Report No. DODIG-2021-105

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INSPECTOR GENERAL

U.S. Department of Defense

JULY 22, 2021

(U) Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations

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(U) Results in Brief

(U) Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations

July 22, 2021

(U) Objective

(U) The objective of this evaluation was to determine the extent that the DoD has taken steps to:

- (U) identify, mitigate, and remediate contamination from perfluoroalkyl and polyfluoroalkyl substances (PFAS) at DoD installations; and
- (U) identify populations exposed to PFAS at DoD installations and inform them of the associated health and safety concerns.

(U) Background

(U) In a July 25, 2019 letter, 31 members of Congress requested that the DoD Office of Inspector General (DoD OIG) "undertake a review of the U.S. Department of Defense's (DoD's) use of PFAS at military sites around the country and the exposure of both military personnel and civilians living near military sites." In response to the congressional letter, the DoD OIG announced this evaluation on February 3, 2020.

(U) PFAS are fire-resistant, man-made chemicals that repel oil, grease, and water. Products that contain PFAS can be found in almost every U.S. home and business; however, some products containing PFAS are largely limited to the DoD and other heavy industries. One such product is Aqueous Film Forming Foam (AFFF), which the DoD began using in the 1970s as a fire suppressant to fight dangerous petroleum-based fires.

(U) Background (cont'd)

(U) The DoD, the Military Departments, and the Defense Logistics Agency have issued policies and established programs and organizations that require their officials to, among other things, manage Environment, Safety, and Occupational Health risks caused by their activities; perform environmental cleanup; control health hazards associated with exposures to chemical, physical, and biological hazards in DoD workplaces; and perform medical surveillance to identify illness trends and annual occupational medical examinations for firefighters.

(U) Additionally, DoD officials issued DoD Instruction (DoDI) 4715.18, requiring proactive evaluations and risk management for "emerging chemicals of environmental concern." We refer to "emerging chemicals of environmental concern" as emerging chemicals (ECs) and the program as the EC Program throughout this report. Furthermore, in 2019 and 2020, Congress included PFAS requirements in the National Defense Authorization Act, including the requirement that the Secretary of Defense "provide blood testing to determine and document potential exposure to...PFAS for each firefighter of the [DoD] during their annual physical exam" beginning in FY 2021.

(U) Findings

~~(CUI)~~ DoD officials have taken steps to identify, mitigate, and remediate contaminant effects from PFAS-containing AFFF at DoD installations, including restricting nonessential use of AFFF and initiating Federal cleanup response actions. However, DoDI 4715.18 requires DoD officials to proactively mitigate contaminant effects from ECs at DoD installations when risk management actions are endorsed by the Emerging Chemicals of Concern Governance Council. EC Program officials included PFOS and PFOA on the EC Watch List [redacted] They commissioned impact assessment reports [redacted] EC Program officials issued a risk alert in 2011 that described risks to DoD areas of concern, including risks to human

(U) Results in Brief

(U) Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations

(U) Findings (cont'd)

~~(CUI)~~ health and the environment. However, the 2011 risk alert was not a risk management action because it was not endorsed by the Emerging Chemicals of Concern Governance Council. Therefore, DoD officials were not required to plan, program, and budget for any actions in response to the 2011 risk alert. EC Program officials did not require proactive risk management actions for PFAS-containing AFFF until 2016 [redacted]. This occurred because DoDI 4715.18 does not include objective requirements for EC Program officials to use when determining when to initiate risk management actions or to elevate an EC from the EC Watch List to the EC Action List. As a result, people and the environment may have been exposed to preventable risks from PFAS-containing AFFF.

~~(CUI)~~ Additionally, DoDI 4715.18 requires DoD officials to apply an enterprise-wide approach to mitigate contaminant effects from ECs. An enterprise-wide approach would address all sources of potential EC exposure caused by DoD activities and the impacts of that exposure to DoD areas of concern. EC Program officials identified PFOS and PFOA as ECs [redacted] EC Program officials commissioned impact assessment reports [redacted] DoD officials have not proactively identified, mitigated, and remediated contaminant effects from PFAS-containing materials other than AFFF at DoD installations. Therefore, DoD officials did not apply an enterprise-wide approach to mitigate the contaminant effects of all sources of potential PFAS exposure caused by DoD activities, as required ~~(CUI)~~ by DoDI 4715.18. This occurred because DoD officials were focused on AFFF, a major source of potential PFAS exposure, and not on all sources of potential PFAS exposure caused by DoD activities. As a result, people and the environment may continue to be exposed to preventable risks from other PFAS-containing materials.

(U) DoD officials have taken steps to identify populations exposed to PFAS at DoD installations and inform them of the associated health and safety concerns. These steps include identifying sources of water containing PFAS and providing PFAS health-related information to military medical treatment facilities. DoDI 6055.05 requires DoD Components to implement risk management steps, including evaluating occupational and environmental health risk management. These risk management steps include tracking, trending, and analyzing clinical examination results related to workplace exposures.

(U) DoD officials developed a plan to implement PFAS blood testing for DoD firefighters by FY 2021, as required by the FY 2020 National Defense Authorization Act. However, DoD officials do not plan to track, trend, and analyze the results of PFAS blood tests conducted on DoD firefighters at a DoD-wide level, as required by DoDI 6055.05. This occurred because DoD officials were focused on the immediate collection of the PFAS blood test results to address the FY 2020 National Defense Authorization Act requirement to test the blood of DoD firefighters and not on the analysis of the blood test results at a DoD-wide level. As a result, the DoD is missing an opportunity to capture comprehensive PFAS exposure data for DoD firefighters to be used for risk management, including future studies to assess significant long-term health effects relating to PFAS.

(U) Results in Brief

(U) Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations

(U) Recommendations

(U) We recommend that the Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]) revise DoDI 4715.18 to include requirements for Emerging Chemical Program officials to:

- (U) initiate proactive risk management actions based on measurable risks to the DoD areas of concern to mitigate contaminant effects of emerging chemicals at DoD installations;
- (U) develop risk management options and initiate proactive risk management actions which may be warranted to identify and mitigate the contaminant effects of emerging chemicals as early as possible in the Emerging Chemical Process, regardless of whether an emerging chemical is on the Emerging Chemical Watch List or the Emerging Chemical Action List; and
- (U) formally inform DoD users of emerging chemicals and of their status in the Emerging Chemical Process.

(U) We recommend that the Deputy Assistant Secretary of Defense (Environment and Energy Resilience) complete the Emerging Chemical Process for potential PFAS exposure caused by DoD activities from PFAS-containing materials other than AFFF by developing and presenting validated risk management options for PFAS on the Emerging Chemical Action List to the Emerging Chemicals of Concern Governance Council, as required by DoDI 4715.18.

(U) We recommend that the Assistant Secretary of Defense (Readiness) (ASD[R]) develop a plan to track, trend, and analyze DoD firefighter PFAS blood test results at a DoD-wide level, in accordance with DoDI 6055.05.

(U) Management Comments and Our Response

(U) The Acting Assistant Secretary of Defense (Sustainment) (ASD[S]), responding for the Under Secretary of Defense for Acquisition and Sustainment, partially agreed with the recommendations to revise DoDI 4715.18. However, comments from the Acting ASD(S) addressed the recommendations; therefore, the recommendations are resolved but will remain open.

(U) The Acting ASD(S), responding for the Deputy Assistant Secretary of Defense (Environment and Energy Resilience), agreed with the recommendation to complete the EC Process for potential PFAS exposure caused by DoD activities from PFAS-containing materials other than AFFF. Comments from the Acting ASD(S) addressed the recommendation; therefore, the recommendation is resolved but will remain open. We suggest that the Acting ASD(S) consider the planned changes to DoDI 4715.18 when addressing this recommendation.

(U) The Acting ASD(R) agreed with the recommendation to develop a plan to track, trend, and analyze DoD firefighter PFAS blood test results at a DoD-wide level, in accordance with DoDI 6055.05. Comments from the Acting ASD(R) addressed the recommendation; therefore, the recommendation is resolved but will remain open. While we recognize that PFAS exposure limits are yet to be determined, we suggest that the Acting ASD(R) consider discussing and providing guidance for the following while implementing long-term actions described in the management comments:

- (U) how the DoD will provide the PFAS blood test clinical examination results recorded in various DoD wide systems (such as the Armed Forces Health Longitudinal Technology Application, the Military Health System GENESIS, other electronic

(U) Comments (cont'd)

(U) systems, or paper medical records) to the National Institute for Occupational Safety and Health and the Navy and Marine Corps Public Health Center's EpiData Center;

- (U) what trend analysis, besides measures of central tendencies (such as the mean, median, and mode) will be calculated for the PFAS blood test results; and
- (U) the plan to collect work-place exposure data (such as length of service, locations served, and any contact with PFAS releases) and illness outcomes data for DoD firefighters (such as increased cholesterol levels or cancer).

(U) Please see the Recommendations Table on the next page for the status of recommendations.

(U) Recommendations Table

Management	Recommendations Unresolved	Recommendations Resolved	Recommendations Closed
(U) Under Secretary of Defense for Acquisition and Sustainment	None	A.1.a, A.1.b, A.1.c	None
(U) Assistant Secretary of Defense (Readiness)	None	B	None
(U) Deputy Assistant Secretary of Defense (Environment and Energy Resilience)	None	A.2	None

Note: The following categories are used to describe agency management's comments to individual recommendations.

- **Unresolved** – Management has not agreed to implement the recommendation or has not proposed actions that will address the recommendation.
- **Resolved** – Management agreed to implement the recommendation or has proposed actions that will address the underlying finding that generated the recommendation.
- **Closed** – OIG verified that the agreed upon corrective actions were implemented.


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ALEXANDRIA, VIRGINIA 22350-1500

July 22, 2021

MEMORANDUM FOR DISTRIBUTION

(U) SUBJECT: Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations (Report No. DODIG-2021-105)

(U) This final report provides the results of the DoD Office of Inspector General's evaluation. We previously provided copies of the draft report and requested written comments on the recommendations. We considered management's comments on the draft report when preparing the final report. These comments are included in the report.

(U) The Acting Assistant Secretary of Defense (Sustainment) agreed to address the recommendations directed to the Under Secretary of Defense for Acquisition and Sustainment and the Deputy Assistant Secretary of Defense (Environment and Energy Resilience); therefore, we consider the recommendations resolved and open. The Acting Assistant Secretary of Defense (Readiness) agreed to address the recommendation directed to the Assistant Secretary of Defense (Readiness); therefore, we consider the recommendation resolved and open. As described in the Recommendations, Management Comments, and Our Response section of this report, we will close the recommendations when we receive documentation showing that all agreed-upon actions to implement the recommendations are completed. Therefore, please provide us within 90 days your response concerning specific actions in process or completed on the recommendations. Send your response to either [redacted]

(U) If you have any questions, please contact [redacted]

Randolph R. Stone
Assistant Inspector General for Evaluations
Space, Intelligence, Engineering, and Oversight

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(U) Contents

(U) Introduction

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(U) Introduction

(U) Objective

(U) The objective of this evaluation was to determine the extent that the DoD has taken steps to:

- (U) identify, mitigate, and remediate contamination from perfluoroalkyl and polyfluoroalkyl substances (PFAS) at DoD installations; and
- (U) identify populations exposed to PFAS at DoD installations and inform them of the associated health and safety concerns.[1]

(U) Background

(U) In a July 25, 2019 letter, 31 members of Congress requested that the DoD Office of Inspector General (DoD OIG) "undertake a review of the U.S. Department of Defense's (DoD's) use of PFAS at military sites around the country and the exposure of both military personnel and civilians living near military sites."[2] In response to the congressional letter, on February 3, 2020, the DoD OIG announced this evaluation of the DoD's use of PFAS at DoD installations. For our evaluation, we selected six DoD installations (five current and one former DoD installation) based on factors such as the reported level of PFAS and active or historical firefighting training activities. The following six current and former DoD installations that we selected host, or hosted, active duty military, National Guard, DoD civilians, and military families.[3]

1. (U) Active duty Army: Fort Bragg, North Carolina
2. (U) Army National Guard: Camp Grayling, Michigan
3. (U) Active duty Navy: Naval Air Station Oceana and Naval Auxiliary Landing Field, Virginia
4. (U) Active duty Marine Corps: Marine Corps Base Camp Pendleton, California
5. (U) Active duty Air Force: Peterson Air Force Base, Colorado
6. (U) Former Air Force: Former Pease Air Force Base, New Hampshire[4]

[1] (U) Throughout this report, we refer to humans in general or collectively as people. We refer to specific communities or groups of people exposed to the same conditions as a population, such as the firefighting population.

[2] (U) See Appendix B for a copy of the letter.

[3] (U) Due to COVID-19 travel restrictions, we did not physically visit the installations identified in this report. We relied on teleconferences, interviews, questionnaires, and data calls to collect testimonial and documentary evidence to gather and verify information.

[4] (U) Former Pease Air Force Base is a former military installation that has been transferred out of the Air Force but for which the DoD retains environmental restoration responsibilities.

(U) We also held meetings with Defense Logistics Agency (DLA) officials involved with storage and disposal of PFAS-containing materials and discussed the following sites.

1. (U) DLA Headquarters, Fort Belvoir, Virginia
2. (U) Defense Supply Center, Richmond, Virginia
3. (U) Defense Fuel Support Point, Verona, New York
4. (U) DLA Distribution Susquehanna, Pennsylvania

(U) See Appendix A, Scope and Methodology, for a detailed discussion of how we conducted our evaluation. Additionally, see the Glossary for definitions of technical terms used in this report.

(U) Description of PFAS

(U) PFAS are fire-resistant man-made chemicals that repel oil, grease, and water. Since the 1940s, a wide variety of commercial and industrial products have included PFAS. According to the United States Environmental Protection Agency (EPA), more than 600 types of PFAS are known to have been used in commercial and industrial products or manufacturing processes in the past decade. PFAS can be found in food packaging materials, nonstick cookware, stain-resistant carpet treatments, and water-resistant clothing. Some products that contain PFAS are largely limited to the DoD and other heavy industries; for example, PFAS are an ingredient in a fire suppressant, known as Aqueous Film Forming Foam (AFFF), used by military installations, civilian airports, and local fire departments, and in fire-resistant aviation hydraulic fluids.

(U) Human exposure to PFAS occurs through the regular use of products that contain PFAS and through occupational exposure.[5] Many PFAS do not break down easily in the environment. Therefore, PFAS can get into sources of food and drinking water. For example, when PFAS-containing AFFF is released, the PFAS in the AFFF can make its way into the ground and affect the groundwater.[6] As a result, PFAS may eventually reach and affect sources of drinking water. The EPA's 2019 PFAS Action Plan, described later in this report, states, "[d]ue to their widespread use and persistence in the environment, most people in the United States have been exposed to PFAS."[7]

[5] (U) United States Environmental Protection Agency, "EPA's Per- and Polyfluoroalkyl Substances (PFAS) Action Plan," February 2019.

[6] (U) AFFF releases may occur in an emergency when AFFF is applied to petroleum-based fires, during firefighter training, during testing of fire suppression systems, or by accident.

[7] (U) EPA's PFAS Action Plan, February 2019.

(U) Potential Health Effects of PFAS Exposure

(U) The EPA, in collaboration with the Agency for Toxic Substances and Disease Registry (ATSDR), reported that "there is evidence that continued exposure above specific levels to certain PFAS may lead to adverse health [effects]."[8] The ATSDR summarized the current knowledge of potential adverse health effects from exposure to PFAS in its 2020 fact sheet for the public. The fact sheet states,

> (U) [a]lthough more research is needed, some studies in people have shown that PFAS may:
>
> - (U) interfere with the body's natural hormones;
> - (U) increase cholesterol levels;
> - (U) affect the immune system; and
> - (U) increase the risk of some cancers.
>
> (U) At this time, scientists are still learning about the health effects of exposures to mixtures of PFAS.[9]

(U) According to the EPA, scientists found PFAS in the blood of 99 percent of Americans tested between 1999 and 2012.[10] The ATSDR is working with research partners and Federal partners, including the DoD, to study whether exposure to certain PFAS may lead to adverse health effects. For example, the ATSDR is conducting a "multi-site health study" to learn more about the relationship between PFAS exposure and health effects. Health effects are determined by the factors leading to human exposure, which include the type of PFAS, the "dose (how much), the duration (how long), and the route [(the means)] of exposure." A major source of human exposure to PFAS is through direct ingestion, such as through drinking water containing PFAS.[11] Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) are the two types of PFAS that were made in the greatest quantities in the United States and are the most well-studied types of PFAS.[12]

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[8] (U) The ATSDR is a Federal public health agency that investigates emerging chemicals of environmental concern, conducts scientific research, and prepares information for Federal and state agencies, the healthcare and environmental community, and the public.

[9] (U) Agency for Toxic Substances and Disease Registry, "Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Frequently Asked Questions," January 28, 2020.

[10] (U) EPA's PFAS Action Plan, February 2019.

[11] (U) Agency for Toxic Substances and Disease Registry, "ToxGuide for Perfluoroalkyls," July 2018.

