



February 2024

ENVIRONMENTAL CLEANUP

DOD Should Communicate Future Costs for Red Hill Remediation and Closure

Accessible Version

GAO Highlights

Highlights of [GAO-24-106185](#), a report to the Committee on Armed Services, House of Representatives

Why GAO Did This Study

In November 2021, approximately 21,000 gallons of fuel was accidentally released from Red Hill, part of a fuel storage system the Navy manages. The Navy was unable to recover about 5,500 gallons, which ultimately contaminated portions of the surrounding area and a nearby well that supplied drinking water to about 93,000 service members and civilians. The November 2021 spill was not the first accidental release at Red Hill. Over the last decade, this facility, which supplied various types of fuel to DOD resources in the Pacific, experienced several other spills that DOD could not fully recover. In March 2022, the Secretary of Defense announced that DOD planned to defuel and permanently close the facility and remediate the site.

House Report 117-397 includes a provision for GAO to review DOD's efforts to remediate Red Hill and report on liabilities and costs to clean up and close the facility. This report (1) describes actions DOD is taking to defuel and close the Red Hill facility, including remediating the site, and the challenges it faces in doing so; (2) assesses to what extent DOD estimated and recorded environmental and contingent liabilities for the November 2021 Red Hill fuel release in its financial statements; and (3) assesses to what extent DOD estimated and reported to Congress on the total fiscal exposure to defuel and close Red Hill. GAO visited the Red Hill site, interviewed DOD regulatory and other officials, and evaluated financial and regulatory documentation. Specifically, GAO met with officials from EPA, the Hawaii Department of Health, the Honolulu

February 2024

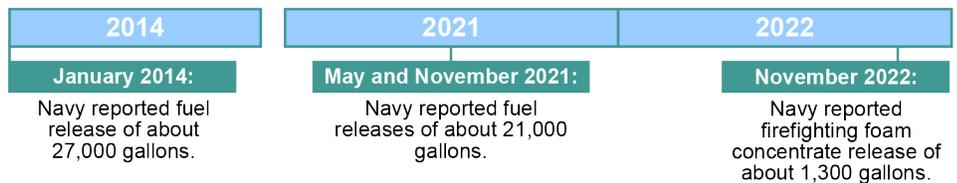
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What GAO Found

The Department of Defense (DOD) responded to fuel and other releases that accidentally occurred from 2014 through 2022 at the Red Hill Bulk Fuel Facility on O'ahu, Hawaii, by containing pollutants and taking abatement measures. Since then, DOD has developed and begun implementing a defueling plan and developed an initial closure plan for the tank system. However, as of August 2023, DOD had not finished a site investigation or remediation plan. DOD plans to close the tanks in place and complete its site investigation by the end of fiscal year 2027, but comprehensive remediation of the site could take decades.

Timeline of Major Releases during 2014 through 2022



Sources: GAO summary of Department of Defense, U.S. Environmental Protection Agency, and State of Hawaii Department of Health documents. | GAO-24-106185

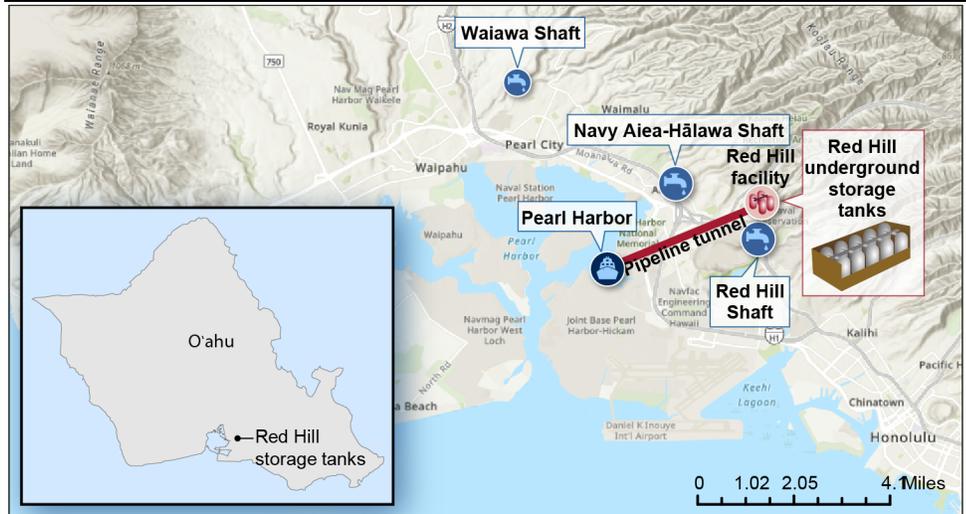
Accessible Text for Timeline of Major Releases during 2014 through 2022

Year	Time period	Event
2014	January 2014	Navy reported fuel release of about 27,000 gallons
2021	May and November 2021	Navy reported fuel releases of about 21,000 gallons
2022	November 2022	Navy reported firefighting foam concentrate release of about 1,300 gallons

Sources: GAO summary of Department of Defense, U.S. Environmental Protection Agency, and State of Hawaii Department of Health documents. | GAO-24-106185

DOD faces three key challenges in its efforts to defuel, remediate, and close Red Hill: (1) obtaining regulatory approval from the Hawaii Department of Health and the Environmental Protection Agency (EPA), (2) assessing contamination amid the site's unique geologic complexity, and (3) gaining trust and working with community stakeholders. Red Hill's proximity to several drinking water wells in the Honolulu Hawaii area compounds the unique geologic complexity.

Map of Red Hill Bulk Fuel Storage Facility, Nearby Navy Drinking Water Wells (Shafts), and the Surrounding Area



Sources: Department of Defense (Red Hill and pipeline location); 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-24-106185

Accessible Text for Map of Red Hill Bulk Fuel Storage Facility, Nearby Navy Drinking Water Wells (Shafts), and the Surrounding Area

Map includes the following:

- Waiawa Shaft (drinking water well near Red Hill facility)
- Navy Aiea-Halawa Shaft (drinking water well near Red Hill facility)
- Pearl Harbor
- Pipeline tunnel (between Pearl Harbor and Red Hill facility)
- Red Hill facility
- Red Hill underground storage tanks
- Red Hill Shaft (drinking water well near Red Hill facility)

Sources: Department of Defense (Red Hill and pipeline location); 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-24-106185

Board of Water Supply, the Hawaii Commission on Water Resource Management, and five selected community groups.

What GAO Recommends

GAO recommends that DOD expand the information available to Congress on the anticipated amount of fiscal exposure for defueling, remediation, and closure of the site in supplemental reports or other budget materials. DOD agreed with the recommendation and discussed planned implementation steps.

View [GAO-24-106185](#). For more information, contact Kristen Kocielek at (202) 512-2989 or kociolekk@gao.gov or J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov.

In response to challenges, DOD has taken several actions, including developing a joint integrated master schedule to prioritize key deliverables for defueling tasks and align them with state officials' priorities and working with EPA to make groundwater well monitoring data more easily available to the public.

DOD and its components stated that the accidental 2021 Red Hill fuel release affected their fiscal year 2022 financial statements in a variety of ways. DOD concluded that while the future outflow of resources to clean up and close Red Hill was probable, an amount was not reasonably estimable given the lack of a completed remedial investigation and experience with a similar site. Accounting standards require that if a future outflow or other sacrifice of resources is probable but not reasonably estimable, an entity should not record an environmental liability in the financial statements. In such cases, an entity should disclose certain information about the event within the notes of its financial statements. Accordingly, DOD and relevant DOD components disclosed information in their fiscal year 2022 financial statements, including a description of the Red Hill event and its effect.

While federal accounting standards require certain environmental liabilities and contingencies to be reported or disclosed in federal agencies' financial statements, other future costs not included in financial statements can be communicated to Congress in budget materials. The financial statement estimates do not represent the total federal fiscal exposure or the total amount that the federal government may have to pay. In addition to the liabilities and contingencies in financial statements, there are other components that, when combined, account for total federal fiscal exposure. These include costs to clean up and close known sites that are not currently reasonably estimable, and unknown cleanup and closure costs that may be identified in the future as remedial investigations are completed and closure plans are approved.

DOD had not, as of the end of fiscal year 2023, communicated information to Congress about total fiscal exposures for anticipated Red Hill remediation activities for fiscal years 2025 and beyond. Specifically, DOD is aware of millions of dollars of costs that it is likely to incur as part of the Red Hill remediation and closure. It is also aware of numerous other costs for significant tasks that it cannot estimate at this time. Congress has appropriated at least \$1.2 billion to DOD for activities related to improvement of infrastructure and defueling at Red Hill, and DOD has spent or plans to spend these funds. However, DOD's reports to Congress have not included projected cost estimates for fiscal year 2025 and beyond, which is the time frame during which DOD will likely incur substantial costs. Because these projected cost estimates have not been conveyed, Congress does not have information on total estimated remediation and closure costs in budget materials. With this financial exposure information, Congress would be better equipped to make decisions regarding funding remediation and closure activities.

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Abbreviations

AFFF	Aqueous Film Forming Foam
AOC	Administrative Order on Consent
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended
DHA	Defense Health Agency
DLA	Defense Logistics Agency
DOD	Department of Defense
DOH	State of Hawaii Department of Health
EPA	Environmental Protection Agency
FASAB	Federal Accounting Standards Advisory Board
GAC	Granular Activated Carbon
NEPA	National Environmental Policy Act of 1969, as amended
PFAS	per- and polyfluoroalkyl substances
RCRA	Resource Conservation and Recovery Act of 1976, as amended
SFFAS	Statement of Federal Financial Accounting Standards

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February 14, 2024

The Honorable Mike Rogers
Chairman
The Honorable Adam Smith
Ranking Member
Committee on Armed Services
House of Representatives

Over the past 10 years, there have been major fuel releases at the Red Hill Bulk Fuel Storage facility on O’ahu, Hawaii, including a November 2021 accidental release of about 21,000 gallons of fuel. Located near Joint Base Pearl Harbor-Hickam, the facility includes 20 large underground storage tanks and is part of a fuel storage system that the United States Navy, a service branch of the Department of Defense (DOD), manages. The Navy was unable to recover about 5,500 gallons of the fuel released in November 2021, which contaminated portions of the surrounding area, or site.¹ It also affected a nearby well that at the time supplied drinking water to about 93,000 service members and civilians, many of whom used the contaminated water.² After the release, many individuals that were exposed to the contamination were treated for symptoms that included headaches, fatigue, dizziness, rashes, skin irritation or burning, and nausea.

In response to the contamination, the State of Hawaii Department of Health (DOH) issued a do-not-drink advisory, and the Navy relocated many of those who reported symptoms to temporary housing. In December 2021, DOH issued an Emergency Order to the Navy requiring the Navy to suspend operations at the facility and defuel the storage tanks. In March 2022, the Secretary of Defense announced that DOD

¹According to an enforceable agreement among the Navy, the Defense Logistics Agency, the Environmental Protection Agency (EPA), and the State of Hawaii Department of Health, the Red Hill site can be defined as the facility and any area where petroleum or other substances released from the facility come to be located. We rely on that definition throughout this report.

²According to Navy and EPA documents, an undetermined amount of that fuel reached and contaminated the Red Hill drinking water well (Red Hill Shaft), one of three wells the Navy used to serve the Joint Base Pearl Harbor-Hickam water system.

planned to defuel and permanently close the facility.³ Subsequently, in May 2022, DOH issued a superseding Emergency Order requiring the Navy to defuel and permanently close the facility. In addition to other appropriations related to the November 2021 Red Hill incident, Congress provided DOD with \$1 billion, to be used in fiscal years 2023 and 2024, to conduct infrastructure improvements and defueling at the facility.

House Report 117-397 includes a provision for us to review the remediation of the environmental contamination resulting from the Red Hill fuel releases, DOD's efforts to calculate and record environmental liabilities for the November 2021 Red Hill incident, and DOD's total projected costs to decommission and remediate the site. This report (1) describes actions DOD is taking to defuel and close Red Hill, including remediating the site, and the challenges DOD reports it faces in completing these actions; (2) assesses to what extent DOD estimated and recorded environmental and contingent liabilities for the November 2021 Red Hill fuel release in its financial statements; and (3) assesses to what extent DOD estimated and reported to Congress on the total fiscal exposure to defuel and close Red Hill, including remediating the site.⁴

To describe the actions DOD is taking to defuel and close Red Hill, including remediating the site, we reviewed legal and agency documents, interviewed agency officials and other stakeholders, and conducted a site visit. Specifically, we reviewed statutes, regulations, and administrative orders; a DOD cost report; and DOD, Environmental Protection Agency (EPA), and DOH documents. We interviewed officials from (1) the Navy, DLA, Department of the Army, and Joint Task Force Red Hill, which DOD set up in 2022 to plan for and execute defueling of the tanks; (2) EPA and DOH; (3) the Honolulu Board of Water Supply, Hawaii Commission on Water Resource Management, and University of Hawaii-Manoa; and (4) five selected community groups. We visited the Red Hill tanks and site near Joint Base Pearl Harbor-Hickam, including the areas of accidental fuel releases.

