Aqueous Film Forming Foam

Report to Congress

October 2017

Office of the Under Secretary of Defense
for Acquisition, Technology, and Logistics

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I. Introduction

The Joint Explanatory Statement accompanying the Consolidated Appropriations Act, 2017 (Public Law 115-31), directs the Secretary of Defense to provide information regarding the Department's efforts to address perfluorinated chemicals (PFCs) contamination on military bases and in neighboring communities due to the use of aqueous film forming foam (AFFF). This report contains information to meet the following reporting requirements:

1. Assess the number of formerly used and current military installations where AFFF was or is currently used, and the impact of PFC contaminated drinking water on surrounding communities; and

2. Include plans for prompt community notification of such contamination, when the contamination was detected, and the procedures for timely remediation.

II. Background

PFCs, including perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), are a large group of man-made chemicals commonly found in the environment. PFCs are widely used to make many industrial and consumer products resistant to heat, stains, water, and grease (e.g., non-stick cookware, waterproof fabric, and firefighting foam). In the 1970s, DoD began using AFFF that contained PFOS and, in some formulations, PFOA. This mission critical product saves lives and protects assets by quickly extinguishing petroleum-based fires, and the Federal Aviation Administration required its use at airports nationally. As a result of AFFF use, PFOS and PFOA has been detected at a number of DoD installations. This report focuses on PFOS and PFOA because these are the only known PFCs with health advisories.

In May 2000, the American manufacturers began voluntarily phasing out the production of PFOS-related products, including AFFF containing PFOS, in response to proposed U.S. Environmental Protection Agency (EPA) regulations under the Toxic Substances Control Act. Shortly after that time, AFFF containing PFOS was no longer available for purchase, but due to its long shelf life the DoD Components may still have some AFFF containing PFOS in their inventory.

In 2009, the EPA Office of Water established a provisional short-term health advisory for PFOS at 200 parts per trillion (ppt) and PFOA at 400 ppt under the Safe Drinking Water Act (SDWA). Although this advisory applied only to drinking water and not to cleanup, DoD used the toxicity data from the provisional health advisory to assess risk to human health at its cleanup sites. Using the 2009 provisional health advisory, DoD identified very few sites that posed an unacceptable risk to human health.

To address rising concerns associated with the use of AFFF containing PFOS, DoD issued a human health and environmental risk alert for AFFF in 2011 that suggested guidelines to control future releases. The alert also advised the DoD Components to determine site-specific characterization, assessment, and risk management procedures if records indicate that a facility may have a release of AFFF into the environment.

On May 19, 2016, EPA issued a SDWA lifetime health advisory (LHA) recommending that the individual or combined levels of PFOS and PFOA concentrations in drinking water be below 70 ppt. This LHA level is significantly lower than the 2009 short-term health advisory. While it is only guidance under the SWDA and is not a required or enforceable drinking water standard, DoD began taking actions to address impacted drinking water based on the new LHA. For example, DoD issued a policy in June 2016 requiring the DoD Components to sample and test drinking water systems where DoD is the water purveyor and to take action where the EPA LHA was exceeded.

The DoD Components also developed strategies under the Defense Environmental Restoration Program (DERP) to start proactively investigating and addressing DoD releases of PFOS and PFOA. As of December 31, 2016, DoD has spent approximately $202 million on PFOS and PFOA sampling, analysis, and cleanup, including about $199 million that was originally programmed for cleanup activities at other sites. This will likely lead to delays in completing cleanup at those sites. We also expect the cost-to-complete estimate to increase as we determine what cleanup actions are required to address the releases of PFOS and PFOA.

III. DoD's Approach to PFOS and PFOA

The Department is committed to addressing the health risk associated with releases of PFOS and PFOA and ensuring safe drinking water for the people living and working on its installations and in the surrounding communities. To that end, DoD is using a multi-faceted approach, discussed in more detail below, to address PFOS and PFOA concerns related to drinking water, cleanup, and the AFFF supply chain.

Drinking Water on Our Installations

The Department sampled 63 drinking water systems for PFOS and PFOA in compliance with EPA's SDWA 3rd Unregulated Contaminant Monitoring Rule (UCMR3)[1]. After the Department completed UCMR3 testing in December 2015, only one DoD drinking water system, at Wright Patterson Air Force Base, tested above the EPA LHA level. The Air Force took the two affected wells at Wright Patterson Air Force Base out of service and worked with Ohio environmental officials to install granular activated carbon filters on the impacted wells. These wells have since returned to service.

In June 2016, the Assistant Secretary of Defense for Energy, Installations, and Environment (ASD(EI&E)) directed the DoD Components to test for PFOS and PFOA where DoD supplies drinking water, including overseas systems, and assess the results against the EPA LHA level. Under this policy, as of March 2017, DoD has tested 83 percent of its 515 drinking water systems and expects to complete the testing in FY 2017. Appendix A shows the number of installations and drinking water systems the DoD Components tested. As of December 2016, 19

[1] UCMR3 required sampling of approximately 6,000 public drinking water systems in the United States and its territories between 2013 and 2015, including 63 DoD drinking water systems. The estimate of 6,000 public drinking water systems is based on the May 2012 EPA UCMR3 fact sheet, "The Third Unregulated Contaminant Monitoring Rule: Searching for Emerging Contaminants in Drinking Water."

DoD drinking water systems, including overseas, tested above the EPA LHA level. For drinking water systems that test above the EPA LHA level, DoD is following EPA's health advisory recommended actions. Appendix B lists the 19 drinking water systems that tested above the EPA LHA level, and includes the EPA recommended actions the DoD Components took to ensure no one is drinking water with elevated levels of PFOS and/or PFOA. These actions include, but are not limited to:

- Publicly notifying water consumers;
- Shutting down a well(s);
- Retesting;
- Providing alternative drinking water; and
- Adding a granular activated carbon filter to the well.

Additionally, where DoD purchases drinking water, installations are encouraged to ask if their suppliers have tested the drinking water for PFOS and PFOA and if so, whether the results are below the EPA LHA level. If the drinking water supplier has not conducted testing, the Departments of the Air Force and Navy test the drinking water at the tap. The Department of the Army is in the early stages of testing. If the results of these tests are above the EPA LHA level, DoD Components will work with the drinking water supplier to take appropriate actions.

DERP

The Department is committed to addressing on-base releases and off-base migration of PFOS and PFOA under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Department follows a comprehensive approach to identify installations where DoD used AFFF containing PFOS or PFOA. The Department then determines whether there is exposure through drinking water and, if there is exposure, the Department's priority is to cut off the drinking water exposure. The Department will prioritize sites with a known or suspected release of PFOS or PFOA for investigation and cleanup, if necessary, using a risk-based approach. The Department's fundamental premise in site prioritization is "worst first," meaning the DoD Components will address sites that pose a relatively greater potential risk to human health or the environment before sites posing a lesser risk. The Department's priority is to quickly reduce significantly elevated levels of PFOS and PFOA in drinking water. DoD Components will take appropriate actions under CERCLA to address the health risk associated with DoD releases of PFOS and PFOA. This is discussed in more detail in the "Formerly Used and Current Military Installations Where AFFF Was or Is Currently Used and the Impact of PFOS and PFOA Contaminated Drinking Water on Surrounding Communities" section of this report.

AFFF Replacement

DoD Components are working to remove AFFF containing PFOS and PFOA from the supply chain. In January 2016, ASD(EI&E) issued a policy requiring the DoD Components to: 1) issue Military Service-specific risk management procedures to prevent uncontrolled land-based releases of AFFF during maintenance, testing, and training activities and 2) remove and properly dispose of AFFF containing PFOS from the local stored supplies for non-shipboard use to prevent future environmental response action costs, where practical. Under this policy, the Air Force funded the removal of AFFF from all fire trucks and crash response vehicles, and

replaced it with environmentally preferable PFOS-free AFFF containing only trace quantities of PFOA. All Air Force bases except Thule Air Force Base, Greenland, have received replacement AFFF and 97 percent of the bases have completed the transition. In addition, the Navy is updating the Military Specification requirements for AFFF, and working with manufacturers to determine the exact chemical composition of AFFF alternatives.