[12] (U) Any chemical that has the chemical structure of at least one carbon atom attached (bonded) to two or more fluorine atoms or includes a chain of carbon atoms attached to fluorine atoms may be considered a PFAS. The bonds between carbon and fluorine atoms are the strongest in nature and do not break down easily. PFOA and PFOS are both perfluoroalkyl substances with eight carbon atoms bonded to fluorine atoms.

(U) The DoD Uses Materials Containing PFAS

(U) DoD officials use products and materials, commonly available to U.S. home and business owners, that contain PFAS.[13] For example, DoD officials purchase foods packaged in materials that may contain PFAS and use water-resistant clothing that may contain PFAS. DoD officials also use products, such as fire suppressants and fire-resistant aviation hydraulic fluids, that are largely limited to the DoD, civilian airports, and local fire departments.

(U) Petroleum-based fires pose a great risk to human life, are especially dangerous to military equipment, such as military aircraft, and are difficult to contain and extinguish. Manufacturers, including U.S. manufacturers, included PFOS and PFOA as ingredients in AFFF concentrates for their unique fire-resistant properties.[14] According to the Under Secretary of Defense for Acquisition and Sustainment (USD[A&S]), the DoD began using the fire suppressant foam AFFF, which contained PFAS, in the 1970s to fight petroleum-based fires.[15] The fire suppressant foam is applied to petroleum-based fires where it forms a film that restricts oxygen to the fire and extinguishes the flames.

(U) The AFFF used by the DoD has historically contained PFOS and PFOA.[16] If stored properly, AFFF concentrates have a long shelf-life and can remain in the DoD inventory for up to 25 years. As of September 30, 2020, DoD officials identified 687 sites, including active and National Guard installations, former military installations, and DLA sites, where PFAS-containing AFFF was used or released. We refer to the potential effects of PFAS to people, the environment, and DoD missions, programs, and resources as contaminant effects throughout this report. See Appendix C for the history of the DoD's use and response to PFAS contaminant effects.

(U) Federal Actions Related to PFAS

(U) Federal and state agencies are responding to PFAS concerns and evaluating potential human health effects associated with exposures to various PFAS. The following Federal actions are the most relevant to the DoD's use of PFAS and to the objective of this evaluation.

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13 (U) As previously discussed, a wide variety of commercial and industrial products have included PFAS. Current Federal laws do not require manufacturers to disclose the ingredients or the specific products or materials that contain PFOS and PFOA. However, some states, such as California, require PFOS and PFOA disclosures (as of November 10, 2017). Therefore, products used within the United States may or may not carry a consumer warning disclosing the presence of PFOS and PFOA.

14 (U) AFFF is made at the time of use by mixing air, water, and foam concentrate (concentrated formula) with suitably designed equipment, such as mixing equipment installed on firefighting vehicles or in aircraft hangars.

15 (U) USD(A&S), "Department of Defense Alternatives to Aqueous Film Forming Foam Report to Congress," June 2018.

16 (U) Most AFFF used by the DoD was PFOS-based, but some formulas also contained PFOA.
(U) USD(A&S), "DoD Alternatives to AFFF Report to Congress," June 2018.

(U) EPA Actions Related to PFAS

(U) From the early 2000s to 2015, the EPA worked with U.S. manufacturers to voluntarily phase out the production of PFOS and PFOA in the United States.[17] Over time, U.S. manufacturers transitioned to the use of alternatives that do not contain PFOS and PFOA. Therefore, in the United States, PFOS and PFOA have not been used as ingredients or in the process of manufacturing products, including AFFF concentrates, since the phase-out.

(U) The EPA gathered and assessed information on the risks of certain PFAS, including PFOS and PFOA.[18] Although the EPA has not established enforceable water quality standards for any PFAS, the EPA established health advisories for PFOS and PFOA in sources of drinking water.[19] The "EPA develops health advisories to provide information on contaminants that can cause human health effects and are known or anticipated to occur in drinking water. The EPA's health advisories are non-enforceable and non-regulatory."[20] The EPA's health advisories for PFOS and PFOA are intended to guide the many Federal and state agencies that are taking actions to respond to PFAS concerns. A contaminant is defined as any substance, which, after release into the environment and upon exposure, will or may reasonably be anticipated to cause adverse health effects.[21]

(U) In 2009, the EPA published provisional health advisories (PHAs) for PFOS and PFOA found in sources of drinking water.[22] According to the EPA, PHA values "reflect reasonable, health-based values above which action should be taken to reduce exposure to unregulated contaminants in drinking water."[23] The EPA issues PHAs in response to an urgent or developing situation and updates them as additional information becomes available.

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17 (U) According to the EPA, between 2000 and 2002, the primary manufacturer of PFOS voluntarily phased out its production in the United States due to potential risks of the chemical. In 2006, eight major companies voluntarily agreed to phase out their global production of PFOA. According to the EPA, by 2015, all eight companies had met the phase-out goals, although a limited number of ongoing uses, such as fire-resistant aviation hydraulic fluids and photography and film products, remain.

18 (U) The Toxic Substances Control Act of 1976 (amended in 1996) gives the EPA authority to establish regulatory controls on any stage of the lifecycle of a chemical and, if necessary, to mitigate "unreasonable risk of injury to health or the environment." However, the EPA has not exercised the authority of these types of regulatory controls and has, instead, used voluntary phase-out activities and requires notification before new PFAS are proposed for manufacturing.

19 (U) According to the EPA, the EPA developed the non-regulatory Health Advisory Program in 1978 to provide information for public health officials or other interested groups on contaminants that can affect drinking water quality, but are not regulated under the Safe Drinking Water Act. The Safe Drinking Water Act was originally passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water. The Safe Drinking Water Act authorizes the EPA to set mandatory, enforceable water quality standards for drinking water contaminants that present a risk to human health.

20 (U) EPA, "Fact Sheet PFOA & PFOS Drinking Water Health Advisories," May 2016.

21 (U) Public Law 96-510, codified in 42 U.S.C. chapter 103, § 9601.

(U) See the Glossary for a complete definition.

22 (U) The EPA established the 2009 provisional health advisory for PFOS at 200 parts per trillion and PFOA at 400 parts per trillion.

23 (U) EPA, "Provisional Health Advisories for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)," January 8, 2009.

(U) In May 2016, based on additional scientific studies and evidence, the EPA replaced the 2009 PHAs with lifetime health advisories (LHAs) for PFOS and PFOA. The EPA established the LHA level of 70 parts per trillion to "provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOS and PFOA from drinking water."[24] According to the EPA, this means that a person drinking water that contains PFOS, PFOA, or a combination of these two PFAS at an amount less than the LHA level of 70 parts per trillion for their entire life should not expect adverse health effects from the PFOS or PFOA.[25] According to the EPA, officials responsible for drinking water systems, including drinking water systems on DoD installations, should:

- (U) notify affected populations if PFOS and PFOA levels in sources of drinking water exceed the lifetime health advisories;
- (U) describe actions taken to reduce risks to affected populations; and
- (U) provide information to affected populations on the risks associated with exposure to PFOS and PFOA in sources of drinking water above the EPA LHA levels.

(U) Additionally, in February 2019, the EPA issued a PFAS Action Plan that had multiple planned actions, including proposals for the potential regulation of PFAS. The EPA PFAS Action Plan states that PFOS and PFOA are considered contaminants and that they may reasonably be anticipated to cause adverse health effects. The EPA PFAS Action Plan addressed the EPA's intent to:

- (U) determine whether to establish mandatory water quality standards in sources of drinking water for PFOS and PFOA;[26]
- (U) propose testing for additional PFAS not previously monitored in sources of drinking water across the United States to determine their prevalence;

[24] (U) EPA, "Fact Sheet PFOA & PFOS Drinking Water Health Advisories," May 2016.

[25] (U) EPA, "Fact Sheet PFOA & PFOS Drinking Water Health Advisories," May 2016.
(U) According to the EPA fact sheet, when both PFOS and PFOA are found in sources of drinking water, the combined concentration of PFOS and PFOA should be compared with the 70 parts per trillion health advisory level. For example, if a source of drinking water is tested and is found to contain both PFOS and PFOA, the amount of PFOS and PFOA should be added together and compared to the EPA's LHA level. If the combined amount of PFOS and PFOA is greater than the EPA's LHA level of 70 parts per trillion, action is recommended to reduce these PFAS in the source of drinking water.

[26] (U) The EPA published provisional health advisories for PFOS and PFOA in sources of drinking water in 2009 and replaced the provisional health advisories with LHAs in 2016. The 2016 LHAs greatly lowered the threshold of the amount of PFOS and PFOA in sources of drinking water that should not lead to adverse health effects. The EPA's PFAS action plan addresses the EPA's intent to determine whether to establish mandatory water quality standards in sources of drinking water for PFOS and PFOA, which may further reduce the amount of these PFAS that should not lead to adverse health effects. Each time the levels are reduced, the impact to people, the environment, and DoD missions, programs, and resources from historical release of PFAS-containing AFFF increases.

- (U) propose the designation of PFOS and PFOA as hazardous substances under Federal cleanup requirements;[27]
- (U) develop "groundwater cleanup recommendations" to guide cleanup activities for groundwater impacted by PFAS from past uses and releases;
- (U) propose additional rules to limit new PFAS from manufacturing;
- (U) take enforcement actions, when appropriate, against violators of existing rules and regulations; and
- (U) continue to study the potential health effects of PFAS in coordination with other agencies.

(U) In February 2020, the EPA published an update to the 2019 PFAS Action Plan that describes the status of its actions, including the development of enhanced water testing methods that laboratories can use to analyze sources of drinking water for PFAS. Additionally, the February 2020 update provides a description of groundwater cleanup recommendations for PFOS and PFOA that were previously issued by the EPA in December 2019.[28] The EPA's groundwater cleanup recommendations advise Federal agencies, including the DoD, to screen for PFAS in groundwater and to use the EPA's LHA levels as the preliminary goal for cleanup of groundwater that is a current or potential source of drinking water.[29]

(U) National Defense Authorization Acts

(U) In 2019 and 2020, Congress included various PFAS requirements in the National Defense Authorization Act (NDAA).[30] The FY 2019 NDAA required the Secretary of Defense to "conduct an assessment of the human health implications of PFAS exposure." The NDAA required the assessment to include an analysis of health effects associated with PFAS and "an estimate of the number of members of the Armed Forces and veterans who may have been exposed to PFAS while serving in the Armed Forces." The FY 2020 NDAA further required the Secretary of Defense to "provide blood testing to determine and document potential exposure to…PFAS for each firefighter of the [DoD] during their annual physical exam" beginning in FY 2021.

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[27] (U) As of July 2021, the EPA has not designated PFOS or PFOA as a "hazardous substance." Hazardous chemicals or substances are materials that pose an unacceptable health hazard or harm to the environment at certain levels. When the EPA gives a chemical or other substance a "hazardous substance" designation under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), this action compels any party responsible for the release of that hazardous substance at unacceptable risk levels to pay for and perform Federal cleanup response actions.

[28] (U) EPA, "Interim Recommendations to Address Groundwater Contaminated with PFOA and PFOS," December 19, 2019.

[29] (U) According to the EPA's PFAS Action Plan, "Screening levels [for PFOA and PFOS] are risk-based values that are used to determine if levels of [these two PFAS] may warrant further investigation at a site," and the cleanup goals are "initial targets for cleanup, which may be adjusted on a site-specific basis as more information becomes available." The recommended screening level for PFOS and PFOA in groundwater is 40 parts per trillion, and the recommended cleanup goal for PFOS and PFOA in groundwater is equal to the EPA's LHA level of 70 parts per trillion.

[30] (U) Public Law 115-232 enacted the FY 2019 NDAA into law and Public Law 116-92 enacted the FY 2020 NDAA into law.

(U) DoD Policies, Programs, and Actions Related to PFAS

(U) The DoD, the Military Departments (MILDEPs), and the DLA have issued the following key policies and established the following programs and organizations that are the most relevant to the DoD's use of PFAS and to the objective of this evaluation.

(U) Environment, Safety, and Occupational Health Policy

(U) The USD(A&S) published DoD Directive (DoDD) 4715.1E, which requires all DoD organizations to "plan, program, and budget to manage [Environment, Safety, and Occupational Health (ESOH)] risks" caused by their activities.[31] DoDD 4715.1E also requires all DoD organizations to "evaluate all activities for emerging ESOH resource requirements." DoDD 4715.1E requires the DoD to protect DoD personnel from risks, including accidental death or occupational illness. Additionally, the DoDD 4715.1E requires the DoD to protect the public from risks, including injury, illness, or death, caused by DoD activities.

(U) Defense Environmental Restoration Program

(U) The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authorizes clean up and enforcement actions by the EPA.[32] The CERCLA established a separate DoD Defense Environmental Restoration Program (DERP) for environmental cleanup at DoD installations. The USD(A&S) published DoD Instruction (DoDI) 4715.07, which provides procedures for implementing the DERP and requires all DoD organizations to "[i]dentify, evaluate and, where appropriate, respond to a release or threat of a release [of hazardous substances or contaminants] into the environment from DoD activities."[33]

(U) The USD(A&S) also published DoD Manual (DoDM) 4715.20 to accompany DoDI 4715.07, which includes the detailed requirements for the identification, investigation, research and development, and cleanup of contamination or contaminant effects from a hazardous substance or contaminant.[34] Therefore,

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31 (U) DoDD 4715.1E, "Environment, Safety, and Occupational Health (ESOH)," March 19, 2005 (Incorporating Change 2, December 30, 2019).

32 (U) Public Law 96-510, codified in 42 U.S.C. chapter 103, § 9600, et al.

(U) The CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980, and was amended in 1986. The law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The 1986 amendment included the establishment of a separate DoD Defense Environmental Restoration Program.

33 (U) DoDI 4715.07, "Defense Environmental Restoration Program (DERP)," May 21, 2013 (Incorporating Change 2, August 31, 2018).

(U) The Secretary of Defense established the DERP in accordance with sections 2701(a)(1) and 2701(c), title 10, United States Code.

34 (U) DoDM 4715.20, "Defense Environmental Restoration Program (DERP) Management," March 9, 2012 (Incorporating Change 1, August 31, 2018).

(U) DoD officials are required by the CERCLA and the DERP to respond to and remediate DoD releases of contaminants, such as PFOS and PFOA. We refer to CERCLA response actions performed in accordance with the DERP as Federal cleanup response actions throughout this report.

(U) Emerging Chemicals of Environmental Concern Program

(U) The USD(A&S) published DoDI 4715.18 to establish the "EC Program" and "procedures for an enterprise-wide approach to the identification, assessment, and management of 'DoD ECs'" to proactively reduce impacts to "people, the environment, and DoD missions, programs, and resources."[35] "ECs" are "emerging chemicals of environmental concern," such as PFAS, and we refer to them as emerging chemicals throughout this report. DoDI 4715.18 defines ECs as

> (U) [c]hemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways.

(U) The Emerging Chemicals of Concern Governance Council (ECGC) provides "executive-level, enterprise-wide strategic direction" to EC Program officials.[36] DoDI 4715.18 requires EC Program officials to develop and present validated risk management options (RMOs) for an EC to the ECGC. DoDI 4715.18 defines RMOs as

> (U) actionable, measurable enterprise-wide initiatives focused on proactively mitigating or eliminating risks identified during the assessment portion of the EC process. Initiatives include new DoD policies or research, development, testing, or evaluation of alternative chemicals.

(U) DoDI 4715.18 requires the ECGC to "endorse" validated RMOs. RMOs endorsed by the ECGC become risk management actions (RMAs), and DoDI 4715.18 requires DoD Components to "plan, program, and budget for the implementation of RMAs."

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[35] (U) DoDI 4715.18, "Emerging Chemicals (ECs) of Environmental Concern," September 4, 2019.
(U) DoDI 4715.18, "Emerging Contaminants (ECs)," June 11, 2009 (Superseded).
(U) We refer to issuances of the DoDI 4715.18 according to their issuance dates, when necessary, to describe the timeline of events discussed in this report. Specifically, we refer to the 2009 DoDI 4715.18 and the 2019 DoDI 4715.18. Although the 2009 DoDI 4715.18 did not always refer to the EC Program requirements in the same terms as the 2019 DoDI 4715.18, it described an enterprise-wide approach similar to the 2019 DoDI 4715.18 for the identification, assessment, and management of ECs. Unless otherwise stated, we quoted the current 2019 DoDI 4715.18 in this report to describe DoDI 4715.18 requirements, which did not change in a meaningful way between the 2009 DoDI 4715.18 and the 2019 DoDI 4715.18.

[36] (U) 2019 DoDI 4715.18.

(U) Occupational and Environmental Health Policy

(U) The USD(A&S) published DoDI 6055.05, which applies "risk management procedures to anticipate, recognize, evaluate, and control health hazards associated with occupational and environmental exposures…in DoD workplaces."[37] DoDI 6055.05 requires the Assistant Secretary of Defense (Health Affairs), to develop "defense planning guidance and medical planning guidance" and oversee the MILDEPs' Occupational Environmental Health Programs (OEHPs). DoDI 6055.05 requires OEHP officials to perform active medical surveillance, which includes occupational medical examinations for exposures to hazards. Additionally, DoDI 6055.05 requires OEHP officials to perform passive medical surveillance, which includes "epidemiological review of clinical examination results," conducting analyses to identify health effects from workplace exposures, and trending data.[38] Furthermore, DoDI 6055.05 reporting and recordkeeping procedures require OEHP officials to "perform trend analysis and epidemiologic studies [and] share hazard and exposure data across the Department of Defense."

