U.S. Government Accountability Office

# Persistent Chemicals: Navy Efforts to Address PFAS at Joint Base Pearl Harbor-Hickam

GAO-24-106812
Q&A Report to Congressional Requesters
April 15, 2024

## Why This Matters

Per- and polyfluoroalkyl substances (PFAS) are a large group of heat and stain resistant chemicals that can persist in the environment—including in water, soil, and air—for decades or longer. According to the Environmental Protection Agency (EPA), exposure to certain PFAS may have adverse effects on human health, including effects on fetal development, the immune system, and the thyroid, and may cause liver damage and cancer.

During November 2022 maintenance activities at Joint Base Pearl Harbor-Hickam in Hawaii, 1,300 gallons of aqueous film-forming foam (AFFF) concentrate was released from a pipe in a tunnel at the installation's Red Hill Bulk Fuel Storage Facility. Some of the concentrate migrated out of the tunnel and into the environment. Because AFFF—a product used to fight flammable liquid fires—contains PFAS, this incident raised concerns about how the Navy would remediate PFAS contamination at the installation.

We were asked to examine the Department of Defense's (DOD) efforts to address PFAS at Joint Base Pearl Harbor-Hickam. This report describes DOD processes for the ongoing monitoring and long-term cleanup of PFAS at Joint Base Pearl Harbor-Hickam; DOD's response to the November 2022 AFFF release at the installation; and DOD and EPA policies addressing PFAS in the environment.