³On June 30, 2022, DOD issued the Red Hill Bulk Fuel Storage Facility Defueling Plan. On November 1, 2022, the Navy issued the Red Hill Bulk Fuel Storage Facility Tank Closure Plan to permanently close the 20 underground storage tanks, four surge tanks, and associated valves and piping at the facility. The Navy worked with the Defense Logistics Agency (DLA) to develop this plan. Several supplements were subsequently issued to both plans.

⁴Fiscal exposures include responsibilities, programs, and activities that either obligate the government to future spending or create an expectation for future spending.

To assess to what extent DOD estimated and recorded environmental and contingent liabilities for the November 2021 Red Hill fuel release in its financial statements,⁵ we reviewed federal accounting standards and guidance for estimating and recording environmental and contingent liabilities. We interviewed officials from the Navy, the Army, DLA, the Defense Health Agency (DHA), the Office of the Under Secretary of Defense (Comptroller), and the DOD Office of the Inspector General and the independent public accountants who conduct the financial statement audits for each of these organizations. We also reviewed financial documents, such as each organization's annual financial statements.

To assess to what extent DOD estimated and reported to Congress on the total fiscal exposure to defuel and close Red Hill, including remediating the site, we reviewed documentation such as DOD cost reports and defueling and closure plans. We also interviewed agency officials, including those from the Army, the Navy, DLA, and DHA; reviewed criteria on federal fiscal exposures and reporting; and evaluated the extent to which DOD communicated about fiscal exposures specific to Red Hill to inform Congress and the public about its potential future remediation responsibilities. Additional details about the scope and methodology of this audit are in appendix I.

We conducted this performance audit from August 2022 to February 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.

⁵Environmental liabilities represent the future outflows or expenditures of resources for probable and reasonably estimable environmental cleanup costs, such as the cost of remediation, closure, and/or disposal actions. A contingency is an existing condition, situation, or set of circumstances involving uncertainty as to possible gain or loss to an entity that will ultimately be resolved when one or more future events occur or fail to occur. Contingent liabilities represent the future outflows or other sacrifice of resources because of past transactions or events that are probable and reasonably estimable. Contingent liabilities are not limited to actions related to environmental cleanup costs.

Background

Red Hill Bulk Fuel Storage Facility

Red Hill occupies 144 acres in south-central O’ahu, approximately 2 miles east of Pearl Harbor. The facility includes 20 underground tanks that were built inside cavities in the basalt rock of Red Hill ridge during World War II. Each underground storage tank is 100 feet in diameter, from 238 to 250 feet high, and holds approximately 285,000 to 302,000 barrels (approximately 12.5 million gallons) of fuel. The tanks are lined with coated welded steel and surrounded by reinforced concrete. As shown in figure 1, these tanks are accessible through a 2.5-mile-long tunnel that contains pipelines leading to the docks at Pearl Harbor, where aboveground storage tanks hold fuel for ships and aircraft. The pipelines transport fuel from the tanks to the underground pump house where fuel can be distributed to the upper tank farm, truck loading rack, piers, or the base. Figure 1 also depicts the Navy’s nearby drinking water wells (shafts), which are discussed in greater detail below.

Figure 1: Map of Red Hill Bulk Fuel Storage Facility, Nearby Navy Drinking Water Wells (Shafts), and the Surrounding Area



Sources: Department of Defense (Red Hill and pipeline location); 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-24-106185

Accessible Text for Figure 1: Map of Red Hill Bulk Fuel Storage Facility, Nearby Navy Drinking Water Wells (Shafts), and the Surrounding Area

Map includes the following:

- Waiawa Shaft (drinking water well near Red Hill facility)
- Navy Aiea-Halawa Shaft (drinking water well near Red Hill facility)
- Pearl Harbor

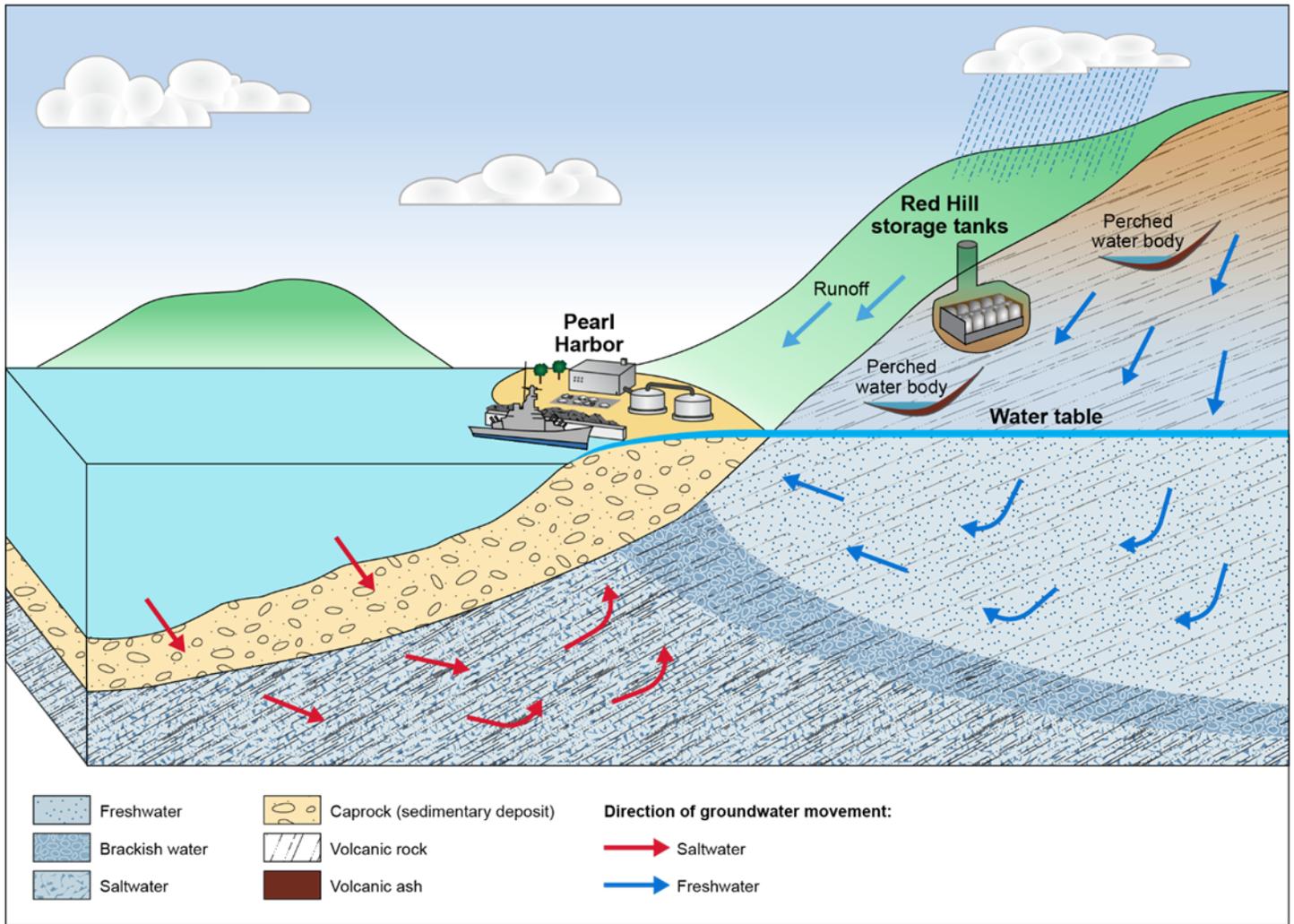
- Pipeline tunnel (between Pearl Harbor and Red Hill facility)
- Red Hill facility
- Red Hill underground storage tanks
- Red Hill Shaft (drinking water well near Red Hill facility)

Sources: Department of Defense (Red Hill and pipeline location); 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-24-106185

Note: Additional drinking water wells are in the area, including the Honolulu Board of Water Supply's Hālawā Shaft.

The tanks sit approximately 100 to 130 feet above the sole source aquifer that provides drinking water for the greater Honolulu area. Certain geologic features help to hold the water table between 15 and 20 feet above average sea level throughout much of the island, creating such aquifers. For example, erosion formed the valleys on either side of the Red Hill ridge and deposited the sediments that help hold the groundwater table higher. In addition, groundwater is held in place by caprock created as the island sank into marine sediments and coral rock, as figure 2 shows.

Figure 2: Water Runoff and Groundwater Flow on O’ahu



Source: GAO's analysis of U.S. Geologic Survey maps; and GAO (illustration). | GAO-24-106185

Accessible Text for Figure 2: Water Runoff and Groundwater Flow on O’ahu

Noteworthy water runoff graphic information:

- Ocean saltwater flows beneath water table
- Freshwater from rain flows above and below water table

-
- Brackish water separates freshwater and saltwater beneath water table
 - Two freshwater perched water bodies are located above the water table near the Red Hill storage tanks

Source: GAO's analysis of U.S. Geologic Survey maps; and GAO (illustration). | GAO-24-106185

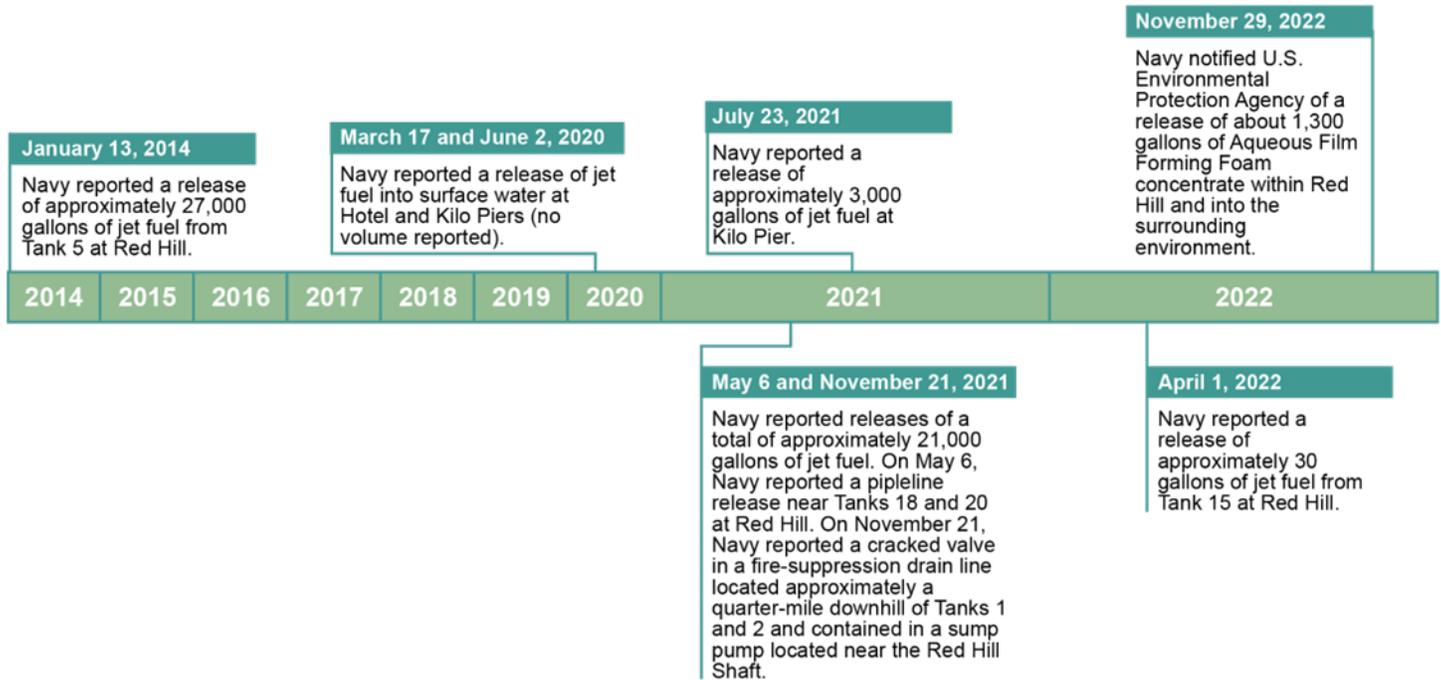
Red Hill is near several drinking water wells and shafts for the island of O'ahu, including three that the military operates and one that the local Honolulu Board of Water Supply operates. The closest drinking water well to Red Hill is the Navy's Red Hill Shaft, which is within the facility's lower access tunnel, about 2,600 feet downhill from the nearest fuel tank. Other nearby wells include the Navy's Aiea-Hālawa Shaft, which is approximately 2 miles northwest of the facility; the Navy's Waiawa Shaft, which is 6 miles northwest of the facility; and the Board of Water Supply's Hālawa Shaft, which is approximately 1 mile northwest of the Red Hill facility.