(U) The USD(A&S) also published DoDM 6055.05, which "provides health professionals with information and references appropriate for developing and conducting occupational medical examinations and surveillance prescribed in DoDI 6055.05."[39] For example, DoDM 6055.05 includes guidance for developing and conducting occupational medical examinations for Service members, including annual occupational medical examinations for firefighters.

(U) DoD Fire and Emergency Services Program

(U) The USD(A&S) published DoDI 6055.06, which requires all DoD organizations to establish a comprehensive Fire and Emergency Services (F&ES) program.[40] According to DoDI 6055.06, the purpose of the F&ES program is to protect "DoD personnel, their families, and the public from risk of death, injury, illness,

[37] (U) DoDI 6055.05, "Occupational and Environmental Health (OEH)," November 11, 2008 (Incorporating Change 2, August 31, 2018).
(U) Although the Office of the Under Secretary of Defense for Acquisition and Sustainment issued this policy, the responsibility to implement the DoDI 6055.05 policy series was transferred to the Under Secretary of Defense for Personnel and Readiness.

[38] (U) Epidemiology is the study of the health of specified populations (for example, occupational populations such as firefighters or regional populations such as cities) to identify the causes of health outcomes and diseases in those populations. In epidemiology, the patient is the community and individuals are viewed collectively. "Epidemiologic studies" and "epidemiological review" are terms used to describe the application of epidemiology.

[39] (U) DoDM 6055.05, "Occupational Medical Examinations and Surveillance Manual," May 2, 2007 (Incorporating Change 3, August 31, 2018).

[40] (U) DoDI 6055.06, "DoD Fire and Emergency Services (F&ES) Program," October 3, 2019.

(U) or property damage as a result of DoD activities" and prevent and minimize "loss of DoD lives and damage to property and the environment." DoDI 6055.06 further requires all DoD F&ES programs to:

- (U) "[c]ontinuously improve firefighter safety and health," by analyzing "work processes to identify firefighter injury and illness risk[;]" and
- (U) "[i]mplement medical surveillance programs in accordance with [DoDM 6055.05]," and monitor "illness trends, analyze data to focus prevention efforts, and implement mishap prevention initiatives."

(U) DoD PFAS Task Force

(U) In July 2019, the Secretary of Defense established the DoD PFAS Task Force.[41] The purpose of the DoD PFAS Task Force is to ensure that the DoD has a "coordinated, aggressive, and holistic approach to DoD-wide efforts to proactively address" the effects of PFAS exposure caused by DoD activities.[42] The DoD PFAS Task Force makes recommendations to the Secretary of Defense for the establishment of, or changes to, policies, programs, and investments, where necessary, to address PFAS challenges.

[41] (U) Secretary of Defense memorandum, "Per- and Polyfluoroalkyl Substances Task Force," July 23, 2019.
(U) According to the Secretary of Defense memorandum establishing the DoD PFAS Task Force, the DoD PFAS Task Force is chaired by the Assistant Secretary of Defense (Sustainment) and comprised of Assistant Secretary-level Military Department counterparts.

[42] (U) "Department of Defense Per- and Polyfluoroalkyl Substances Task Force Operating Principles," September 13, 2019.

(U) Finding A

(U) The DoD Is Identifying, Mitigating, and Remediating Contaminant Effects From PFAS-Containing AFFF; However, the DoD's Emerging Chemicals Program Needs Improvement

(U) DoD officials have taken steps to identify, mitigate, and remediate contaminant effects from PFAS-containing AFFF at DoD installations. Specifically, DoD officials reduced the risk of contaminant effects from PFAS-containing AFFF by:

- (U) restricting nonessential use of AFFF;
- (U) requiring engineered containment systems or spill response measures for AFFF releases;
- (U) implementing strict reporting and record keeping requirements;
- (U) converting existing stocks of AFFF concentrates containing PFOS and PFOA to AFFF concentrates with little to no PFOS or PFOA;
- (U) performing research and development projects seeking to develop an effective firefighting alternative without PFAS that meets or exceeds firefighting performance requirements; and
- (U) initiating Federal cleanup response actions.

~~(CUI)~~ However, DoDI 4715.18 requires DoD officials to proactively mitigate contaminant effects from ECs at DoD installations when RMAs are endorsed by the ECGC. EC Program officials:

- ~~(CUI)~~ included PFOS and PFOA on the EC Watch List [redacted]
- ~~(CUI)~~ commissioned impact assessment reports t[redacted] and
- (U) issued a risk alert in 2011 that described risks to DoD areas of concern, including risks to human health and the environment.

~~(CUI)~~ Although EC Program officials issued the 2011 risk alert, the 2011 risk alert was not an RMA because it was not endorsed by the ECGC. Therefore, DoD officials were not required to plan, program, and budget for any actions in response to the 2011 risk alert. EC Program officials did not require proactive RMAs for PFAS-containing AFFF until 2016 [redacted]. This occurred because the DoDI 4715.18 does not include objective requirements for EC Program officials

~~(CUI)~~ to use when determining when to initiate RMAs or to elevate an EC from the EC Watch List to the EC Action List. As a result, people and the environment may have been exposed to preventable risks from PFAS-containing AFFF.

~~(CUI)~~ Additionally, DoDI 4715.18 requires DoD officials to apply an enterprise-wide approach to contaminant effects from ECs. An enterprise-wide approach would address all sources of potential EC exposure caused by DoD activities and the impacts of that exposure to DoD areas of concern. EC Program officials:

- ~~(CUI)~~ identified PFOS and PFOA as ECs [redacted]; and
- ~~(CUI)~~ commissioned impact assessment reports [redacted].

~~(CUI)~~ [redacted]. DoD officials have not proactively identified, mitigated, and remediated contaminant effects from PFAS-containing materials other than AFFF at DoD installations. Therefore, DoD officials did not apply an enterprise-wide approach to mitigate contaminant effects from all sources of potential PFAS exposure caused by DoD activities, as required by DoDI 4715.18. This occurred because DoD officials were focused on AFFF, a major source of potential PFAS exposure, and not on all sources of potential PFAS exposure caused by DoD activities. As a result, people and the environment may continue to be exposed to preventable risks from other PFAS-containing materials.

(U) DoD Officials Have Taken Steps to Identify, Mitigate, and Remediate Contaminant Effects From PFAS-Containing AFFF at DoD Installations

(U) DoD officials have taken steps to identify, mitigate, and remediate contaminant effects from PFAS-containing AFFF used to fight petroleum-based fires at DoD installations.[43] Specifically, DoD officials reduced the risk of contaminant effects from PFAS-containing AFFF by:

- (U) restricting nonessential use of AFFF;
- (U) requiring engineered containment systems or spill response measures for AFFF releases;[44]

[43] (U) DoD officials mitigate contaminant effects from PFAS-containing AFFF by taking actions to reduce risks or to reduce the severity of risks associated with PFAS. DoD officials remediate contaminant effects from PFAS-containing AFFF by taking actions intended to be the final and permanent solution to remedy the contaminant effects.

[44] (U) Engineered containment systems refer to physical infrastructure, such as a drainage system to a tank, designed to completely contain a release of AFFF solution or other substance, such as fuel, until it can be safely treated for release or removed for proper disposal. Spill response refers to immediate, short-term response to limit, address, or mitigate a spill or release.

- (U) implementing strict reporting and record keeping requirements; and
- (U) converting existing stocks of AFFF concentrates containing PFOS and PFOA to AFFF concentrates with little to no PFOS or PFOA.[45] This action included disposal of existing stocks of AFFF concentrates containing PFOS and PFOA to prevent future usage or release.

(U) For example, installation officials at Camp Grayling showed us their policy restricting nonessential use of AFFF and restricting visiting firefighters from bringing any AFFF to the installation. Additionally, installation officials at Fort Bragg developed a policy requiring installation firefighters to cover all drains in and around any area where an AFFF release occurs, control migration of the foam with dams or dikes, and contact installation environmental officials for further support. In another example, installation officials at Marine Corps Base Camp Pendleton showed us their progress toward converting AFFF concentrates containing PFOS and PFOA in firefighting vehicles, stockpiles, and aircraft hangar fire suppressions systems on the installation to AFFF concentrates with little to no PFOS or PFOA. Installation officials at Marine Corps Base Camp Pendleton were working with DLA officials to dispose of the unused AFFF concentrates.

(U) DoD PFAS Task Force officials reported that DoD officials are performing research and development projects to determine ways to reduce the risk of contaminant effects from PFAS-containing AFFF. The research and development projects are seeking to develop an effective firefighting alternative without PFAS that meets or exceeds firefighting performance requirements. The research and development projects include assessments of whether the identified alternatives pose potential health risks.

(U) DoD officials also reduced the risk of contaminant effects from PFAS by initiating Federal cleanup response actions. DoD PFAS Task Force officials reported that installation officials took action, including providing bottled water, in all locations where PFOS and PFOA were identified in sources of drinking water above the EPA's LHA levels. Additionally, DoD PFAS Task Force officials reported that "[n]o one – on or off base – is drinking water" containing PFOS or PFOA in levels higher than the EPA's LHAs where PFAS contaminant effects were caused by DoD activities.[46] For example, installation officials at Naval Air Station Oceana and Naval Auxiliary Landing Field Fentress provided us with a timeline of their Federal cleanup response actions. Actions included testing sources of drinking water both on the installation and in the surrounding community, providing bottled water

[45] (U) Although U.S. manufacturers phased out the production of PFOS and PFOA and the commercially-available AFFF concentrates contain little to no PFOS or PFOA, the DoD has found trace amounts of PFOS or PFOA in the replacement AFFF concentrates. Additionally, the replacement AFFF concentrates contain other types of PFAS.

[46] (U) DoD PFAS Task Force, "Progress Report," March 2020.

(U) where necessary, and installing treatment systems that remove PFOS and PFOA from sources of drinking water. In another example, environmental officials at former Pease Air Force Base described Federal cleanup response actions taken to ensure that no one is drinking water containing PFOS or PFOA in levels higher than the EPA's LHAs. The environmental officials partnered with local community officials to renovate the drinking water treatment plant to ensure PFOS and PFOA are removed from the drinking water before delivery to the community.[47] Additionally, installation environmental officials at both Camp Grayling and Peterson Air Force Base told us about projects occurring at their installations to evaluate methods to remediate PFAS contaminant effects in groundwater and in soil. The actions taken to reduce the risk of contaminant effects from PFAS in groundwater or in sources of drinking water address those specific routes of exposure regardless of whether the historical impacts resulted from PFAS-containing AFFF or PFAS-containing materials other than AFFF.

(U) We found that DoD, MILDEP, and DLA officials began to consolidate efforts in 2016 to identify, mitigate, and remediate contaminant effects from PFAS-containing AFFF.[48] Beginning in 2019, DoD PFAS Task Force officials further consolidated these efforts and issued various policies promulgated throughout the DoD. DoD, MILDEP, and DLA officials continue to report the status of their efforts to respond to PFAS concerns through public reports on the defense.gov website and Service-specific websites, status reports to Congress, and direct communication with community stakeholders near military installations.

(U) DoD Officials Did Not Take Proactive Risk Management Actions to Mitigate Contaminant Effects From PFAS-Containing AFFF at DoD Installations

~~(CUI)~~ Although DoD officials are identifying, mitigating, and remediating contaminant effects from PFAS-containing AFFF, DoDI 4715.18 requires DoD officials to proactively mitigate contaminant effects from ECs at DoD installations. EC Program officials included PFAS on the EC Watch List [redacted]. [redacted], EC Program officials commissioned impact assessment reports [redacted] EC Program officials issued a risk alert in 2011 that described risks to DoD areas of concern, including risks to human health and the environment. However, the 2011 risk alert was not an RMA because

[47] (U) The environmental officials at former Pease Air Force Base expect the renovation to be completed in the summer of 2021.

[48] (U) DoD PFAS Task Force officials stated that since the EPA established the LHA levels for PFOS and PFOA in sources of drinking water in 2016, the CERCLA requires the DoD to respond with Federal cleanup response actions to actual or threatened releases of PFOS and PFOA into the environment.

~~(CUI)~~ it was not endorsed by the ECGC. Therefore, DoD officials were not required to plan, program, and budget for any actions in response to the 2011 risk alert. EC Program officials did not require proactive RMAs for PFAS-containing AFFF until 2016 [redacted]

~~(CUI)~~ Additionally, DoDI 4715.18 requires DoD officials to apply an enterprise-wide approach to mitigate contaminant effects from an EC. An enterprise-wide approach would address all sources of potential EC exposure caused by DoD activities and the impacts of that exposure to DoD areas of concern. EC Program officials identified PFOS and PFOA as ECs [redacted] DoD officials commissioned impact assessment reports [redacted]. DoD officials have not proactively identified, mitigated, and remediated contaminant effects from PFAS-containing materials other than AFFF at DoD installations. Therefore, DoD officials did not apply an enterprise-wide approach to mitigate the contaminant effects from all sources of potential PFAS exposure caused by DoD activities, as required by DoDI 4715.18.

(U) DoDI 4715.18 Requires DoD Officials to Take Proactive Risk Management Actions

(U) DoD officials initiated the EC Program in 2006 to proactively evaluate and manage risks from ECs, established the EC Program with the first publication of DoDI 4715.18 in 2009, and updated DoDI 4715.18 in 2019. DoDI 4715.18 "provides procedures for an enterprise-wide approach to the identification, assessment, and management of 'DoD ECs.'" DoDI 4715.18 requires a process, which we refer to as the DoDI 4715.18 EC Process, to proactively reduce impacts to "people, the environment, and DoD missions, programs, and resources." The DoDI 4715.18 EC Process requires EC Program officials to identify ECs and maintain an EC Watch List. EC Program officials assess media interest, review scholarly publications, and evaluate the likelihood of changing guidance or standards on the international, Federal, or state levels to determine if chemicals or substances used by the DoD meet the DoDI 4715.18 definition of an EC. EC Program officials use these indicators to identify ECs for addition to the EC Watch List. The EC Watch List is a list of ECs with a potential risk of impact to DoD areas of concern.

(U) Once an EC is added to the EC Watch List, the DoDI 4715.18 EC Process requires EC Program officials to "assess the likelihood and severity of impacts associated with ECs." These impact assessments incorporate "qualitative data, quantitative data, or a combination of both," to assess the impacts associated with ECs.[49] The impact assessments must address enterprise-wide categories that represent DoD areas of concern for ECs, such as environment, safety, and health; training and readiness; and cleanup.[50] The DoDI 4715.18 EC Process requires EC Program officials to determine if ECs on the EC Watch List should be elevated to the EC Action List based on the risks to the DoD areas of concern assessed in the EC impact assessments. The EC Action List is a list of ECs with a "probable high risk of impact to people, the environment, and DoD mission, programs, or resources and for which proactive RMOs are being developed or actions are ongoing."[51]

(U) Once EC Program officials elevate an EC from the EC Watch List to the EC Action List, the DoDI 4715.18 EC Process requires EC Program officials to develop and present validated RMOs for the EC to the ECGC.[52] The DoDI 4715.18 EC Process requires the ECGC to "endorse" validated RMOs. RMOs endorsed by the ECGC become RMAs. DoDI 4715.18 requires DoD Components to "plan, program, and budget for the implementation of RMAs needed to [proactively] reduce the likelihood or severity of impacts to people, the environment, and DoD missions, programs, and resources."

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49 (U) 2019 DoDI 4715.18.

(U) See the Glossary for definitions of qualitative and quantitative.

~~(CUI)~~ The 2009 DoDI 4715.18 did not include a description of the specific requirements for qualitative and quantitative assessments. However, we found that the impact assessment reports commissioned by EC Program officials [redacted] included qualitative and quantitative assessments, as described in the 2019 DoDI 4715.18.

50 ~~(CUI)~~ The 2009 DoDI 4715.18 did not list the specific enterprise-wide categories that represent DoD areas of concern. However, both the impact assessment reports commissioned by EC Program officials [redacted] and the 2019 DoDI 4715.18 list the enterprise-wide categories that represent DoD-relevant areas of concern for ECs: environment, safety, and health; training and readiness; production, operations, maintenance, and disposal of DoD assets; cleanup; and acquisition and research, development, testing, and evaluation.

51 (U) 2019 DoDI 4715.18.

(U) According to the 2019 DoDI 4715.18, if the impact assessments indicate low or moderate risk of impact to any of the DoD areas of concern, the EC remains on the EC Watch List. If the impact assessments indicate high risk of impact to any of the DoD areas of concern, the EC is elevated to the EC Action List. The 2009 DoDI 4715.18 used the terms potential high risk for the EC Watch List and probable high risk for the EC Action List.

