



Addressing Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)

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The estimated cost of this report or study for the Department of Defense is approximately \$44,000.00. This includes \$200.00 in expenses and \$44,000.00 in DoD labor.

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Purpose

- **Official Response to House Report 115-200:**

Polyfluoroalkyl Substances, page 118

“...The briefing should provide the following:

- (1) the locations on or in proximity to current and former military installations where the Department has conducted testing of military, public, and private drinking water systems and a summary of the results of those tests where PFOS/PFOA levels were detected in excess of the LHA levels;
- (2) the locations on or in proximity to current and former military installations where the Department has conducted groundwater testing where PFOS/PFOA may have been released and a summary of the results of those tests where PFOS/PFOA levels were detected in excess of the LHA levels;
- (3) short-term mitigations that have been funded and provided by the Department, both on military installations and in the surrounding communities, where PFOS/PFOA levels were detected in excess of the LHA levels;
- (4) the process and timeline for identifying and resourcing long-term remediation on military installations or in the surrounding communities where PFOS/PFOA levels were detected in excess of the LHA levels; and
- (5) research conducted in pursuit of less environmentally harmful AFFF blends containing less or no PFOS/PFOA.”



Addressing PFOS and PFOA

- **PFOS/PFOA Background**
- **Programmatic approach to identify, investigate, and respond to the presence of PFOS and PFOA at military bases**
 - Drinking Water
 - Groundwater
- **Programmatic approach for the removal and replacement of PFOS and PFOA in Aqueous Film Forming Foam (AFFF)**



PFOS/PFOA Background

- **PFOS/PFOA are part of a class of man-made chemicals used in many industrial and consumer products to make the products resist heat, stains, water, and grease**
 - Examples include: Teflon[®] cookware, waterproofing fabric and coating on fast food wrappers
- **Limited human studies show PFOS/PFOA may be associated with developmental delays in fetuses & children; decreased fertility; increased cholesterol; changes to the immune system; increased uric acid levels; changes in liver enzymes; and prostate, kidney, and testicular cancer**
- **In the 1970's DoD began using a firefighting foam (aqueous film forming foam –AFFF), which contained PFOS to extinguish petroleum fires**
 - Some AFFF formulations may also contain PFOA
- **In May 2000 the primary American manufacturers began phasing out the production of PFOS/PFOA related products**



PFOS/PFOA Background (continued)

- **In 2009, the U.S. Environmental Protection Agency (EPA) Office of Water established a provisional health advisory (PHA) for PFOS at 200 parts per trillion (ppt) and PFOA at 400 ppt**
 - As of 2012, EPA has published 214 health advisories
- **EPA included PFOS/PFOA for monitoring under the Safe Drinking Water Act (SDWA) Third Unregulated Contaminant Monitoring Rule (UCMR), which required sampling between 2013-2015**
- **In February 2014, EPA provided the draft health assessment for peer review**
 - The health assessment provides discussion of the human health risks used to develop the health advisory level
 - During the public peer review process DoD provided comments. EPA did not respond to our comments
 - Also, DoD was not provided the Science Advisory Board peer review before EPA published the Lifetime Health Advisory (LHA)



PFOS/PFOA Background

- **On May 19, 2016, EPA issued new Lifetime Health Advisories for PFOS and PFOA concentrations at 70 ppt (individually or combined)**
 - EPA LHA levels are only guidance under the SDWA and are not required or enforceable drinking water standards
 - Health advisory information is used to determine risk in the cleanup of water under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, aka Superfund)



Drinking Water on Our Installations

- **Completed UCMR3 testing and reporting December 2015**
 - 63 DoD drinking water systems required testing
 - Only one system detected levels above the EPA PHA – Wright Patterson AFB had one sample at 235ppt
- **As a concerned consumer, in June 2016 ASD(EI&E) directed the Military Departments to test for PFOS/PFOA where DoD supplies drinking water**
 - Completed sampling and testing of all 524 DoD drinking water systems for PFOS/PFOA
- **DoD has identified 24 drinking water systems, where DoD is the water supplier, which tested above the LHA**
 - DoD is following the EPA advisory recommended actions to include taking wells off line and providing alternative drinking water
 - These actions break the exposure pathway
- **Where DoD is not the drinking water supplier, installations are encouraged to ask if their drinking water suppliers have tested the drinking water and are the results below the EPA LHAs**
 - Identified 12 systems where DoD is not the supplier that tested above the LHA level