The Department is also investing in research and development projects to develop a fluorine-free foam. For example, DoD has partnered with the National Toxicology Program of the National Institute of Environmental Health Sciences, which is evaluating the toxicity of AFFF compounds on the DoD qualified products list. The purpose of this evaluation is to assist DoD in making decisions about selecting and procuring the qualified fluorinated products with the highest performance and lowest toxicity.

IV. Formerly Used and Current Military Installations Where AFFF Was or Is Currently Used and the Impact of PFOS and PFOA Contaminated Drinking Water on Surrounding Communities

The Department followed a comprehensive approach to identify installations where DoD used AFFF containing PFOS or PFOA. Releases of PFOS and PFOA on DoD installations are primarily associated with firefighting training areas, hangars, fire suppression systems, and aircraft crash sites. As of December 31, 2016, DoD has identified 393 active and Base Realignment and Closure installations with one or more areas where there is a known or suspected release of PFOS and/or PFOA; Appendix C lists these installations and the associated investigation and cleanup costs, where applicable. This list includes sites that DoD is currently addressing as part of its DERP, and new areas not currently included in the DERP (e.g., airplane crash sites, aircraft hangar suppression systems). These known or suspected PFOS and PFOA release areas are in various stages of assessment, investigation, and cleanup.

Now that DoD has an initial list of known and suspected release areas, DoD Components are following the CERCLA process to investigate these releases to confirm if a release occurred. The DoD Components will collect information on the nature and extent of the releases to determine if cleanup actions are necessary. The Department considers the EPA's health advisory information when addressing risk to human health under its cleanup program consistent with EPA risk assessment guidance.

The Department is following the EPA advisory recommendations for off-base migration into drinking water, and will notify the appropriate state agencies and affected communities. The Department investigates the source(s) of the PFOS and PFOA to reduce the risk associated with drinking water above the LHA in a timely manner and minimize the impact of PFOS and PFOA to surrounding communities. For example, after detecting PFOS above the EPA provisional health advisory level in drinking water samples at the former Pease Air Force Base in April 2014, the Air Force promptly notified the New Hampshire Department of Environmental Services of the elevated levels. In response, the City of Portsmouth immediately shut down the affected wells, and the Air Force began investigating the source of the PFOS and PFOA in the groundwater and in off-site private water supply wells.

V. Plans for Prompt Community Notification of Drinking Water Contamination, When Contamination was Detected, and Procedures for Timely Remediation

Throughout the cleanup process, DoD works in concert with regulatory agencies and communities, and shares information in an open and transparent manner. When elevated levels of PFOS and PFOA are detected that may pose an unacceptable risk to human health, DoD uses a proactive outreach strategy to promptly notify potentially affected community members. Outreach efforts may include:

- Communicating proactively to potentially affected communities;
- Partnering with local regulatory and governmental organizations to reach stakeholders;
- Hosting public meetings;
- Alerting and engaging with the media;
- Messaging through community social media; and
- Updating community leaders.

The DoD Components use a variety of methods to actively reach out to and notify the surrounding community about the potential impacts of PFOS and PFOA. For example, the Air Force established a proactive outreach program to provide potentially affected communities with consistent and accurate information regarding its responses to PFOS and PFOA. The Air Force's community outreach efforts include participating in public community meetings (both ad hoc and Restoration Advisory Boards (RABs)[2]), providing local and social media alerts and engagement, updating community leaders and influencers, and posting pertinent information on the Air Force Civil Engineer Center (see http://www.afcec.af.mil/WhatWeDo/Environment/Perfluorinated-Compounds) and installation-specific public web sites. The Air Force also develops fact sheets to inform affected residents of the Air Force's efforts to prevent human exposure to PFOS and PFOA. Throughout the outreach process, the Air Force collaborates with local regulatory and governmental organizations to reach stakeholders.

Additionally, the Navy is developing frequently asked questions documents to help the public understand Navy-wide and installation-specific cases related to PFOS and PFOA contamination that may impact their communities. For example, the Navy prepared an off-base sampling fact sheet for Naval Air Station Fallon. The fact sheet informs the public of the potential exposure to PFOS and PFOA detected in the onsite groundwater. The fact sheet also explains the Navy's request to sample drinking water at a home in the surrounding community to determine if PFOS and PFOA are present in private drinking water wells in the area, and highlights the Navy's future actions based on the sampling results. These future actions include notifying the resident of his or her personal drinking water results and providing an alternate water source, if necessary, until the Navy can implement a permanent solution. For more information about the Navy's policies on and management strategy for addressing PFOS and PFOA, see http://www.secnav.navy.mil/eie/pages/pfc-pfas.aspx.

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[2] The Department encourages community involvement in the cleanup process through RABs. Since 1994, DoD has established RABs at more than 300 military installations and properties in the United States and its territories to encourage communities and installation personnel to identify and discuss potential cleanup issues.

VI. Conclusion

Addressing elevated levels of PFOS and PFOA from DoD activities is a priority for DoD. The DoD Components have taken action to ensure safe drinking water for people living and working on their military installations and in the surrounding communities. Following the CERCLA process, DoD is addressing its cleanup responsibility and promptly notifying affected communities. DoD is also taking steps to remove and replace AFFF containing PFOS in the supply chain, and is committed to finding a fluorine-free alternative that safeguards its troops and military assets, meets critical mission requirements, and protects human health and the environment.

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Appendix A

Number of Installations and Drinking Water Systems Tested for PFOS and PFOA, and Associated Sampling Costs

This Appendix provides the number of installations and drinking water systems DoD Components tested as of March 2017, and the associated costs.

Appendix A: Summary by DoD Component
Number of Installations and Drinking Water Systems Tested for Perfluorooctane Sulfonate (PFOS)/Perfluorooctanoic Acid (PFOA), and Associated Sampling Costs

DoD Component	Number of Installations in US/Territories/ Overseas[1,2]	Associated Drinking Water Systems[2]		Drinking Water Systems Tested by DoD or non-DoD Purveyor[2]		Drinking Water Systems Tested by DoD and Cost where PFOS/PFOA < EPA LHA Level[3]		Drinking Water Systems Tested by DoD and Cost where PFOS/PFOA > EPA LHA Level[6]		Total Drinking Water Sampling Costs[4,5] (thousands of dollars)
		DoD Purveyor	Non-DoD Purveyor	DoD Purveyor	Non-DoD Purveyor	Number of Systems[2]	Cost[4,5] (thousands of dollars)	Number of Systems[2]	Cost[4,5] (thousands of dollars)	
Army[7]	2,884	246	1,993	159	1,354	284	$1,411.4	9	$30.4	**$1,441.8**
Navy	108	100	236	100	236	151	$260.0	5	$388.6	**$648.6**
USMC	68	28	52	28	52	29	$47.5	1	$11.5	**$59.0**
Air Force	177	140	134	140	128	268	$213.0	5	$167.0	**$380.0**
DLA	8	1	7	1	7	5	$21.4	0	$0.0	**$21.4**
DoD Totals	**3,245**	**515**	**2,422**	**428**	**1,777**	**737**	**$1,953.2**	**20**	**$597.5**	**$2,550.7**

Footnotes:

1: Includes Guard and Reserve facilities.
2: The number of installations and the number of drinking water systems are current as of March 28, 2017.
3: The EPA Lifetime Health Advisory (LHA) level for PFOS and PFOA is 70 parts per trillion (individually or combined).
4: Cost data are current as of December 31, 2016.
5: This cost does not include in-house labor, public notifications, travel, or contractual actions.
6: The number of drinking water systems tested by DoD and the associated cost includes Fort Leavenworth, where the Army is not the drinking water purveyor.
7: The Army has contracted a portion of its drinking water system sampling and anticipates finalizing that sampling by the end of Fiscal Year 2017.

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Appendix B

DoD Summary of Safe Drinking Water Actions where DoD is the Drinking Water Purveyor and the Systems Tested Above the EPA LHA Level

This Appendix provides a summary of actions taken by the DoD Components for drinking water systems where DoD is the drinking water purveyor and the systems tested above the EPA LHA level.

