RED HILL BULK FUEL STORAGE FACILITY

Tank Closure Plan – Supplement 2

May 31, 2023

Office of the Secretary of the Navy

Table of Contents

List of Enclosures 1
1. Introduction 3
1.1 Department of the Navy Tank Closure Plan History 3
1.2 Contents of Tank Closure Plan Supplement 2 3
2. Removal of the Fuel Pipelines* 5
2.1 Pipeline Configuration 5
2.2 General Considerations 5
2.3 Pipeline Removal 6
2.4 Engineering Feasibility 7
2.5 Schedule 7
3. Assessment of the Long Term Structural Integrity of the Tanks 8
4. Process for Cleaning the Surge Tanks 9
5. Conclusion 10
Appendix A: Updated Plan of Action and Milestones 11

**Figures 2.1 and 2.2 have been redacted from this public document*

List of Enclosures

1. Assessment of the Long Term Structural Integrity of the Red Hill Underground Storage Tanks
2. Responses to Hawaii Department of Health Comments on Third Party Analysis of Alternatives
3. Responses to EPA Comments on Tank Closure Plan, Third Party Analysis of Alternatives, and Supplement 1

Acronyms

ASN EI&E	Assistant Secretary of the Navy for Energy, Installations and Environment
AST	Above ground Storage Tank
CNRH	Commander, Navy Region Hawaii
CPM	Critical Path Method
DOD	Department of Defense
DOH	Department of Health, Hawaii
DON	Department of the Navy
EO	Emergency Order
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
EXWC	Engineering and Expeditionary Warfare Center
FLC	Fleet Logistics Center
FOR	Fuel Oil Reclaimed
FRP	Facility Response Plan
F-24	F-24 Jet Fuel
F-76	Marine Diesel Fuel
HAR	Hawaii Administrative Rules
IDW	Investigation-Derived Waste
JBPHH	Joint Base Pearl Harbor-Hickam
JP-5	Jet Fuel Propellant No. 5
JP-8	Jet Fuel Propellant No. 8
JTF-RH	Joint Task Force-Red Hill
NAVFAC	Naval Facilities Engineering Systems Command
NAVSUP	Naval Supply Systems Command
NLT	No Later Than
RHBFSF	Red Hill Bulk Fuel Storage Facility
SECDEF	Secretary of Defense
SECNAV	Secretary of the Navy
UST	Underground Storage Tanks
WMP	Waste Management Plan

1. Introduction

In accordance with the Secretary of Defense's (SECDEF) March 7, 2022 memo, the Department of Defense (DoD) is responsible for the safe defueling and closure of the Red Hill Bulk Fuel Storage Facility's (RHBFSF) underground storage tanks (UST), surge tanks, and associated piping systems. The Hawaii State Department of Health's (DOH) superseding Emergency Order (EO), issued on May 6, 2022, recognized that the Defueling Plan and Tank Closure Plan are distinct from one other and will be developed on separate timelines.

The SECDEF established that the Joint Task Force-Red Hill (JTF-RH) would lead and execute all defueling activities, after which the Department of the Navy (DON) would commence with the closure of the facility.

1.1 Department of the Navy Tank Closure Plan History

On November 1, 2022, the DON provided to the Hawaii Department of Health (DOH) a plan to permanently close the 20 underground storage tanks, four surge tanks, and associated valves and piping systems at RHBFSF, as depicted in Figure 1-1. The DON Tank Closure Plan addressed the following:

- Infrastructure Description and Procedures Needed Before Cleaning
- Sequence and Process for Cleaning of Tanks and Piping Systems
- Management of Accumulated Sludge and Materials
- Method of Permanent Closure and Associated Design and Process
- Site Assessment and Release Investigation and Response
- Coordination and Outreach

On December 22, 2022, the DON submitted a third party analysis of alternatives for tank closure, which evaluated engineering feasibility, worker safety, impacts to the environment and surrounding community, potential costs, and work schedule for each of the following tank closure alternatives:

- ALTERNATIVE 1: Closure In-Place.
- ALTERNATIVE 2: Closure In-Place and Preparation for Non-Fuel Reuse.
- ALTERNATIVE 3: Closure with Fill.
- ALTERNATIVE 4: Remove Tank Steel Liner, and Fill.

With the submission of the third party analysis, the DON formally sought DOH approval for ALTERNATIVE 1: Closure in Place as the permanent closure method. The DON selected this alternative because it will allow for potential beneficial non-fuel reuse of the tanks while minimizing impacts to the environment, local community, safety concerns, and closure schedule.

On February 28, 2023, the DON submitted Tank Closure Plan Supplement 1, which provided additional detail on tank and pipeline cleaning, detailed procedures for waste management, a process for updating the Facility Response Plan, an update on planning for beneficial non-fuel reuse, an updated Critical Path Method (CPM) schedule, and responses to DOH comments on the initial Tank Closure Plan.