52 (U) According to DoDI 4715.18, the ECGC is chaired by the Assistant Secretary of Defense for Sustainment and is comprised of Assistant Secretary of Defense officials representing enterprise-wide categories that represent areas of concern for ECs. The ECGC meets to endorse proactive RMOs and issues the resulting RMAs to DoD Components.

~~(CUI)~~ EC Program Officials Commissioned Impact Assessment Reports [redacted]

~~(CUI)~~ EC Program officials completed DoDI 4715.18 EC Process ac[redacted] related to two PFAS: PFOS and PFOA. Figure 1 shows the timeline of activities performed by EC Program officials, including impact assessment reports and policies, memorandums, and risk alerts issued to DoD Components and users of PFAS-containing AFFF related to PFOS and PFOA, and select EPA activities, including health advisories.

(U) Figure 1. Timeline of EC Program Activities and Select EPA Activities Related to PFOS and PFOA

(U) Source: DoD OIG.

~~(CUI)~~ EC Program officials identified potential changes to environmental regulatory standards related to PFOS and PFOA and included PFOS and PFOA on the EC Watch List [redacted][53] EC Program officials commissioned impact assessments reports for PFOS and PFOA [redacted][54] [redacted]

~~(CUI)~~ [redacted] acturers, U.S. manufacturers of AFFF concentrates transitioned to the use of alternatives that do not contain PFOS and PFOA. However, the EPA did not prohibit the use of existing stocks of AFFF concentrates containing PFOS and PFOA in the United States.[55]

~~(CUI)~~ [redacted]

[53] (U) See Figure 1.

[54] (U) See Figure 1.
~~(CUI)~~ [redacted]
~~(CUI)~~ [redacted]
~~(CUI)~~ [redacted]
~~(CUI)~~ [redacted]
~~(CUI)~~ [redacted]
~~(CUI)~~ We reviewed the impact assessment reports and found that the impact assessments were prepared as required by DoDI 4715.18. The Phase I impact assessments combined qualitative and quantitative data, while the Phase II impact assessments went into further detail to validate the results of the Phase I impact assessments and focused on quantitative data. [redacted]

[55] ~~(CUI)~~ [redacted]. Specifically, the European Union required DoD officials to convert existing stocks of AFFF concentrates containing PFOS and PFOA to AFFF concentrates with little to no PFOS or PFOA at military installations in Europe by June 2011. However, we did not evaluate whether this occurred because it was outside of the scope of this evaluation.

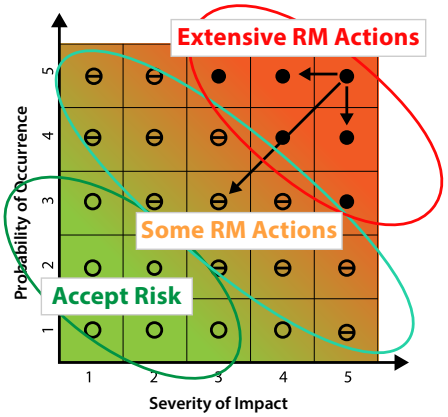
~~(CUI)~~ [redacted] According to EC Program officials, the combination of the probability of occurrence and the severity of impact associated with the risks to DoD areas of concern justify the options shown in Figure 3 to accept risk, require some RMAs (depicted as "RM Actions"), or require extensive RMAs at DoD installations.

~~(CUI)~~ [redacted]

[redacted]

~~(CUI)~~ [redacted]

(U) Figure 3. Risk Management Actions Applicable to Risk Cube



(U) Source: EC Program presentation at December 2006 Federal Remediation Technologies Roundtable meeting.

~~(CUI)~~ [redacted]

- ~~(CUI)~~ [redacted]
- ~~(CUI)~~ [redacted]
- ~~(CUI)~~ [redacted]

~~(CUI)~~ [redacted] In August 2008, the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics issued a memorandum to the DoD acquisition community, stating, "[W]e do not intend to develop risk management options [RMOs] for PFOA since industry is taking appropriate actions."[56] [redacted].[57] Therefore, EC Program officials did not issue RMAs through the ECGC.

[56] (U) See Figure 1.
(U) Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics memorandum, "Phase-Out of Perfluorooctanoic Acid (PFOA)," August 7, 2008.
(U) The Office of the Under Secretary of Defense for Acquisition and Sustainment was formerly the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics.

[57] ~~(CUI)~~ [redacted]

~~(CUI)~~ EC Program Officials Did Not Require Proactive Risk Management Actions for PFAS-Containing AFFF Until 2016 [redacted]

~~(CUI)~~ EC Program officials issued a risk alert in 2011 that described risks to the DoD areas of concern, including risks to human health and the environment. However, the 2011 risk alert was not an RMA because it was not endorsed by the ECGC. Therefore, DoD officials were not required to plan, program, and budget for any actions in response to the 2011 risk alert. EC Program officials did not require proactive RMAs for PFAS-containing AFFF until 2016 [redacted]

(CUI) [redacted] In 2009, the EPA published PHAs for PFOS and PFOA found in sources of drinking water.[58] However, EC Program officials did not issue RMAs for these PFAS in response to the 2009 PHA. Instead, as shown in Figure 1, EC Program officials from the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics issued the "Chemical & Material Emerging Risk Alert: Aqueous Film Forming Foam (AFFF)" in 2011. The risk alert stated that PFAS-containing AFFF "contain[s] chemicals that present human health and environmental risks and require[s] special handling and disposal." The risk alert described the environmental risks associated with the storage, use, and disposal of PFAS-containing AFFF and included recommendations to control future releases of stockpiled, PFAS-containing AFFF. However, EC Program officials did not develop and present these recommendations to the ECGC for endorsement of RMAs. DoDI 4715.18 requires DoD Components to "plan, program, and budget for the implementation of RMAs," but it does not describe risk alerts as part of the DoDI 4715.18 EC Process or require DoD Components to plan, program, and budget for the implementation of risk alert recommendations. The 2011 risk alert was not endorsed by the ECGC. Therefore, EC Program officials did not issue the risk alert in the form of an RMA, as defined by DoDI 4715.18. Consequently, it was not a requirement for DoD Components to act on the 2011 risk alert. Additionally, installation officials, including firefighters, at the six current and former military installations and the DLA sites we evaluated were not aware of the 2011 risk alert.

[58] (U) As discussed in the Background section of this report, according to the EPA, PHA values "reflect reasonable, health-based values above which action should be taken to reduce exposure to unregulated contaminants in drinking water." The EPA issues PHAs in response to an urgent or developing situation, and updates them as additional information becomes available.

(CUI) [redacted]

(U) On December 16, 2015, the ECGC endorsed RMOs for PFAS-containing AFFF into RMAs. In January 2016, EC Program officials provided the ECGC-endorsed RMAs for PFAS-containing AFFF in a memorandum to DoD Components.[59] The RMA memorandum required the initiation of research and development of an effective firefighting alternative without PFAS. Additionally, the RMA memorandum required DoD officials to implement steps to reduce the risk of contaminant effects from PFAS-containing AFFF. The RMA memorandum required DoD officials to:

- (U) "prevent routine uncontrolled land-based releases of AFFF during maintenance, testing, and training activities," including restricting nonessential use of AFFF and requiring engineered containment systems or spill response measures for AFFF releases; and
- (U) replace existing stocks of AFFF concentrates containing PFOS and PFOA with AFFF concentrates with little to no PFOS or PFOA.[60]

(CUI) [redacted], the ECGC did not endorse RMAs to mitigate contaminant effects of PFAS-containing AFFF until 2016.[61] Neither MILDEP nor DLA officials issued policy targeted to installation F&ES officials using stockpiled, PFAS-containing AFFF to require the use of proactive strategies to mitigate contaminant effects until after the 2016 RMA.[62] Therefore, AFFF concentrates containing PFOS and PFOA

[59] (U) See Figure 1.
(U) Office of the Assistant Secretary of Defense for Energy, Installations, and Environment memorandum, "Emerging Contaminants Governance Council (ECGC) Meeting Results," January 28, 2016.

[60] (CUI) [redacted]
The RMA memorandum did not included a deadline for completion of these requirements.

[61] (U) See Figure 1.

[62] (U) We reviewed the MILDEP's and the DLA's policies issued to the Services, National Guard, and the DLA related to PFAS. We found that, in some instances, the Services moved ahead of the EC Program or DoD PFAS Task Force activities and began to take certain proactive steps to identify and mitigate contaminant effects from PFAS-containing AFFF at military installations. For example, the Department of the Air Force published interim guidance in 2012 for PFAS sampling and response actions in the absence of environmental regulatory standards and began performing Federal cleanup response actions in 2014. In another example, the Department of the Navy issued a policy in 2014 to address drinking water and environmental restoration program activities related to PFAS, including response actions such as providing bottled water to stop exposure to PFAS. The Army did not issue any policy to identify, mitigate, and remediate contaminant effects from PFAS until 2016.

~~(CUI)~~ remained in the DoD inventory and remained in use until 2016. [redacted][63]

(U) DoD Officials Did Not Take Proactive Steps to Identify, Mitigate, and Remediate Contaminant Effects From PFAS-Containing Materials Other Than AFFF

~~(CUI)~~ DoDI 4715.18 requires DoD officials to apply an enterprise-wide approach to mitigate contaminant effects from ECs. An enterprise-wide approach would address all sources of potential EC exposure caused by DoD activities and the impacts of that exposure to DoD areas of concern. As previously discussed, DoD officials identified PFOS and PFOA as ECs [redacted] EC Program officials commissioned impact assessment reports [redacted]

- (CUI) [redacted]
- (CUI) [redacted][64]

(CUI) [redacted] as of July 2021, EC Program officials had not issued any RMAs requiring actions at DoD installations related to PFAS-containing materials other than AFFF.

[63] (U) See Figure 1.
[64] (CUI) [redacted]

(U) As previously discussed, the Secretary of Defense established the DoD PFAS Task Force in 2019 to ensure that the DoD has a "coordinated, aggressive, and holistic approach to DoD-wide efforts to proactively address" the effects of PFAS exposure caused by DoD activities. Although DoD PFAS Task Force officials issued various policies and reports to Congress describing their efforts to respond to PFAS concerns, DoD PFAS Task Force officials did not address PFAS-containing materials other than AFFF in the policies or reports. As previously discussed, actions taken to reduce the risk of contaminant effects from PFAS in groundwater or in sources of drinking water address those specific routes of exposure regardless of whether the historical impacts resulted from PFAS-containing AFFF or PFAS-containing materials other than AFFF. However, these actions do not address current and future contaminant effects from PFAS-containing materials other than AFFF to groundwater, sources of drinking water, or other routes of exposure.

(U) Furthermore, neither MILDEP nor DLA officials issued consistent policy to installation officials initiating Federal cleanup response actions regarding which PFAS-containing materials to investigate.[65] Therefore, installation officials may not consistently investigate their activities to identify all sources of PFAS and their contaminant effects on DoD installations and in the surrounding communities. We asked installation officials at the six current and former military installations and the DLA sites we evaluated what materials and activities at the installation contained PFAS. Installation officials at the six current and former military installations and the DLA sites we evaluated were aware of PFAS in consumer products, such as food packaging materials, nonstick cookware, stain-resistant carpet treatments, and water-resistant clothing. However, the installation officials were not aware of whether potential PFAS exposure caused by DoD activities could result from the use of PFAS-containing materials other than AFFF on their installations.

~~(CUI)~~ [redacted] However, EC Program officials have not issued RMAs for PFAS-containing materials other than AFFF at DoD installations. Additionally, DoD PFAS Task Force officials have not addressed PFAS-containing materials other than AFFF in their policies or reports to Congress.

[65] (U) We reviewed the MILDEP's and the DLA's policies issued to the Services, National Guard, and the DLA related to PFAS. We found that, in some instances, the Services described the potential for contaminant effects caused by DoD activities from PFAS-containing materials other than AFFF at military installations and in some instances they did not. For example, both the Department of the Navy and the Army published guidance addressing releases of PFAS that described the use of PFAS in the manufacturing process of adding metal plating (coating) to materials that sometimes occurs at military installations. However, the Air Force policies did not describe the potential for contaminant effects from PFAS-containing materials other than AFFF at military installations.

~~(CUI)~~ Furthermore, neither MILDEP nor DLA officials have taken steps to identify, mitigate, and remediate contaminant effects from PFAS-containing materials other than AFFF at DoD installations. Therefore, as of July 2021, DoD officials did not apply an enterprise-wide approach to mitigate contaminant effects from all sources of potential PFAS exposure caused by DoD activities at DoD installations.

(U) DoDI 4715.18 Does Not Include Objective Requirements to Initiate Risk Management Actions or to Elevate an EC to the EC Action List

~~(CUI)~~ DoD officials did not require proactive RMAs for PFAS-containing AFFF until 2016 because the DoDI 4715.18 does not include objective requirements for EC Program officials to use when determining when to initiate RMAs or to elevate an EC from the EC Watch List to the EC Action List. [redacted].[66] As shown in Figure 1, EC Program officials [redacted], did not issue an RMA until 2016, [redacted].

(U) According to an EC Program official, the EC Program was established to provide proactive, strategic planning to reduce risks to the DoD from ECs. However, when we asked the EC Program official why proactive RMAs were not issued before 2016, the EC Program official told us that they react to what is emerging from environmental regulatory agencies. We concluded that the EC Program official's statement contradicted the proactive purpose of the EC Program.

(U) As previously discussed, DoDI 4715.18 defines ECs as chemicals with "new or changing toxicity values" or "new or changing human health or environmental regulatory standards." For example, DoDI 4715.18 states that "if gaps in human health science exist, the DoD can make recommendations to…the EPA, or other agencies for additional studies to reduce uncertainty." Various EPA activities, such as manufacturing phase-outs and health advisories, occurred while PFOS and PFOA

[66] ~~(CUI)~~ [redacted]

(U) were on the EC Watch List. These EPA activities indicated that new or changing toxicity values were expected for PFOS and PFOA and that new or changing human health or environmental regulatory standards were expected for PFOS and PFOA. DoDI 4715.18 requires EC Program officials to proactively evaluate and manage risks from ECs with RMAs. Therefore, regardless of whether the EPA had finalized and issued environmental regulatory standards, DoDI 4715.18 required EC Program officials to proactively evaluate and manage risks from PFOS and PFOA.

(U) DoDI 4715.18 requires EC Program officials to develop and present RMOs to be endorsed as RMAs by the ECGC for ECs with high risk of impact to any of the DoD areas of concerns. However, DoDI 4715.18 does not have objective requirements to define risk levels or define how to quantify risks to the DoD areas of concern. This allowed EC Program officials to make decisions regarding PFAS that were not aligned with the DoDI 4715.18 EC Process goal of proactively reducing risks to the DoD areas of concern. If DoDI 4715.18 included objective requirements for EC Program officials to use when determining when to initiate risk management actions, then EC Program officials could make informed and timely decisions to proactively reduce impacts to "people, the environment, and DoD missions, programs, and resources."

~~(CUI)~~ [redacted]. The DoDI 4715.18 EC Process requires EC Program officials to develop RMOs for ECs on the EC Action List. However, DoDI 4715.18 does not require EC Program officials to develop RMOs for ECs that remain on the EC Watch List, even if those RMOs may be warranted. EC Program officials did not elevate PFOS and PFOA to the EC Action List [redacted] and, according to DoDI 4715.18, were not required to develop RMOs for the ECGC to endorse as RMAs. If DoDI 4715.18 required EC Program officials to initiate proactive RMAs at the earliest opportunity, regardless of whether an EC is on the EC Watch List or the EC Action List, then EC Program officials could make informed and timely decisions to proactively reduce impacts to "people, the environment, and DoD missions, programs, and resources."

~~(CUI)~~ As previously discussed, EC Program officials added PFOS and PFOA to the EC Watch List [redacted]. Although EC Program officials issued a risk alert in 2011, we found no evidence that installation officials, including firefighters, at the six current and former military installations and the DLA sites we evaluated were aware of the 2011 risk alert. The DoDI 4715.18 EC Process requires EC program officials to identify ECs and to justify the addition of the EC to the EC Watch List and the EC Action List. DoDI 4715.18 requires EC Program officials to notify

~~(CUI)~~ members of the ECGC representing the DoD areas of concern "about the potential consequences of…impact assessment report findings." However, DoDI 4715.18 does not require EC Program officials to make DoD users of the ECs aware of the EC's status in the EC Process.[67]

(U) DoD Officials Were Focused on AFFF, a Major Source of Potential PFAS Exposure, and Not on All Sources of Potential PFAS Exposure Caused by DoD Activities

(U) DoD officials did not apply an enterprise-wide approach to mitigate contaminant effects from all sources of potential PFAS exposure caused by DoD activities. This occurred because DoD officials were focused on AFFF, which is a major source of potential PFAS exposure caused by DoD activities. According to the ATSDR, the historical use of PFAS-containing AFFF at DoD installations has resulted in "widespread" PFAS contaminant effects in groundwater and sources of drinking water at DoD installations and in the surrounding communities. Therefore, AFFF is a major source of potential PFAS exposure caused by DoD activities because of the risks AFFF poses to sources of drinking water.[68]

(U) We asked DoD officials, including EC Program officials, DoD PFAS Task Force officials, and installation officials at the six current and former military installations and the DLA sites we evaluated, about sources of potential PFAS exposure caused by DoD activities. At each of the six current and former military installations and the DLA sites we evaluated, DoD officials only described their actions to identify, mitigate, and remediate contaminant effects from PFAS-containing AFFF. Additionally, we found that all of the DoD's efforts, including Federal cleanup response actions, policies, and reports to Congress, were related to AFFF and PFAS-containing AFFF impacts to sources of drinking water. Therefore, DoD officials were focused on AFFF, a major source of potential PFAS exposure caused by DoD activities.