Appendix B: DoD Summary of Safe Drinking Water Actions where DoD is the Drinking Water Purveyor and the Systems Tested Above the EPA LHA Level

DoD Installations where DoD is the Drinking Water Purveyor and Actions Taken to Address PFOS/PFOA Above the EPA LHA Level[1]					
DoD Component	**Installation**	**State**	**Results (PFOS/ PFOA) or Range**	**Actions Taken[2]**	**Total Cost through Dec 31, 2016[3,4] (thousands of dollars)**
Army	Fort Hunter Liggett	California	330	Costs reported are for multiple rounds of sampling throughout the water system. One well at Fort Hunter Liggett exceeded the LHAs and has been taken offline. A treatment system will be installed on that well if it is needed in the future, to ensure the water is below the LHAs.	$2.1
Army	JB Lewis-McChord: Fort Lewis Cantonment	Washington	72	Costs reported are for multiple rounds of sampling throughout the water system. One well at the Lewis Cantonment area exceeded the LHAs and has been shut down. The remaining wells will be used to supply water until a treatment system can be installed to ensure the water from the system is below the LHAs.	$3.4
Army	JB Lewis-McChord: McChord Field	Washington	250	Costs reported are for multiple rounds of sampling throughout the water system. Two wells at the McChord Field area of JBLM exceeded the LHAs and have been shut down. The remaining wells will be used to supply water under the LHAs, and treatment systems will be installed to mitigate the two wells so they can be turned back on while ensuring the water distributed is below the LHAs.	$3.4
Army	Soto Cano AB, HN	Honduras	59-83	Costs reported are for multiple rounds of sampling throughout the water system. Two wells were above the LHAs initial sampling. No wells were above LHAs with confirmatory sampling. Bottled water is being used on the installation until additional confirmatory sampling confirms water is below the LHAs.	$2.8
Army	USAG Daegu, KR Camp Carroll	Korea	327	Costs reported are for multiple rounds of sampling throughout the water system. Camp Carroll's onsite water was above the LHAs and they isolated and shut down those wells over the LHAs so all water being distributed now is below the LHAs.	$3.8
Army	USAG Daegu, KR Camp Walker	Korea	244	Costs reported are for multiple rounds of sampling throughout the water system. Camp Walker's onsite water was above the LHAs and they have connected to the city water, which is below the LHAs.	$3.8
Army	USAG Red Cloud, KR: Camp Red Cloud	Korea	381	Costs reported are for multiple rounds of sampling throughout the water system. Camp Red Cloud's onsite water was above the LHAs and they have connected to the city water, which is below the LHAs.	$3.8
Army	USAG Red Cloud, KR: Camp Stanley	Korea	169	Costs reported are for multiple rounds of sampling throughout the water system. Camp Stanley's onsite water was above the LHAs and they have connected to the city water, which is below the LHAs.	$3.8
				Army Subtotal:	**$26.7**

Appendix B: DoD Summary of Safe Drinking Water Actions where DoD is the Drinking Water Purveyor and the Systems Tested Above the EPA LHA Level

DoD Installations where DoD is the Drinking Water Purveyor and Actions Taken to Address PFOS/PFOA Above the EPA LHA Level[1]					
DoD Component	**Installation**	**State**	**Results (PFOS/ PFOA) or Range**	**Actions Taken[2]**	**Total Cost through Dec 31, 2016[3,4] (thousands of dollars)**
Navy	NAS Oceana - NALF Fentress	Virginia	2,800-4,900	Drinking water sampling and analysis. Navy provided alternative drinking water, upgraded wastewater treatment plant, design/construction for water treatment plant	$364.0
Navy	NSA Monterey - Naval Radio Transmitter Facility Dixon	California	260	Drinking water sampling and analysis. Navy is providing alternative drinking water and retesting drinking water wells.	$0.8
Navy	NSF Diego Garcia: Cantonment/Air Operations	Diego Garcia	5,849	Alternate drinking water supply was already being provided due to other contaminants. New drinking water treatment plant MILCON project was completed in December 2016, which will address PFOS/PFOA.	$0.0
Navy	NSF Diego Garcia: I Site	Diego Garcia	102	Actions taken at the I Site are included in the actions taken at the Cantonment/Air Operations Site.	$0.0
Navy	NSF Diego Garcia: Sub Site	Diego Garcia	74-78	Shut down drinking water wells that exceeded EPA LHAs wells. Bottled water was being provided until granular activated carbon filters were replaced and reconfigured. Conducting quarterly retesting of drinking water wells.	$23.8
				Navy Subtotal:	**$388.6**
USMC	MCB Camp Pendleton (South)	California	77	-One sample exceeded the PFOS/PFOA combined Health Advisories Level. -The affected reservoir was drained and replaced with water from another source. -Resampling confirmed levels below the Health Advisories Level in the current water supply and levels slightly above the Health Advisories Level in the well taken out of service. Installation will continue to monitor the system.	$11.5
				USMC Subtotal:	**$11.5**

Appendix B: DoD Summary of Safe Drinking Water Actions where DoD is the Drinking Water Purveyor and the Systems Tested Above the EPA LHA Level

DoD Installations where DoD is the Drinking Water Purveyor and Actions Taken to Address PFOS/PFOA Above the EPA LHA Level[1]					
DoD Component	**Installation**	**State**	**Results (PFOS/ PFOA) or Range**	**Actions Taken[2]**	**Total Cost through Dec 31, 2016[3,4] (thousands of dollars)**
Air Force	Eielson AFB	Alaska	9-91	Drinking water sampling and analysis. Three out of six drinking water wells were taken off-line. Eielson upgraded the base water treatment plant by installing activated carbon filter. Eielson conducting monthly sampling.	$35.0
Air Force	Horsham Air Guard Station	Pennsylvania	PFOS: 60 PFOA: 290	Drinking water sampling and analysis for several years. Two drinking water wells are off-line. Currently sampling monthly at four locations.	$3.0
Air Force	Mountain Home Air Force Base	Idaho	77-105	Drinking water sampling and analysis. AF purchasing pallets of bottled water for consumption until mitigation actions can be completed. Additional sampling conducted to determine safe location for replacement drinking water well and to determine filtration system requirements for drinking water well #4.	$30.0
Air Force	New Boston	New Hampshire	13-78	Drinking water sampling and analysis. Well above the EPA LHAs has been shut down. The AF is conducting quarterly sampling for the operational drinking water wells.	$2.0
Air Force	Wright Patterson Air Force Base (AFB)	Ohio	90-235	Drinking water sampling and analysis. Bottled water was provided for Area A, where two drinking water wells and the treatment system were shut down. In the process of installing granular activated carbon filter system. Base officials are continuing to sample drinking water to ensure levels remain below the EPA LHAs.	$97.0
				Air Force Subtotal:	**$167.0**
				Grand Total:	**$593.8**

Footnotes:

1: The EPA Lifetime Health Advisory (LHA) level for PFOS and PFOA is 70 parts per trillion (individually or combined).

2: Examples of actions taken include but are not limited to: sampling and analysis, retesting, shutting down a well(s), providing alternative drinking water, adding an activated carbon filter to the well, blending water systems, etc.

3: Costs include but are not limited to sample collection, analysis and reporting plus any costs associated with the actions taken.

4: This cost does not include in-house labor, public notifications, travel, or contractual actions.

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Appendix C

DoD Installations with a Known or Suspected Release of PFOS or PFOA

This Appendix provides the DoD installations with one or more known or suspected releases of PFOS or PFOA.