The Joint Base Pearl Harbor-Hickam Water Distribution System provides public drinking water to approximately 93,000 users. Prior to the fuel release incident in 2021, the Red Hill Shaft supplied an estimated 15 to 20 percent of the total water supply, while the Waiawa Shaft supplied the rest. The Aiea-Hālawa Shaft was available as an alternative water source. Since the release, the Red Hill and Aiea-Hālawa Shafts have been isolated and the distribution system has drawn its water exclusively from the Waiawa Shaft to provide public drinking water, according to Navy officials. Additionally, the Board of Water Supply's Hālawa Shaft, which previously served approximately 450,000 people of Honolulu, is shut down because of the Board of Water Supply's concerns about possible contamination.

History of Recent Facility Releases

Red Hill experienced several fuel releases from 2014 to 2022. In addition, a firefighting foam concentrate was released from Red Hill in 2022. Figure 3 shows the timeline of these releases.

Figure 3: Timeline of Major Releases at or near the Red Hill Bulk Fuel Storage Facility, 2014–2022



Sources: GAO summary of Department of Defense, U.S. Environmental Protection Agency, and State of Hawaii Department of Health documents. | GAO-24-106185

Accessible Text for Figure 3: Timeline of Major Releases at or near the Red Hill Bulk Fuel Storage Facility, 2014–2022

Year	Time period	Event
2014	January 13, 2014	Navy reported a release of approximately 27,000 gallons of jet fuel from Tank 5 at Red Hill.
2020	March 17 and June 2, 2020	Navy reported a release of jet fuel into surface water at Hotel and Kilo Piers (no volume reported).
2021	May 6 and November 21, 2021	Navy reported releases of a total of approximately 21,000 gallons of jet fuel. On May 6, Navy reported a pipeline release near Tanks 18 and 20 at Red Hill. On November 21, Navy reported a cracked valve in a fire-suppression drain line located approximately a quarter-mile downhill of Tanks 1 and 2 and contained in a sump pump located near the Red Hill Shaft.
2021	July 23, 2021	Navy reported a release of approximately 3,000 gallons of jet fuel at Kilo Pier.

Year	Time period	Event
2022	April 1, 2022	Navy reported a release of approximately 30 gallons of jet fuel from Tank 15 at Red Hill.
2022	November 29, 2022	Navy notified U.S. Environmental Protection Agency of a release of about 1,300 gallons of Aqueous Film Forming Foam concentrate within Red Hill and into the surrounding environment.

Sources: GAO summary of Department of Defense, U.S. Environmental Protection Agency, and State of Hawaii Department of Health documents. | GAO-24-106185

The largest recent releases from Red Hill occurred in 2014, 2021, and 2022.⁶

- 2014.** In January 2014, approximately 27,000 gallons of JP-8 jet fuel were released during a refilling of Red Hill Storage Tank 5 after routine maintenance and repair work.⁷ The Navy reported the release to DOH. The Navy then drained the tank and collected samples from existing groundwater and soil vapor monitoring wells.⁸ The Navy determined that improper welding led to tiny holes in the storage tank wall, which was the primary cause of the fuel leak. Results from tests taken in and around Tank 5 indicated a spike in levels of hydrocarbons in soil vapor and groundwater. Nonetheless, drinking water monitoring results confirmed compliance with federal and state drinking water standards both before and after the January 2014 release.
- 2021.** On May 6, 2021, a pressure surge event occurred in one of the Red Hill fuel pipelines during routine fuel transfer operations. The surge caused a pipeline to fail, releasing about 21,000 of JP-5 jet fuel onto the tunnel floor located between the underground storage tanks. The fuel ran down the tunnel floor into containment trenches and into a fire-suppression drain and sump pump. The Navy had previously

⁶EPA cited four other releases in March 2020, June 2020, July 2021, and April 2022 at Hotel and Kilo Piers at Joint Base Pearl Harbor-Hickham and a tank at Red Hill. These releases are depicted in fig. 3. EPA officials also cited other historical releases at Red Hill, including fuel releases in the 1940s.

⁷JP-8 is a fuel derived from kerosene with additives for military use. DOD uses two kerosene-based aircraft fuels, JP-5 and JP-8. JP-8 also contains a corrosion inhibitor and anti-icing additive.

⁸Groundwater monitoring wells are principally used for observing groundwater levels and flow conditions, obtaining samples for determining groundwater quality, and evaluating hydraulic properties of water-bearing strata. Soil-vapor-monitoring wells are used for monitoring soil around the tanks and piping, to measure for the presence of petroleum fumes, which may indicate a release.

installed the drain and pump to collect Aqueous Film Forming Foam concentrate (AFFF)—a fire-fighting fluid—to pump it to disposal tanks outside the tunnel. The presence of fluid caused the system to switch on and pumped fuel into the fire suppression pipeline. The fuel remained there until November 20, 2021, when a train performing maintenance hit and cracked a valve in the suppression line, which leaked and released fuel into the tunnel system near the Red Hill Shaft. The fuel entered a groundwater sump and flowed into a drain, which led to fuel flowing into the Red Hill Shaft, contaminating the water in the shaft.

- **2022.** In November 2022, the facility experienced an AFFF release. In the case of a fuel fire, the facility's fire suppression system used AFFF—which contains per- and polyfluoroalkyl substances (PFAS)—to create a foam blanket to extinguish the fire.⁹ According to a Joint Task Force investigation, due to contractor error during routine maintenance, an estimated 1,300 gallons of AFFF concentrate were unintentionally released. The same day, the Navy notified DOH and EPA of a release incident involving AFFF concentrate within the facility and in the surrounding environment. The Navy completed its emergency response to and initial cleanup of this release in spring 2023, and in May 2023, the Joint Task Force issued findings from an investigation of the release. According to EPA, a report documenting the removal activities was submitted on November 29, 2023, and is under regulatory review.

Of the almost 51,000 gallons of fuel released in the 2014 and 2021 incidents, over 15,000 was recovered by the Navy, according to EPA officials.

⁹PFAS are a large group of synthetic chemicals that have a wide range of uses in consumer products, manufacturing, and fire safety. They also have caused environmental contamination of water, soil, and air and some have been linked to health problems in humans.

Legal Framework Governing the Remediation and Closure Process

Under federal and state laws and regulations and legal agreements, the Navy and DLA are responsible for remediation and closure of Red Hill.¹⁰ The following describes key aspects of the legal framework governing remediation and closure of Red Hill:

- **Hawaii’s Underground Storage Tank Regulations.** EPA regulates underground storage tanks like those at Red Hill under the Resource Conservation and Recovery Act of 1976, as amended (RCRA). Under RCRA, EPA may approve a state underground storage tank program to operate in lieu of the federal regulatory program, subject to certain authority retained by EPA. EPA has approved Hawaii’s underground storage tank regulations to operate in place of the federal program, and Hawaii—through DOH—has primary enforcement responsibility with respect to its program.

Hawaii’s underground storage tank regulations set forth actions that owners and operators must take in response to a release of petroleum or other regulated substances from an underground storage tank. Such actions include removing as much of the regulated substance from the tank system as possible and taking necessary action to minimize the spread of contamination. The regulations also lay out requirements for the permanent closure of an underground storage

¹⁰The Pearl Harbor Naval Complex, which includes Red Hill, is a designated National Priorities List site under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA, or Superfund). CERCLA established the Superfund program, which is the federal government’s principal program to address sites contaminated with hazardous substances. EPA administers the Superfund program and coordinates the cleanup of sites by identifying sites potentially requiring cleanup and placing eligible sites on the National Priorities List. The National Priorities List includes some of the most seriously contaminated sites EPA has identified for cleanup, and the Pearl Harbor Naval Complex was placed on the list in 1992. CERCLA site investigations and cleanup activities are ongoing across the site. According to EPA, after a two-phased remedial investigation at Red Hill, the Navy recommended no further action at the site under CERCLA, and the State of Hawaii now oversees regulation of Red Hill as a petroleum site. Hawaii’s regulatory role at Red Hill is described in part in the following section. As discussed in greater detail below, DOH is overseeing the remediation of petroleum releases from Red Hill under Hawaii’s underground storage tank regulations and a 2015 Administrative Order on Consent, and EPA is overseeing the remediation of those releases under the 2015 Administrative Order on Consent and a 2023 Consent Order. In addition, according to EPA, the Navy is now investigating PFAS releases at Red Hill pursuant to the Pearl Harbor Naval Complex Federal Facility Agreement under CERCLA and in coordination with investigations under the 2015 Administrative Order on Consent.

tank system like Red Hill. Under these regulations, to permanently close the Red Hill tank system, the Navy and DLA must

1. empty and clean the tanks and tank system;
2. remove the tank system from the ground, fill the tanks with an inert solid material, or close the tanks in place in a DOH-approved manner; and
3. conduct a site assessment to determine if contamination is present.

If contamination is discovered, the Navy and DLA must undertake a release response action, which includes a more detailed investigation of the site to identify the full extent of contamination. This investigation will enable the Navy to identify site cleanup criteria and, if necessary, develop a corrective action plan to clean up the site in a manner protective of human health and the environment.

- **2015 Administrative Order on Consent (AOC).** The Navy, DLA, EPA, and DOH entered this AOC after the 2014 fuel release. The AOC includes a statement of work that details the tasks the Navy and DLA must perform to address fuel releases from the facility. Those tasks include infrastructure improvements, groundwater modeling activities, and investigation and remediation of releases. After DOD's decision to defuel and close the facility, EPA and DOH communicated to the Navy that they no longer required the Navy to perform some activities in the statement of work—such as specific infrastructure improvements. However, the Navy must complete others, such as groundwater modeling. The modeling, discussed in detail in sections below, includes a groundwater-flow model and a contaminant fate and transport model that, together, should allow the Navy to estimate the flow of groundwater and trajectory of any contaminants and plan accordingly for any necessary remediation.¹¹
- **2022 DOH Emergency Order.** DOH issued an Emergency Order to the Navy in May 2022 that superseded a December 2021 Emergency Order DOH issued to the Navy shortly after the November 2021 fuel release.¹² The 2022 Emergency Order requires the Navy to submit for DOH's approval a phased plan for defueling and permanently closing Red Hill. The order includes specific requirements for the defueling

¹¹"Fate and transport" refers to how the nature of contaminants might change (chemically, physically, or biologically) and where they go as they move through the environment.

¹²The December 2021 Emergency Order required Navy to suspend operations at the facility and defuel the tanks.

plan and notes that the Navy must close the facility in accordance with Hawaii's underground storage tank regulations, as described above.

- **2023 Consent Order.** In June 2023, EPA, the Navy, and DLA finalized a consent order that further governs the defueling and closure of Red Hill. The Consent Order also requires the Navy and DLA to take certain actions to safeguard drinking water at the Red Hill Shaft and all Joint Base Pearl Harbor-Hickam well sites. It also provides EPA oversight and enforcement authority with respect to the Navy's defueling and closure activities.¹³

Environmental Liabilities and Federal Accounting Guidance

Federal agencies are required to report certain cost estimates for cleanup work, called environmental liabilities, on their annual financial statements, according to the federal accounting standards. These standards say that costs for cleanup work should be reported as environmental liabilities when they are both probable and reasonably estimable. In addition, agencies may need to include an estimate of contingent liabilities.

Specifically, each of the DOD components is subject to accounting standards issued by the Federal Accounting Standards Advisory Board (FASAB).¹⁴ FASAB's Statement of Federal Financial Accounting Standards (SFFAS) 5, *Accounting for Liabilities of the Federal Government*, sets the liability standards for entities of the U.S. government. SFFAS 5 defines a liability as a probable future outflow or other sacrifice of resources resulting from a past transaction or event. A

¹³According to Navy officials, the 2023 Consent Order was crafted to complement the 2015 AOC. It is currently anticipated that remediation activities at Red Hill will take place pursuant to the 2015 AOC, rather than the 2023 Consent Order. However, if the 2015 AOC is terminated before release response and remediation activities are complete, then these activities can proceed under the 2023 Consent Order. Navy officials said that as long as the Navy continues remediation and release response actions under the 2015 AOC, the Navy and DLA may seek to terminate the 2023 Consent Order in the future if they have completed all other non-remediation/release response requirements dictated by the Consent Order.