~~(CUI)~~ Although AFFF is a major source of potential PFAS exposure caused by DoD activities, AFFF is not the only PFAS-containing product that is largely limited to the DoD and other heavy industries. [redacted]. EC Program officials elevated PFOS and PFOA to the EC Action List [redacted]. However, EC Program officials have not issued any RMAs for PFAS since 2016. [redacted]

[67] (U) Similarly, the 2009 DoDI 4715.18 required EC Program officials to "provide updates to senior DoD leadership" but did not require EC Program officials to communicate with DoD users of the ECs.

[68] (U) As previously discussed, drinking water containing PFAS is a major route of human exposure to PFAS.

~~(CUI)~~ [redacted] DoDI 4715.18 requires "an enterprise-wide approach to the identification, assessment, and management" of ECs. An enterprise-wide approach should include identifying, assessing, and managing all sources of potential PFAS exposure caused by DoD activities, [redacted]

(U) People and the Environment May Be Exposed to Preventable Risks From PFAS

~~(CUI)~~ As a result of the DoD not taking proactive risk management actions, people and the environment may have been exposed to preventable risks from PFAS-containing AFFF. [redacted][69] DoD officials could not have known the amount of risk or future impact from each historical release of PFAS-containing AFFF.[70] However, we found that EC Program officials had the opportunity to require proactive RMAs to mitigate contaminant effects of PFAS-containing AFFF at DoD installations before the 2016 RMA.

~~(CUI)~~ Installation officials at each of the six current and former military installations and the DLA sites we evaluated showed us the results of assessments that identified locations of historical PFAS-containing AFFF releases.[71] The assessments we reviewed indicated that the majority of historical PFAS-containing AFFF releases occurred before the 2000s.[72] However, we found that the assessments also identified locations where uncontrolled releases of PFAS-containing AFFF were believed to have occurred more recently in the years prior to 2016, when the ECGC issued RMAs for PFAS-containing AFFF.[73] [redacted][74] [redacted]

69 ~~(CUI)~~ [redacted]

70 (U) Historical releases may have occurred in an emergency, during testing or training, or by accident.

71 (U) The installation assessments identified locations of potential historical PFAS-containing AFFF releases through records reviews and interviews with knowledgeable people.

72 (U) As previously discussed, from the early 2000s to 2015, the EPA worked with U.S. manufacturers to voluntarily Phase out the production of PFOS and PFOA in the United States.

73 ~~(CUI)~~ [redacted]

74 ~~(CUI)~~ [redacted]

~~(CUI)~~ us a report that identified locations of historical PFAS-containing AFFF releases. The Naval Auxiliary Landing Field Fentress PFAS report indicated that installation F&ES officials released PFAS-containing AFFF directly onto the ground to test the functionality of firefighting vehicles in the years between 2010 and 2015. Additionally, installation firefighters at Peterson Air Force Base told us that they did not stop releasing PFAS-containing AFFF in a location where it could affect the soil during training exercises until 2011. Therefore, uncontrolled release of PFAS-containing AFFF prior to 2016 may have contributed to unnecessary groundwater and drinking water contaminant effects that will cost the DoD time and resources to investigate and remediate when performing Federal cleanup response actions.[75]

(U) In addition, uncontrolled storage, handling, and use of PFAS-containing AFFF prior to 2016 may have contributed to unnecessary occupational exposure to installation F&ES officials, including firefighters.[76] We asked firefighters at the military installations we evaluated when they became aware of potential health effects from exposure to PFAS. Firefighters at the five current military installations we evaluated were not aware of the risks until 2016 when they received their Service-specific policies restricting nonessential use of AFFF, which were written in response to the RMAs issued by the ECGC.[77]

~~(CUI)~~ Installation F&ES officials are not the only potential users of PFAS-containing materials. Additionally, AFFF is not the only PFAS-containing product that is largely limited to the DoD and other heavy industries. [redacted]. For example, fire-resistant aviation hydraulic fluids are a potential source of PFAS exposure caused by DoD activities, such as exposures caused by accidental releases during MILDEP maintenance activities.

[75] (U) Uncontrolled releases are historical releases where engineered containment systems or spill response measures were not used to contain the PFAS-containing AFFF and where DoD officials did not take steps to prevent PFAS-containing AFFF from reaching sources of potential human exposure, such as sources of water.

[76] (U) Uncontrolled storage, handling, and use refers to a lack of occupational controls placed on AFFF concentrates. For example, the storage of AFFF concentrates in unlocked facilities or facilities not equipped with engineered containment systems is uncontrolled storage. In another example, the handling and use of AFFF concentrates by firefighters without personal protective equipment is uncontrolled handling and use.

(U) According to the EPA, occupational exposure is one way that people are exposed to PFAS. Additionally, according to the ATSDR, some studies have found higher levels of PFAS in firefighters who use PFAS-containing AFFF compared to the general population.

(U) EPA's PFAS Action Plan, February 2019.

(U) Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Perfluoroalkyls Draft for Public Comment," June 2018.

[77] (U) Although we selected six DoD installations and spoke to officials representing three DLA Sites for our evaluation, DoD firefighters were only present and assigned to the five current DoD installations. Therefore, the firefighters at the five current military installations represent all of the DoD firefighters with whom we spoke.

(U) In another example, installation environmental officials at Camp Grayling provided us a report that described the results of their investigation into PFAS contaminant effects in groundwater on the installation. The investigation found PFOS and PFOA at levels exceeding the EPA LHAs in the groundwater in an area on the installation designed to provide materials storage and maintenance and repair areas for military equipment. According to the Camp Grayling report, the area was not identified during the initial investigation but was added to the investigation later when test results indicated potential PFAS contaminant effects in the area. The report stated that no known historical releases of PFAS-containing AFFF occurred in the area, and there are no fire suppressions systems in any of the buildings in the area. According to the report, the location suggested that the release occurred near a station for washing equipment, such as military vehicles, but that the PFAS-containing material source was unknown. Although it is possible that the contaminant effects may have been the result of a PFAS-containing AFFF release unknown to Camp Grayling officials, this example indicates that PFAS contaminant effects may be present in unexpected locations and resulting from unknown sources, including PFAS-containing materials other than AFFF. Therefore, as a result, people and the environment may be exposed to preventable risks from PFAS-containing materials other than AFFF.

(U) Recommendations, Management Comments, and Our Response

(U) Recommendation A.1

(U) We recommend that the Under Secretary of Defense for Acquisition and Sustainment revise DoD Instruction 4715.18 to include requirements for Emerging Chemical Program officials to:

a. **(U) Initiate proactive risk management actions based on measureable risks to the DoD areas of concern to mitigate contaminant effects of emerging chemicals at DoD installations.**

b. **(U) Develop risk management options and initiate proactive risk management actions which may be warranted to identify and mitigate the contaminant effects of emerging chemicals as early as possible in the Emerging Chemical Process, regardless of whether an emerging chemical is on the Emerging Chemical Watch List or the Emerging Chemical Action List.**

c. **(U) Formally inform DoD users of emerging chemicals and of their status in the Emerging Chemical Process.**

(U) Assistant Secretary of Defense (Sustainment) Comments

(U) The Acting Assistant Secretary of Defense (Sustainment) (ASD[S]), responding for the Under Secretary of Defense for Acquisition and Sustainment, partially agreed with the recommendations. Specifically, the Acting ASD(S) stated that the DoDI 4715.18 should be revised to more clearly articulate EC Program activities. The Acting ASD(S) stated that the USD(A&S) will revise DoDI 4715.18 to:

- (U) develop risk measures consistent with the "Department of Defense Risk Management Guide for Defense Acquisition Programs" to quantify risks to the DoD areas of concern;[78]
- (U) require EC Program officials to apply the measurable risk management requirements and, when warranted, present risk management options to the ECGC;
- (U) include the development of risk management options for ECs on the EC Watch List and the EC Action List; and
- (U) include a process to formally inform DoD users of ECs of their status in the EC Process.

(U) The Acting ASD(S) also stated that the USD(A&S) plans to issue these requirements in a policy memorandum by January 2022 and to incorporate the requirements in the next update to DoDI 4715.18, which is anticipated to occur by September 2025.

(U) Our Response

(U) Comments from the Acting ASD(S) addressed the recommendations. While the comments we received stated that the Acting ASD(S) partially agreed with the recommendations, the comments clarified that the partial agreement was related to terms we used in our recommendation and was not related to the recommended revisions to DoDI 4715.18. Therefore, the recommendations are resolved but will remain open. We will close these recommendations after we verify that the January 2022 policy memorandum and the next update to DoDI 4715.18 fully address the recommendations.

[78] (U) Office of the Deputy Assistant Secretary of Defense for Systems Engineering, "Department of Defense Risk, Issue, and Opportunity Management Guide for Defense Acquisition Programs," January 2017.
(U) The DoD Risk, Issue, and Opportunity Management Guide provides guidance for risk identification, risk analysis, risk mitigation, and risk monitoring. It also describes the use of consistent, predefined criteria to determine when to act and how to prioritize actions.

(U) Recommendation A.2

(U) We recommend that the Deputy Assistant Secretary of Defense (Environment and Energy Resilience) complete the Emerging Chemical Process for potential perfluoroalkyl and polyfluoroalkyl substance exposure caused by DoD activities from perfluoroalkyl and polyfluoroalkyl substance-containing materials other than Aqueous Film Forming Foam by developing and presenting validated risk management options for the perfluoroalkyl and polyfluoroalkyl substances on the Emerging Chemical Action List to the Emerging Chemicals of Concern Governance Council, as required by DoD Instruction 4715.18.

(U) Assistant Secretary of Defense (Sustainment) Comments

(U) The Acting ASD(S), responding for the Deputy Assistant Secretary of Defense (Environment and Energy Resilience), agreed with the recommendation. The Acting ASD(S) stated that validated risk management options will be presented to the ECGC in the second quarter of FY 2022.

(U) Our Response

(U) Comments from the Acting ASD(S) addressed the recommendation; therefore, the recommendation is resolved but will remain open. We suggest that the Acting ASD(S) consider the planned changes to DoDI 4715.18 when addressing this recommendation. We will close this recommendation after we verify that the information provided and that the actions taken fully addressed the recommendations.

(U) Finding B

(U) The DoD Is Identifying Populations Exposed to PFAS in Drinking Water, Informing Them of the Associated Health and Safety Concerns, and Implementing PFAS Blood Tests for DoD Firefighters; However, the DoD Firefighter PFAS Blood Testing Implementation Plan Needs Improvement

(U) DoD officials have taken steps to identify populations exposed to PFAS in drinking water at DoD installations and inform them of the associated health and safety concerns. These steps include identifying sources of water containing PFAS and providing PFAS health-related information to military medical treatment facilities. DoDI 6055.05 requires DoD Components to implement risk management steps, including evaluating occupational and environmental health risk management. These risk management steps include tracking, trending, and analyzing clinical examination results related to workplace exposures.

(U) DoD officials developed a plan to implement PFAS blood testing for DoD firefighters by FY 2021, as required by the FY 2020 NDAA. However, DoD officials do not plan to track, trend, and analyze the results of PFAS blood tests conducted on DoD firefighters at a DoD-wide level, as required by DoDI 6055.05. This occurred because DoD officials were focused on the immediate collection of the PFAS blood test results to address the FY 2020 NDAA requirement to test the blood of DoD firefighters and not on the analysis of the blood test results at a DoD-wide level. As a result, the DoD is missing an opportunity to capture comprehensive PFAS exposure data for DoD firefighters to be used for risk management, including future studies to assess long-term health effects relating to PFAS exposure.

(U) DoD Officials Have Taken Steps to Identify Populations Exposed to PFAS in Drinking Water at DoD Installations and Inform Them of the Associated Health and Safety Concerns

(U) DoD officials have taken steps to identify populations exposed to PFAS in drinking water at DoD installations and inform them of the associated health and safety concerns. Specifically, in response to the EPA issuing LHAs for PFOS and PFOA in sources of drinking water in May 2016, DoD officials tested all DoD-operated drinking water systems to identify sources of drinking water with concentrations of PFOS or PFOA above the EPA LHA levels. In addition, the MILDEPs tested private and public drinking water wells for PFOS and PFOA in communities surrounding military installations that may have been impacted by DoD activities.

(U) DoD officials also followed the EPA's recommended actions, including notifying affected populations if PFOS and PFOA levels in sources of drinking water exceeded the LHAs. These notifications included describing actions being taken to reduce risks and providing information on the risks associated with exposure to PFOS and PFOA in sources of drinking water above the EPA LHA levels. The DoD's outreach strategy also included coordinating with state and local governments and conducting community outreach to address PFAS concerns and answer questions from potentially impacted communities.

(U) For example, after installation officials at Camp Grayling identified PFOS and PFOA in groundwater tested in May 2017, installation officials hosted a town hall meeting to announce the test results and a plan to identify whether any sources of drinking water surrounding the installation, including private drinking water wells, had PFOS and PFOA concentrations above the EPA LHA levels. Installation officials at Camp Grayling notified residents and state regulators of the test results after testing private drinking water wells and finding that PFOS and PFOA concentrations were above the EPA LHA levels. The installation officials at Camp Grayling also described the actions they would take to address the contaminant effects of PFOS and PFOA in the sources of drinking water. Installation officials at Camp Grayling posted information on the State of Michigan's PFAS Action Response Team website, which included health information, a timeline of events, frequently asked questions, and Grayling Area Restoration Advisory Board information.[79]

[79] (U) A Restoration Advisory Board is a stakeholder group, involving the local community, that meets to discuss environmental restoration at a DoD installation.

(U) DoD officials also provided PFAS health-related information to Military Health System healthcare providers to address questions from the potentially exposed population. Specifically, the Assistant Secretary of Defense (Health Affairs) issued a memorandum in February 2020 that provided PFAS health-related information resources to Military Health System healthcare providers.[80] The MILDEPs also prepared their own PFAS health information for healthcare providers. For example, in August 2016, the U.S. Air Force School of Aerospace Medicine issued a detailed report to Air Force healthcare providers, which included frequently asked questions about PFAS.[81] In addition, in January 2016, the Navy and Marine Corps Public Health Center issued two technical guides as a resource to help Navy healthcare providers prepare for health-related questions related to exposure to PFAS in drinking water. Furthermore, in early 2017 the Army Public Health Center issued an information paper for healthcare providers that was made available to Army commands for outreach to their communities.

(U) Additionally, DoD officials are addressing the FY 2019 NDAA requirement for the Secretary of Defense to "conduct an assessment of the human health implications of PFAS exposure." The FY 2019 NDAA required the assessment to include an analysis of health effects associated with PFAS and an estimate of the number of members of the Armed Forces and veterans who may have been exposed to PFAS while serving in the Armed Forces. Defense Health Agency Public Health Division officials told us they took several steps to address these requirements. Specifically, Defense Health Agency Public Health Division officials:

- (U) identified and evaluated health studies relevant to members of the Armed Forces and veterans;
- (U) identified and evaluated peer-reviewed papers on civilian firefighter PFAS exposures and other potential industrial processes that use PFAS; and
- (U) estimated the number of potential Service members and veterans, including National Guard, active duty personnel, and DoD firefighters, who may have been exposed to PFAS based on reported estimates of the number of Armed Forces personnel located on installations where sources of drinking water tested at or above the EPA LHAs for PFOS and PFOA.[82]

[80] (U) Assistant Secretary of Defense (Health Affairs) memorandum, "Per- and Polyfluoroalkyl Substances: Information for Healthcare Providers," February 7, 2020.

[81] (U) The U.S. Air Force School of Aerospace Medicine issued an updated PFAS report in February 2019.

[82] (U) According to Defense Health Agency Public Health Division officials, the estimates will include a calculation to account for how long the drinking water may have been affected by PFAS contaminant effects.

(U) According to an Office of the Deputy Assistant Secretary of Defense (Health Readiness & Policy Oversight) (ODASD[HRPO]) official, the reports addressing the FY 2019 NDAA requirement are expected to be finalized in the fourth quarter of FY 2021.

(U) Furthermore, DoD officials developed a plan for annually testing DoD firefighters' blood to document and determine potential PFAS exposure by FY 2021, in accordance with the FY 2020 NDAA. We refer to the plan to implement PFAS blood testing for DoD firefighters as the DoD firefighter PFAS blood testing implementation plan throughout this report. According to Office of the Deputy Assistant Secretary of Defense (Force Safety and Occupational Health) officials, the Office of the Assistant Secretary of Defense (Readiness) (ASD[R]) determined that the best way to complete the NDAA blood testing requirement was for occupational medical providers to test blood during the annual occupational medical examination of each firefighter.