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Army - Active	Aberdeen Proving Ground	Maryland	$130.2	$0.0	$130.2
Army - Active	Army Aviation Support Facility 1 Ronkonkoma New York	New York	$0.0	$0.0	$0.0
Army - Active	Army Aviation Support Facility 2 Rochester New York	New York	$0.0	$0.0	$0.0
Army - Active	Army Aviation Support Facility 3 New York	New York	$0.0	$0.0	$0.0
Army - Active	Army Aviation Support Facility 3333 Skyway Dr Montana	Montana	$0.0	$0.0	$0.0
Army - Active	Army Aviation Support Facility Greenville	South Carolina	$0.0	$0.0	$0.0
Army - Active	Army National Guard Armory	Montana	$0.0	$0.0	$0.0
Army - Active	Army National Guard Facility Casper, Wyoming	Wyoming	$0.0	$0.0	$0.0
Army - Active	Austin Bergstrom Hangar	Texas	$0.0	$0.0	$0.0
Army - Active	Aviation Support Facility Johnstown	Pennsylvania	$0.0	$0.0	$0.0
Army - Active	Aviation Support Facility New Century	Kansas	$0.0	$0.0	$0.0
Army - Active	Bangor Armed Forces Reserve Center	Maine	$0.0	$0.0	$0.0
Army - Active	Brunswick Armed Forces Reserve Center	Maine	$0.0	$0.0	$0.0
Army - Active	Camp Minden Training Site former Louisiana Army Ammunition Plant	Louisiana	$0.0	$0.0	$0.0
Army - Active	Camp Navajo	Arizona	$0.0	$0.0	$0.0
Army - Active	Camp Pendleton State Military Reservation	Virginia	$0.0	$0.0	$0.0
Army - Active	Camp Roberts Building 7020 (Former Fire Training Area, CPRO-39)	California	$0.0	$0.0	$0.0
Army - BRAC	Devens[3]	Massachusetts	$126.8	$0.0	$126.8
Army - Active	Ethan Allen Firing Range	Vermont	$0.0	$0.0	$0.0
Army - Active	Former Crash Fire Station, Building 241	New Hampshire	$0.0	$0.0	$0.0
Army - Active	Fort Bragg	North Carolina	$0.0	$0.0	$0.0
Army - Active	Fort Campbell	Kentucky	$0.0	$0.0	$0.0
Army - Active	Fort Carson	Colorado	$23.5	$0.0	$23.5
Army - Active	Fort Drum	New York	$623.0	$0.0	$623.0
Army - Active and BRAC	Fort Greely	Alaska	$0.0	$0.0	$0.0
Army - Active	Fort Hunter Liggett	California	$0.0	$0.0	$0.0
Army - Active	Fort Irwin	California	$0.0	$0.0	$0.0
Army - Active	Fort Jackson	South Carolina	$0.0	$0.0	$0.0
Army - Active	Fort Knox	Kentucky	$0.0	$0.0	$0.0
Army - Active	Fort Leavenworth	Kansas	$0.0	$0.0	$0.0
Army - Active	Fort Lee	Virginia	$5.0	$0.0	$5.0
Army - Active	Fort McCoy	Wisconsin	$12.0	$0.0	$12.0
Army - BRAC	Fort Meade BRAC	Maryland	$9.5	$0.0	$9.5
Army - BRAC	Fort Ord	California	$73.5	$0.0	$73.5

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Army - BRAC	Fort Pickett	Virginia	$0.0	$0.0	$0.0
Army - Active	Fort Rucker	Alabama	$0.0	$0.0	$0.0
Army - Active	Fort Sill	Oklahoma	$0.0	$0.0	$0.0
Army - Active	Fort Stewart, Georgia	Georgia	$0.0	$0.0	$0.0
Army - Active	Fort Wainwright	Alaska	$0.0	$0.0	$0.0
Army - Active	Garrison Bldg 15 Guernsey, Wyoming	Wyoming	$0.0	$0.0	$0.0
Army - Active	Grand Prairie Hangar	Texas	$0.0	$0.0	$0.0
Army - Active	Hunter Army Airfield	Georgia	$0.0	$0.0	$0.0
Army - Active	Jackson Airport Armory	Mississippi	$0.0	$0.0	$0.0
Army - Active	Joint Base Berry Field	Tennessee	$0.0	$0.0	$0.0
Army - Active	Joint Base Lewis-McChord	Washington	$20.0	$0.0	$20.0
Army - Active	Letterkenny Army Depot	Pennsylvania	$234.6	$0.0	$234.6
Army - Active	Los Alamitos Joint Forces Training Base	California	$0.0	$0.0	$0.0
Army - Active	Martindale Hangar	Texas	$0.0	$0.0	$0.0
Army - Active	McEntire Air National Guard Station/Army Aviation Support Facility	South Carolina	$0.0	$0.0	$0.0
Army - Active	Muscatatuck Urban Training Complex Butlerville, Indiana	Indiana	$0.0	$0.0	$0.0
Army - Active	National Guard Tempe Readiness Center Arizona	Arizona	$0.0	$0.0	$0.0
Army - Active	North Penn U.S. Army Reserve Center	Pennsylvania	$12.9	$0.0	$12.9
Army - Active	Range 36 Air-to-Ground, Indiana	Indiana	$0.0	$0.0	$0.0
Army - Active	Sacramento Army Aviation Support Facility	California	$0.0	$0.0	$0.0
Army - BRAC	Seneca Army Ammunition Plant[3]	New York	$238.0	$0.0	$238.0
Army - Active	Shelbyville Army Aviation Support Facility	Indiana	$0.0	$0.0	$0.0
Army - Active	Silver Bell Army Heliport Arizona	Arizona	$0.0	$0.0	$0.0
Army - Active	Smyrna Volunteer Training Site	Tennessee	$0.0	$0.0	$0.0
Army - Active	State Military Reservation	New York	$0.0	$0.0	$0.0
Army - BRAC	Sudbury[3]	Massachusetts	$64.1	$0.0	$64.1
Army - BRAC	Umatilla Chemical Depot/Well #4/Sample # 16-6746-AZW6A	Oregon	$0.0	$0.0	$0.0
Army - Active	USAG Kwajalein Atoll	Marshall Islands	$0.0	$0.0	$0.0
Army - Active	Yakima Training Center	Washington	$0.0	$0.0	$0.0
Army - Active	Yuma Proving Ground/Kofa Firing Range	Arizona	$0.0	$0.0	$0.0
		Army Subtotals:	**$1,573.1**	**$0.0**	**$1,573.1**

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Navy - BRAC	Adak Alaska Naval Air Facility	Alaska	$0.0	$0.0	$0.0
Navy - BRAC	Agana	Guam	$58.0	$0.0	$58.0
Navy - BRAC	Alameda	California	$120.0	$0.0	$120.0
Navy - Active	Amchitka Alaska	Alaska	$0.0	$0.0	$0.0
Navy - Active	Anacostia Naval Station	District of Columbia	$0.0	$0.0	$0.0
Navy - BRAC	Annapolis	Maryland	$351.0	$0.0	$351.0
Navy - Active	Bainbridge Maryland Naval Training Center	Maryland	$0.0	$0.0	$0.0
Navy - Active and BRAC	Barbers Point Naval Air Station	Hawaii	$0.0	$0.0	$0.0
Navy - Active	Barking Sands Hawaii F Pacific Missile Range Facility	Hawaii	$0.0	$0.0	$0.0
Navy - Active	Barrow	Alaska	$151.0	$0.0	$151.0
Navy - Active	Bedford Massachusetts Naval Weapons Industrial Reserve Plant	Massachusetts	$0.0	$0.0	$0.0
Navy - Active	Bethpage New York Naval Weapons Industrial Reserve Plant	New York	$0.0	$0.0	$0.0
Navy - Active	Bloomfield Connecticut Naval Weapons Industrial Reserve Plant	Connecticut	$0.0	$0.0	$0.0
Navy - Active	Bristol Tennessee Naval Weapons Industrial Reserve Plant	Tennessee	$0.0	$0.0	$0.0
Navy - BRAC	Brunswick	Maine	$973.0	$0.0	$973.0
Navy - Active	Calverton	New York	$374.0	$0.0	$374.0
Navy - BRAC	Cecil Field Naval Air Station	Florida	$0.0	$0.0	$0.0
Navy - BRAC	Charleston Naval Shipyard	South Carolina	$0.0	$0.0	$0.0
Navy - BRAC	Charleston Naval Station	South Carolina	$0.0	$0.0	$0.0
Navy - BRAC	Chase Field Naval Air Station	Texas	$0.0	$0.0	$0.0
Navy - Active	Chesapeake Beach	Maryland	$151.0	$0.0	$151.0
Navy - Active	Chesapeake Virginia St. Julian's Creek	Virginia	$0.0	$0.0	$0.0
Navy - Active	China Lake	California	$75.0	$0.0	$75.0
Navy - BRAC	Concord Naval Weapons Station	California	$0.0	$0.0	$0.0
Navy - Active	Corpus Christi Texas Naval Air Station	Texas	$0.0	$0.0	$0.0
Navy - Active	Crane	Indiana	$3.0	$0.0	$3.0
Navy - Active	Craney Island Virginia Navy Fuel Depot/Naval Supply Center	Virginia	$0.0	$0.0	$0.0
Navy - BRAC	Crows Naval Auxiliary Landing Field	California	$0.0	$0.0	$0.0
Navy - Active	Cutler	Maine	$14.3	$0.0	$14.3
Navy - Active	Dahlgren Virginia Naval Surface Warfare Center	Virginia	$0.0	$0.0	$0.0
Navy - BRAC	Dallas	Texas	$41.0	$0.0	$41.0
Navy - Active	Dallas Texas Naval Weapons Industrial Reserve Plant	Texas	$0.0	$0.0	$0.0
Navy - Active	Dam Neck Virginia	Virginia	$0.0	$0.0	$0.0