Drinking Water off DoD Installations

- **The Components also sampled private drinking water wells if there was a suspected or known release that migrated off-base**
- **DoD is working with the Communities and private individuals to break the exposure pathway**
- **DoD off-base testing as of August 2017:**
 - 2,445 off-base Public and Private drinking water systems tested
 - 564 public or private drinking water systems tested above the EPA LHA level
- **The accompanying spreadsheets provide:**
 - the location of military, public and private drinking water systems
 - test results
 - the short- and long-term actions to address results that were above the EPA LHA level
 - the planned and completed actions for the wells with results above the EPA LHA level



Groundwater Sampling

- **DoD follows a comprehensive approach to identify installations where DoD stored and/or used AFFF and suspect a release is impacting drinking water**
 - As of August 2017, DoD identified 401 active and BRAC installations in the United States with at least one area where there is a known or suspected release of PFOS/PFOA
- **DoD is following the CERCLA process to address these suspected releases**
 - First step is to identify the source(s) of a known or suspected release
 - Then identify if there is an exposure through drinking water
 - If there is exposure, DoD priority is to cut off drinking water exposure
 - Once exposure pathway is broken, the site is prioritized and will follow the CERCLA process to fully investigate the release and determine the appropriate cleanup actions based on risk
- **The DoD Components are conducting additional investigations, which include sampling groundwater**



Groundwater Sampling

Component	Total Installations with known or suspected release of PFOS/PFOA (as of August 31, 2017)	Number of Installations Sampled where results exceeded EPA LHA (as of August 31, 2017)	Total number of groundwater wells sampled	Number of groundwater wells that tested above the EPA LHA
Army	64	9	258	104
Navy/USMC	127	40	1,368	784
Air Force	203	39	1,022	719
DLA	7	2	20	14
Total	401	90	2,668	1,621



AFFF Replacement

- **ASD(EI&E) issued a policy in January 2016 requiring the Military Departments to:**
 - Issue Service-specific risk management procedures to prevent uncontrolled land-based AFFF releases during maintenance, testing, and training activities
 - Remove and properly dispose of PFOS-based AFFF from the local supplies for non-shipboard use where practical
- **Each of the Military Departments is taking actions to remove the AFFF containing PFOS from the supply system**
 - AF funded removal of AFFF from all fire trucks and crash response vehicles in FY 2016
- **DLA is developing new stock numbers for PFOS-free foam**
- **SERDP Statement of Need issued in October 2016 on fluorine-free foam**
 - Three Research and Development projects initiated
 - Fluorine-free Aqueous Film Forming Foam, John Payne, National Foam
 - Fluorine-free Foams with Oleophobic Surfactants and Additives for Effective Pool Fire Suppression, Ramagopal Ananth, Naval Research Laboratory
 - Novel Fluorine-free Replacement for Aqueous Film Forming Foam, Joseph Tsang, NAVAIR



PFOS/PFOA Initiatives

- **Conducted fate, transport, effects, and remediation research and demonstrations**
- **Held PFAS workshop in May 2017 (<https://www.serdp-estcp.org/Featured-Initiatives/Per-and-Polyfluoroalkyl-Substances-PFASs/2017-Workshop-Report-on-Per-and-Polyfluoroalkyl-Substances>)**
- **SERDP released two Statements of Need for FY 2018, and is initiating supplemental FY 2018 Statements of Need**
- **Participating on the Interstate Technology and Regulatory Council (ITRC) project to review and summarize the currently available Perfluoroalkyl Substances (PFAS) information**
 - ITRC technical team is comprised of members representing Federal and State regulators, Federal agencies, industry, and community stakeholders
 - The ITRC document will provide a unified summary of the state of the science to aid in the selection of appropriate responses to environmental releases of PFAS



