the public.

EPA PFAS Action Plan Next Steps

- To implement the plan, the EPA will continue to work in close coordination with multiple entities, including other federal agencies, states, tribes, local governments, water utilities, industry, and the public.
- The EPA will provide updates on actions outlined in the plan on the Agency's website.

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**, and identifying effective **treatment and remediation** actions.

Research: Human Health Toxicity

- **Problem:** Lack of human toxicity information for many PFAS of interest
- **Action:**
 - Initial literature search of published toxicity data for 31 PFAS of interest
 - Conduct assessments, fill gaps through high throughput testing
- **Results:**
 - Draft toxicity assessments available for HFPO-DA and PFBS
 - Draft IRIS assessment underway for PFBA, PFHxS, PFHxA, PFNA and PFDA
 - High throughput assays underway for 150 PFAS representative of chemical space to support prioritization, read across, relative toxicity 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 topics such as 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 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 fate and transport pathways, relative source attribution, 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 9 additional PFAS, including HFPO-DA
- 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 (e.g. landfills, incineration) 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 PFAS releases to the environment
- **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 for States, Tribes and Communities

- **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’

Research 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>

<https://www.epa.gov/pfas/epa-pfas-data-and-tools>

The screenshot shows the EPA website page for PFAS data and tools. The browser address bar displays the URL <https://www.epa.gov/pfas/epa-pfas-data-and-tools>. The page features the EPA logo and navigation menus for Environmental Topics, Laws & Regulations, and About EPA. A search bar is located in the top right corner. The main content area is titled 'PFOA, PFOS and Other PFASs' and includes a sub-section 'EPA PFAS Data and Tools'. A sidebar on the left lists navigation options: PFAS Home, Basic Information on PFAS, EPA Actions, PFAS Infographic, Data and Tools (highlighted), and State Information. The main content area lists several categories of resources:

- Chemistry**
 - [Chemistry Dashboard](#)
 - [ChemView](#)
- Drinking Water**
 - [Drinking Water Treatability Database](#)
 - [PFOA](#)
 - [PFOS](#)
 - [Drinking Water Laboratory Methods](#)
 - [Data from EPA's Third Unregulated Contaminant Monitoring Rule \(UCMR\)](#)
- Toxicity**
 - [GenX Chemicals Studies](#)
 - [Health & Environmental Research Online \(HERO\)](#)
 - [Toxics Release Inventory](#)
- Waste**
 - [Sampling and Laboratory Methods \(SW-486 Compendium\)](#)

At the bottom of the page, there is a link: [Contact Us](#) to ask a question, provide feedback, or report a problem.

For More Information

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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