(U) DoD Officials Do Not Plan to Track, Trend, and Analyze the Results of PFAS Blood Tests Conducted on DoD Firefighters at a DoD-Wide Level

(U) Although DoD officials are implementing the FY 2020 NDAA requirement to test DoD firefighters' blood for PFAS, DoD officials do not plan to track, trend, and analyze the results of PFAS blood tests conducted on DoD firefighters at a DoD-wide level. While the FY 2020 NDAA did not include requirements to track, trend, and analyze the results of PFAS blood tests conducted on DoD firefighters, the DoDI 6055.05 requires DoD Components to track, trend, and analyze clinical examination results related to workplace exposures.

(U) DoDI 6055.05 requires the heads of DoD Components to implement risk management requirements to "protect DoD personnel from accidental death, injury, and illness caused by hazardous occupational or environmental exposures" as part of their OEHPs. Additionally, DoD Component OEHP officials are required to evaluate the effectiveness of their occupational and environmental health risk management activities, which includes performing both "active" and "passive" medical surveillance. To perform passive surveillance, DoD officials should track, trend, and analyze medical data as part of evaluating occupational and environmental health risk effectiveness.

(U) To meet the FY 2020 NDAA requirement to test the blood of DoD firefighters for PFAS, occupational medicine healthcare providers will perform PFAS blood testing during the annual occupational medical examination of DoD firefighters. The results of the blood test will be recorded in the individual employee's

(U) occupational medical record. However, DoD officials do not plan to track, trend, and analyze the results of the PFAS blood tests at a DoD-wide level, as required by DoDI 6055.05.

(U) The DoD Firefighter PFAS Blood Testing Implementation Plan Includes Requirements to Test the Blood of DoD Firefighters for PFAS and Record the Results in the Firefighter's Individual Occupational Medical Record

(U) According to DoDI 6055.05, active medical surveillance includes occupational medical examinations for exposures to hazards. DoDM 6055.05 "provides health professionals with information and references appropriate for developing and conducting occupational medical examinations" as part of active medical surveillance. For example, an occupational medical examination for firefighters includes hearing and blood tests. As previously discussed, DoD officials developed the DoD firefighter PFAS blood testing implementation plan for annually testing DoD firefighters' blood to document and determine potential PFAS exposure by FY 2021, in accordance with the FY 2020 NDAA. In September 2020, the ASD(R) issued a memorandum providing requirements for implementing the FY 2020 NDAA requirement to test DoD firefighters' blood for PFAS.[83] To implement DoD firefighter PFAS blood testing, occupational medicine healthcare providers will conduct blood testing during the annual occupational medical examination of each DoD firefighter and record the results in the individual firefighter's occupational medical record. According to the memorandum, the PFAS blood testing requirements will be incorporated into the next revision of the DoDM 6055.05.

(U) The DoD firefighter PFAS blood testing implementation plan requirements include:

- (U) the list of PFAS that must be tested, including PFOS and PFOA;
- (U) guidance on providing the PFAS blood test results to DoD firefighters, including providing each tested DoD firefighter with "information on PFAS using the DoD-approved fact sheet;"[84] and
- (U) guidance on providing occupational medicine healthcare providers information and direction on PFAS blood testing, including providing each occupational medicine healthcare provider with "information on PFAS using the DoD-approved fact sheet."[85]

[83] (U) ASD(R) memorandum, "Blood Testing for DoD Firefighters to Determine Exposure to Per- and Poly-fluoroalkyl Substances," September 29, 2020.

[84] (U) ASD(R) memorandum, "Blood Testing for DoD Firefighters to Determine Exposure to Per- and Poly-fluoroalkyl Substances," September 29, 2020.

[85] (U) ASD(R) memorandum, "Blood Testing for DoD Firefighters to Determine Exposure to Per- and Poly-fluoroalkyl Substances," September 29, 2020.

(U) ODASD(HRPO) officials told us that the PFAS blood test results will be recorded in the individual firefighter's occupational medical record in the electronic records of either the Armed Forces Health Longitudinal Technology Application, the Military Health System GENESIS, other electronic systems, or paper medical records. Therefore, the DoD firefighter PFAS blood testing implementation plan to conduct blood testing for PFAS during the annual occupational medical examination of each DoD firefighter and record the results in the individual firefighter's occupational medical record meets the intent of DoDI 6055.05 for active medical surveillance.

(U) The DoD Firefighter PFAS Blood Testing Implementation Plan Does Not Include Requirements to Track, Trend, or Analyze the Results of PFAS Blood Testing at a DoD-Wide Level

(U) According to DoDI 6055.05, passive medical surveillance includes "epidemiological review of clinical examination results," conducting analyses to identify health effects from workplace exposures, and trending data. The DoDI 6055.05 requires that "work place exposure data, medical surveillance results…and illness outcomes data should be reviewed to examine program effectiveness" when conducting analyses to identify health effects. Additionally, the reporting and recordkeeping procedures of DoDI 6055.05 require OEHP officials to "perform trend analysis and epidemiologic studies [and] share hazard and exposure data across the Department of Defense." According to DoDI 6055.05, hazard and exposure assessment data includes "potentially exposed personnel, exposure monitoring…and qualified health staff performing assessments." Specifically, the passive medical surveillance required by DoDI 6055.05 includes tracking, trending, and analyzing clinical examination results related to workplace exposures. Although the DoD firefighter PFAS blood testing implementation plan meets the intent of DoDI 6055.05 for active medical surveillance, the plan does not require the results to be tracked, trended, or analyzed at the DoD-wide level, as required by DoDI 6055.05 for passive medical surveillance.

(U) According to ODASD(HRPO) officials, healthcare providers will record the PFAS blood test results for the individual firefighter tested only in the firefighter's individual occupational medical record. Specifically, the PFAS blood test results will be recorded in the electronic records or paper medical records. ODASD(HRPO) officials told us that the use of electronic and paper records varies by DoD Component and sometimes by location.

(U) We asked ODASD(HRPO) officials how occupational medicine healthcare providers and DoD firefighters were expected to use the blood test result data. According to the ODASD(HRPO) Director for Force Readiness and Health

(U) Assurance Policy, occupational medicine healthcare providers will be able to tell DoD firefighters how their individual blood test results compare to the national average of PFAS blood levels in the U.S. population, based on age groups.[86] However, occupational medicine healthcare providers will not be able to tell DoD firefighters if their individual blood test results relate to specific health effects because scientists are still learning about the health effects of exposures to PFAS.

(U) In September 2020, the ASD(R) issued a memorandum that included DoD-approved fact sheets tailored to DoD firefighters and to the occupational medicine healthcare providers evaluating DoD firefighters.[87] Both fact sheets state that individual blood test results cannot predict or rule out health problems now or in the future.[88] Additionally, neither fact sheet includes information on whether DoD officials will track and trend the blood test data of DoD firefighters to identify PFAS exposure trends. Furthermore, the fact sheets do not inform the DoD firefighters and the occupational medicine healthcare providers whether DoD officials will conduct analyses on the blood test results or perform future studies to determine whether there is any correlation between PFAS levels in blood and health effects among the DoD firefighting population.

(U) DoDI 6055.05 requires DoD Components to evaluate occupational and environmental health risk management effectiveness by performing passive medical surveillance. Passive medical surveillance includes tracking, trending, and analyzing clinical examination results related to workplace exposures. However, DoD officials do not plan to track, trend, or analyze the DoD firefighter PFAS blood test results at a DoD-wide level to identify exposure trends and conduct analyses to identify health effects among the DoD firefighting population.

[86] (U) The CDC's National Health and Nutritional Examination Survey measures PFAS levels in the blood of the U.S. population.

[87] (U) ASD(R) memorandum, "Transmittal of Fact Sheets for Blood Testing for DoD Firefighters Per- and Poly- fluoroalkyl Substances Levels," September 29, 2020.

[88] (U) "Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS): A Guide for Department of Defense Firefighters," September 29, 2020, and "Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS): A Guide for Occupational Medicine Providers Evaluating DoD Firefighters," September 29, 2020.

(U) DoD Officials Were Focused on the Immediate Collection of PFAS Blood Test Results to Address the FY 2020 NDAA Requirement to Test the Blood of DoD Firefighters and Not on the Analysis of the Results at a DoD-Wide Level

(U) The DoD firefighter PFAS blood testing implementation plan does not include tracking, trending, and analyzing the DoD firefighter PFAS blood test results at a DoD-wide level. This occurred because DoD officials were focused on the immediate collection of PFAS blood test results to address the FY 2020 NDAA requirement to test the blood of DoD firefighters and not on the analysis of the results at a DoD-wide level. The FY 2020 NDAA requires the DoD "to determine and document potential exposure to…PFAS for each firefighter of the [DoD] during their annual physical exam" starting in FY 2021. DoD officials developed the DoD firefighter PFAS blood testing implementation plan to begin testing DoD firefighter blood in FY 2021, but the plan does not include tracking, trending, or analyzing the test results at a DoD-wide level because the FY 2020 NDAA did not include any requirements to track and trend the PFAS blood test results.

(U) According to the ODASD(HRPO) Director for Force Readiness and Health Assurance Policy, DoD officials were focused on meeting the specific requirements of the FY 2020 NDAA to provide PFAS blood tests to DoD firefighters during their annual occupational medical examination and provide the results to the individual firefighter because the FY 2020 NDAA did not include any requirements to do an epidemiological study or analysis. The ODASD(HRPO) official also explained that, as long as the medical provider records the blood test results in the firefighter's individual occupational medical record, DoD officials will have met the minimum standard to comply with the FY 2020 NDAA. According to ODASD(HRPO) officials, tracking and trending PFAS blood test results was not included within the scope of implementing individual firefighter testing; therefore, actions to track and trend blood test results are currently not part of the DoD firefighter PFAS blood testing implementation plan.

(U) According to the ATSDR, workers who use products containing PFAS are at a higher risk for PFAS occupational exposure. DoD firefighters began using AFFF containing PFOS and PFOA in the 1970s to extinguish dangerous petroleum-based fires. As discussed in Finding A, DoD officials did not issue policy restricting nonessential use of AFFF until 2016, and DoD firefighters continue the use of PFAS-containing AFFF for fire emergencies, which may indicate a higher likelihood

(U) that DoD firefighters have been exposed to PFAS. Without tracking, trending, and analyzing PFAS blood test results, DoD officials will not know the extent or effect of PFAS exposure among the firefighter population across the DoD.

(U) The DoD Is Missing an Opportunity to Capture Comprehensive PFAS Exposure Data for DoD Firefighters to Be Used for Risk Management, Including Future Studies to Assess Long-Term Health Effects Relating to PFAS Exposure

(U) The DoD is missing an opportunity to capture comprehensive PFAS exposure data for DoD firefighters to be used for risk management, including future studies to assess long-term health effects relating to PFAS exposure. By not tracking, trending, and analyzing the PFAS blood test results, DoD officials will not be able to perform comprehensive reviews of the blood test results for studies and analyses. These studies and analyses would enhance the knowledge of healthcare providers, Service members, their families, and the DoD civilian workforce about the long-term health effects associated with PFAS exposure. Furthermore, with no plan in place to track, trend, and analyze DoD firefighter PFAS blood test results, DoD officials will likely encounter challenges evaluating occupational and environmental health risk management effectiveness through passive medical surveillance for the DoD firefighter population, in accordance with DoDI 6055.05.

(U) Recommendation, Management Comments, and Our Response

(U) Recommendation B

(U) We recommend that the Assistant Secretary of Defense (Readiness) develop a plan to track, trend, and analyze DoD firefighter perfluoroalkyl and polyfluoroalkyl substances blood test results at a DoD-wide level, in accordance with DoD Instruction 6055.05.

(U) Assistant Secretary of Defense (Readiness) Comments

(U) The Acting ASD(R) agreed with the recommendation. Specifically, the Acting ASD(R) stated that, to support occupational illness surveillance and trend analysis, the DoD will:

- (U) provide firefighter PFAS blood level data to the National Institute for Occupational Safety and Health to assist in their Fire Fighter Cancer Cohort study that includes PFAS research; and

- (U) conduct trend analysis of direct care PFAS serum laboratory results at the Navy and Marine Corps Public Health Center's EpiData Center, including measures of central tendencies, with confidence intervals, for six PFAS compounds.[89]

(U) The Acting ASD(R) stated that these actions would take approximately 4 years.

(U) Additionally, the Acting ASD(R) stated that, to perform occupational exposure surveillance, the DoD will:

- (U) "use its toxicology expertise in the Tri-Service Toxicology Consortium—with external peer review (e.g., National Research Council Committee on Toxicology)—to understand the relationship of PFAS blood levels to firefighter workplace exposures;" and
- (U) use the relationship of PFAS blood levels to firefighter workplace exposures and work with the National Institute for Occupational Safety and Health to develop exposure measurement technologies that are predictive of PFAS blood levels.

(U) The Acting ASD(R) stated that the development of PFAS exposure limits and exposure assessment procedures will take more than 4 years.

(U) Our Response

(U) Comments from the Acting ASD(R) addressed the recommendation; therefore, the recommendation is resolved but will remain open. The long-term actions described by the Acting ASD(R) outline the planned approach to conduct passive medical surveillance. The DoDI 6055.05 requires the review of three items to perform passive medical surveillance: (1) work-place exposure data, (2) clinical examination results, and (3) illness outcomes data. While we recognize that PFAS exposure limits are yet to be determined, we suggest that the Acting ASD(R) consider discussing and providing guidance for the following while implementing long-term actions described in the management comments:

- (U) how the DoD will provide the PFAS blood test clinical examination results recorded in various DoD-wide systems (such as the Armed Forces Health Longitudinal Technology Application, the Military Health System GENESIS, other electronic systems, or paper medical records) to the National Institute for Occupational Safety and Health and the Navy and Marine Corps Public Health Center's EpiData Center;

[89] (U) According to their website, the Navy and Marine Corps Public Health Center's EpiData Center provides data analysis for public health surveillance for the Department of the Navy, including occupational and environmental epidemiology. Additionally, EpiData Center officials design and conduct epidemiological investigations and studies.

- (U) what trend analysis, besides measures of central tendencies (such as the mean, median, and mode) will be calculated for the PFAS blood test results; and
- (U) the plan to collect work place exposure data (such as length of service, locations served, and any contact with PFAS releases) and illness outcomes data for DoD firefighters (such as increased cholesterol levels or cancer).

(U) We will close this recommendation after we verify that the information provided and that the actions taken by the ASD(R) officials fully addressed the recommendations by: (1) collecting the PFAS blood test clinical examination results, (2) collecting the work-place exposure and illness outcome data, and (3) analyzing this data in accordance with DoDI 6055.05.

(U) Appendix A

(U) Scope and Methodology

(U) We conducted this evaluation from February 2020 through May 2021 in accordance with the "Quality Standards for Inspection and Evaluation," published in January 2012 by the Council of the Inspectors General on Integrity and Efficiency. Those standards require that we adequately plan the evaluation to ensure that objectives are met and that we perform the evaluation to obtain sufficient, competent, and relevant evidence to support the findings, conclusions, and recommendations. We believe that the evidence obtained was sufficient, competent, and relevant to lead a reasonable person to sustain the findings, conclusions, and recommendations.

(U) Interviews with Officials

(U) We met and interviewed individuals at the following organizations to determine whether DoD officials knew the requirements for the identification, mitigation, and remediation of contaminant effects from PFAS; to determine whether DoD officials informed populations exposed to PFAS of the associated health and safety concerns; and to understand their concerns and challenges related to PFAS.

- (U) Office of the Assistant Secretary of Defense (Sustainment)
- (U) Office of the Assistant Secretary of Defense (Readiness)
- (U) Office of the Assistant Secretary of Defense (Health Affairs)
- (U) Office of the Deputy Assistant Secretary of Defense (Environment and Energy Resilience)
- (U) Office of the Secretary of Defense Office of General Counsel (Environment and Installations)
- (U) DoD PFAS Task Force
- (U) DoD Fire and Emergency Services Working Group
- (U) Office of the Deputy Chief of Staff, Army, G-9
- (U) Office of the Assistant Secretary of the Navy (Energy, Installations and Environment)
- (U) Commander, Navy Installations Command
- (U) Naval Facilities Engineering Command
- (U) Office of the Deputy Assistant Secretary of the Air Force (Environment, Safety, and Infrastructure)
- (U) Air Force Materiel Command, Air Force Civil Engineer Center

- (U) DLA Installation Management
- (U) Installation officials from environmental, fire and emergency services, engineering, public affairs, and health departments

(U) Site Selection

(U) We selected a non-statistical sample of military installations and DLA sites in the United States. The military installations represent two sites per MILDEP and include both current and former military installations and both active duty and National Guard military installations. We also prioritized factors relevant to this evaluation, including:

- (U) reported levels of PFAS, including PFOS and PFOA, found at the installations;
- (U) sources of human exposure, including both groundwater and sources of drinking water;
- (U) known active or historical firefighting training activities; and
- (U) reported Federal cleanup response actions.