PFOS/PFOA Challenges

- **Without a EPA cleanup standard we cannot capture our requirements**
 - Cleanup standard -- Lifetime Health Advisory (LHA) vs Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) risk assessment
- **Responding to state laws and standards**
- **PFAS exposure assessment and health study – Coordinating with ATSDR on the design and how we will work together throughout the process**
- **PFOS/PFOA versus Perfluoroalkyl Substances (PFAS) versus Perfluorinated Compounds (PFCs)**
- **EPA must go through the process to establish a Maximum Contaminant Level (MCL) under the Safe Drinking Water Act**
- **Disposal of contaminated groundwater and used granulated activated carbon (GAC)**
- **Insufficient time to program for requirements**

DoD remains committed to protecting human health and the environment



Conclusion

- **DoD's priority is to address PFOS/PFOA to protect personnel living and working on our installations and the surrounding communities that we have impacted**
- **Military Departments have made great strides to ensure safe drinking water for our installations**
- **We are addressing DoD's cleanup responsibility**
- **Initiated removal of AFFF with PFOS from the supply chain**



References



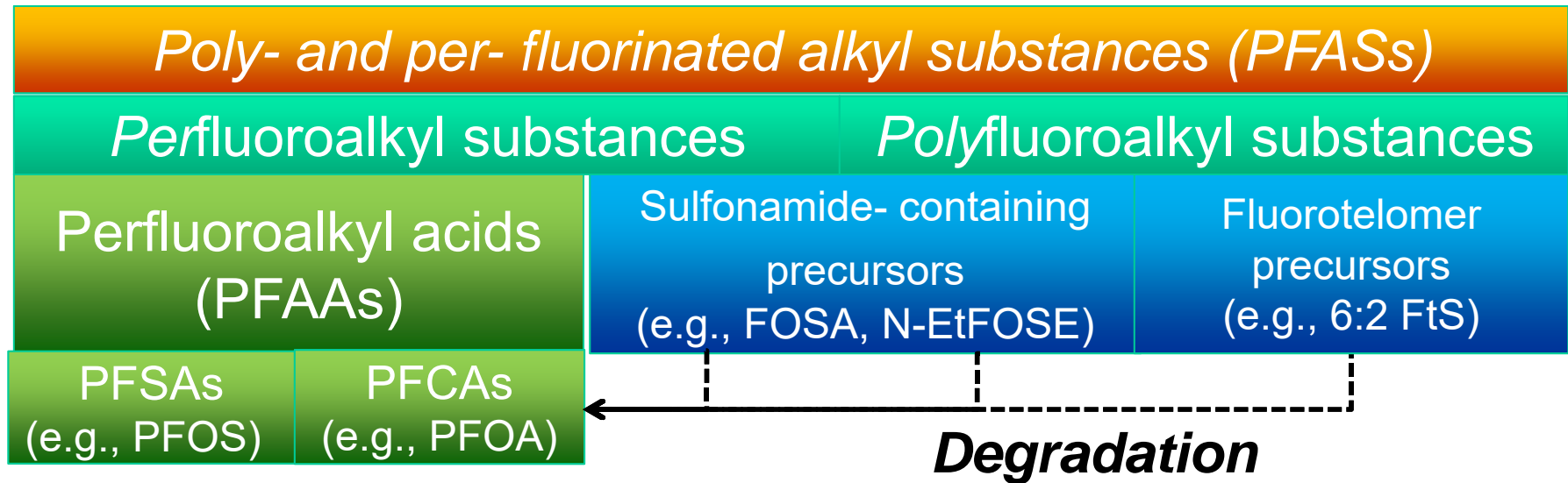
Applicable Policies

- **DoD Instruction 4715.06, “Environmental Compliance in the United States,” May 4, 2015**
- **DoD Instruction 4715.07, “Defense Environmental Restoration Program,” May 21, 2013**
- **DoD Instruction 4715.18, “Emerging Contaminants (ECs),” June 11, 2009**
- **DoD Manual 4715.20, “Defense Environmental Restoration Program (DERP) Management,” March 9, 2012**
- **ASD(EI&E) Memorandum, “Testing DoD Drinking Water for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA),” June 10, 2016**
- **Emerging Contaminant Governance Council Meeting Results January 28, 2016**