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Navy - BRAC	Davisville	Rhode Island	$21.0	$0.0	$21.0
Navy - BRAC	Driver Navy Radio Transmitter Facility	Virginia	$0.0	$0.0	$0.0
Navy - Active	Earle	New Jersey	$786.0	$59.0	$845.0
Navy - Active	El Centro California Naval Air Facility	California	$0.0	$0.0	$0.0
Navy - Active	Fallon	Nevada	$211.8	$0.0	$211.8
Navy - Active	Fleet and Industrial Supply Center Jacksonville	Florida	$0.0	$0.0	$0.0
Navy - Active	Fort Worth Texas Naval Air Station Joint Reserve Base	Texas	$0.0	$0.0	$0.0
Navy - BRAC	Glenview Naval Air Station	Illinois	$0.0	$0.0	$0.0
Navy - Active	Great Lakes	Illinois	$5.0	$0.0	$5.0
Navy - Active	Gulfport	Mississippi	$150.7	$0.0	$150.7
Navy - BRAC	Hunters Point Annex	California	$0.0	$0.0	$0.0
Navy - Active	Imperial Beach California	California	$0.0	$0.0	$0.0
Navy - Active	Indian Head Maryland Naval Surface Warfare Center	Maryland	$0.0	$0.0	$0.0
Navy - Active	Jacksonville	Florida	$25.0	$0.0	$25.0
Navy - Active	Joint Base Pearl Harbor-Hickam	Hawaii	$0.0	$0.0	$0.0
Navy - Active	Key West Florida Naval Air Station	Florida	$0.0	$0.0	$0.0
Navy - Active	Keyport Washington Naval Undersea Warfare Center	Washington	$0.0	$0.0	$0.0
Navy - Active	Kings Bay	Georgia	$3.0	$0.0	$3.0
Navy - Active	Kingsville Texas Naval Air Station	Texas	$0.0	$0.0	$0.0
Navy - Active	Lemoore California Naval Air Station	California	$0.0	$0.0	$0.0
Navy - Active	Little Creek Virginia Naval Amphibious Base	Virginia	$0.0	$0.0	$0.0
Navy - BRAC	Long Beach Naval Shipyard	California	$0.0	$0.0	$0.0
Navy - BRAC	Long Beach Naval Station	California	$0.0	$0.0	$0.0
Navy - BRAC	Louisville Crane Division Naval Ordnance Station/Naval Surface Warfare Center	Kentucky	$0.0	$0.0	$0.0
Navy - BRAC	Mare Island Naval Shipyard	California	$0.0	$0.0	$0.0
Navy - Active	Mayport	Florida	$12.0	$0.0	$12.0
Navy - Active	McClennan Texas Naval Industrial Reserve Ordnance Plant	Texas	$0.0	$0.0	$0.0
Navy - Active	Meridian	Mississippi	$925.0	$0.0	$925.0
Navy - BRAC	Midway Island Naval Air Facility	Midway Islands	$0.0	$0.0	$0.0
Navy - Active and BRAC	Millington	Tennessee	$15.0	$0.0	$15.0
Navy - Active	Minneapolis Minnesota Naval Industrial Reserve Ordnance Plant	Minnesota	$0.0	$0.0	$0.0
Navy - Active	Naval Air Station Whidbey Island	Washington	$1,284.0	$90.0	$1,374.0
Navy - Active	Naval Auxiliary Landing Field Fentress (Oceana)	Virginia	$2,706.0	$96.5	$2,802.5

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Navy - Active	Naval Base Coronado	California	$0.0	$0.0	$0.0
Navy - Active	Naval Base San Diego	California	$0.0	$0.0	$0.0
Navy - Active	Naval Command Telecommunications Station Stockton	California	$0.0	$0.0	$0.0
Navy - Active	Naval District Command	District of Columbia	$15.0	$0.0	$15.0
Navy - Active	Naval Support Activity Andersen Guam	Guam	$0.0	$0.0	$0.0
Navy - Active	Naval Surface Warfare Center Carderock	Maryland	$0.0	$0.0	$0.0
Navy - Active	Naval Surface Warfare Center Division Panama City	Florida	$0.0	$0.0	$0.0
Navy - Active	Navy Munitions Command East Asia Division Pearl Harbor	Hawaii	$0.0	$0.0	$0.0
Navy - Active	Navy Munitions Command Yorktown	Virginia	$0.0	$0.0	$0.0
Navy - Active	New London	Connecticut	$20.0	$0.0	$20.0
Navy - Active	New Orleans Louisiana Naval Air Station Joint Reserve Base	Louisiana	$0.0	$0.0	$0.0
Navy - Active	Newport	Rhode Island	$228.4	$0.0	$228.4
Navy - Active	Norfolk Virginia Naval Base	Virginia	$0.0	$0.0	$0.0
Navy - BRAC	Orlando Naval Training Center	Florida	$0.0	$0.0	$0.0
Navy - Active	Patuxent River	Maryland	$234.0	$0.0	$234.0
Navy - Active	Pearl Harbor - Fleet and Industrial Supply Center	Hawaii	$456.5	$0.0	$456.5
Navy - Active	Pearl Harbor - Naval Facilities Engineering Command	Hawaii	$181.0	$0.0	$181.0
Navy - Active	Pearl Harbor Hawaii Naval Shipyard	Hawaii	$0.0	$0.0	$0.0
Navy - Active	Pensacola	Florida	$439.0	$0.0	$439.0
Navy - BRAC	Philadelphia Naval Station	Pennsylvania	$0.0	$0.0	$0.0
Navy - Active	Port Hueneme	California	$9.0	$0.0	$9.0
Navy - Active	Portsmouth Naval Shipyard	Maine	$0.0	$0.0	$0.0
Navy - Active	Portsmouth Virginia Norfolk Naval Shipyard	Virginia	$0.0	$0.0	$0.0
Navy - Active	Pt Mugu	California	$353.2	$0.0	$353.2
Navy - BRAC	Puerto Rico Naval Activity	Puerto Rico	$0.0	$0.0	$0.0
Navy - Active	Puget Sound Fleet and Industrial Supply Center Manchester	Washington	$0.0	$0.0	$0.0
Navy - BRAC	Puget Sound Naval Station Sand Point	Washington	$0.0	$0.0	$0.0
Navy - Active	Puget Sound Washington Naval Shipyard	Washington	$0.0	$0.0	$0.0
Navy - Active	Rocket Center West Virginia Allegheny Ballistics Laboratory	West Virginia	$0.0	$0.0	$0.0
Navy - Active	San Diego California Auxiliary Landing Field	California	$0.0	$0.0	$0.0
Navy - Active	San Diego California Fleet Anti-Submarine Warfare Training Center Pacific	California	$0.0	$0.0	$0.0
Navy - Active	San Diego California NISE-WEST	California	$0.0	$0.0	$0.0
Navy - Active	San Nicolas Island California Outlying Landing Field	California	$0.0	$0.0	$0.0
Navy - Active	Saufley Field	Florida	$3.0	$0.0	$3.0