(U) Due to COVID-19 travel restrictions, we did not physically visit the installations identified in this report. We relied upon teleconferences, interviews, questionnaires, and data calls to collect testimonial and documentary evidence to verify information.

(U) We selected the following six current and former DoD installations, which host, or hosted, active duty military, National Guard, DoD civilians, and military families, for our evaluation.

1. (U) Active duty Army: Fort Bragg, North Carolina
2. (U) Army National Guard: Camp Grayling, Michigan
3. (U) Active duty Navy: Naval Air Station Oceana and Naval Auxiliary Landing Field Fentress, Virginia
4. (U) Active duty Marine Corps: Marine Corps Base Camp Pendleton, California
5. (U) Active duty Air Force: Peterson Air Force Base, Colorado
6. (U) Former Air Force site: Former Pease Air Force Base, New Hampshire

(U) We also held meetings with DLA officials involved with storage and disposal of PFAS-containing materials and discussed the following locations.

1. (U) DLA Headquarters, Fort Belvoir, Virginia
2. (U) Defense Supply Center, Richmond, Virginia
3. (U) Defense Fuel Support Point, Verona, New York
4. (U) DLA Distribution Susquehanna, Pennsylvania

(U) Data Collection

~~(CUI)~~ To determine whether DoD officials implemented the requirements for the identification, mitigation, and remediation of contaminant effects from PFAS and whether DoD officials informed populations exposed to PFAS of the associated health and safety concerns, we collected and reviewed the following types of documents.

- (U) DoD reports and briefings prepared for Congress
- (U) DoD and DoD PFAS Task Force policies
- (U) MILDEP, DLA, and installation-level policies and standard operating procedures related to PFAS
- ~~(CUI)~~ [redacted]
- (U) DoD, MILDEP, and DLA PFAS response timelines
- (U) Reports and briefings describing research and development projects, such as remediation projects
- (U) Installation environmental management plans, such as spill response plans
- (U) Installation F&ES emergency response records
- (U) Installation F&ES training plans and procedures
- (U) Installation records of releases of PFAS-containing AFFF
- (U) Installation AFFF concentrate inventories and disposal records
- (U) DoD, MILDEP, DLA, and installation public affairs materials
- (U) Installation outreach documentation, such as Restoration Advisory Board briefing charts
- (U) Installation PFAS test results for both groundwater and sources of drinking water both on the installations and in the surrounding communities
- (U) Installation maps and drawings showing groundwater and sources of drinking water tested for PFAS

- (U) Installation engineering drawings and schematics of engineered containment systems
- (U) Installation assessments prepared in accordance with the Federal cleanup process

(U) Use of Computer-Processed Data

(U) We did not use computer-processed data to perform this evaluation.

(U) Prior Coverage

(U) During the last 5 years, the Government Accountability Office (GAO) and the Army Audit Agency issued four reports related to PFAS contaminant effects and environmental cleanup.

(U) Unrestricted GAO reports can be accessed at http://www.gao.gov. Unrestricted Army Audit Agency reports can be accessed at https://www.army.mil/aaa.

(U) GAO

(U) Report No. GAO-21-421, "Firefighting Foam Chemicals: DoD Is Investigating PFAS and Responding to Contamination, but Should Report More Cost Information," June 2021

(U) The GAO determined that the DoD is early in the environmental cleanup process at or near 687 military installations with a known or suspected release of PFAS-containing AFFF. The DoD has taken actions to address PFAS in sources of drinking water above the EPA LHA levels; however it has not taken actions to address PFAS in sources of drinking water that are above state-imposed PFAS standards but below the EPA LHA levels. Although the DoD estimates that future PFAS costs will likely increase significantly, the DoD has not reported estimated costs for future PFAS cleanup in its annual environmental report to Congress. The GAO also found that, although the DoD identified six potential firefighting alternatives without PFAS, none of the alternatives fully meet or exceed firefighting performance requirements. The DoD is continuing to fund research to identify firefighting alternatives without PFAS, as required by the FY 2020 NDAA.

(U) Report No. GAO-18-700T, "Drinking Water: Status of DoD Efforts to Address Drinking Water Contaminants Used in Fire Fighting Foam," September 2018

(U) The GAO determined that the DoD has initiated actions to address elevated levels of PFOS and PFOA in drinking water at or near military installations. In response to the EPA's non-enforceable advisories, the DoD directed military installations to identify locations with known or suspected release of PFOS and PFOA. The GAO also found that the DoD requested these installations to test for PFOS and PFOA in the drinking water and address any contamination above the levels in the EPA's health advisories. Furthermore, the DoD has taken steps to address health and environmental concerns with its use of firefighting foam that contains PFAS.

(U) Report No. GAO-18-78, "Drinking Water: DoD Has Acted on Some Emerging Contaminants but Should Improve Internal Reporting on Regulatory Compliance," October 2017

(U) The GAO determined that the DoD's public water systems complied with EPA and state health-based drinking water regulations at a level comparable with other systems in the United States. The DoD has not internally reported on all data on compliance with health-based drinking water regulations or used available data to assess compliance. The GAO determined that this indicates that the internal reporting systems of the DoD are either not clear in DoD regulations or are not clearly understood by those implementing them. The DoD also has not used its data to determine why the two types of systems—DoD-treated water and non-DoD-treated water—have different compliance rates. The GAO also found that the DoD has initiated steps to address concerns in regards to both the firefighting foam and elevated levels of PFOS and PFOA in drinking-water. The DoD has restricted the use of firefighting foam that contain these emerging contaminants and has funded efforts to provide alternative foam without the contaminants. Furthermore, the DoD has shut down wells, provided alternate water sources, or installed water treatment systems to respond to elevated levels of PFOS and PFOA.

(U) Report No. GAO-17-151, "Military Base Realignments and Closures: DoD Has Improved Environmental Cleanup Reporting but Should Obtain and Share More Information," January 2017

(U) The GAO determined that cleanup of environmental contaminants on installations closed under Military Base Realignments and Closures has been a key impediment to the transfer and ultimate reuse of the property by the community. The DoD has improved its reporting on the cost of these cleanups to Congress. The DoD has not reported to Congress how the cleanup

(U) of emerging chemicals under Military Base Realignments and Closures will significantly increase the estimated cost. Additionally, the GAO also found that the DoD has made progress in transferring property; however, officials have identified several challenges in the transfer process. The GAO stated that DoD officials noted that some of these challenges may be aided by sharing information from others who have successfully developed mitigation strategies or navigated complex regulatory environments.

(U) Army Audit Agency

(U) Report No. A-2020-0050-FIZ, "Per- and Polyfluoroalkyl Substances (PFAS) Contamination on Army Installations," May 2020

(U) The Army Audit Agency determined that Army installations took actions to mitigate contaminants and to meet the EPA's LHA limits. A review of Army installations identified 13 installations with drinking water that exceeded the EPA limits. The Army Audit Agency reviewed 7 of the 13 and determined that those bases took actions to reduce contamination levels of PFOS and PFOA to meet Army guidance. The Army Audit Agency also found that although most Army installations generally completed quarterly assessments to monitor contamination levels, Sierra Army Depot did not. Furthermore, 32 of 64 Army installations with Army-owned water systems did not record their assessments in the DoD's official system of record, Defense Occupational and Environmental Health Readiness System, for PFOS and PFOA results. The Army Audit Agency recommended that the Army support funding to remediate PFAS levels on Army establishments, update PFAS guidance to include a timeframe and methods for Army installations to notify affected users of contaminated water, update and consolidate PFAS guidance, require installations to provide PFAS sampling results to the U.S. Army Public Health Center and enter the results into the Defense Occupational and Environmental Health Readiness System, and ensure the required assessments are completed and reported in the Defense Occupational and Environmental Health Readiness System.

(U) Appendix B

(U) Congressional Request Letter, July 25, 2019

Congress of the United States
Washington, DC 20515

July 25, 2019

Glenn A. Fine
Acting Inspector General
Office of Inspector General
U.S. Department of Defense
4800 Mark Center Drive
Alexandria, VA 22350-1500

Mr. Fine:

We are writing to request that you undertake a review of the U.S. Department of Defense's (DoD's) use of per- and polyfluoroalkyl substances (PFAS) at military sites around the country and the exposure to both military personnel and civilians living near military sites.

PFAS is a class of chemicals that has been, and continues to be, used in military firefighting foam. Medical experts have found PFAS chemicals to be extremely hazardous to human health.

Thus, we are extremely concerned about the public health impact of PFAS on not only service members and their families living on and near military bases, but also on citizens in surrounding communities.

The DoD is currently tracking at least 401 sites with potential PFAS contamination, but it has only taken mitigation steps at 32 sites.

Simply, it appears the scope of the problem far outweighs the current allocated resources and focus of the DoD, despite Congress' attempt to provide additional resources for clean-up.

For these reasons, we ask that you undertake a review and respond to the following:

1) When did the DoD first learn that PFAS chemicals were harmful to human health?

2) What methodology has the DoD used to determine the scope of the problem and how to allocate its resources to address it?

3) What has the DoD done to inform service members, their families, and impacted communities about the danger of PFAS chemical contamination?

4) What is the DoD's plan to discontinue the use of PFAS chemicals?

5) What is the DoD's plan to mitigate, and clean up, PFAS contamination of the environment, including soil and drinking water?

6) What is the DoD doing to identify service members, their families and people in communities exposed to PFAS and provide them with the appropriate care to address and mitigate the impacts of the exposure?

(U) Congressional Request Letter, July 25, 2019 (cont'd)

We owe it to our service members, their families, and the communities that support them to ensure that the DoD is appropriately addressing this public health crisis.

Thank you very much for your assistance.

Sincerely,

Daniel T. Kildee
MEMBER OF CONGRESS

Brian Fitzpatrick
MEMBER OF CONGRESS

Debbie Dingell
MEMBER OF CONGRESS

Katie Hill
MEMBER OF CONGRESS

Ro Khanna
MEMBER OF CONGRESS

Madeleine Dean
MEMBER OF CONGRESS

Chris Pappas
MEMBER OF CONGRESS

Andy Levin
MEMBER OF CONGRESS

Sean Casten
MEMBER OF CONGRESS

James P. McGovern
MEMBER OF CONGRESS

Gilbert R. Cisneros, Jr.
MEMBER OF CONGRESS

Xochitl Torres Small
MEMBER OF CONGRESS

(U) Congressional Request Letter, July 25, 2019 (cont'd)

Antonio Delgado
MEMBER OF CONGRESS

Peter Welch
MEMBER OF CONGRESS

Brendan F. Boyle
MEMBER OF CONGRESS

Mark Pocan
MEMBER OF CONGRESS

Deb Haaland
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Andy Kim
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John B. Larson
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Lori Trahan
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Fred Upton
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Chellie Pingree
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Harley Rouda
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Richard Neal
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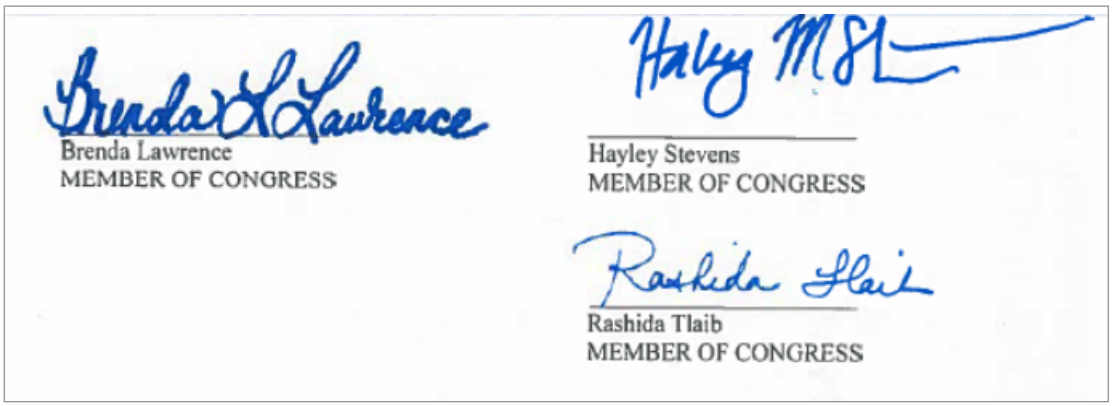
Ben Ray Lujan
MEMBER OF CONGRESS

Sean Patrick Maloney
MEMBER OF CONGRESS

Kathleen M. Rice
MEMBER OF CONGRESS

(U) Congressional Request Letter, July 25, 2019 (cont'd)



Brenda Lawrence
MEMBER OF CONGRESS

Hayley Stevens
MEMBER OF CONGRESS

Rashida Tlaib
MEMBER OF CONGRESS

(U) Appendix C

(U) Timeline of PFAS History and the DoD's Response

(U) PFAS have been used in a wide variety of commercial and industrial products and in manufacturing processes since the 1940s, and many Federal agencies, including the DoD and the EPA, are responding to PFAS concerns. The following is a brief history of key PFAS-related events that affected the DoD.

(U) 1970s:

- (U) The DoD began using AFFF, which contained PFOS, and in some formulations, PFOA, to extinguish petroleum-based fires.
- (U) 1974: Congress passed the Safe Drinking Water Act to protect public health by regulating the nation's public drinking water supply.
- (U) 1976: Congress passed the Toxic Substances Control Act to control substances determined to cause unreasonable risk to public health or the environment.

(U) 1980:

- (U) Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act to clean up sites contaminated by substances deemed hazardous by the EPA in the United States.

~~(CUI)~~ 2000s:

- (U) 2000: The primary American manufacturers began phasing out the production of PFOS-related products.
- (U) 2005: The EPA Office of Pollution Prevention and Toxics conducted an assessment of PFOS and PFOA to develop toxicity benchmarks. The EPA released a draft PFOA risk assessment in January 2005.
- (U) 2006: The EPA reached an agreement with PFOA manufacturers to voluntarily phase out PFOA over a 10-year period.
- (U) 2006: The DoD EC Program was established to proactively evaluate and minimize adverse impacts from emerging chemicals to DoD missions.
- ~~(CUI)~~ [redacted]
- (U) 2009: EC Program officials formally established the EC Program policy, DoDI 4715.18.
- (U) 2009: The EPA published provisional health advisories for PFOS and PFOA in sources of drinking water.

~~(CUI)~~ 2010s:

- (U) 2011: EC Program officials issued a risk alert for AFFF.
- (U) 2013-2015: The EPA's third Unregulated Contaminant Monitoring Rule required monitoring for 30 contaminants, including PFOS and PFOA, using analytical methods developed by the EPA. This monitoring provided a basis for future regulatory action to protect public health.
- (U) January 2016: The ECGC issued a policy memorandum, based on recommendations from EC Program officials, including endorsed RMAs requiring Service-specific risk management procedures to prevent uncontrolled releases of AFFF during maintenance, testing, and training; requiring engineered containment systems or spill response measures for AFFF releases; and requiring the removal and disposal of PFOS-based AFFF where practical.
- (U) May 2016: The EPA published LHAs for PFOS and PFOA in sources of drinking water.
- (U) May 2016: The DoD Components consolidated efforts to start addressing releases of PFAS by developing strategies under the Defense Environmental Restoration Program.
- (U) 2016-2017: The MILDEPs tested for PFOS and PFOA where the DoD supplies drinking water. During this time, DoD officials identified 401 installations that had used AFFF containing PFOS or PFOA and tested wells and groundwater for potential PFAS impacts. MILDEP officials identified 90 active and closed military installations in which sources of drinking water or groundwater tested above the EPA's LHA levels.
- (U) 2017-2019: DoD officials wrote multiple reports and gave several presentations to congressional committees detailing the DoD's response to PFAS concerns.
- (U) 2018: The MILDEPs began the process of removing PFOS-based AFFF inventory from its stockpiles.
- (U) 2018: Congress passed the FY 2019 NDAA, which addressed specific PFAS response requirements.
- ~~(CUI)~~ [redacted]
- (U) February 2019: The EPA issued a PFAS Action Plan that addressed multiple planned actions, including proposals for potential regulation of PFAS.

- (U) 2019: The Secretary of Defense established the DoD PFAS Task Force that consists of DoD and MILDEP officials with a mission to ensure a coordinated DoD-wide approach to quickly address PFAS contaminant effects caused by DoD activities.
- (U) 2019: DoD officials issued multiple policy memorandums to address responses to PFAS concerns, including requirements related to the DoD cleanup program and reporting of PFAS investigation results. MILDEP officials published additional policies and guidance documents, when necessary, to direct installation officials on the Service-specific processes to comply with these requirements.
- (U) 2019: Congress passed the FY 2020 NDAA, which included additional PFAS response requirements, including a mandate to include blood testing for PFAS during annual firefighter medical examinations beginning in FY 2021.