¹⁴FASAB is an advisory committee sponsored by the Office of Management and Budget, the Department of the Treasury, and GAO, which develops and issues accounting concepts and standards, including the *FASAB Handbook of Federal Accounting Standards and Other Pronouncements, as Amended*. The American Institute of Certified Public Accountants has designated FASAB as the issuer of generally accepted accounting principles for federal entities.

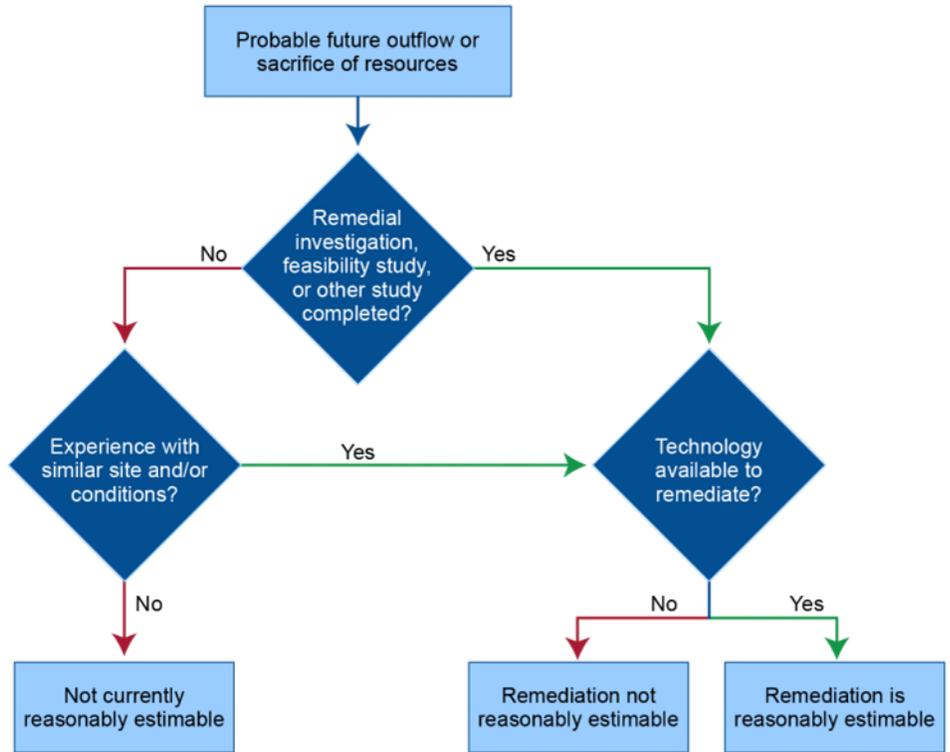
liability is recorded for government-related events¹⁵ when the future outflow or other sacrifice of resources is both probable and measurable (defined as reasonably estimable).¹⁶ In addition, DOD and its components are subject to Office of Management and Budget Circular A-136, Financial Reporting Requirements, and DOD *Financial Management Regulation*, volume 4. Those governing criteria refer to the requirements from SFFAS 5, which states that probable refers to that which can reasonably be expected or believed to be more likely than not on the basis of available evidence and logic (with the exception of threatened litigation and unasserted claims).¹⁷ Figure 4 is a FASAB flowchart used to determine, for government-related events, if a probable future outflow or other sacrifice of resources is reasonably estimable.

¹⁵A government-related event is a non-transaction-based event between a federal entity and its environment, such as hazardous waste spills on federal property caused by federal operations.

¹⁶FASAB's Federal Financial Accounting and Auditing Technical Release 2 offers further guidance on the terms "probable" and "reasonably estimable" for environmental liabilities in the federal government.

¹⁷For pending or threatened litigation and unasserted claims, "probable" refers to that which is likely, not to that which is more likely than not.

Figure 4: Flowchart to Determine If a Probable Future Outflow or Other Sacrifice of Resources Is Reasonably Estimable



Source: Federal Accounting Standards Advisory Board (FASAB) guidance. | GAO-24-106185

Accessible Text for Figure 4: Flowchart to Determine If a Probable Future Outflow or Other Sacrifice of Resources Is Reasonably Estimable

Flowchart steps:

- Probable future outflow or sacrifice of resources
 - Remedial investigation, feasibility study, or other study completed?
 - No: Experience with similar site and/or conditions?
 - No, Not currently reasonably estimable
 - Yes, Technology available to remediate?
 - Yes: Technology available to remediate?
 - No, Remediation not reasonably estimable
 - Yes, Remediation is reasonably estimable

Source: Federal Accounting Standards Advisory Board (FASAB) guidance. | GAO-24-106185

According to SFFAS 5 and FASAB’s Federal Financial Accounting and Auditing Technical Release 2, if a future outflow or other sacrifice of

resources, related to a past event, has been determined to be both probable and reasonably estimable, the environmental liability should be recognized and reported in the entity's financial statements.¹⁸ If an event has occurred and a future outflow or other sacrifice of resources is probable but not reasonably estimable, an entity should not record an environmental liability in the financial statements, but should disclose certain information about the event within the notes of its financial statements.¹⁹ In determining whether costs are reasonably estimable for government-related cleanup, agencies are to consider a completed study—such as a remedial investigation and feasibility study—or prior experience with a similar site or similar site conditions.

While the federal accounting standards require certain environmental liabilities and contingencies to be reported or disclosed in federal agencies' financial statements, these do not constitute the total federal fiscal exposure, or the total amount that the federal government may have to pay. In addition to the liabilities and contingencies in financial statements, there are other components that, when combined, account for total federal fiscal exposure. These include costs to clean up and close known sites that are not currently reasonably estimable and unknown clean-up and closure costs.

DOD Is Defueling Red Hill and Working on Plans to Remediate and Close the Site, but Faces Some Challenges

DOD responded to fuel and other releases that occurred between 2014 and 2022 by containing pollutants, taking abatement measures, and providing support to affected residents. Since the last release, DOD has developed and begun implementing a defueling plan and is developing a detailed closure plan, but it has not completed a site investigation or remediation plan. DOD faces challenges to completing these steps,

¹⁸Environmental liabilities would include the estimated cost of the site investigation and remediation plan (if they have been performed).

¹⁹Disclosure requirements when the criteria for reasonably estimable are not met are (1) the nature of the environmental damage and (2) an estimate of the possible liability, an estimate of the range of the possible liability, or a statement that such an estimate cannot be made.

including gaining regulatory approval and identifying where pollutants targeted for remediation efforts are located.

DOD Took Short-Term Actions in Response to the Releases

In 2014, 2021, and 2022, the Navy took immediate response actions and initial abatement measures to contain pollutants from the fuel and AFFF releases, according to documents and officials from EPA and the Navy. For example, the officials told us that the Navy

- employed containment booms around the released fluid to contain the leaked fuel and used absorbent materials to collect released fluids;
- measured the contents mopped up, allowing it to estimate the amount released and contained; and
- excavated soils where it found fuels and AFFF, sealed storm drains, and removed and replaced asphalt in the affected areas.

After the 2021 release, specifically, officials said the Navy also

- took the Red Hill and Aiea-Hālawa Shafts offline and relied solely on the Waiawa Shaft for drinking water;
- in 2022, began to pump and treat water from the Red Hill Shaft, skimming fuel from the water;
- continues to pump and treat about 5 million gallons of water per day from the Red Hill Shaft, to remove fuel from the water and potentially decrease the rate of migration of fuel away from the Shaft; and
- is using granular activated carbon (GAC) to filter and treat groundwater before discharging it to a nearby stream; these filters are used to remove substances, such as fuel, from contaminated water (see sidebar).²⁰

²⁰In 2022, we reported that while GAC filters attract and bind a wide range of contaminants, short-chain PFAS do not adhere to GAC filters as readily as long-chain PFAS and can potentially remain in the drinking water even after GAC treatment. GAO, *Persistent Chemicals: Technologies for PFAS Assessment, Detection, and Treatment*, [GAO-22-105088](#) (Washington, D.C.: July 28, 2022).

Granular Activated Carbon (GAC) Systems

As shown in the picture below, Navy officials have used GAC systems, located near the tunnel within the Red Hill Bulk Fuel Facility, as a means to filter fuel that leaked into the water in the Red Hill Shaft and discharge the treated water into nearby Hālawā stream. According to EPA, GAC is a material used to filter harmful chemicals from contaminated water and is useful for the removal of taste- and odor-producing compounds. GAC treatment typically involves pumping contaminated water or soil vapor through a column or tank filled with GAC. As contaminated material flows through the GAC, the contaminants attach to the surface of the granules. The water or vapor exiting the container is cleaner.

GAC treatment is the most common way to treat contaminated groundwater and soil vapor, according to the EPA. DOH has authorized the Navy to discharge the treated water from Red Hill Shaft under a National Pollutant Discharge Elimination System general permit. The GAC systems are expected to run as long as they provide a benefit to the aquifer and limit the spread of pollutants from the fuel leaks.



Source: GAO. | GAO-24-106185

Navy officials said that as of October 2023, the Navy had installed 31 total groundwater monitoring wells in and around Red Hill and planned to install an additional eight wells by the end of 2023. The officials said they plan to install more wells in 2024 but have not yet determined the specific number and locations.

After the 2021 fuel releases contaminated the Red Hill Shaft, the Navy supported military families and residents by, for example, providing bottled water to affected service members for 4 months and temporary housing. DOD said that after DOH issued a do-not-drink order in November 2021, the department and its components took several actions to restore safe drinking water by March 2022:

- the Navy flushed the water distribution system to clear it of contaminated water and sampled the drinking water to confirm its safety;

- the Army used GAC filters to clean the drinking water in Army housing; and
- the Navy began acquiring GAC filters for the Red Hill Shaft water.

Navy officials said that as of August 2023, 12 GAC units were installed at the Red Hill Shaft, and the Navy was addressing ongoing challenges with the drinking water supply.²¹ In addition, in January 2023, DOD's DHA established a Red Hill Clinic for service members and others affected by the release. Further, DHA officials said they plan to establish a health registry to track and monitor for individual health conditions that might arise due to drinking water containing jet fuel.²²

DOD Is Implementing a Defueling Plan and Is Developing a Tank Closure Plan, but Has Not Completed Long-Term Site Remediation Plans

In 2022, DOD established the Joint Task Force Red Hill. This task force serves as the single DOD entity to ensure the safe and expeditious defueling of Red Hill. It coordinates with state and federal stakeholders in setting conditions for closure and to rebuild trust with the State of Hawaii and the local community of O'ahu.²³ As of October 2023, the task force had begun defueling Red Hill according to its defueling plan. Beyond defueling, the Navy is planning for closure of the Red Hill tank system by developing a tank closure plan. However, the Navy has not yet conducted a site investigation or completed a long-term remediation plan for the Red Hill site.

Defueling Plan

As of October 2023, the Joint Task Force had begun defueling the Red Hill tanks according to its defueling plan, with expected completion by January 2024. In June 2022, DOD issued a defueling plan for the facility and subsequently issued four supplements to the initial plan. The defueling plan required the task force to find and contract for other fuel

²¹Navy officials said the final design would reduce the total number to 10 GAC units installed at the Red Hill Shaft in future years.

²²There are at least four ongoing federal court cases, filed between August 2022 and April 2023, arising out of the 2021 Red Hill fuel releases. Each case asserts claims under the Federal Tort Claims Act and includes allegations that plaintiffs suffered various health issues from consuming and using contaminated water.

²³This task force comprises members of the Navy, the Army, and other DOD services.

storage options, as well as manage short-term fuel capacity to support commercial fuel storage and emergency storage needs. It also required the task force to conduct repairs to the pipeline and facility to enable the defueling to occur safely and plan for potential releases during defueling.

Navy officials said that as of August 2023, the Navy had completed all the 253 repairs required before it could start defueling, and that DOH conditionally approved all of them. The Joint Task Force and DLA had also completed a necessary environmental analysis of the planned defueling pursuant to the National Environmental Policy Act of 1969, as amended (NEPA) and its implementing regulations.²⁴

Under the DOH 2022 Emergency Order and the 2023 Consent Order, DOH and EPA are responsible for approving DOD's plans to defuel and close the Red Hill tanks.²⁵ As of October 2023, EPA had approved the full defueling plan and DOH had conditionally approved the plan to permit DOD to begin defueling. In November 2023, DOD issued a fourth supplement to the defueling plan. In it, DOD states that it plans to complete defueling the tanks by mid-January 2024 and to remove residual fuel left in the tanks by March 2024. After these activities, there will still be a few thousand gallons of sludge left in the tanks, according to the plan, which DOD plans to remove during the future tank deconstruction.

Tank Closure Plan

In November 2022, the Navy issued an initial tank closure plan for the 20 underground storage tanks, four surge tanks, and associated valves and piping at Red Hill. The Navy has also issued two supplements to the plan.