These are consistent with CERCLA, NCP, DERP Statute (10 U.S.C. 2701), and SDWA



Alphabet Soup



Acronyms

- Perfluorinated carboxylic acids (PFCAs)
- Perfluorinated sulfonic acids (PFASs)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluorooctane sulfonamide (FOSA)
- 2-N-Ethyl-perfluoro-1-octanesulfamido ethanol (N-EtFOSE)
- Fluorotelomer sulfonate (FtS)

Source: Buck et al., 2011; Houtz, 2013

**DoD Component Summary
Number of Installations and Drinking Water Systems Tested for
Perfluorooctane Sulfonate (PFOS) Perfluorooctanoic Acid (PFOA)**

Summary of DoD Drinking Water Systems							
DoD Component	Number of Installations in US/Territories/ Overseas ¹	Number of DoD Drinking Water Systems for DoD Installations		Number of DoD Drinking Water Systems Tested by Either DoD or the non-DoD Purveyor		Number of DoD Drinking Water Systems Tested Where PFOS/PFOA > EPA LHA ³	
		DoD Purveyor	Non-DoD Purveyor	DoD Purveyor	Non-DoD Purveyor ²	DoD Purveyor	Non-DoD Purveyor
Army	2,905	255	2,738	255	1,589	12	4
Navy	108	100	236	100	236	5	1
USMC	68	28	52	28	52	1	2
Air Force	177	140	134	140	134	6	5
DLA	8	1	7	1	7	0	0
DoD Totals	3,266	524	3,167	524	2,018	24	12

Footnotes:

1: Includes Guard and Reserve facilities.

2: Non-DoD purveyor tested most of these systems so far as required under the EPA's Unregulated Contaminant Monitoring Rule 3 or per request from DoD. For systems not tested, the DoD Components are assessing on a case-by-case basis to determine if the systems may be impacted and needs testing.

3: The EPA Lifetime Health Advisories (LHAs) for PFOS and PFOA are 70 parts per trillion (individually or combined).

The information included in the table above is current as of August 31, 2017.

AIR FORCE

Department of the Air Force
Summary of DoD Testing of Groundwater Monitoring Wells and Actions Taken where Results were above the EPA LHAs for PFOS/PFOA

Air Force Installations where DoD Sampled Groundwater Monitoring Wells and Actions Taken where Results were Above the EPA LHAs ¹										
DoD Component	Installation	State/Territory	On-base Groundwater Monitoring Wells			Off-base Groundwater Monitoring Wells			Actions Taken as of August 31, 2017 ²	Key Actions Planned for FY 2018 to Reduce PFOS/PFOA Below LHA
			Total Number Sampled	Number that Tested above the EPA LHAs ¹	Range of Results above EPA LHAs (ppt)	Total Number Sampled	Number that Tested above the EPA LHAs ¹	Range of Results above EPA LHAs (ppt)		
Air Force-Active	Moody AFB	Georgia	34	22	590–375,000 ppt PFOS+PFOA	0			Completed the base-wide Preliminary Assessment and received regulatory concurrence on the findings. Initiated a base-wide Site Inspection for PFOS and PFOA.	Continue following the CERCLA process through investigation, cleanup, and long-term monitoring. Perform mitigation activities when impacts to human health are determined.
Air Force-Active	Patrick AFB	Florida	28	28	71–4,300,000 ppt PFOS+PFOA	0			Completed the base-wide Preliminary Assessment and received regulatory concurrence on the findings. Initiated a base-wide Site Inspection for PFOS and PFOA.	Continue following the CERCLA process through investigation, cleanup, and long-term monitoring. Perform mitigation activities when impacts to human health are determined.
Air Force-Active	Peterson AFB	Colorado	14	8	79–88,400 ppt PFOS+PFOA	10	2	130–980 ppt PFOS+PFOA	Submitted request for Expanded SI funds. Conducted mitigation efforts, as reported in Drinking Water Data Call	Expanded SI Field work and continued mitigation on private and public drinking water wells
Air Force-Active	Robins AFB	Georgia	5	3	150–1,400 ppt PFOS+PFOA	0			Completed the base-wide Preliminary Assessment and received regulatory concurrence on the findings. Initiated a base-wide Site Inspection for PFOS and PFOA.	Continue following the CERCLA process through investigation, cleanup, and long-term monitoring. Perform mitigation activities when impacts to human health are determined.