(U) 2020s:

- (U) DoD officials issued additional policy memorandums that included requirements to address responses to PFAS concerns, including requirements for additional water sampling, reporting of state-specific and host nation-specific PFAS requirements, and public health engagement. MILDEP officials published policies and guidance documents, when necessary, to direct installation officials on the Service-specific processes to comply with these requirements.
- (U) The EPA published an update to its PFAS Action Plan.
- (U) DoD PFAS Task Force officials published a progress report and updated the number of active and National Guard installations, former military installations, and DLA sites where assessments of historical PFAS-containing AFFF use or release were underway to 676 sites.
- (U) DoD officials issued additional reports and sent representatives to testify to congressional committees detailing the DoD's response to PFAS concerns.
- (U) DoD, MILDEP, and DLA officials continue to report the status of their efforts to respond to PFAS concerns through public reports on the defense.gov website and Service-specific websites, through status reports to Congress, and through other outlets, such as through direct communication with community stakeholders near military installations.

(U) Management Comments

(U) Assistant Secretary of Defense (Sustainment)

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

SUSTAINMENT

06/28/2021

MEMORANDUM FOR PROGRAM DIRECTOR, RESEARCH AND ENGINEERING DIVISION, OFFICE OF THE DEPARMTENT OF DEFENSE INSPECTOR GENERAL

SUBJECT: Review of Draft Inspector General Report, "Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations," Project Number D2020-DEVOSR-0088.000

I am providing the response to the recommendation for the Under Secretary of Defense for Acquisition and Sustainment (USD(A&S)), and the Deputy Assistant Secretary of Defense for Environment and Energy Resilience (DASD(E&ER)) contained in the subject report.

I appreciate the Department of Defense (DoD) Office of Inspector General's (IG) review of the Department's actions related to per- Polyfluoroalkyl Substances (PFAS). This assessment is a companion to the Government Accountability Office (GAO) assessment of the department's investigation and response actions for PFAS, and together they provide a comprehensive look at DoD's actions to address PFAS.

The DoDIG's draft report recommends, "…that the Under Secretary of Defense for Acquisition and Sustainment revise DoDI 4715.18 to include requirements for Emerging Chemical Program officials to:

- Initiate proactive risk management actions based on measurable risks to the DoD areas of concern to mitigate contaminant effects of emerging chemicals at DoD installations;
- Develop risk management options and initiate proactive risk management actions which may be warranted to identify and mitigate the contaminant effects of emerging chemicals as early as possible in the Emerging Chemical Process, regardless of whether an emerging chemical is on the Emerging Chemical Watch List or the Emerging Chemical Action List; and
- Formally inform DoD users of emerging chemicals of their status in the Emerging Chemical Process."

I partially concur with this recommendation. I agree the DoD Instruction (DoDI) 4715.18 should be revised to more clearly articulate our actions and address the points raised above. However, to clarify, the DoDI currently directs the assessment of risks associated with emerging chemicals of concern across the DoD enterprise, including a range of potential areas of interest to the Department, and is inclusive of DoD installations.

(U) Assistant Secretary of Defense (Sustainment) (cont'd)

To clarify how DoD will implement this recommendation, the DASD(E&ER), acting at the direction of the USD(A&S), will provide a policy memorandum by January 2022, which will serve as official guidance until the procedures are included in the next update to the DoDI 4715.18, which is anticipated to occur by September 2025, to more clearly direct the following actions:

1. Develop measurable risk criteria consistent with the *Department of Defense Risk Management Guide for Defense Acquisition Programs*, (2017) to quantify risks to the DoD areas of concern from Emerging Chemicals (EC).

2. Reference or include this measurable risk process and when warranted, present risks management options to the Emerging Chemicals Steering Group (ECSG) and Emerging Chemicals Governance Council (ECGC).

3. Include the development of risk management options for EC on the Watch List and Action List.

4. Include a process to formally inform DoD users of emerging chemicals of their status.

The DoD IG's draft report also recommends, "...that the Deputy Assistant Secretary of Defense (Environment and Energy Resilience) complete the Emerging Chemical Process for potential PFAS exposure caused by DoD activities from PFAS-containing materials other than AFFF by developing and presenting validated risk management options for PFAS on the Emerging Chemical Action List to the Emerging Chemicals of Concern Governance Council, as required by DoDI 4715.18."

I concur with this recommendation and will present validated risk management options for PFAS to the Emerging Chemicals of Concern Governance Council in the second quarter of Fiscal Year 2022.

Please contact [redacted] with any questions or concerns.

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Paul D. Cramer
Performing the Duties of Assistant Secretary of Defense for Sustainment

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(U) Assistant Secretary of Defense (Readiness)

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
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WASHINGTON, D.C. 20301-4000

MEMORANDUM FOR PROGRAM DIRECTOR, RESEARCH & ENGINEERING DIVISION, OFFICE OF THE DEPARTMENT OF DEFENSE INSPECTOR GENERAL

SUBJECT: Review of Draft Inspector General Report, "Evaluation of the Department of Defense's Actions to Control Contaminant Effects from Perfluoroalkyl and Polyfluoroalkyl Substances at Department of Defense Installations," Project Number D2020-DEVOSR-0088.000

I appreciate the Department of Defense Office of the Inspector General's (DoD OIG) review of the Department's actions related to Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) effects. This memo is in response to the recommendation in the subject report for the Assistant Secretary of Defense for Readiness to "…develop a plan to track, trend, and analyze DoD firefighter PFAS blood test results at a DoD-wide level, in accordance with DoDI 6055.05."

I concur with this recommendation. To meet the statutory requirements to provide blood tests to the DoD firefighters, our office, the Office of the Assistant Secretary of Defense for Health Affairs, and the Defense Health Agency are working together to track the number of PFAS blood tests performed against the number of firefighters planned to receive the tests. This information is being provided to the DoD Components performing the testing to resolve any gaps.

To support occupational illness surveillance and trend analysis requirements of DoD Instruction 6055.05, "Occupational and Environmental Health," the DoD will first need to understand the health effects expected from exposure to PFAS at various blood concentrations. The DoD will support, monitor, and leverage relevant multi-year research efforts either underway or planned to understand the potential PFAS health effects. The Agency for Toxic Substances and Disease Registry is performing a multi-site health study at 10 locations (including several nearby DoD installations) and at the former Pease Air Force Base to identify health effects associated with consuming water containing PFAS, and the blood level of PFAS associated with those health effects. In parallel, the National Institute for Occupational Safety and Health (NIOSH) is leading a Fire Fighter Cancer Cohort study that includes PFAS research. DoD will provide firefighter PFAS blood level data to NIOSH to use in their firefighter PFAS research. In addition, the Navy and Marine Corps Public Health Center's EpiData Center will perform trend analysis of direct care PFAS serum laboratory results collected from DoD firefighters. The trend analysis of laboratory PFAS serum data will include measures of central tendencies, with confidence intervals, for all six PFAS compounds.

Similar research was performed in developing the current DoD policy for blood lead levels in DoD Manual 6055.05, "Occupational Medical Examinations and Surveillance Manual",

(U) Assistant Secretary of Defense (Readiness) (cont'd)

Change 2, April 2017. This policy development was initiated as a result of the National Research Council report, "Potential Health Risks to DOD Firing-Range Personnel from Recurrent Lead Exposure," in 2013. Using this effort as a benchmark, understanding the potential health effects and developing medical surveillance policy for PFAS would take approximately four years.

After this research provides an understanding of health effects from PFAS exposure, the DoD will be able to use individual firefighter test results to advise each firefighter on actions to manage their individual health risk, conduct trend analysis of test results across time and groups of firefighters, and then perform trend analysis of health effects (i.e., illness) for individuals and groups of firefighters.

To perform occupational exposure surveillance, DoD will first need to develop exposure assessment procedures that correlate exposure levels to the PFAS blood levels predictive of the health effects identified in the studies previously described. DoD will use its toxicology expertise in the Tri-Service Toxicology Consortium – with external peer review (e.g., National Research Council Committee on Toxicology) – to understand the relationship of PFAS blood levels to firefighter workplace exposures. DoD will use this relationship and work with NIOSH to develop exposure measurement technologies that are predictive of PFAS blood levels.

The Force Safety and Occupational Health (FSOH) office is performing a similar development effort, started in 2017 for occupational exposure assessments for inhalation of lead dust and fume. In 2020, FSOH, in coordination with the Military Services, completed the correlation of blood lead levels to airborne lead dust and fume, and are currently reviewing additional technical and policy issues before publishing DoD policy for an occupational exposure limit with assessment procedures for lead in air. While these efforts would imply that it will require four years to develop policy for assessing PFAS workplace exposures, PFAS does not yet have exposure assessment procedures as provided by OSHA for lead air sampling and analysis. Developing a PFAS exposure limit with assessment procedures will require more than four years.

The Office of the Secretary of Defense for Readiness is committed to managing the health risks to DoD firefighters, but also recognizes the significant limitations of the current science in being able to accurately inform firefighters of any PFAS occupational exposure risks. This is further complicated by the need to balance the life-saving properties to our firefighters of the current use of certain firefighting foam that contains PFAS.

Thank you for your support of the Department's goal to protect DoD personnel from accidental death, injury, and illness caused by hazardous occupational or environmental exposures.

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Thomas A. Constable
Acting Assistant Secretary of Defense for Readiness

(U) Acronyms and Abbreviations

AFFF	Aqueous Film-Forming Foam
ASD(R)	Assistant Secretary of Defense (Readiness)
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
EC	Emerging Chemical
ECGC	Emerging Chemicals of Concern Governance Council
EPA	Environmental Protection Agency
ESOH	Environment, Safety, and Occupational Health
F&ES	Fire and Emergency Services
LHA	Lifetime Health Advisory
MILDEP	Military Departments
NDAA	National Defense Authorization Act
NFPA	National Fire Protection Association
OEHP	Occupational and Environmental Health Programs
ODASD(HRPO)	Office of the Deputy Assistant Secretary of Defense (Health Readiness & Policy Oversight)
PFAS	Perfluoroalkyl and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PHA	Provisional Health Advisory
RMA	Risk Management Action
RMO	Risk Management Option
USD(A&S)	Under Secretary of Defense for Acquisition and Sustainment

(U) Glossary

(U) Aqueous Film-Forming Foam (AFFF). AFFF is a foam made at the time of use by mixing air into a water solution containing a specifically formulated foam concentrate (concentrated version), by means of suitably designed equipment. The resulting foam flows freely over a burning liquid surface and acts as a barrier both to exclude air or oxygen and to develop an aqueous film on the fuel surface that is capable of suppressing combustible vapors to quickly extinguish the flames.

(U) Contaminant. Includes, but is not limited to, any element, substance, compound, or mixture, including disease-causing agents, which, after release into the environment and upon exposure, ingestion, inhalation, or assimilation into any organism (including humans), either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations, in such organisms or their offspring.

(U) Contaminant Effects. The potential effects of a contaminant, such as PFOS or PFOA, to people, the environment, and DoD missions, programs, and resources.

(U) DoD Areas of Concern. Enterprise-wide categories that represent five DoD functional areas relevant to ECs, which are:

- (U) environment, safety, and health;
- (U) training and readiness;
- (U) production, operations, maintenance, and disposal of DoD assets;
- (U) cleanup; and
- (U) acquisition and research, development, testing, and evaluation.

(U) DoD Components. The Office of the Secretary of Defense, the Military Departments, Joint Chiefs of Staff and the Joint Staff, the combatant commands, the Office of Inspector General of the DoD, the Defense agencies, DoD field activities, and all other organization entities within the DoD.

(U) Emerging Chemical Action List. A list of emerging chemicals with a probable high risk of impact to at least one of the DoD areas of concern and for which proactive risk management options are being developed or actions are ongoing.

(U) Emerging Chemical Watch List. A list of emerging chemicals with a potential risk of impact to DoD areas of concern.

(U) Emerging Chemical (EC). ECs are chemicals relevant to the DoD that are characterized by a perceived or real threat to human health or the environment and that have new or changing toxicity values or new or changing human health or environmental regulatory standards. Changes may be due to new science discoveries, detection capabilities, or exposure pathways.

(U) Engineered containment. Physical infrastructure designed to completely contain a release of AFFF solution (or other substance, such as fuel). Engineered containment systems can be designed in a variety of ways to contain various substances and typically include a drainage system to a tank, pit, or channel, either above ground or below ground, which can contain the substance until it can be safely treated for release or removed for proper disposal. DoD design criteria require DoD Components to construct engineered containment systems when foam fire suppression systems are built, such as in aircraft hangars.

(U) Epidemiology. The method used to find the causes of health outcomes and diseases in populations. In epidemiology, the patient is the community and individuals are viewed collectively. Epidemiology is the scientific, systematic, and data-driven epidemiological study of the distribution (frequency, pattern) of health related effects and the causes and risk factors of health-related effects in specific populations, such as occupational populations, schools, cities, or countries.

(U) Exposure. The intensity, frequency, and length of time personnel are subjected to a hazard.

(U) Former military installations. Installations that are in the process of being closed, have been closed, or are being realigned by congressional authorization, but are still under the jurisdiction of the DoD. Former military installations also include properties that have been transferred out of the DoD but for which the DoD retains environmental restoration responsibilities.

(U) Groundwater. Water beneath the surface of land.

(U) Hazardous Substance. Any substance designated by the EPA as hazardous under various legal authorities, including the Federal Water Pollution Control Act, the Solid Waste Disposal Act, the Federal Water Pollution Control Act, the Clean Air Act, and the Toxic Substances Control Act.

(U) Health Advisory. The EPA establishes health advisories, based on its assessment of the latest peer-reviewed science, to provide drinking water system operators and officials who have the responsibility for overseeing drinking water systems with information on the health risks of certain chemicals so they can take the appropriate actions to protect the consumers of the drinking water.

(U) Installation. A base, camp, post, station, yard, center, homeport facility for any ship, or other activity under the jurisdiction of the DoD, including any leased facility.

(U) Lifetime Health Advisory. A lifetime health advisory is an EPA Health Advisory calculated to account for a lifetime of exposure to a chemical found in sources of drinking water.

(U) Medical Surveillance. Medical surveillance is the systematic assessment of employees exposed or potentially exposed to occupational hazards. This assessment monitors individuals for adverse health effects and determines the effectiveness of exposure prevention strategies. A medical surveillance program includes the analysis of both individual and aggregate surveillance data over time, with the goal of reducing and ultimately preventing occupational illness and injury.

(U) Military Departments. The Military Departments, created by the National Security Act of 1947, are the Army, Navy, and Air Force.

(U) Mitigate. To reduce risk.

(U) Occupational and Environmental Health Risk Management. A process that assists organizations and individuals in making informed risk decisions in order to reduce or offset risk, thereby increasing operational effectiveness and the probability of mission success.

(U) Occupational Health. Activities directed toward anticipation, recognition, evaluation, and control of potential occupational and environmental health hazards; preventing injuries and illness of personnel during operations; and accomplishment of mission at acceptable levels of risk.

(U) Occupational Medical Examination. Medical examinations performed to prevent work-related health problems by assessing the health status of individuals in relation to their work and making medical recommendations regarding worker placement, accommodation, and exposure controls. Occupational medical examinations may include information regarding an individual's medical background and history, physical examination, laboratory tests, and analysis of exposure to hazardous substances.

(U) Provisional Health Advisory. A provisional health advisory is an EPA Health Advisory released to the public so that drinking water system operators and officials who have the responsibility for overseeing drinking water systems can take action early even if scientific study of the chemical is still ongoing.

(U) Qualitative. An observation defined by non-numerical data, such as text, video, photographs, or audio recordings, and assigned to a category that, although it may be represented as a number, has no numerical value.

(U) Quantitative. An observation that has a meaningful numerical value. It can be either a direct observation or a count.

(U) Release. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of containers containing any hazardous substance or contaminant).

(U) Remediate. Actions taken in accordance with CERCLA to remedy the effects of environmental contamination on human health and safety, ecological resources or receptors, and operations. These actions occur sometime after the release of contaminants into the environment, as opposed to immediately following and in response to a release incident, and are consistent with or intended to be the final and permanent solution for site releases.

(U) Response Action. Identification, investigation, removal actions, remedial actions, or a combination of removal and remedial actions.

(U) Risk management action. Risk management actions are risk management options that are validated by EC Program officials and endorsed by the Emerging Chemicals of Concern Governance Council during the EC process.

(U) Risk management option. Actionable, measurable enterprise-wide initiatives focused on proactively mitigating or eliminating risks identified during the EC process. Initiatives include new DoD policies or research, development, testing, or evaluation of alternative chemicals.

(U) Risk. Chance of adverse outcome or bad consequence, such as injury, illness, or loss. Risk level is expressed in terms of hazard probability and severity.

(U) Site. A distinct area of an installation containing one or more releases or threatened releases of hazardous substances treated as a discrete entity or consolidated grouping for response purposes. Installations may have more than one site. Former military installations may also be considered sites.

(U) Source of Drinking Water. Any raw or finished (treated) water source that is or may be used by a public water system or as drinking water by one or more individuals.

(U) Spill response. Spill response refers to immediate, short-term response to limit, address, or mitigate a spill or release. AFFF spill response activities are intended to contain the flow of foam solution by blocking sewer and storm water drains, employing portable dikes or booms, and diverting the foam solution to an area suitable for containment.

(U) Toxicity value. A numerical expression of the relationship between the amount of human exposure to a chemical or substance and the potential for adverse health effects. The most common toxicity values published by regulatory and health agencies, such as the EPA, are reference doses, which are levels below which no adverse health effects are expected to occur in humans.


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