



PFAS and DOE

Presentation for the Analytical Services Program

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What are PFAS?

- Per- and polyfluoroalkyl substances (PFAS) are a man-made group of nearly 5,000 chemicals that includes PFOA, PFOS, GenX, and many other chemicals.
- Some have been commercially branded as Teflon and ScotchGard.
- PFAS were historically used in manufacturing, firefighting foam, and in many consumer products.
- PFAS have been used in cookware, carpet-care liquids, treated apparel, treated upholstery, floor sealants, floss, plumber's tape, food packaging, microwave popcorn, cosmetics, sunscreen, and more.



“Forever Chemicals”

- PFAS remain in the environment and are unaffected by natural degradation due to the strong carbon-fluorine bond, preventing breakdown.
- This emerging group of contaminants have recently been the focus of Federal, state, and international concern because of unknown full toxicological effects and difficulty of remediation.
- EPA set a lifetime health advisory level for PFOA and PFOS, individually or combined, of 70 parts per trillion in May 2016.
- The DoD has been the leading Federal agency in research and liability due to PFAS-containing aqueous film forming foam (AFFF) being a requirement in the firefighting foam.



PFAS and DOE

- DOE is aware that PFAS have been discharged as a chemical agent in a fire suppression product- AFFF.
- Beyond AFFF use, there may be other current or past uses of PFAS in DOE operations and processes that have resulted in releases to the environment.
- Of particular importance for DOE, PFAS were widely used in uranium processing operations.
- Office of Environment, Health, Safety and Security (AU) has been working with DOE Programs and sites on a **voluntary and collaborative basis** to better understand and characterize the extent of PFAS issues across the complex, and to provide support to sites and leadership.



Regulatory Context

- The regulatory climate around PFAS is very dynamic. The Administration has identified PFAS as a subject of concern.
- In February 2020, EPA proposed to regulate two PFAS substances under the Safe Drinking Water Act; approximately two years to establish regulatory levels.
- In December 2019, EPA issued guidance for Federal cleanup sites, setting an action level of 70 parts per trillion (ppt) level for groundwater that is a current or potential source of drinking water.
- CDC, NIOSH, ATSDR, and FDA are advancing PFAS studies, analysis, or rulemakings.
- Many states have proposed or established lower PFAS standards:
 - New Jersey has established a limit of 13 ppt;
 - New York has proposed 10 ppt;
 - California is recommending <1 ppt.



National Defense Authorization Act (2020): DoD Requirements

- Prohibits use of PFAS in firefighting foam after Sept 30, 2025, except for use on ships, emergency responses, and in limited testing/training.
- Incorporates blood testing for PFAS as part of routine physicals for military firefighters.
- Adds 172 PFAS to the list of chemicals covered by the Toxics Release Inventory under Section 313 of the Emergency Planning and Community Right-to-Know Act.
- Requires incineration be conducted at temperature range adequate to breakdown PFAS chemicals and maximum degree of emission reduction of PFAS.
- DoD is to work on cooperative agreements to address, test, monitor, and remove PFAS contamination in drinking, surface, or groundwater from DoD activities and provide funding.
- DOE will be able to utilize advancements in characterization, remedial research, and monitoring/testing procedures as DoD research progresses.

Office of Environment, Health, Safety and Security



EPA Research on Human Effects

- EPA is researching the human health effects of seven of the most common PFAS in collaboration with National Toxicology Program experts.
- The expert panel issued their draft report in 2019 and will finalize the assessment in 2020.
- EPA expects to finalize the perfluorobutane sulfonic acid and GenX toxicity assessments in 2020.
- EPA expects to propose draft toxicity values of these chemicals for public and scientific review in 2020.