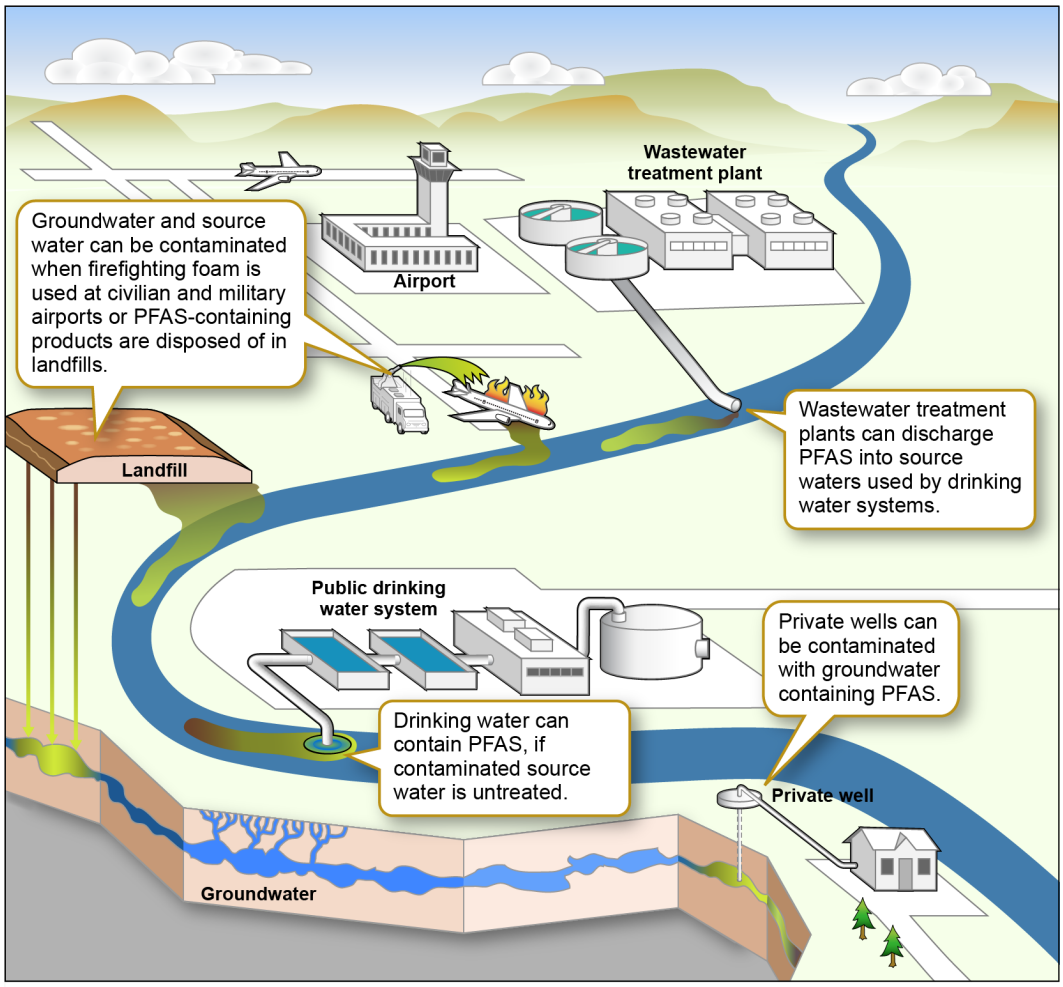
## Key Takeaways

- As of February 2024, DOD testing has not detected PFAS in the active drinking water shaft at Joint Base Pearl Harbor-Hickam. According to installation officials, they monitor drinking water for PFAS at frequencies required by DOD policy and requests by EPA and the state of Hawaii.
- DOD has policies and guidance related to monitoring PFAS levels in drinking water at its installations, conducting long-term cleanup and remediation of PFAS in the environment, and using and disposing of products containing PFAS—including AFFF.
- On April 10, 2024, EPA issued a National Primary Drinking Water Regulation that established allowable levels for six PFAS in drinking water. Prior to this, PFAS in drinking water were not regulated at the federal level. In addition, EPA has proposed a rule that designates certain PFAS as hazardous substances, which is expected to facilitate nationwide cleanup of sites contaminated by these compounds. Once this proposed rule is finalized, DOD plans to update its policies to reflect the new regulation.
- The Navy, as part of DOD's departmentwide environmental restoration program, has identified 32 sites of known or potential PFAS contamination at Joint Base Pearl Harbor-Hickam. The Navy is taking steps to assess these sites and, where appropriate, develop plans for their long-term cleanup.

## How do PFAS get into the environment?

PFAS can enter the environment through the use and disposal of PFAS and products containing PFAS—including AFFF. First developed in the 1940s, PFAS are used in a wide range of products, including carpet, nonstick cookware, waterproof clothing, and firefighting foam used at airports and military bases. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are two of the most widely used and studied chemicals in the PFAS group.[1] See figure 1 for examples of how PFAS can get into water sources.

**Figure 1: Examples of How Per- and Polyfluoroalkyl Substances (PFAS) Enter Water Sources**




Source: GAO; GAO (illustration). | GAO-24-106812

AFFF has traditionally been considered the most effective product available for suppressing fires caused by jet fuel. According to DOD officials, since 1970, AFFF has been the designated firefighting agent for fuel fires at military facilities, commercial airports, and other industries (e.g., oil and gas). Release of AFFF into the environment, either through accidental spills or releases or for fire training and suppression, has resulted in PFAS contamination of drinking water and groundwater in and around DOD installations.

## What restrictions has Congress placed on DOD's use and management of AFFF?

The National Defense Authorization Acts for Fiscal Years 2020, 2021, 2022, and 2023 established several requirements aimed at reducing DOD's use of AFFF; disposal of products containing PFAS, including AFFF; and increasing efforts to identify, remediate, and report on PFAS contamination at its installations.[2]

Specifically, the National Defense Authorization Act for Fiscal Year 2020 established several restrictions on DOD's use of AFFF, including prohibitions on its:

- procurement of AFFF containing in excess of 1 part per billion of PFAS substances after October 1, 2023, unless for use onboard ocean-going vessels;
- use at military installations after October 1, 2024—with waivers possible until October 1, 2026, and an exemption for shipboard use; and
- uncontrolled release at military installations unless for emergency response or for the purposes of testing of equipment or training of personnel, if complete containment, capture, and proper disposal mechanisms are in place to ensure no AFFF is released into the environment.

The National Defense Authorization Act for Fiscal Year 2022 also placed a temporary moratorium on the use of incineration to dispose of AFFF and other specified materials contaminated with PFAS until the Secretary of Defense issued guidance implementing EPA's interim guidance on destruction and disposal of PFAS and other legal requirements or until EPA issued a final rule regarding the destruction and disposal of materials containing PFAS. In December 2020, EPA issued its initial interim guidance on the destruction and disposal of certain PFAS and PFAS-containing materials.[3] In July 2023, DOD issued its own interim guidance on destruction and disposal of materials containing PFAS in response to the requirement in the National Defense Authorization Act for Fiscal Year 2022. In a separate July 2023 policy memo, DOD decided to continue the temporary moratorium on incineration of these PFAS materials.[4] DOD's interim guidance also stated that DOD anticipated that EPA would be updating its December 2020 interim guidance and noted that DOD will update its guidance annually to reflect changes as technologies mature, EPA updates its guidance, and additional data become available. In April 2024, during the week preceding issuance of our review, EPA updated its initial interim guidance.[5]

## How are PFAS regulated in drinking water at the federal level?

On April 10, 2024, EPA issued the National Primary Drinking Water Regulation.[6] The regulation establishes maximum contaminant levels for PFOA and PFOS in drinking water of 4.0 parts per trillion for each (one part per trillion is equivalent to a single drop of water in 20 Olympic-sized swimming pools). This regulation requires that:

- Public water systems must monitor for these PFAS and have 3 years to complete initial monitoring (by 2027), followed by ongoing compliance monitoring. Water systems must also provide the public with information on the levels of these PFAS in their drinking water beginning in 2027.
- Public water systems have 5 years (by 2029) to implement solutions that reduce these PFAS if monitoring shows that drinking water levels exceed these maximum containment levels.
- Beginning in 5 years (2029), public water systems that have PFAS in drinking water which violates one or more of these maximum contaminant levels must take action to reduce levels of these PFAS in their drinking water and must provide notification to the public of the violation.