²⁴In summer 2023, pursuant to NEPA and its implementing regulations, the Joint Task Force and DLA analyzed the potential environmental impacts of the proposed gravity-based defueling of Red Hill and relocation of the Red Hill fuel by tanker ship. In June 2023, the Joint Task Force and DLA published a Draft Environmental Assessment/Overseas Environmental Assessment of the proposed action for public comment. In response, the Joint Task Force and DLA received more than 20 substantive comments from members of the public. In August 2023, the Joint Task Force and DLA published a Final Environmental Assessment/Overseas Environmental Assessment of the proposed action and a Finding of No Significant Impact in which they concluded that the proposed action will not significantly impact the quality of the human environment.

²⁵The 2023 Consent Order describes key activities that had to take place before defueling began, such as training, third-party quality assurance of repairs, and approval of a facility response plan. Likewise, the DOH 2022 Emergency Order includes minimum requirements for defueling, such as plans for oil spill/release prevention, containment, and response as well as completion of necessary repairs.

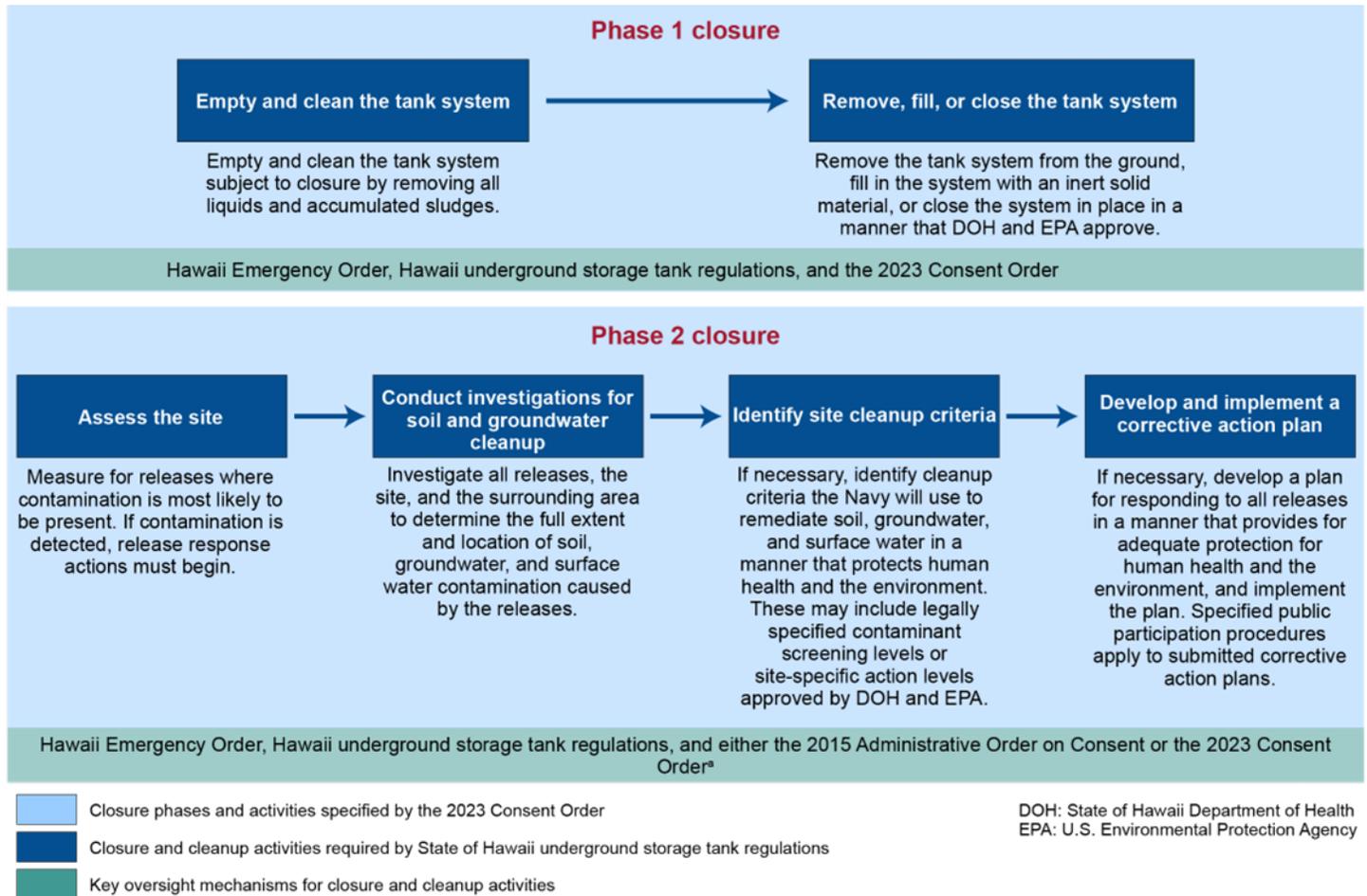
The tank closure plan shows that the Navy intends to clean the Red Hill tanks and pipelines, dispose of the resulting sludge, perform studies of the design and process for permanent closure, and perform a site assessment and release investigation and response for soil and groundwater cleanup. One of the supplements provides additional details on the Navy's intent to safely clean and close the tanks, including goals for waste management and accidental release response, and the other proposes removal of the fuel pipelines.²⁶ As of January 2024, EPA and DOH has provided written comments to Navy about these supplements.

As discussed above, the Navy and DLA need to perform certain work to achieve closure of Red Hill under the applicable regulations and orders. The 2023 Consent Order incorporates the closure requirements of the Hawaii underground storage tank regulations and divides the work needed to close the facility into two phases, which generally correspond to closure of the tanks (Phase 1 Closure) and remediation of the site (Phase 2 Closure).²⁷ Figure 5 summarizes (1) the activities the Navy and DLA must perform to achieve closure under the Hawaii underground storage tank regulations, (2) how those activities correspond to the closure phases identified in the 2023 Consent Order, and (3) key oversight mechanisms for the Navy's closure activities. This section focuses on Navy's plans for closing the tanks (i.e., Phase 1 Closure), while the following section focuses on Navy's plans for remediating the site (i.e., Phase 2 Closure).

²⁶U.S. Department of the Navy, *Red Hill Bulk Fuel Storage Facility Tank Closure Plan Supplement 1* (Feb. 28, 2023), and *Red Hill Bulk Fuel Storage Facility Tank Closure Plan Supplement 2* (May 31, 2023), accessed October 28, 2023, <https://cnrh.cnrc.navy.mil/Operations-and-Management/Red-Hill/>.

²⁷Specifically, the 2023 Consent Order defines the closure phases as follows. Phase 1 Closure, consistent with Hawaii Administrative Rules § 11-280.1-71, means (1) emptying and cleaning the Facility Subject to Closure by removing all liquids and accumulated sludges and (2) (a) removing the Facility Subject to Closure, (b) filling the Facility Subject to Closure with an inert solid material, or (c) closing in place the Facility Subject to Closure in another manner approved by EPA. Phase 2 Closure, consistent with Hawaii Administrative Rules §§ 11-280.1-71 and -72, as well as Hawaii Administrative Rules Chapter 11-280.1, Subchapter 6, means conducting a site assessment of and any necessary release response for the soil, groundwater, and soil vapor that may have been contaminated by the Facility Subject to Closure. For the purposes of the 2023 Consent Order, the Facility Subject to Closure is the 20-field constructed bulk fuel underground storage tanks; surge tanks; and the pumps, infrastructure, and associated piping between the 20 tanks and the pumphouse at the Red Hill Bulk Fuel Storage Facility.

Figure 5: Phases and Milestones for Red Hill Bulk Fuel Facility Closure



Source: GAO analysis of laws, regulations, and orders. | GAO-24-106185

Accessible Text for Figure 5: Phases and Milestones for Red Hill Bulk Fuel Facility Closure

Key oversight mechanisms for closure and cleanup activities	Closure phases and activities specified by the 2023 Consent Order	Closure and cleanup activities required by State of Hawaii underground storage tank regulations	Closure and cleanup activities required by State of Hawaii underground storage tank regulations (details)
Hawaii Emergency Order, Hawaii underground storage tank regulations, and the 2023 Consent Order	Phase 1 closure	Empty and clean the tank system	Empty and clean the tank system subject to closure by removing all liquids and accumulated sludges.

Letter

Key oversight mechanisms for closure and cleanup activities	Closure phases and activities specified by the 2023 Consent Order	Closure and cleanup activities required by State of Hawaii underground storage tank regulations	Closure and cleanup activities required by State of Hawaii underground storage tank regulations (details)
Hawaii Emergency Order, Hawaii underground storage tank regulations, and the 2023 Consent Order	Phase 1 closure	Remove, fill, or close the tank system	Remove the tank system from the ground, fill in the system with an inert solid material, or close the system in place in a manner that DOH (DOH: State of Hawaii Department of Health) and EPA (EPA: U.S. Environmental Protection Agency) approve
Hawaii Emergency Order, Hawaii underground storage tank regulations, and either the 2015 Administrative Order on Consent or the 2023 Consent Order ^a	Phase 2 closure	Assess the site	Measure for releases where contamination is most likely to be present. If contamination is detected, release response actions must begin
Hawaii Emergency Order, Hawaii underground storage tank regulations, and either the 2015 Administrative Order on Consent or the 2023 Consent Order ^a	Phase 2 closure	Conduct investigations for soil and groundwater cleanup	Investigate all releases, the site, and the surrounding area to determine the full extent and location of soil, groundwater, and surface water contamination caused by the releases.
Hawaii Emergency Order, Hawaii underground storage tank regulations, and either the 2015 Administrative Order on Consent or the 2023 Consent Order ^a	Phase 2 closure	Identify site cleanup criteria	If necessary, identify cleanup criteria the Navy will use to remediate soil, groundwater, and surface water in a manner that protects human health and the environment. These may include legally specified contaminant screening levels or site-specific action levels approved by DOH and EPA.
Hawaii Emergency Order, Hawaii underground storage tank regulations, and either the 2015 Administrative Order on Consent or the 2023 Consent Order ^a	Phase 2 closure	Develop and implement a corrective action plan	If necessary, develop a plan for responding to all releases in a manner that provides for adequate protection for human health and the environment, and implement the plan. Specified public participation procedures apply to submitted corrective action plans.

Source: GAO analysis of laws, regulations, and orders. | GAO-24-106185

Note: Key oversight mechanisms for closure and cleanup activities include (1) the Emergency Order issued by DOH on May 6, 2022; (2) the Hawaii underground storage tank regulations at Chapter 11-280.1, Hawaii Administrative Rules; (3) the 2015 Administrative Order on Consent among DOH, EPA, the Navy, and the Defense Logistics Agency (DLA); and (4) the 2023 Consent Order among EPA, the Navy, and DLA.

^aAccording to the Navy, it is currently anticipated that the 2015 Administrative Order on Consent, rather than the 2023 Consent Order, will serve as an oversight mechanism for the activities depicted

here. However, if the 2015 Administrative Order on Consent is terminated before the actions are complete, the 2023 Consent Order would then serve as the oversight mechanism.

Navy officials estimated in March 2023 that closure of the tanks (i.e., Phase 1 Closure) would occur in fiscal year 2027, but they also said they intend to further refine the plan pending DOH's and EPA's approval. After emptying and cleaning the tank system, the Navy would prefer to close the tanks rather than remove or fill them. The Navy's preferred tank closure method—closing the tanks in place—is in a conceptual framework, according to Navy officials, and they are still in discussions with DOH and EPA to define it. As of August 2023, the Navy was developing a scope of work to identify necessary steps to close the tanks in place, according to Navy officials. The Navy said that the information in the supplement to the closure plan demonstrates its commitment to stop using the tanks for fuel storage or other hazardous substances.

Under the DOH 2022 Emergency Order and 2023 Consent Order, DOH and EPA are responsible for approving DOD's plans to close the Red Hill tanks. Navy officials said the earliest that DOH and EPA could approve the closure-in-place method is later in fiscal year 2024. But DOH officials said they could approve Navy's closure-in-place method at any time during fiscal year 2024 if the Navy first submits a complete cleaning plan, closure design, and waste management plan, among other information. In addition, as of December 2023, EPA officials said the Navy had not yet submitted a closure-in-place method for approval.

Site Assessment, Investigation, and Remediation

The Navy plans to investigate the site and surrounding area to determine the full extent and location of soil, groundwater, and surface water contamination caused by recent and historical releases at Red Hill. The Navy indicated in its November 2022 tank closure plan that it would conduct a site investigation for soil and groundwater cleanup at Red Hill. This effort will enable the Navy to identify site cleanup criteria and, if necessary, develop a corrective action plan—also referred to as a remediation plan—to clean up the site in a manner protective of human health and the environment. As of August 2023, the Navy had not completed a site assessment or investigation nor established a long-term remediation plan to clean up Red Hill, but officials told us that it intends to do so. Pursuant to the 2023 Consent Order, these activities (listed below) fall under Phase 2 Closure. According to the Navy, it is currently anticipated these cleanup-oriented actions will be addressed pursuant to the 2015 AOC, rather than the 2023 Consent Order. However, if the AOC is terminated before these actions are complete, the 2023 Consent Order

would then serve as the oversight mechanism, in addition to the Hawaii Emergency Order and underground storage tank regulations.