PFAS Treatment

- Current PFAS treatment technologies include:
 - Granular Activated Charcoal
 - Ion Exchange Resin
 - Reverse Osmosis/Nanofiltration



DOE PFAS Working Group

- Summer 2019 - AU-21 established DOE PFAS Working Group
- Comprised of environmental and analytical experts from across the Complex
- Meet bi-monthly via webinar
 - Updates from AU-21
 - Highlighted Presenters
 - Open Discussion
- Contact Ashley.Ruocco@hq.doe.gov if interested in joining



PFAS-related DOE Documents

- Operating Experience Level 3 Document (September 2019): [PFAS Awareness](#)
- Operating Experience Summary: (March 2020): [Emerging Contaminants in Groundwater at BNL](#)

Office of Environment, Health, Safety and Security
Operating Experience Level 3

OE-3: 2019-04 September 2019

Per- and Polyfluoroalkyl Substances (PFAS) Awareness

PURPOSE
This Operating Experience Level 3 (OE-3) document provides information about emerging contaminants referred to as per- and polyfluoroalkyl substances (PFAS). PFAS is a class of Safe Drinking Water Act (SDWA) contaminants.

In May 2016, the Environmental Protection Agency (EPA) issued a new drinking water Lifetime Health Advisory (LHA) for two types of PFAS chemicals: perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). The new drinking water LHA is 70 parts per trillion (ppt) for PFOS and PFOA, individually or combined. There are more than 3,000 man-made fluorinated organic compounds. For context, one ppt is equivalent to one drop of water in 20 Olympic-sized swimming pools.

BACKGROUND
PFAS are manufactured fluorinated organic chemicals commonly used in household items such as non-stick cookware, clothing, shoes, furniture, and carpets. PFAS chemicals are also used in firefighting, most notably in Aqueous Film Forming Foam (AFFF), a firefighting agent used to suppress fuel fires. AFFF contains both PFOS and PFOA and has been extensively used by firefighters in training and equipment testing.

The understanding of potential drinking water impacts from PFAS has significantly increased over the past decade. This class of chemicals started to get publicity in 2001 and 2002 due to water contamination from the Washington Works Plant located outside of Parkersburg, West Virginia. A class-action lawsuit against DuPont due to water contamination generated additional publicity. In 2006, DuPont, along with other manufacturers such as 3M, agreed to principally phase out the production of PFOA and PFOS.

REGULATORY STATUS
Currently, PFAS is undergoing extensive regulatory scrutiny by Federal, State, and public-interest organizations.

Although there is not yet Federal regulation of these compounds, many states have introduced and/or established more stringent health advisory limits for individual compounds.

Third Unregulated Contaminant Monitoring Rule (UCMR3): Due to escalating concerns, six PFAS compounds were included in EPA's final UCMR3 in May 2012. This inclusion triggered monitoring at major water systems between January 2013 and December 2015. As typical for the UCMR3, EPA regularly released the UCMR3 monitoring data to the public, starting in late 2013.

EPA's 2009 Provisional and 2016 Revised Health Advisories (HAs): In 2009, EPA established provisional HAs for PFOS at 200 ppt and PFOA at 400 ppt. These two numbers served as the benchmark during the UCMR3 monitoring period, which found relatively few exceedances of PFOS and PFOA.

In May 2016, EPA released revised HAs for the sum of PFOA and PFOS at 70 ppt. This numerical reduction significantly increased the number of water systems impacted.

Office of Environment, Health, Safety and Security
Operating Experience Summary

OE20-020 March 2020

Emerging Contaminants in Groundwater at BNL

Introduction
This Operating Experience Summary provides information about per- and polyfluoroalkyl substances (PFAS) that have been identified in drinking water and groundwater at the U.S. Department of Energy's (DOE's) Brookhaven National Laboratory (BNL) on Long Island, New York (NY). Due to soil and groundwater contamination from legacy chemical and radionuclide releases, in 1989 the BNL site was included on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). The DOE, U.S. Environmental Protection Agency (EPA) and NY State Department of Environmental Conservation (NYDEC) entered into a Federal Facilities Agreement to coordinate environmental remediation activities at the site.