Prior to finalization of this regulation, PFAS in drinking water were unregulated by EPA. However, in 2016, under the authority of the Safe Drinking Water Act, EPA published health advisory levels of 70 parts per trillion for PFOA and PFOS in drinking water.[7] EPA health advisories are nonenforceable and nonregulatory but serve to provide information on contaminants not subject to drinking water

regulations, including those that can cause adverse human health effects and are known or anticipated to occur in drinking water. Since 2016, DOD has had policies in place for monitoring PFAS levels in drinking water at its installations.[8]

In 2022, EPA issued updated interim health advisory levels for PFOA and PFOS in drinking water at 0.004 parts per trillion and 0.02 parts per trillion, respectively.[9] This supersedes EPA's 2016 health advisory levels. EPA also issued health advisories for two additional PFAS substances. However, the updated interim levels are lower than available testing methods can detect.[10] DOD did not revise its drinking water policies to reflect the new interim levels, but according to officials, revised its drinking water policy in 2023 in anticipation of a final EPA drinking water standard. According to DOD policy and officials we met with, DOD will implement and comply with the April 2024 EPA regulation.

Joint Base Pearl Harbor-Hickam is also subject to environmental regulation of the State of Hawaii Department of Health. As of February 2024, Hawaii has no regulations for PFAS in drinking water. Hawaii will also adopt federal PFAS limits in drinking water in compliance with the April 2024 EPA regulation.

Table 1 provides an overview of key DOD policies related to PFAS in drinking water that have been in place since 2016.

**Table 1: Key Department of Defense (DOD) Policies Related to Per- and Polyfluoroalkyl Substances (PFAS) in Drinking Water since 2016**

| Policy | Summary of requirements |
|---|---|
| Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Testing DOD Drinking Water for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)* (June 10, 2016) | Required military installations to test drinking water for PFOS and PFOA. Established actions required of installations if test results are greater than 70 parts per trillion, including providing alternative drinking water.<br>(Superseded by March 2, 2020, Office of the Assistant Secretary of Defense memorandum.) |
| Assistant Secretary of Defense Memorandum, *Per- and Polyfluoroalkyl Substances Sampling of Department of Defense Drinking Water Systems* (March 2, 2020) | Established requirements for the frequency of and methods for testing drinking water for all DOD-owned drinking water systems. Required that where state, local, or federal regulations for PFAS were more stringent than the DOD guidance, the more stringent regulations would apply, and implemented requirements for more frequent testing of drinking water systems with testing results that exceed 70 parts per trillion for PFOS and PFOA.<br>(Superseded by July 11, 2023, Office of the Assistant Secretary of Defense memorandum.) |
| Assistant Secretary of Defense Memorandum, *Monitoring of Per- and Polyfluoroalkyl Substances Sampling for Installations with Non-Department of Defense Drinking Water Systems* (July 23, 2020) | Required military installations that receive drinking water from a non-DOD purveyor to request drinking water sampling data for PFAS from the purveyor or conduct drinking water sampling for PFAS if the purveyor will not. If sampling results exceed 70 parts per trillion for PFOS and/or PFOA, the installation would notify the public and request that the purveyor take immediate action to decrease the PFAS levels. |
| Assistant Secretary of Defense Memorandum, *Department of Defense Guidance on Using State Per- and Polyfluoroalkyl Substances (PFAS) Drinking Water Standards in Comprehensive Environmental Response, Compensation, and Liability Act Removal Actions* (December 22, 2021) | Established guidance that DOD may initiate a removal action under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, where DOD is responsible for a confirmed release of PFOA or PFOS concentrations above 70 parts per trillion in drinking water. The guidance also provided that DOD should, to the extent practicable, attain state PFAS drinking water standards when conducting a removal action.[a] |

| | |
|---|---|
| Assistant Secretary of Defense Memorandum, *Memorandum for Sampling of Per- and Polyfluoroalkyl Substances in DoD-Owned Drinking Water Systems* (July 11, 2023) | Updated requirements for the frequency of and methods for testing drinking water for all DOD-owned drinking water systems based on EPA detection methods and in anticipation of a final EPA drinking water standard for certain PFAS. Implemented requirements for increased testing of drinking water systems with testing results that exceed EPA's minimum reporting levels. If DOD-owned systems detect PFOA and/or PFOS in drinking water exceeding 70 parts per trillion, requires DOD to provide alternative drinking water and take action to lower concentrations. Requires that where state and local regulations for PFAS have been fully implemented, and are more stringent than DOD's guidance, the more stringent regulations will apply. |

Source: GAO presentation of DOD information. | GAO-24-106812

[a]There are generally two types of cleanup actions under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended. Removal actions are usually short-term cleanups for sites that pose immediate threats to human health or the environment. Remedial actions are generally long-term cleanups that aim to permanently and significantly reduce contamination. As a part of a remedial action, the lead agency is to identify "applicable or relevant and appropriate requirements" (ARAR) for the cleanup. State drinking water standards may qualify as an ARAR for remedial actions. While DOD is not required to attain ARARs for a removal (as opposed to a remedial) action, if a state's PFAS drinking water standard is properly promulgated and consistently implemented, DOD will, to the extent practicable, seek to attain those standards upon the completion of the removal action and may use the state standard to determine the cleanup level to be attained by DOD.