- **Site assessment and investigation.** The tank closure plan indicates that the Navy will conduct a site assessment and release investigation and response at Red Hill in accordance with Hawaii's underground storage tank regulations. Those regulations require underground storage tank owners and operators to conduct a site assessment before permanent closure of a tank system. The purpose of that site assessment is to measure for releases where contamination is most likely to be present at an underground storage tank site. In the tank closure plan, the Navy stated that because releases at Red Hill are known to have occurred and will be addressed as a part of closure, the focus in the closure plan is on the site investigation and associated release response activities that are now also prerequisites for closure.²⁸

According to the Navy's tank closure plan and Navy officials, the Navy must conduct a site investigation to develop remediation plans. This investigation will identify contaminants of potential concern, such as Total Petroleum Hydrocarbons, and determine the extent of releases from the facility. The Navy will use this information to establish site cleanup criteria and develop a corrective action plan, as Hawaii's underground storage tank regulations require. The investigation will also identify remediation alternatives that the Navy will assess before it proceeds with long-term remediation actions.

As of August 2023, officials said the Navy intends to complete the site investigation by the end of fiscal year 2027 and will develop the remediation plan after completing the site investigation. The Navy did not provide a time frame for developing the site investigation report or a corrective action (or remediation) plan. The Navy said it expects to base its remediation plans in part on several models that it developed or is developing to inform its investigation and planning. These models—which are required by the 2015 AOC—show, separately, groundwater flow; the concept of the site, including its unique geology; and contaminant fate and transport. (The Navy's modelling efforts are discussed in the next section.)²⁹

²⁸As of October 2023, DOH officials said they had not received the Navy's site assessment for the underground storage tank system.

²⁹The Navy also developed other studies and plans, such as a groundwater protection plan in 2018, that it intends to mitigate long-term risks of accidental fuel releases.

- **Remediation plan.** Navy officials said they expect to start developing a remediation plan for the site after completing the site investigation at the end of fiscal year 2027. Navy officials said they intend to close the tanks in place by removing the fuel and discontinuing use of the tanks for fuel storage. However, as noted above, to permanently close the tank system under Hawaii’s underground storage tank regulations, the Navy must investigate and remediate contamination resulting from releases of regulated substances from the facility.

Officials from the Navy, DOH, and EPA said better groundwater models and ongoing monitoring of site conditions are key to investigating and understanding the extent of contamination and developing long-term remediation plans. According to Navy and DOH officials, it is important that the Navy base long-term remediation on a credible assessment of groundwater modeling and monitoring, soil-vapor monitoring, and where it detects fuel plumes in the ground. Navy and EPA officials said that full, comprehensive site remediation could take decades, given the site’s complexity and the time needed to determine the extent of contamination. Navy officials did not have an estimated timeline for full and permanent closure of the Red Hill tank system.

DOD Is Taking Steps to Address Key Challenges to Its Efforts at Red Hill

DOD stated that it faces three key challenges in its efforts to defuel and close the Red Hill tanks and remediate the site: (1) obtaining regulatory approval from DOH and EPA, (2) assessing contamination amid the site’s unique geologic complexity, and (3) gaining trust and working with community stakeholders.

Obtaining Regulatory Approval from DOH and EPA

DOD stated that it faces challenges to gaining DOH and EPA approval for key plans within its timelines to defuel and close the tank system and aligning differing views on these efforts. DOH officials said they were overwhelmed with the large volume of items related to Red Hill—some unrequested—that the Navy submitted to them for review and approval.

To address these challenges, Joint Task Force Red Hill officials said they developed a joint integrated master schedule to prioritize key deliverables for defueling tasks and align them with state officials’ priorities. Navy officials said they were meeting regularly with DOH officials to clarify

steps toward defueling and closure. EPA officials said they were working with DOH to unify schedules and tasks and better understand and apply standards used for water quality testing. In addition, DOH said it was working to approve the defueling plan in phases rather than all at once, to help ensure the Navy's progress with timelines. In January 2024, officials from DOH said despite the large volume of items related to Red Hill, DOH met the Navy's deadlines for reviews of defueling documents. EPA officials also said that EPA had been able to meet Navy deadlines as of January 2024.

The Navy is also planning for how it will remediate and close Red Hill. In November 2023, DOD established a new group responsible for closure of the tank system called the Navy Closure Task Force Red Hill. This information was published in the fourth supplement to the defueling plan, along with a transition timeline and the closure task force's responsibilities. The supplement includes information on how the defueling task force will shift responsibilities to the Navy's closure task force.

Assessing Contamination amid the Site's Unique Geologic Complexity

The Navy said that it faces a challenge in determining the extent of environmental contamination at the site, including the amount and location of fuel toxins that form in plumes in the underground aquifer. The area is unique and geologically complex, according to Navy and EPA officials. The Navy is currently working on models—a groundwater-flow model and a contaminant fate and transport study—to show the direction of the groundwater to determine potential contaminant flow.

The groundwater-flow model is meant to show the direction of groundwater to determine potential contaminant flow. Both EPA and DOH disapproved the model in 2018 and 2022 and requested improvements. State officials and a University of Hawaii expert told us that the Navy's groundwater model did not reflect the actual flow of groundwater and, as a result, could not help the Navy address remediation needs. Navy officials said they would complete a revised version by 2024, use groundwater-well-monitoring data and soil-vapor-monitoring data to improve the groundwater models and provide data to test them. However, according to EPA officials, EPA and DOH did not recommend that the model be used to understand fate and transport of any releases that might occur during defueling. Rather, these agencies recommended relying on monitoring and data collection instead. According to EPA

officials, the Navy expects to submit a final model to EPA and DOH for review and approval in September 2024.

The Navy is also performing a contaminant fate and transport study intended to show the potential fate and transport, degradation, and transformation of contaminants released from the facility. The Navy intends to use the model to better understand the location of the contaminants and plan for future remediation. Navy officials stated that they believe this understanding will help identify where it could install future groundwater-monitoring wells and help it understand the effectiveness of remedial actions, such as using natural attenuation.³⁰ Navy officials said the Navy completed an interim contaminant fate and transport model to aid decision-making on the defueling process and submitted it to DOH and EPA in June 2023 for review. It has not used the model to predict the fate of any current or potential future contamination, according to the Navy. Officials said they plan to submit the contaminant fate and transport model for review and approval in September 2024.

To address the challenge of determining the extent of contamination, the Navy is working with DOH and the University of Hawaii to better understand groundwater flow and contamination threats to areas near the fuel releases on O’ahu. In addition, the Navy has funded the development of an independent groundwater model and expects results sometime in 2024.

Building Trust and Working with Stakeholders

DOD stated that it faces challenges working with and building the trust of local community stakeholders and addressing their concerns about defueling, closure, and remediation of the fuel and AFFF releases. Days after the November 2021 fuel release, a community group said that the Navy did not communicate to service members and the public about the risks that the release created to drinking water. The group said this prompted distrust among the community about the Navy’s efforts to address the contamination.

³⁰According to EPA, natural attenuation relies on natural processes to decrease or “attenuate” concentrations of contaminants in soil and groundwater. Scientists monitor these conditions to make sure natural attenuation is working. According to EPA, while natural attenuation is a cost-effective and sustainable approach to address petroleum contamination, a comprehensive site assessment and monitoring are needed to determine whether natural attenuation is a viable and sufficient approach for this remediation.

Moreover, the community groups with which we spoke expressed several concerns related to Joint Task Force Red Hill and the Navy's efforts, including that

- the Navy did not provide the community with accessible and readable data on groundwater quality and testing from lab reports;
- the Navy did not address community concerns about conducting remediation, such as the appropriate standards of groundwater cleanup under which remediation will be conducted, which the Navy has not yet defined; and
- the Navy did not provide updates on the progress of its efforts to defuel and close the tanks, which resulted in confusion among the public about the Navy's actions.

EPA, DOH, and EPA's Inspector General also expressed concerns related to community involvement. EPA and DOH sent a joint letter in February 2023 requesting that the Navy provide accessible and readable data and more opportunities for community engagement.³¹ EPA's Inspector General issued a report in April 2023 that recommended that EPA work with the Navy and DOH to clearly communicate remediation information to the public.³²

The Navy said it took the following actions to address reported concerns about data transparency, remediation, and the defueling and closure progress:

- Based on the EPA Inspector General's report, the Navy worked with EPA to make groundwater-well-monitoring data more easily available to the public by developing a web-based application. The Navy completed this application, and EPA made it publicly available in July 2023. EPA officials said they presented a pilot version of the application to members of the public in April 2023 and received

³¹Environmental Protection Agency and State of Hawaii Department of Health, "Letter to Navy Region Commander Involving Clarification of Scope of 2015 Administrative Order on Consent and Schedule for Consolidated Environmental Scope of Work Red Hill Bulk Fuel Storage Facility" (February 2023).

³²U.S. Environmental Protection Agency, Office of Inspector General, *EPA Region 9 Must Continue Oversight Throughout the Decontamination and Closure of the Red Hill Facility*, Report No. 23-E-0015 (April 2023).

positive feedback, including that the application enabled data downloading and sorting in an easy-to-use manner.³³

- The Navy is also working on studies to address community concerns about contamination cleanup standards. These studies will inform a comprehensive remediation plan, which will include defined remediation criteria. After completing investigation efforts, the Navy plans to propose to DOH and EPA site-specific remediation levels per state regulations and make this information publicly available.
- From August 2022 through January 2023, the Navy conducted over 50 public outreach meetings with a variety of public entities, including neighborhood groups, to inform the public of its progress in defueling and closing Red Hill, and to provide to them some data and information. EPA and the Navy agreed to host such meetings quarterly, beginning in January 2023, and as of January 2024, had held four meetings.

In addition, the following actions have been taken:

- In July 2023, EPA, with input from the Navy, developed a community-engagement plan to improve communication by holding public meetings to help explain the activities at Red Hill, including risks and progress with defueling and closure efforts. For example, in August 2023, EPA hosted, and published online, recorded webinars, some in native Hawaiian languages, about EPA's oversight efforts at Red Hill. Specifically, EPA hosted three webinars about Red Hill that were recorded and published online. The recordings were translated into languages most spoken in Hawaii, including Olelo Hawaii, Japanese, Tagalog, and Ilocano.
- In August 2023, Joint Task Force Red Hill published a defueling dashboard on its website to communicate to the public about its progress in defueling the tank system.
- In October and November 2023, EPA and the Navy participated in Community Representation Initiative meetings, as required by the 2023 Consent Order. This initiative includes 10 representatives from the local community that are to hold meetings for the purposes of

³³In addition to the Navy's action to provide the public with information, DOH established a web page to provide ongoing information to the public related to the Navy's efforts at Red Hill, including information on drinking water quality at Joint Base Pearl Harbor-Hickam and groundwater water quality near the Red Hill Shaft. Similarly, EPA has also developed a website to provide the latest information to the public on developments in defueling, cleanup, inspections, drinking water and closure at Red Hill, including links to both the Navy and DOH's Red Hill websites.

reviewing progress in defueling, closure, and implementation of drinking water requirements, and facilitating flow of information among community members. The members are to meet twice a quarter, and Navy and DLA are to attend the meetings. The Navy and DLA are required to provide Community Representation Initiative participants with opportunities to provide individual comments on progress at Red Hill. According to EPA officials, EPA facilitators helped community members elect the 10 representatives in September 2023. EPA officials said they expect the Community Representation Initiative to complement EPA's own community engagement plan to communicate with the public more effectively.

- In its May 2023 supplement to the tank closure plan, the Navy included a proposal to remove the pipelines from the facility. Navy officials said the proposal demonstrates its commitment to never use the tanks for storage of fuel or other hazardous substance storage. They stated this could allay public concern about the Navy's intent and progress toward closure of the facility.