PFAS are a family of more than 4,500 man-made fluorinated organic chemicals that have been produced since the mid-20th century. They have been used for various purposes such as Teflon®-coated cookware, stain-resistant carpets, water-resistant textiles, food wrappers, and firefighting foam. PFAS has also been used in operational processes such as metal plating, uranium processing, and highly corrosive applications.

Long Island's drinking water is obtained from groundwater withdrawn from an EPA designated sole source aquifer system. Long Island's groundwater is highly vulnerable to contamination as the aquifers are composed of highly permeable sand and gravel. At BNL, because groundwater is encountered very close to the land surface (10 to 50 feet), chemical releases can have almost immediate impacts to groundwater quality.

The source of PFAS contamination at BNL is linked to the historical use of aqueous film-forming foam (AFFF) which is used to fight Class B (or fuel) fires.

Background
From 2013 to 2015, water systems serving more than 10,000 customers began testing for PFAS under the Safe Drinking Water Act (SDWA). The SDWA's Third Unregulated Contaminant Monitoring Rule (UCMR-3) program included six PFAS compounds as emerging contaminants of concern. Currently, there are no specific Federal or NY State drinking water standards for PFAS. In 2016, EPA established a Lifetime Health Advisory Level (HAL) of 70 ng/L (or 70 parts per trillion) for the individual or combined concentrations of two PFAS compounds: Perfluorooctane sulfonate (PFOS) and Perfluorooctanoic acid (PFOA). In December 2018, the NY State Drinking Water Quality Council recommended individual drinking water standards of 10 ng/L each for both PFOS and PFOA.

These proposed standards received 2,700 comments when published in the NY State Register in July 2019. They are expected to be finalized and published in 2020.

In March 2017, Suffolk County Department of Health tested water samples from BNL's potable water supply wells for the same six PFAS compounds monitored under UCMR-3. PFAS were identified in three out of five active water supply wells. The presence of PFAS was confirmed by analyzing multiple samples between 2017 and 2019. Although the combined PFOS and PFOA concentrations in the supply wells are typically less than the 70 ng/L HAL, individual PFOS concentrations in three of the wells routinely exceed the proposed 10 ng/L drinking water standard.

In 2018, routine PFAS testing was added to BNL's potable water monitoring program and samples are now tested for PFAS on a quarterly basis.



Next Steps

- Establish a coherent framework for approaching PFAS Complex-wide
- Continue collaborating across agencies, especially EPA and DOD
- Continue supporting sites and labs across the DOE complex
 - DOE PFAS Working Group



Resources

- DOE PFAS SharePoint:
[https://projectenhancementcorp.sharepoint.com/sites/projects/AU21/The Office of Sustainable Environmental Stewardship/SitePages/Emerging%20Contaminants%20-%20PFAS.aspx](https://projectenhancementcorp.sharepoint.com/sites/projects/AU21/The%20Office%20of%20Sustainable%20Environmental%20Stewardship/SitePages/Emerging%20Contaminants%20-%20PFAS.aspx)
 - For access, contact Una Song at una.song@hq.doe.gov or Danae Rupp at danae.rupp@hq.doe.gov and they will send you an invite.
- EPA PFAS Homepage: <https://www.epa.gov/pfas>
- EPA PFAS Action Plan:
[https://www.epa.gov/sites/production/files/2019-02/documents/pfas action plan 021319 508compliant 1.pdf](https://www.epa.gov/sites/production/files/2019-02/documents/pfas_action_plan_021319_508compliant_1.pdf)
- EPA PFAS Action Plan Update:
[https://www.epa.gov/sites/production/files/2020-01/documents/pfas action plan feb2020.pdf](https://www.epa.gov/sites/production/files/2020-01/documents/pfas_action_plan_feb2020.pdf)
- In the media: *The Devil We Know* and *Dark Waters*



Questions?

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