## How did Joint Base Pearl Harbor-Hickam respond to the November 2022 AFFF release?

According to Joint Base Pearl Harbor-Hickam officials, they responded to the November 2022 AFFF release as required by DOD policy and the Navy Region Hawaii Integrated Contingency Plan, which established response and reporting requirements in the event of an AFFF release.[11] The incident, which occurred during maintenance activities, resulted in the release of 1,300 gallons of AFFF concentrate from a pipe in a tunnel at the installation's Red Hill Bulk Fuel Storage Facility. Some of the concentrate migrated out of the tunnel and into the environment. Further, according to officials, in responding to the AFFF release the Navy followed additional procedures that were determined to be necessary by EPA and state regulators.

Both DOD and EPA have since completed investigations of the November 2022 AFFF release and issued final reports.[12] According to these reports, immediately following the AFFF release, emergency responders—including DOD, Navy, and civilian personnel—conducted an initial evaluation of the release and performed containment measures. For example, they placed absorbent padding inside and outside of the affected areas to remove as much AFFF as possible and sealed the interior tunnel walls and concrete floor where the pipe was located with epoxy to lock any residual contamination in place and prevent contamination from migrating to subsurface soils. The Navy also restricted access to the site.

According to the EPA investigation report, because some AFFF breached the facility, DOD, supported by the Navy, in the days following the AFFF release removed approximately 3,000 cubic feet of soil from the surrounding area and took measures to prevent any AFFF-contaminated materials from entering a nearby storm drain. In addition, a temporary asphalt cap was installed to minimize rain infiltration. The Navy then backfilled the excavated area with clean soil.

Both the Navy and EPA investigations recommended that (1) increased government oversight of AFFF-related activities at the Red Hill facility was necessary, (2) all AFFF concentrate should be removed from the facility, and (3) the AFFF system at Red Hill should be decommissioned. According to the Navy investigation, immediately following the incident, the Navy began the process to

remove AFFF from the system's pipelines and make preparations for proper disposal.[13] Officials at Joint Base Pearl Harbor-Hickam told us there are no plans to resume use of the system and, once the fuel is removed from the facility, an AFFF system will not be required.[14]

According to Navy officials, as a result of the 2022 AFFF concentrate release, the Navy also took steps to investigate PFAS in groundwater in the surrounding area. Specifically, according to DOD officials, at the request of EPA and state regulators, the Navy developed a sampling and analysis plan that included weekly monitoring for PFAS at 10 groundwater monitoring wells through June 2023.[15] Further monthly monitoring of the same wells was performed through December 2023 under a different agreement with EPA and state regulators.

According to EPA officials, in September 2023, at EPA's request the Navy performed a separate one-time PFAS sampling of 21 wells around the Red Hill Bulk Fuel Storage Facility. This included the 10 groundwater wells around Red Hill that had been previously sampled. This sampling found low-level PFAS detections in four wells that exceeded the state of Hawaii groundwater screening levels.[16] DOD officials stated they are not concerned that these PFAS detections will impact drinking water as the nearest drinking water well is upgradient and approximately six miles away. Additionally, according to Navy officials, the PFAS that were detected were not the result of the November 2022 AFFF release.

According to EPA officials, as of December 2023, the Navy determined it had met the state regulator's emergency response requirements and discontinued PFAS groundwater monitoring at Red Hill until implementation of long-term cleanup actions planned for 2025 (discussed later in this report). According to these officials, based on results from the September 2023 sampling, EPA and state regulators requested, in March 2024, that the Navy resume interim PFAS groundwater sampling until implementation of the planned long-term cleanup actions commence.

## How does Joint Base Pearl Harbor-Hickam monitor for PFAS in drinking water?

The Navy conducts PFAS sampling in the drinking water shafts at Joint Base Pearl Harbor-Hickam in accordance with DOD policy, according to Navy officials.[17] According to DOD policy, active DOD-owned drinking water systems must be tested for PFAS at least every 2 years if the presence of PFAS is below minimum reporting levels. At the time we conducted our audit work, DOD policy used the 2016 health advisory level of 70 parts per trillion as its minimum reporting level. In the days preceding issuance of our report, EPA finalized maximum contaminant levels for PFOA and PFOS in drinking water of 4 parts per trillion. Information presented in this report reflects DOD policy prior to the establishment of the new EPA regulation. According to DOD, its monitoring requirements will comply with EPA's April 2024 drinking water regulation.

For systems with results showing PFAS above 2016 minimum reporting levels, testing will occur semiannually until the levels are below 70 parts per trillion for two consecutive samples. Additionally, if combined concentrations of PFOA or PFOS exceeding 70 parts per trillion are detected in drinking water, DOD must provide alternative drinking water and take other actions to lower concentration levels to below 70 parts per trillion. We have previously reported that DOD has taken actions to address PFAS in drinking water at or near military installations such as shutting down drinking water wells, providing alternative drinking water, or installing treatment systems.[18]

As of February 2024, only one of the three drinking water shafts at Joint Base Pearl Harbor-Hickam was in use. See figure 2 for a map of the three drinking water shaft locations.