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Navy - Active	Seal Beach California Naval Weapons Station	California	$0.0	$0.0	$0.0
Navy - Active	Solomons Maryland Naval Recreation Center	Maryland	$0.0	$0.0	$0.0
Navy - BRAC	South Weymouth	Massachusetts	$1,000.0	$0.0	$1,000.0
Navy - Active	Space and Naval Warfare Systems Center Pacific San Diego	California	$0.0	$0.0	$0.0
Navy - BRAC	Treasure Island	California	$6.0	$0.0	$6.0
Navy - BRAC	Trenton	New Jersey	$338.0	$0.0	$338.0
Navy - Active	Walter Reed National Military Medical Center	Maryland	$0.0	$0.0	$0.0
Navy - BRAC	Warminster	Pennsylvania	$3,218.0	$12,966.0	$16,184.0
Navy - Active	Washington DC Naval Research Laboratory	District of Columbia	$0.0	$0.0	$0.0
Navy - Active	Washington DC Naval Security Station	District of Columbia	$0.0	$0.0	$0.0
Navy - BRAC	White Oak - Naval Surface Warfare Center Dahlgren Division Detachment (Silver Spring)	Maryland	$0.0	$0.0	$0.0
Navy - Active	Whiting Field	Florida	$111.0	$0.0	$111.0
Navy - BRAC	Willow Grove	Pennsylvania	$4,065.0	$10,862.0	$14,927.0
Navy - BRAC	New Potential Area of Concern Preliminary Assessments[4]	Various	$115.0	$0.0	$115.0
		Navy Subtotals:	**$19,247.9**	**$24,073.5**	**$43,321.4**
USMC - Active[5]	Barstow	California	$504.0	$0.0	$504.0
USMC - Active[5]	Beaufort South Carolina Marine Corps Air Station	South Carolina	$0.0	$0.0	$0.0
USMC - Active[5]	Camp Lejeune	North Carolina	$225.0	$0.0	$225.0
USMC - Active[5]	Camp Pendleton California Marine Corps Base	California	$0.0	$0.0	$0.0
USMC - Active[5]	Cherry Point	North Carolina	$20.5	$0.0	$20.5
USMC - BRAC[5]	El Toro Marine Corps Air Station	California	$0.0	$0.0	$0.0
USMC - Active[5]	Kaneohe Bay Hawaii Marine Corps Base	Hawaii	$0.0	$0.0	$0.0
USMC - Active[5]	Miramar California Marine Corps Air Station	California	$0.0	$0.0	$0.0
USMC - Active[5]	Parris Island South Carolina Marine Corps Recruit Depot	South Carolina	$0.0	$0.0	$0.0
USMC - Active[5]	Quantico	Virginia	$44.5	$0.0	$44.5
USMC - Active[5]	San Juan Puerto Rico Marine Corps Recruiting Command	Puerto Rico	$0.0	$0.0	$0.0
USMC - BRAC[5]	Tustin	California	$143.0	$0.0	$143.0
USMC - Active[5]	Twentynine Palms	California	$10.0	$0.0	$10.0
USMC - Active[5]	Yuma	Arizona	$318.0	$0.0	$318.0
		USMC Subtotals:	**$1,265.0**	**$0.0**	**$1,265.0**

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-Active	Air Force Plant 3	Oklahoma	$790.7	$0.0	$790.7
Air Force-Active	Air Force Plant 36	Ohio	$81.4	$0.0	$81.4
Air Force-Active	Air Force Plant 4	Texas	$790.7	$0.0	$790.7
Air Force-Active	Air Force Plant 42	California	$790.7	$0.0	$790.7
Air Force-Active	Air Force Plant 44	Arizona	$81.4	$0.0	$81.4
Air Force-Active	Air Force Plant 6	Georgia	$399.8	$0.0	$399.8
Air Force-Active	Air Force Plant 85	Ohio	$439.3	$0.0	$439.3
Air Force-Active	Air Force Plant PJKS	Colorado	$439.3	$0.0	$439.3
Air Force-BRAC	Air Force Research Laboratory Mesa	Arizona	$74.0	$0.0	$74.0
Air Force-Active	Air Force Research Laboratory Rome	New York	$392.9	$0.0	$392.9
Air Force-ANG	Alpena	Michigan	$131.9	$0.0	$131.9
Air Force-Active	Altus AFB	Oklahoma	$816.1	$0.0	$816.1
Air Force-Active	Arnold AFB	Tennessee	$790.7	$0.0	$790.7
Air Force-ANG	Atlantic City	New Jersey	$115.7	$0.0	$115.7
Air Force-Active	Avon Park Air Force Reserve	Florida	$392.9	$0.0	$392.9
Air Force-ANG	Bangor International Airport	Maine	$115.7	$0.0	$115.7
Air Force-Active	Barksdale AFB	Louisiana	$790.7	$0.0	$790.7
Air Force-ANG	Barnes Municipal	Massachusetts	$91.7	$0.0	$91.7
Air Force-Active	Beale AFB	California	$814.4	$0.0	$814.4
Air Force-Active	Bellows Air Force Station	Hawaii	$81.4	$0.0	$81.4
Air Force-BRAC	Bergstrom AFB	Texas	$1,255.0	$0.0	$1,255.0
Air Force-ANG	Birmingham International Airport	Alabama	$67.7	$0.0	$67.7
Air Force-ANG	Boise	Idaho	$155.9	$0.0	$155.9
Air Force-ANG	Bradley International Airport	Connecticut	$67.7	$0.0	$67.7
Air Force-BRAC	Brooks-City Base	Texas	$73.0	$0.0	$73.0
Air Force-Active	Buckley AFB	Colorado	$439.3	$0.0	$439.3
Air Force-BRAC	Buckley Annex	Colorado	$60.0	$0.0	$60.0
Air Force-ANG	Burlington	Vermont	$107.9	$0.0	$107.9
Air Force-Active	Calumet Air Force Station	Michigan	$58.2	$0.0	$58.2
Air Force-Active	Cannon AFB	New Mexico	$790.7	$0.0	$790.7
Air Force-Active	Cape Canaveral Air Force Station	Florida	$1,743.8	$0.0	$1,743.8
Air Force-BRAC	Carswell AFB	Texas	$73.0	$0.0	$73.0
Air Force-BRAC	Castle AFB	California	$2,260.0	$0.0	$2,260.0
Air Force-Active	Cavalier Air Force Station	North Dakota	$8.9	$0.0	$8.9
Air Force-ANG	Channel Islands	California	$67.7	$0.0	$67.7

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-BRAC	Chanute AFB	Illinois	$2,805.0	$360.0	$3,165.0
Air Force-ANG	Charlotte Douglas	North Carolina	$139.7	$0.0	$139.7
Air Force-Active	Cheyenne Mountain Air Force Station	Colorado	$72.5	$0.0	$72.5
Air Force-ANG	Cheyenne Municipal	Wyoming	$127.7	$0.0	$127.7
Air Force-Active	Clear Air Force Station	Alaska	$772.5	$0.0	$772.5
Air Force-Active	Columbus AFB	Mississippi	$790.7	$0.0	$790.7
Air Force-Active	Creech AFB	Nevada	$674.7	$0.0	$674.7
Air Force-Active	Davis-Monthan AFB	Arizona	$790.7	$0.0	$790.7
Air Force-ANG	Des Moines	Iowa	$175.7	$0.0	$175.7
Air Force-Active	Dobbins Air Reserve Base	Georgia	$392.9	$0.0	$392.9
Air Force-Active	Dover AFB	Delaware	$541.2	$27.5	$568.7
Air Force-ANG	Duluth International Airport	Minnesota	$131.9	$0.0	$131.9
Air Force-Active	Dyess AFB	Texas	$790.7	$0.0	$790.7
Air Force-BRAC	Eaker AFB	Arkansas	$1,073.0	$0.0	$1,073.0
Air Force-Active	Eareckson AFB	Alaska	$8.9	$0.0	$8.9
Air Force-Active	Edwards AFB	California	$667.7	$0.0	$667.7
Air Force-Active	Eglin AFB	Florida	$937.4	$0.0	$937.4
Air Force-Active	Eielson AFB	Alaska	$920.8	$8,734.0	$9,654.8
Air Force-ANG	Ellington Field	Texas	$115.7	$0.0	$115.7
Air Force-Active	Ellsworth AFB	South Dakota	$587.6	$1,706.9	$2,294.5
Air Force-BRAC	England AFB	Louisiana	$1,435.0	$0.0	$1,435.0
Air Force-ANG	EWVRA Shepherd Field (Martinsburg)	West Virginia	$127.7	$0.0	$127.7
Air Force-Active	Fairchild AFB	Washington	$790.7	$0.0	$790.7
Air Force-Active	FE Warren AFB	Wyoming	$586.0	$0.0	$586.0
Air Force-ANG	Forbes Field	Kansas	$115.7	$0.0	$115.7
Air Force-ANG	Fort Wayne Municipal	Indiana	$115.7	$0.0	$115.7
Air Force-BRAC	Four Lakes Air National Guard Station	Washington	$60.0	$0.0	$60.0
Air Force-ANG	Francis S. Gabreski	New York	$199.7	$0.0	$199.7
Air Force-ANG	Fresno Air Guard	California	$115.7	$0.0	$115.7
Air Force-ANG	Ft. Smith	Arkansas	$139.7	$0.0	$139.7
Air Force-BRAC	Galena Forward Operating Location	Alaska	$1,075.0	$0.0	$1,075.0
Air Force-ANG	General Mitchell	Wisconsin	$175.7	$0.0	$175.7
Air Force-BRAC	General Mitchell Air Reserve Station	Wisconsin	$1,762.0	$0.0	$1,762.0
Air Force-BRAC	Gentile Air Force Station	Ohio	$1,060.0	$0.0	$1,060.0
Air Force-BRAC	George AFB	California	$1,795.0	$0.0	$1,795.0