DOD Disclosed Information Associated with Red Hill Contaminant Releases and Closure in Its Financial Statements

DOD and its components stated that the 2021 Red Hill fuel release affected their fiscal year 2022 financial statements in a variety of ways, based on FASAB and DOD guidance.³⁴ DOD concluded that while the future outflow of resources was probable, an amount was not reasonably estimable. As previously noted, accounting standards require that if a future outflow or other sacrifice of resources is probable but not reasonably estimable, an entity should not record an environmental liability in the financial statements. In such cases, an entity should disclose certain information about the event within the notes of its financial statements. In determining whether costs are reasonably estimable for government-related cleanup, agencies are to consider a completed study—such as a remedial investigation and feasibility study—and prior experience with a similar site or similar site conditions. If costs are not reasonably estimable, an estimate of the possible liability, an

³⁴Each DOD component prepares its own set of financial statements annually. These component financial statements are annually consolidated to create the DOD agency-wide financial statements.

estimate of the range of the possible liability, or a statement that such an estimate cannot be made should be disclosed.

The disclosures made by each relevant DOD component in its fiscal year 2022 financial statements included a description of the event and its effect on the relevant component. Table 1 outlines how DOD and its components reported liabilities and disclosed information associated with Red Hill within the notes of their fiscal year 2022 financial statements.

Table 1: Department of Defense and Its Components' Reporting of Red Hill Liabilities in Fiscal Year 2022 Financial Statements

Department of Defense (DOD) or component	Amount of liability recorded for Red Hill ^a	Is there a disclosure in the notes to the financial statements for Red Hill?	Which financial statement note contains disclosure?	Possible liability estimates included in disclosure ^b
DOD agency-wide financial statements	\$0	Yes	Environmental and Disposal Liabilities	\$2.0 billion through fiscal year 2027
Department of the Navy	\$0	Yes	Environmental and Disposal Liabilities	\$860.2 million, of which \$387.8 million was obligated in fiscal year 2022
Defense Logistics Agency (DLA)	\$0	Yes	Environmental and Disposal Liabilities	\$1.4 billion, of which \$100.7 million was obligated in fiscal year 2022
Department of the Army	\$0	Yes	Commitments and Contingencies	No estimate provided
Defense Health Agency	\$0	No	Not applicable	Not applicable

Source: GAO analysis of Department of Defense fiscal year 2022 annual financial statements. | GAO-24-106185

^aA liability for federal accounting purposes is a probable future outflow or other sacrifice of resources resulting from past transactions or events.

^bDue to reported material weaknesses in internal control over financial reporting at DOD, the Navy, and DLA, and the associated financial statement disclaimers of opinion, these estimates are not audited.

Our assessments of DOD and the components' financial reporting on the 2021 Red Hill fuel release follow.

DOD, Navy, and DLA Reporting

We reviewed DOD's, the Navy's, and DLA's treatment of the 2021 Red Hill fuel release within their fiscal year 2022 annual financial statements. We found that each organization disclosed the incident under the notes to the financial statements in environmental and disposal liabilities, without assigning a monetary value to the environmental liability. Those

components determined that the outflow of resources related to the event was probable but was not reasonably estimable.³⁵

As noted above, DOD has not yet completed a remedial investigation for Red Hill. In addition, due to Red Hill's unique size and complexity, DOD does not have experience with a similar site to project accurate estimates for remediating and closing the site. DOD, Navy, and DLA disclosures in the notes to the financial statements contain possible liability estimates for the cost of remediation and closure of Red Hill.

According to DOD, there were still many unknowns within these estimates. For instance, as discussed above, EPA and DOH regulators have not yet approved the closure method for the tanks within the facility. Additionally, the extent of financial responsibility between the Navy and DLA has not been fully determined between them, and thus they could not estimate their portions of the liabilities. As outflows associated with Red Hill were probable, but not reasonably estimable, DOD and its components stated that they disclosed information about the event in the notes to the financial statements, based on SFFAS 5 requirements.

Army Contingency Reporting

We reviewed the Army's treatment of the 2021 Red Hill fuel release within the contingent liabilities it reported in its fiscal year 2022 annual financial statements. We found that the Army disclosed the incident under the notes to the financial statements in commitments and contingencies.³⁶ SFFAS 5 provides guidance for the recognition and disclosure of contingencies. Recognition and disclosure of contingencies follow similar

³⁵We reviewed the treatment of the Red Hill fuel release in DOD, Navy, and DLA environmental and disposal liabilities reported in their fiscal year 2022 annual financial statements. However, we did not assess their compliance with accounting standards for environmental and disposal liabilities. The independent public accountants responsible for audits of these financial statements reported material weaknesses or significant deficiencies that related to environmental and disposal liabilities. Also, the auditors of the DOD, Navy, and DLA financial statements were unable to obtain sufficient, appropriate evidence to provide a basis for expressing opinions on the financial statements.

³⁶We reviewed the treatment of the Red Hill fuel release in DOD and Army contingent liabilities disclosed in the notes to their fiscal year 2022 annual financial statements. However, we did not assess the Army's compliance with accounting standards for contingent liabilities. The independent public accountants responsible for audits of DOD's and the Army's financial statements reported material weakness that related to environmental and disposal liabilities. Also, the auditors of these financial statements were unable to obtain sufficient, appropriate evidence to provide a basis for expressing opinions on the financial statements.

criteria as environmental and disposal liabilities, insofar that entities must recognize a contingent liability if an outflow or other sacrifice of resources is both probable and reasonably estimable.³⁷

Army officials stated that the Army does not have a role in the closure of the facility, including remediating the site. But they said the Army recognizes the potential for future liabilities associated with filtering, monitoring, and providing drinking water to certain Army housing areas that the fuel release affected. According to Army officials, because the Army will not provide future outflows or other sacrifices of resources for closure and remediation of the facility, it does not meet the criteria that are defined in the accounting standards for environmental and disposal liabilities. The Army deemed that liabilities related to Red Hill, but unrelated to environmental cleanup, were probable but not currently estimable. As such, the contingency was disclosed in notes to the financial statements, based on federal accounting standards.³⁸

DHA Reporting

DHA did not report liabilities or provide disclosures related to Red Hill in its fiscal year 2022 financial statements. DHA officials stated that its responsibilities concerning Red Hill were restricted to providing care to the affected DOD personnel during fiscal year 2022. These responsibilities fell under DHA's normal operations, and thus it would not record a related liability under SFFAS 5. DHA officials also stated that they are not responsible for costs related to defueling, closure, or remediation efforts of the facility in 2022 or in the future. In addition, officials said DHA's involvement with Red Hill did not meet the SFFAS 5

³⁷A contingency is an existing condition, situation, or set of circumstances involving uncertainty as to possible gain or loss to an entity. The uncertainty will ultimately be resolved when one or more future events occur or fail to occur.

³⁸Contingency disclosures should include the nature of the contingency and an estimate of the possible liability, an estimate of the range of the possible liability, or a statement that such an estimate cannot be made.

definition of a liability, and DHA was not required to disclose liabilities related to Red Hill in its financial reports.³⁹

DOD Faces Millions of Dollars in Costs for Red Hill Remediation Activities, but Has Not Shared Information About Its Fiscal Exposure with Congress

As previously noted, while federal accounting standards require certain environmental liabilities and contingencies to be reported or disclosed in federal agencies' financial statements, these do not represent the total federal fiscal exposure nor the total amount that the federal government may have to pay. In addition to the liabilities and contingencies in financial statements, there are other components that, when combined, account for total federal fiscal exposure. These include costs to clean up and close known sites that are not currently reasonably estimable and unknown clean up and closure costs that may be identified in the future as remedial investigations are completed and closure plans are approved.

DOD had not, as of the end of fiscal year 2023, communicated information to Congress about total fiscal exposures for anticipated Red Hill remediation activities for fiscal years 2025 and beyond. Fiscal exposures are responsibilities, programs, and activities that may legally commit the federal government to future spending or create expectations for future spending based on current policy, past practices, or other factors. Specifically, according to DOD, it is aware of millions of dollars of costs that it likely will incur as part of the Red Hill remediation. DOD is also aware of many other significant remediation tasks whose costs it cannot estimate at this time, which could total significantly more than the current known future costs. While these estimates of future fiscal exposures are not required to be reported or disclosed in financial statements based on accounting standards, the estimates are relevant

³⁹We reviewed the treatment of the Red Hill fuel release in DOD's and DHA's fiscal year 2022 annual financial statements. However, we did not assess DHA's compliance with accounting standards for environmental and disposal liabilities or contingent liabilities. While the independent public accountants responsible for audits of DOD's and DHA's financial statements did not report a material weaknesses or significant deficiency related to environmental and disposal liabilities or contingent liabilities, the auditors of these financial statements were unable to obtain sufficient, appropriate evidence to provide a basis for expressing opinions on the financial statements.

information for congressional oversight. DOD can communicate total estimated remediation costs in budget materials, updating the information as it learns more. With this information, Congress would be better equipped to make decisions regarding future funding for remediation and closure activities.

DOD Could Improve Communication of Fiscal Exposures for Red Hill Cleanup

DOD did not communicate information about total fiscal exposures related to Red Hill in its department-wide budget materials that would help inform Congress and the public about its potential future remediation responsibilities. In 2022, Congress appropriated \$1 billion to DOD to remain available until September 30, 2024, for activities related to improvement of infrastructure and defueling at Red Hill. In addition, Congress separately appropriated \$200 million to DOD to remain available until expended for similar purposes. As of September 30, 2023, DOD had obligated approximately \$629 million to respond to the recent releases and to defuel the Red Hill site and expended \$67 million of that amount.

DOD issued a cost projection report in 2022 to inform Congress of the department's projected costs to defuel and permanently close Red Hill, including the efforts DOD must take to accomplish these tasks. However, the report did not include complete projected cost estimates for fiscal years 2025 and beyond, which is the time frame during which DOD will likely incur substantial costs related to remediating and closing Red Hill.

DOD stated that it will pay for Red Hill-related costs through fiscal year 2024 with resources from appropriations discussed above, and with Defense Working Capital Funds from DLA. For fiscal year 2025 and beyond, DOD has indicated that the President's budget request will include costs related to cleanup and closing of Red Hill as part of the normal budget process. However, DOD officials stated that they did not discuss in detail with congressional oversight personnel the known and unknown future costs related to the closure of Red Hill.

Through a review of DOD cost-projection documents and interviews with DOD officials, we found that DOD anticipates spending millions of dollars annually during fiscal years 2025 and beyond related to Red Hill. Those costs include

- approximately \$10 million annually to operate a water treatment plant for the area,
- more than \$3 million for pipeline removals,
- hundreds of thousands of dollars annually for DHA to track health effects to affected DOD and civilian personnel, and
- hundreds of thousands of dollars annually for soil vapor extraction.

In addition to known costs, DOD will incur costs for numerous lines of effort related to remediating and closing Red Hill that it cannot estimate, including

- free petroleum product recovery,⁴⁰
- spill plume delineation,⁴¹
- development of the groundwater flow and contaminant fate and transport models, and
- site investigations and closure method planning.

Future Fiscal Exposure

We have consistently recommended that agencies maintain clear and open communication with Congress concerning their future financial obligations, which include both known and unknown future fiscal exposures. For example, in 2023, we found that the Department of the Interior did not communicate known exposures to Congress in budget materials associated with abandoned hardrock mines throughout the country. We stated that transparency of reporting in budget materials is an essential element for providing Congress with a more comprehensive picture of fiscal exposures.⁴²

⁴⁰Free petroleum product recovery is the process of removing or extracting liquid substances (often referred to as free product) from the environment, typically soil or water. The process is used in environmental remediation efforts, particularly in cases where contaminants, such as petroleum-based products, have been released into the environment.

⁴¹According to EPA, spill plume delineation is the process of identifying and defining the boundaries of a plume resulting from a fuel release into the surrounding environment, such as water or air. A plume is an elongated and often irregularly shaped area where the spilled substance disperses and spreads due to a variety of physical and environmental factors.

⁴²GAO, *Abandoned Hardrock Mines: Land Management Agencies Should Improve Reporting of Total Cleanup Costs* [GAO-23-105408](#) (Washington, D.C.: Jan. 13, 2023).

In addition, in 2013, we found that budget reporting does not always fully capture or require consideration of federal fiscal exposures.⁴³ In several previous reports, we have recommended the use of supplemental reporting—that is, communicating information about fiscal exposures in budget materials—to provide policymakers with a more complete understanding of future fiscal exposures.⁴⁴ We also found that expanding the availability and use of supplemental reports, including information on measures that can signal significant changes in the magnitude of fiscal exposures, can be important to enhancing transparency and oversight of federal resources. Such supplemental reports can also aid Congress in monitoring the financial condition of programs over the longer term.⁴⁵

Since 2003, we have reported on the need for agencies to improve recognition of fiscal exposures and provide Congress and the public with a more comprehensive picture of the federal government’s future financial obligations.⁴⁶ For example, in October 2013, we found that for some fiscal exposures, agency budget submissions might communicate incomplete information or potentially misleading signals about the government’s future financial obligations.⁴⁷ In our 2017 High Risk Series report, we stated that some departments and agencies need to improve the completeness of information about long-term remediation responsibilities and their associated costs so that decision makers, including Congress, can consider the full scope of the federal government’s remediation obligations.⁴⁸

An essential element for providing Congress with a more comprehensive picture of fiscal exposures for cleaning up Red Hill is transparency through reporting in budget materials and expanding the availability of

⁴³GAO, *Fiscal Exposures: Improving Cost Recognition in the Federal Budget*, [GAO-14-28](#) (Washington, D.C.: Oct. 29, 2013). Fiscal exposures include costs that can be anticipated but may not be estimated and included in financial statements.