**Figure 2: Map of Department of Defense's Three Drinking Water Shafts at Joint Base Pearl Harbor-Hickam**


Sources: Department of Defense (Red Hill); Hawaii Commission on Water Resource Management data (shaft location); Map Resources (O'ahu map); GAO (icons); Esri and its licensors (Pearl Harbor and surrounding area map). The map image of Pearl Harbor and the surrounding area is the intellectual property of Esri and is used herein under license; attribution for the map is as follows: Esri, HERE, Garmin, SafeGraph, METI/NASA, USGS, EPA, USDA, CGIAR. | GAO-24-106812

- **Waiawa shaft (active).** The Waiawa shaft is currently the only operating drinking water shaft at Joint Base Pearl Harbor-Hickam; it provides drinking water for the entire installation. PFAS have not been detected in drinking water samples taken from the shaft. According to Navy officials, in accordance with DOD monitoring policy, water in the Waiawa shaft is tested for PFAS at least every 2 years; however, they have been testing the Waiawa shaft more frequently since the November 2022 AFFF release. The most recent test results, taken on January 30, 2024, indicate that there were no PFAS in the shaft.[19] Officials from both the Navy and EPA have raised concerns about relying on the Waiawa shaft as the sole source of drinking water at Joint Base Pearl Harbor-Hickam and about the need for an alternate drinking water source in case of an emergency.
- **Aiea-Hālawa shaft (inactive).** PFOA and PFOS were detected in November 2021 at the Aiea-Hālawa shaft. Detected levels were below 70 parts per trillion, which, per DOD policy, did not require the Navy to take any action to close the shaft or provide alternative drinking water sources. Navy officials do not attribute the source of these PFAS to AFFF, and they noted that the detections of PFAS were below the 70 parts per trillion 2016 health advisory levels—less than 6 parts per trillion for each of the five PFAS detected—and not clearly linked to a specific source. At the time of this testing DOD policy not require that any action to close the shaft or provide alternative drinking water sources based on these levels. However, in December 2021, following the Red Hill fuel release the Navy made the decision to take the water shaft offline out of an abundance of caution for potential fuel contamination.

  According to Navy officials, sampling conducted in April, August, and October 2023 at the shaft showed that PFAS levels declined from previous sampling. April sample results were less than 2 parts per trillion for five detected PFAS and both August and October sample results did not detect any PFAS. In light of concerns about the need for another water source at Joint Base Pearl

Harbor-Hickam, Navy, and EPA officials indicated they are in preliminary discussions with state regulators about steps that would need to be taken to reactivate the Aiea-Hālawa shaft as a second drinking water source. According to state regulators—as part of their responsibilities enforcing the Safe Drinking Water Act—state regulations require they certify the reactivation of the shaft since it has been offline for over 6 months.[20] State regulators told us they are being more cautious and comprehensive in their oversight than they might otherwise be because of the 2021 Red Hill fuel release. As of February 2024, there was no estimated date for reactivating the shaft.

- **Red Hill shaft (inactive).** The Navy closed this shaft in November 2021 in response to fuel contamination in the drinking water following the Red Hill fuel release. According to DOD officials, PFAS were not detected at the Red Hill drinking water shaft. However, groundwater sampling in this area detected low levels of PFAS in the general area in December 2022, but as of April 2024, they are below the state of Hawaii groundwater screening levels. According to EPA, while PFAS have not been detected in the Red Hill drinking water shaft above 70 parts per trillion, Navy testing in December 2021 found low parts-per-trillion concentrations of PFAS that fell below EPA's health advisory levels current at that time. According to Navy officials, monitoring at the Red Hill shaft is not expected to continue for PFAS and there are no current plans to reactivate the shaft.

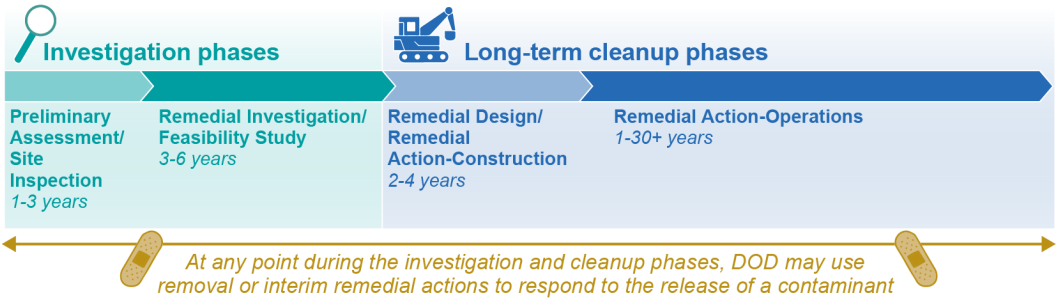
## How is PFAS contamination being addressed at Joint Base Pearl Harbor-Hickam?