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-Active	Goodfellow AFB	Texas	$790.7	$0.0	$790.7
Air Force-Active	Grand Forks AFB	North Dakota	$439.3	$0.0	$439.3
Air Force-ANG	Great Falls International Airport	Montana	$103.7	$0.0	$103.7
Air Force-ANG	Greater Peoria	Illinois	$127.7	$0.0	$127.7
Air Force-BRAC	Griffiss AFB	New York	$2,000.0	$0.0	$2,000.0
Air Force-BRAC	Grissom AFB	Indiana	$1,423.0	$0.0	$1,423.0
Air Force-Active	Grissom Air Reserve Base	Indiana	$439.3	$0.0	$439.3
Air Force-ANG	Gulfport Biloxi	Mississippi	$163.7	$0.0	$163.7
Air Force-ANG	Hancock Field	New York	$151.7	$0.0	$151.7
Air Force-Active	Hanscom AFB	Massachusetts	$468.0	$0.0	$468.0
Air Force-ANG	Harrisburg International Airport	Pennsylvania	$43.7	$0.0	$43.7
Air Force-ANG	Hector Field	North Dakota	$127.7	$0.0	$127.7
Air Force-Active	Hill AFB	Utah	$587.6	$0.0	$587.6
Air Force-Active	Holloman AFB	New Mexico	$790.7	$0.0	$790.7
Air Force-BRAC	Homestead AFB	Florida	$1,073.0	$0.0	$1,073.0
Air Force-Active	Homestead Air Reserve Base	Florida	$392.9	$0.0	$392.9
Air Force-ANG	Horsham	Pennsylvania	$127.7	$6,300.0	$6,427.7
Air Force-ANG	Hulman	Indiana	$115.7	$0.0	$115.7
Air Force-Active	Hurlburt Field	Florida	$790.7	$0.0	$790.7
Air Force-ANG	Jackson	Mississippi	$119.9	$0.0	$119.9
Air Force-ANG	Jacksonville	Florida	$203.9	$0.0	$203.9
Air Force-ANG	Joe Foss Field (Sioux Falls)	South Dakota	$151.7	$0.0	$151.7
Air Force-Active	Joint Base Andrews	Maryland	$392.9	$0.0	$392.9
Air Force-Active	Joint Base Cape Cod (Massachusetts Military Reservation)	Massachusetts	$1,317.6	$305.5	$1,623.1
Air Force-Active	Joint Base Charleston	South Carolina	$392.9	$0.0	$392.9
Air Force-Active	Joint Base Elmendorf-Richardson	Alaska	$1,542.8	$0.0	$1,542.8
Air Force-Active	Joint Base Langley-Eustis	Virginia	$785.8	$0.0	$785.8
Air Force-Active	Joint Base McGuire-Dix-Lakehurst	New Jersey	$617.3	$1,187.8	$1,805.1
Air Force-Active	Joint Base San Antonio - Lackland, Randolph, Ft Sam Houston, Camp Bullis	Texas	$2,272.1	$0.0	$2,272.1
Air Force-Active	Keesler AFB	Mississippi	$790.7	$0.0	$790.7
Air Force-BRAC	Kelly AFB	Texas	$1,946.0	$0.0	$1,946.0
Air Force-ANG	Key Field	Mississippi	$143.9	$0.0	$143.9
Air Force-BRAC	KI Sawyer AFB	Michigan	$2,395.0	$0.0	$2,395.0
Air Force-Active	King Salmon	Alaska	$51.8	$0.0	$51.8

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-Active	Kirtland AFB	New Mexico	$667.7	$0.0	$667.7
Air Force-ANG	Klamath Falls	Oregon	$103.7	$0.0	$103.7
Air Force-BRAC	Kulis Air National Guard Base	Alaska	$1,060.0	$0.0	$1,060.0
Air Force-ANG	Lambert St. Louis	Missouri	$55.7	$0.0	$55.7
Air Force-Active	Laughlin AFB	Texas	$790.7	$0.0	$790.7
Air Force-ANG	Lincoln Municipal	Nebraska	$163.7	$0.0	$163.7
Air Force-Active	Little Rock AFB	Arkansas	$790.7	$0.0	$790.7
Air Force-BRAC	Loring AFB	Maine	$2,441.0	$0.0	$2,441.0
Air Force-Active	Los Angeles AFB	California	$72.5	$0.0	$72.5
Air Force-BRAC	Lowry AFB	Colorado	$240.0	$0.0	$240.0
Air Force-Active	Luke AFB	Arizona	$790.7	$0.0	$790.7
Air Force-Active	MacDill AFB	Florida	$790.7	$0.0	$790.7
Air Force-Active	Malmstrom AFB	Montana	$439.3	$0.0	$439.3
Air Force-ANG	Mansfield	Ohio	$127.7	$0.0	$127.7
Air Force-BRAC	March AFB	California	$1,364.0	$1.0	$1,365.0
Air Force-Active	March Air Reserve Base	California	$790.7	$0.0	$790.7
Air Force-ANG	Martin State	Maryland	$139.7	$0.0	$139.7
Air Force-BRAC	Mather AFB	California	$1,571.0	$197.0	$1,768.0
Air Force-Active	Maxwell Gunter AFB	Alabama	$790.7	$0.0	$790.7
Air Force-BRAC	McClellan AFB	California	$1,144.0	$0.0	$1,144.0
Air Force-Active	McConnell AFB	Kansas	$439.3	$0.0	$439.3
Air Force-ANG	McEntire Air Guard	South Carolina	$223.7	$0.0	$223.7
Air Force-ANG	McGhee-Tyson	Tennessee	$127.7	$0.0	$127.7
Air Force-ANG	Memphis International Airport	Tennessee	$55.7	$0.0	$55.7
Air Force-Active	Minneapolis-St Paul Air Reserve Station	Minnesota	$69.9	$0.0	$69.9
Air Force-ANG	Minneapolis-St Paul International Airport	Minnesota	$69.8	$0.0	$69.8
Air Force-Active	Minot AFB	New Dakota	$439.3	$0.0	$439.3
Air Force-ANG	Moffett Field	California	$31.7	$0.0	$31.7
Air Force-ANG	Montgomery Regional (Dannelly Field)	Alabama	$79.7	$0.0	$79.7
Air Force-Active	Moody AFB	Georgia	$392.9	$0.0	$392.9
Air Force-Active	Mountain Home AFB	Idaho	$790.7	$0.0	$790.7
Air Force-BRAC	Myrtle Beach AFB	South Carolina	$1,246.0	$0.0	$1,246.0
Air Force-ANG	Nashville Metro	Tennessee	$55.7	$0.0	$55.7
Air Force-Active	Nellis AFB	Nevada	$667.7	$0.0	$667.7
Air Force-Active	New Boston Air Force Station	New Hampshire	$8.9	$0.0	$8.9