⁴⁴GAO, *Long-Term Commitments: Improving the Budgetary Focus on Environmental Liabilities*, [GAO-03-219](#) (Washington, D.C.: Jan. 24, 2003), and [GAO-14-28](#).

⁴⁵[GAO-14-28](#).

⁴⁶GAO, *Fiscal Exposures: Improving the Budgetary Focus on Long-Term Costs and Uncertainties*, [GAO-03-213](#) (Washington, D.C.: Jan. 24, 2003); [GAO-14-28](#); and [GAO-03-219](#).

⁴⁷[GAO-14-28](#).

⁴⁸GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, [GAO-17-317](#) (Washington, D.C.: Feb. 15, 2017).

information about agencies' estimated remediation costs. Without additional information about DOD's known and unknown fiscal exposures for the remediation of Red Hill, such as costs to remediate polluted groundwater, close the tanks in place, and monitor long-term health effects, policymakers may not be able to make fully informed decisions about funding further work to remediate and permanently close the site. By more fully providing information on fiscal exposure, as more is learned about the costs involved, decision makers—including DOD and Congress—can be better equipped to make important funding decisions about the site.

Conclusions

The accidental release of thousands of gallons of fuel and other materials from Red Hill have resulted in significant effects on DOD military and civilian personnel, as well as area residents, and have resulted in fiscal exposures for DOD in the future. DOD and the Navy conducted immediate response and remediation actions and have reported on the costs of these actions. However, DOD did not communicate information about future fiscal exposures for fiscal year 2025 and beyond, such as total estimated remediation costs, in budget materials or other reports. If DOD communicated more information on its future financial obligations in budget materials or other reports, Congress and the public could have a more complete picture of DOD's long-term fiscal exposure related to the remediation responsibilities for Red Hill. In addition, development of this information by DOD for Congress could also enable DOD to update and refine the cost estimates as more is learned.

Recommendation for Executive Action

The Secretary of Defense should expand the information available to Congress regarding the agency's fiscal exposure related to the Red Hill Bulk Fuel Facility by clearly identifying anticipated costs for defueling, remediating, and closing Red Hill in supplemental reports or other budget materials, updating the information as more is learned. (Recommendation 1)

Agency Comments and Our Evaluation

We provided a draft of this report to DOD, EPA, and DOH for review and comment. We received written comments from DOD, which are reproduced in appendix II and summarized below. In addition, we received technical comments from EPA and DOH, which we incorporated as appropriate.

DOD agreed with our recommendation and discussed planned implementation steps. Specifically, as planned site assessments are completed and closure and remediation plans receive regulatory approval, estimable cost projections will be incorporated and communicated through the normal budget process. The action that DOD described, if implemented effectively, would address our recommendation.

We are sending copies of this report to the appropriate congressional committees, the Secretary of Defense, 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>.

If you or members of your staffs have any questions regarding this report, please contact Kristen Kociolek at (202) 512-2989 or kociolekk@gao.gov or J. Alfredo Gómez at (202) 512-3841 or gomezj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix III.



Kristen Kociolek
Director, Financial Management and Assurance

Letter

A handwritten signature in black ink that reads "Alfredo Gómez". The signature is written in a cursive style with a large, stylized initial 'A' and 'G'.

J. Alfredo Gómez
Director, Natural Resources and Environment

Appendix I: Objectives, Scope, and Methodology

This report (1) describes the actions the Department of Defense (DOD) is taking to defuel and close the Red Hill Bulk Fuel Facility, including remediating the site, and the challenges it faces in completing these actions; (2) assesses to what extent DOD estimated and recorded environmental and contingent liabilities for the November 2021 Red Hill fuel release in its financial statements; and (3) assesses to what extent DOD estimated and reported the total fiscal exposure to defuel and close Red Hill, including remediating the site.

To address our first objective, we reviewed federal and state statutes and regulations and legal agreements to identify the requirements for addressing fuel leaks from Red Hill and for closing the underground tanks at the Red Hill site. We then conducted interviews with DOD officials, including those from the Navy, the Army, the Defense Logistics Agency (DLA), and the Defense Health Agency (DHA), and officials from the Environmental Protection Agency (EPA) and State of Hawaii Department of Health (DOH). During the interviews, we asked that they describe DOD's past, ongoing, and potential future actions to remediate the fuel releases at Red Hill and close the tank system and challenges that DOD faces in completing these actions. We visited the Red Hill tanks and site near Joint Base Pearl Harbor-Hickam, including the areas of accidental fuel releases in 2014 and 2021.

We met with state and local stakeholders, including officials from the Honolulu Board of Water Supply and the Hawaii Commission on Water Resource Management, and Dr. Donald Thomas, Professor of geochemistry and hydrology, from the University of Hawaii-Manoa. We also interviewed selected community groups to obtain their perspectives on DOD's remediation and closure actions. To select these groups, we requested from EPA and Navy officials the names of the groups they had met with about defueling, remediation, and closure of the facility. We also received recommendations from the identified groups. We confirmed that these groups were aware of or held opinions about or related to DOD's actions to defuel, clean up, and close Red Hill. This was a nonprobability sample, and thus the views shared with us are not generalizable to the views of other community groups or the broader public. Specifically, we interviewed five community groups in O'ahu—Armed Forces Housing

Advocates, Earthjustice, O’ahu Water Protectors, the Sierra Club, and the University of Hawaii Red Hill Task Force. The following refers to each group’s stated mission:

- **Armed Forces Housing Advocates.** The Armed Forces Housing Advocates’ mission is to end the substandard housing conditions to which military families are exposed. The organization was founded to protect all current and future military families from Military Housing Privatization Initiative companies.
- **Earthjustice.** Earthjustice is a nonprofit public interest environmental law organization. Its mission is to protect people’s health, preserve places and wildlife, advance clean energy, and combat climate change. Earthjustice has worked with Sierra Club Hawaii on a range of litigation, including at the Red Hill site.
- **O’ahu Water Protectors.** The O’ahu Water Protectors is an advocacy group working to shut down Red Hill and protect water from further contamination.
- **Sierra Club.** Sierra Club’s mission is to explore, enjoy, and protect the wild places of the earth; to practice and promote the responsible use of the earth’s ecosystems and resources; to educate and enlist humanity to protect and restore the quality of the natural and human environment; and to use all lawful means to carry out these objectives. Sierra Club works in conjunction with Earthjustice on advocacy and litigation of various matters, including on Red Hill.
- **University of Hawaii Red Hill Task Force.** The University of Hawaii Red Hill Task Force was formed in December 2021 following the confirmation of contamination in drinking water supplied from the Red Hill Shaft. The task force leads the coordination of the University of Hawaii’s Red Hill-related research efforts. The task force is coordinated through the Water Resources Research Center and consists of faculty, staff, and students from University of Hawaii-Manoa and Leeward Community College; independent scientists; and trained community volunteers.

We identified short-term and proposed long-term lines of effort the DOD components reportedly undertook or planned to undertake to remediate and close Red Hill. In addition, we visited Red Hill in March 2023 to observe and document the condition of the facility and status of efforts DOD has taken to defuel, remediate, and close the facility.

Documentation we reviewed included DOD defueling and closure plans, including relevant supplements to these plans issued by DOD; DOD and Navy Command investigation and Joint Task Force investigation reports;

EPA Safe Drinking Water Act inspection reports and Compliance Evaluation Inspections; and DOH emergency orders.

To address our second objective, we reviewed federal accounting standards and guidance for estimating and recording environmental and contingent liabilities. Accounting standards and guidance are derived from the Federal Accounting Standards Advisory Board; the Office of Management and Budget; and DOD *Financial Management Regulation*, volume 4.

We reviewed financial documents, such as each organization's annual financial statements. In addition, we interviewed officials with the Navy, the Army, DLA, DHA, the Office of the Under Secretary of Defense (Comptroller), the DOD Office of the Inspector General, and independent public accountants that conduct the financial statement audits for each of the organizations.

To address our third objective, we determined the lines of effort to defuel, remediate, and close Red Hill. We did this by evaluating documentation that DOD developed, such as the Red Hill Spend Plan, the Red Hill Defueling Plan, and the Red Hill Tank Closure Plan. We interviewed Army, Navy, DLA, and DHA officials and requested internal documentation to determine the extent to which each component had made estimates for each line of effort. We used this information to evaluate DOD's reported estimations to remediate and close Red Hill.

Additionally, we assessed DOD documents concerning appropriations that the department has and will use specifically to clean up Red Hill. We evaluated DOD communications from the component level to the agency-wide level about fiscal exposures specific to Red Hill to inform Congress and the public about its potential future remediation responsibilities.

We conducted this performance audit from August 2022 to February 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.

Appendix II: Comments from the Department of Defense

**Appendix II: Comments from the Department
of Defense**



DEPARTMENT OF THE NAVY
OFFICE OF THE ASSISTANT SECRETARY
(ENERGY, INSTALLATIONS AND ENVIRONMENT)
1000 NAVY PENTAGON
WASHINGTON, DC 20350-1000

January 19, 2024

Ms. Kristen Kociolek
Director Financial Management and Assurance
U.S. Government Accountability Office
441 G Street NW
Washington, DC 20458

Subject: GAO Draft Report, GAO-24-106185, "ENVIRONMENTAL CLEANUP: DOD
Should Communicate Future Costs for Red Hill Remediation and Closure"
dated November 16, 2023 (GAO Code 106185)

Dear Ms. Kociolek,

Attached is the Department of Defense response to the subject report. My point of
contact is Mr. Stephen Hurff who can be reached at Stephen.Hurff2.civ@us.navy.mil and
phone (703) 639-7039.

Sincerely,

Robert E. Thompson
Principal Deputy Assistant Secretary
of the Navy
(Energy, Installations, and Environment)

**GAO DRAFT REPORT DATED NOVEMBER 16, 2023
GAO-24-106185 (GAO CODE 106185)**

**“ENVIRONMENTAL CLEANUP: DOD SHOULD COMMUNICATE FUTURE COSTS
FOR RED HILL REMEDIATION AND CLOSURE”**

**DEPARTMENT OF DEFENSE COMMENTS
TO THE GAO RECOMMENDATION**

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense should expand the information available to Congress regarding the agency’s fiscal exposure related to the Red Hill Bulk Fuel Facility by clearly identifying anticipated costs for defueling, remediating, and closing Red Hill in supplemental reports or other budget materials, updating the information as more is learned.

DoD RESPONSE: DoD concurs with the GAO recommendation to identify anticipated costs for remediating and closing the Red Hill Bulk Fuel Storage Facility as requirements are known. As planned site assessments are completed and closure and remediation plans receive regulatory approval, estimable cost projections will be incorporated and communicated through the normal budget process.

Accessible Text for Appendix II: Comments from the Department of Defense

January 19, 2024

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Director Financial Management and Assurance
U.S. Government Accountability Office
441 G Street NW
Washington, DC 20458

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Attached is the Department of Defense response to the subject report. My point of contact is Mr. Stephen Hurff who can be reached at Stephen.Hurff2.civ@us.navy.mil and phone (703) 639-7039.

Sincerely,

Robert E. Thompson
Principal Deputy Assistant Secretary
of the Navy
(Energy, Installations, and Environment)

**GAO DRAFT REPORT DATED NOVEMBER 16, 2023 GAO-24-106185 (GAO
CODE 106185)**

**“ENVIRONMENTAL CLEANUP: DOD SHOULD COMMUNICATE FUTURE COSTS
FOR RED HILL REMEDIATION AND CLOSURE”**

DEPARTMENT OF DEFENSE COMMENTS TO THE GAO RECOMMENDATION

RECOMMENDATION 1: The GAO recommends that the Secretary of Defense should expand the information available to Congress regarding the agency’s fiscal

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DoD RESPONSE: DoD concurs with the GAO recommendation to identify anticipated costs for remediating and closing the Red Hill Bulk Fuel Storage Facility as requirements are known. As planned site assessments are completed and closure and remediation plans receive regulatory approval, estimable cost projections will be incorporated and communicated through the normal budget process.

Appendix III: GAO Contacts and Staff Acknowledgments

GAO Contacts

Kristen Kociolek, (202) 512-2989 or kociolekk@gao.gov

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Staff Acknowledgments

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