PFAS contamination at Joint Base Pearl Harbor-Hickam is being addressed through the Defense Environmental Restoration Program. It is a requirement of this program that DOD's environmental restoration activities be conducted in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and other applicable federal, state, and local requirements.[21] CERCLA, also known as "Superfund," provides the federal government with the authority to respond to releases or threatened releases of hazardous substances, pollutants, and contaminants that pose a threat to public health or the environment.[22]

As of February 2024, PFAS were not designated as hazardous substances under CERCLA.[23] However, CERCLA also authorizes federal agencies, including DOD, to take cleanup actions for pollutants or contaminants in accordance with CERCLA regulations. Under a CERCLA Federal Facility Agreement for the Pearl Harbor Naval Complex, for certain locations at Joint Base Pearl Harbor-Hickam, the Navy is required to define the nature and extent of PFAS contamination and clean it up where necessary to protect public health and the environment.[24] According to officials, DOD is currently using the full range of CERCLA authorities to respond to PFAS as a pollutant or contaminant and has responded to PFAS under this authority for many years.

In addressing PFAS as a pollutant or contaminant under CERCLA, DOD identifies, evaluates, and where appropriate, responds to known or potential DOD releases of PFAS to the environment.[25] According to DOD officials, these actions include both short-term interim responses and long-term cleanup phases. See figure 3 for an overview of the timeline of each of these phases.

**Figure 3: Phases of Department of Defense's (DOD) Environmental Restoration Process**




Source: Department of Defense (DOD); GAO (icons). | GAO-24-106812

To identify potential areas of interest for PFAS contamination, the Navy reviewed data and historic documents and conducted interviews with installation officials with historical knowledge of known or suspected PFAS releases. The Navy provided its site inspection reports to EPA in November 2023 for official comment. EPA provided comments in January 2024, to include recommending that the Navy investigate additional areas of interest.

The Navy reports identified 124 potential areas of interest for PFAS contamination. According to officials, these sites included all aircraft hangars, locations of known or suspected jet fuel fires, AFFF training sites, and other locations that may have been used in the storage or use of AFFF. The Navy reports determined that use or releases of PFAS-containing materials could not be substantiated at 92 of these areas. They organized the remaining 32 areas of interest—including Red Hill—into four categories; sites in Groups A, B, and C were recommended to advance further through the CERCLA process to the in-depth remedial investigation phase; no action will be taken for Group D sites, for which there is no documentation of AFFF or PFAS use. See table 2 for number of sites in each category.

**Table 2: Categories for Areas of Interest at Joint-Base Pearl Harbor-Hickam Involving Releases Known or Suspected Per- and Polyfluoroalkyl Substances (PFAS)**

| Category | Number of sites |
|---|---|
| Group A<br><br>Known AFFF releases. Sites are where AFFF suppressants known to have contained PFAS were documented to have been used for hangar tests, firefighter training, or fire suppression for crashes. | 12 |
| Group B<br><br>Potential AFFF releases. Sites are potential release sites, including areas where AFFF suppressants known to have contained PFAS were documented to have been stored or used but have no known releases (e.g., fire stations, hangars, flight lines, runways, AFFF handling/storage areas). | 7 |
| Group C<br><br>Electroplating facilities. Sites are electro-plating facilities that may have used vapor suppressants containing PFAS. | 1 |
| Group D<br><br>No documentation. Sites are potential other secondary sources of PFAS releases but do not have documentation of past use of AFFF or PFAS. | 12 |
| **Total** | **32** |

Source: GAO presentation of Department of the Navy information. | GAO-24-106812

## Agency Comments

We provided a draft of this report to DOD and EPA for review and comment. DOD and EPA generally agreed with our findings and did not provide written comments. Where appropriate, we incorporated their technical comments into the report.

## How GAO Did This Study

We reviewed and summarized information from previous GAO reports on PFAS contamination in the environment—including drinking water and groundwater.[26] We identified and reviewed relevant DOD, EPA, and state of Hawaii guidance, policies, and other documentation on regulating release, response, use, and disposal of PFAS-containing substances. We interviewed officials from DOD, EPA, and the state of Hawaii on efforts to regulate PFAS at Joint Base Pearl Harbor-Hickam and nationally.

We identified and reviewed relevant DOD, EPA, and state of Hawaii documents on the Navy's response to the November 2022 AFFF release at Joint Base Pearl Harbor-Hickam. We conducted a site visit to Joint Base Pearl Harbor-Hickam, during which we toured the site of the November 2022 AFFF release and interviewed officials from DOD, EPA, and the state of Hawaii on the Navy's response and cleanup of the AFFF release.

We identified and reviewed relevant DOD and EPA reports on drinking water and groundwater monitoring at Joint Base Pearl Harbor-Hickam. We interviewed officials from DOD, EPA, and the state of Hawaii on the drinking water and groundwater monitoring at Joint Base Pearl Harbor-Hickam.

We identified and reviewed relevant statutes and DOD and EPA policies and other requirements for long-term cleanup and remediation of PFAS in the environment. We reviewed documents and interviewed officials from DOD, EPA, and the state of Hawaii on these efforts at Joint Base Pearl Harbor-Hickam.