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-ANG	New Castle	Delaware	$103.7	$0.0	$103.7
Air Force-BRAC	Newark AFB	Ohio	$1,060.0	$0.0	$1,060.0
Air Force-Active	Niagara Falls Air Reserve Station	New York	$399.8	$0.0	$399.8
Air Force-BRAC	Norton AFB	California	$1,467.0	$0.0	$1,467.0
Air Force-Active	Offutt AFB	Nebraska	$439.3	$0.0	$439.3
Air Force-BRAC	O'Hare Air Reserve Station	Illinois	$76.0	$0.0	$76.0
Air Force-BRAC	Onizuka Air Force Station	California	$60.0	$0.0	$60.0
Air Force-BRAC	Ontario Air Force Station	California	$74.0	$0.0	$74.0
Air Force-Active	Patrick AFB	Florida	$939.0	$0.0	$939.0
Air Force-ANG	Pease	New Hampshire	$67.7	$0.0	$67.7
Air Force-BRAC	Pease AFB	New Hampshire	$12,500.0	$4,000.0	$16,500.0
Air Force-Active	Peterson AFB	Colorado	$1,303.7	$4,127.7	$5,431.4
Air Force-Active	Pittsburgh Air Force	Pennsylvania	$171.8	$0.0	$171.8
Air Force-ANG	Pittsburgh Air Force Reserve Command	Pennsylvania	$171.8	$0.0	$171.8
Air Force-BRAC	Plattsburgh International Airport	New York	$2,042.0	$30.0	$2,072.0
Air Force-ANG	Portland International Airport	Oregon	$115.7	$0.0	$115.7
Air Force-ANG	Puerto Rico Munoz International Airport	Puerto Rico	$127.7	$0.0	$127.7
Air Force-ANG	Quonset Point State Airport	Rhode Island	$55.7	$0.0	$55.7
Air Force-BRAC	Reese AFB	Texas	$1,554.0	$0.0	$1,554.0
Air Force-ANG	Reno Tahoe	Nevada	$139.7	$0.0	$139.7
Air Force-BRAC	Richards-Gebaur AFB	Missouri	$1,307.0	$0.0	$1,307.0
Air Force-ANG	Richmond International Airport Byrd Field	Virginia	$67.7	$0.0	$67.7
Air Force-ANG	Rickenbacker	Ohio	$79.7	$0.0	$79.7
Air Force-BRAC	Rickenbacker Air National Guard Base	Ohio	$1,074.0	$0.0	$1,074.0
Air Force-Active	Robins AFB	Georgia	$1,206.5	$0.0	$1,206.5
Air Force-ANG	Rosecrans Memorial	Missouri	$103.7	$0.0	$103.7
Air Force-BRAC	Roslyn Air National Guard Station	New York	$60.0	$0.0	$60.0
Air Force-ANG	Salt Lake City	Utah	$71.9	$0.0	$71.9
Air Force-ANG	Savannah International Airport	Georgia	$163.7	$0.0	$163.7
Air Force-ANG	Schenectady Airport	New York	$223.7	$0.0	$223.7
Air Force-Active	Schriever AFB	Colorado	$81.4	$0.0	$81.4
Air Force-Active	Scott AFB	Illinois	$439.3	$0.0	$439.3
Air Force-ANG	Selfridge	Michigan	$307.7	$0.0	$307.7
Air Force-Active	Seymour Johnson AFB	North Carolina	$392.9	$0.0	$392.9
Air Force-Active	Shaw AFB	South Carolina	$392.9	$0.0	$392.9

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
Air Force-Active	Sheppard AFB	Texas	$790.7	$0.0	$790.7
Air Force-ANG	Sioux Gateway (Sioux City)	Iowa	$115.7	$0.0	$115.7
Air Force-ANG	Sky Harbor International Airport	Arizona	$91.7	$0.0	$91.7
Air Force-ANG	Springfield Municipal (Capital)	Illinois	$7.7	$0.0	$7.7
Air Force-ANG	Springfield-Beckley Municipal	Ohio	$151.7	$0.0	$151.7
Air Force-ANG	Standiford Field Air National Guard	Kentucky	$91.7	$0.0	$91.7
Air Force-ANG	Stanly/Badin County Airport Air National Guard Base	North Carolina	$31.7	$0.0	$31.7
Air Force-ANG	Stewart International Airport	New York	$163.7	$0.0	$163.7
Air Force-Active	Tinker AFB	Oklahoma	$816.1	$0.0	$816.1
Air Force-ANG	Toledo Express	Ohio	$151.7	$0.0	$151.7
Air Force-Active	Travis AFB	California	$816.1	$0.0	$816.1
Air Force-ANG	Truax Field	Wisconsin	$115.7	$0.0	$115.7
Air Force-ANG	Tucson International Airport	Arizona	$187.7	$0.0	$187.7
Air Force-ANG	Tulsa International Airport	Oklahoma	$91.7	$0.0	$91.7
Air Force-Active	Tyndall AFB	Florida	$392.9	$0.0	$392.9
Air Force-Active	USAF Academy	Colorado	$81.4	$0.0	$81.4
Air Force-Active	Vance AFB/Kegelman	Oklahoma	$790.7	$0.0	$790.7
Air Force-Active	Vandenberg AFB	California	$790.7	$0.0	$790.7
Air Force-ANG	Volk Field	Wisconsin	$107.9	$0.0	$107.9
Air Force-Active	Wake Island	Guam	$81.4	$0.0	$81.4
Air Force-Active	Westover Air Reserve Base	Massachusetts	$392.9	$0.0	$392.9
Air Force-Active	Whiteman AFB	Missouri	$439.3	$0.0	$439.3
Air Force-ANG	Will Rogers International Airport	Oklahoma	$115.7	$0.0	$115.7
Air Force-BRAC	Williams AFB	Arizona	$1,089.0	$0.0	$1,089.0
Air Force-ANG	WK Kellogg	Michigan	$163.7	$0.0	$163.7
Air Force-Active	Wright Patterson AFB	Ohio	$503.3	$2,805.6	$3,308.9
Air Force-BRAC	Wurtsmith AFB	Michigan	$2,079.7	$3,000.0	$5,079.7
Air Force-ANG	Yeager (McLaughlin)	West Virginia	$103.7	$0.0	$103.7
Air Force-Active	Youngstown Air Reserve Station	Ohio	$81.4	$0.0	$81.4
		Air Force Subtotals:	**$119,712.1**	**$32,783.0**	**$152,495.1**

Appendix C: DoD Installations with a Known or Suspected Release of PFOS/PFOA

DoD Component	Installation Name	State/Territory	Investigation Costs[1] (thousands of dollars)	Cleanup Costs[2] (thousands of dollars)	Total Cost through Dec 31, 2016 (thousands of dollars)
DLA - Active	Defense Supply Center Richmond	Virginia	$0.0	$0.0	$0.0
DLA - Active	Susquehanna	Pennsylvania	$0.0	$0.0	$0.0
		DLA Subtotals:	**$0.0**	**$0.0**	**$0.0**
		Grand Totals:	**$141,798.1**	**$56,856.5**	**$198,654.6**

Footnotes:

1: Investigation costs include but are not limited to: site investigation work (e.g., preliminary assessments, site inspections, remedial investigations) and monitoring.

2: Cleanup costs include but are not limited to site restoration; corrective action (e.g., supplying bottled water, installing granular activated carbon filters).

3: This installation is not one of the 393 active and BRAC installations with one or more areas where there is a known or suspected release of PFOS or PFOA as of December 31, 2016; however, it is included here because DoD spent DERP funds to investigate for a potential release of PFOS or PFOA at the request of the regulator.

4: The Navy expended these funds to investigate known or suspected PFOS/PFOA releases at several BRAC installations.

5: The Navy plans, programs, budgets, and executes the Defense Environmental Restoration Program for the U.S. Marine Corps.