We conducted this performance audit from March 2023 to April 2024 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## List of Addressees

The Honorable Mazie K. Hirono
Chair
Subcommittee on Readiness and Management Support
Committee on Armed Services
United States Senate

The Honorable Brian Schatz
United States Senate

The Honorable Ed Case
House of Representatives

The Honorable Jill N. Tokuda
House of Representatives

We are sending copies of this report to the appropriate congressional committees and members, the Secretary of Defense, the Secretary of the Navy, the Administrator of the Environmental Protection Agency, and other interested parties. In addition, the report is available at no charge on the GAO website at https://www.gao.gov.

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## Endnotes

[1]PFAS are a group of chemicals that include PFOA, PFOS, and many other chemicals. PFOA and PFOS are the two types of PFAS most produced and studied. Both chemicals are persistent in the environment and the human body, which means that they do not break down and can accumulate over time.

[2]National Defense Authorization Act for Fiscal Year 2020, Pub. L. No. 116-92, §§ 322, 323, and 324 (2019); William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, Pub L. No 116-283, § 318 (2021); National Defense Authorization Act for Fiscal Year 2022, Pub L. No 117-81, §§ 341, 343, 344, 345, and 346 (2021); and James M. Inhofe National Defense Authorization Act for Fiscal Year 2023, Pub. L. No. 117-263, § 345 (2022).

[3]EPA, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances* (Dec. 18, 2020). Under the National Defense Authorization Act for Fiscal Year 2020, EPA was required to publish this interim guidance and update it at least every 3 years. Pub. L. No. 116-92, § 7361.

[4]Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Guidance on Incineration of Materials Containing Per- and Polyfluoroalkyl Substances* (July 14, 2023).

[5]EPA, *Interim Guidance on the Destruction and Disposal of Perfluoroalkyl and Polyfluoroalkyl Substances and Materials Containing Perfluoroalkyl and Polyfluoroalkyl Substances—Version 2* (April 8, 2024).

[6]EPA, *PFAS National Primary Drinking Water Regulation Rulemaking*, Docket No. EPA-HQ-OW-2022-0114 (April 10, 2024).

[7]EPA, *Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate*, 81 Fed. Reg. 33250 (May 25, 2016).

[8]Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Testing DOD Drinking Water for Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA)* (June 10, 2016).

[9]EPA, *Lifetime Drinking Water Health Advisories for Four Perfluoroalkyl Substances*, 87 Fed. Reg. 36848 (June 21, 2022). In addition to updating the 2016 interim health advisory limits for PFOA and PFOS, EPA issued final health advisories for two additional PFAS substances—hexafluoropropylene oxide (HFPO) dimer acid and its ammonium salt (together referred to as GenX

chemicals) and perfluorobutane sulfonic acid and its related compound potassium perfluorobutane sulfonate (together referred to as PFBS).

[10]Because currently available analytical methods cannot detect PFOA and PFOS at the levels of the interim health advisories, EPA recommended that if water systems detect PFOA and PFOS, water systems take steps such as informing residents, undertaking monitoring, and examining steps to limit exposure.

[11]Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Response and Reporting of Aqueous Film Forming Foam Usage, and Accidental Releases/Spills on Military Installations and National Guard Facilities* (April 7, 2022); Navy, Commander Navy Region Hawaii, *Integrated Contingency Plan* (Aug. 2023) (incorporating Change 12). In accordance with guidance in the April 2022 memo issued in response to the National Defense Authorization Act for Fiscal Year 2021, DOD components are required to report any AFFF usage or spill above 10 gallons of AFFF concentrate or 300 gallons of mixed foam. Within 24 hours, notification shall be forwarded to the Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilience.

[12]DOD, *Joint Task Force-Red Hill Command Investigation into the Facts and Circumstances Surrounding the Discharge of Aqueous Film Forming Foam at Red Hill Bulk Fuel Storage Facility on 29 November 2022* (May 5, 2023); EPA, *Aqueous Film Forming Foam Investigation Report: Red Hill Bulk Fuel Storage Facility* (Oct 2023).

[13]Consistent with statute and EPA guidance, DOD has identified four commercially available options to destroy or dispose of PFAS-containing materials. Assistant Secretary of Defense for Energy, Installations and Environment Memorandum, *Interim Guidance on Destruction or Disposal of Materials Containing Per- and Polyfluoroalkyl Substances in the United States* (July 11, 2023). EPA released its interim destruction and disposal guidance in 2020. EPA, *Interim PFAS Destruction and Disposal Guidance; Notice of Availability for Public Comment*, 85 Fed. Reg. 83554 (Dec. 22, 2020). Updated EPA guidance is expected to advise federal agencies and others on the best methods of disposal or destruction for waste containing PFAS, taking into account technologies developed after 2020. As of April 2024, updated guidance was in the final stages of the federal review process and is expected to be finalized by spring 2024.

[14]In November 2021 about 20,000 gallons of fuel were accidentally released from the Red Hill Bulk Storage Facility at Joint Base Pearl Harbor-Hickam. Subsequently, the Navy began the process of defueling the facility. In February 2024, we reported that the Navy was unable to recover about 5,500 gallons, contaminating portions of the surrounding area, or site, and the Red Hill drinking water shaft that supplies drinking water to about 93,000 service members and civilians, many of whom used the contaminated water. GAO, *Environmental Cleanup: DOD Should Consider Disclosing Total Future Costs for Cleanup Efforts at Red Hill,* GAO-24-106185 (Washington, D.C.: Feb 14, 2024).

[15]Naval Facilities Engineering Systems Command, *PFAS-Specific Sampling and Analysis Plan, Red Hill Bulk Fuel Storage Facility, Adit 6: Joint Base Pearl Harbor-Hickam, O'ahu, Hawaii* (Dec. 7, 2022).

[16]Hawaii Department of Health, *Interim Soil and Water Environmental Action Levels (EALS) for Perfluoroakyl and Polyfluoroalkyl Substances (PFASs)* (Jan. 2024). The state of Hawaii's screening levels were most recently updated in January 2024 available at https://health.hawaii.gov/heer/guidance/ehe-and-eals/#ehe6.

[17]Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Sampling of Per- and Polyfluoroalkyl Substances in DOD-Owned Drinking Water Systems* (July 11, 2023).

[18]GAO, *Drinking Water: DOD Has Acted on Some Emerging Contaminants but Should Improve Internal Reporting on Regulatory Compliance,* GAO-18-78 (Washington, D.C.: Oct. 18, 2017).

[19]Navy, Safe Waters Joint Base Pearl Harbor-Hickam, *Joint Base Pearl Harbor-Hickam (JBPHH) Drinking Water Long Term Monitoring Dashboard* available at https://app.powerbi.com/view?r=eyJrIjoiNTIyNDU0OTMtODgwNS00ZjQ4LTg1Y2UtODkxYTgxMjQ5NGZhIiwidCI6ImUyYzE5MDhiLTI2NzItNGE0Ni05M2ZkLTdmMDhkYTExNjZiNSIsImMiOjJ9 (accessed on Feb. 7, 2024).

[20]Safe Drinking Water Act, Pub. L. No. 93-523 (1974), *as amended; codified at* 42 U.S.C. §§ 300f–300j-26 (2010). Among other things, the Safe Drinking Water Act authorizes EPA to establish National Primary Drinking Water Regulations, which generally limit the levels of specific contaminants in public drinking water systems that can adversely affect public health. States generally have primary responsibility for enforcing federal drinking water regulations.

[21]DOD Instruction 4715.07, *Defense Environmental Restoration Program (DERP)* (May 21, 2013) (incorporating Change 2, Aug. 31, 2018). The Defense Environmental Restoration Program was established by the Superfund Amendments and Reauthorization Act of 1986, which amended CERCLA. In implementing the program, DOD is required to carry out its activities addressing hazardous substances, pollutants, or contaminants in a manner consistent with section 120 of CERCLA. 10 U.S.C. § 2701.

[22]Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Pub. L. No. 96-510 (1980), as amended; codified at 42 U.S.C. §§ 9601-9675.

[23]EPA has proposed a rule to designate certain PFAS as hazardous substances under CERCLA, which EPA expects will provide additional tools that the government and others could use to address PFAS contamination and facilitate the cleanup of contaminated sites. EPA, *Designation of Perflouorooctanoic Acid (PFOA) and Perfluorooctanesulfonic Acid (PFOS) as CERCLA Hazardous Substances*, 87 Fed. Reg. 54415 (Sept. 6, 2022). This rule is currently under review, and according to EPA officials, is anticipated to be finalized in spring 2024. According to DOD officials, once EPA's proposed rule is finalized, DOD will revise its policies, as necessary, to comply with EPA's regulations.

[24]EPA Region 9, State of Hawaii and Navy, *Pearl Harbor Naval Complex Federal Facilities Agreement* (Mar. 1994). According to EPA officials, in addition to DOD requirements the Navy is investigating PFAS releases at Joint Base Pearl Harbor-Hickam pursuant to the 1994 Pearl Harbor Naval Complex Federal Facility Agreement under CERCLA. The purpose of this multiparty agreement is to ensure that environmental impacts associated with past and present activities at the Navy's Pearl Harbor complex are investigated and remediated as necessary to protect public health and welfare and the environment.

[25]Assistant Secretary of Defense for Energy, Installations, and Environment Memorandum, *Taking Interim Actions to Address Per- and Polyfluoroalkyl Substances Migration from DoD Installations and National Guard Facilities* (July 11, 2023). DOD components are further directed to prioritize implementation of interim actions as expeditiously as possible to address PFAS under CERCLA, such as removal of soil "hot spots" and installation of groundwater extraction systems, where supported by site-specific information.

[26]For an overview of our work on government and other efforts to detect PFAS, prevent exposure, and treat contamination see GAO, *Persistent Chemicals: Detecting, Limiting Exposure To, and Treating PFAS Contamination*, GAO-23-106970 (Washington, D.C.: Sept. 27, 2023).

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