1.2 Contents of Tank Closure Plan Supplement 2

This Supplement 2 builds upon the previous November 1, 2022, December 22, 2022, and February 28, 2023 submissions. Supplement 2 provides the following:

- A plan for removal of the three fuel pipelines
- A third party assessment of the long term structural integrity of the tanks (Enclosure 1)
- Additional procedures for addressing the surge tanks
- Responses to DOH comments on the third party analysis of alternatives for tank closure (Enclosure 2)
- Responses to EPA comments on 1) the initial Tank Closure Plan, 2) the third party analysis of alternatives for tank closure, and 3) Supplement 1 (Enclosure 3)

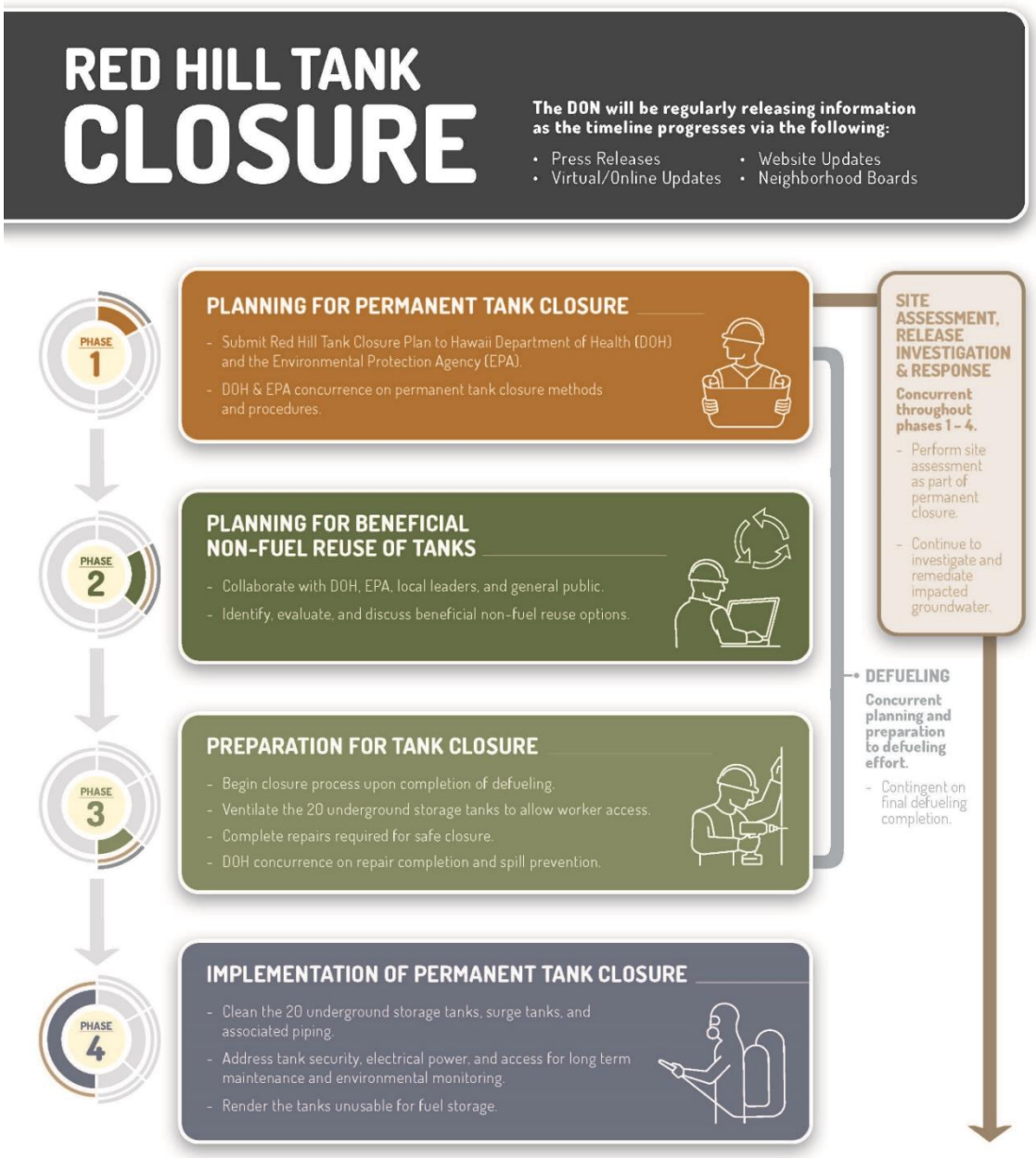

FIGURE 1-1: FOUR PHASES OF RED HILL TANK CLOSURE

2. Removal of the Fuel Pipelines

The original Tank Closure Plan (submitted November 1, 2022) and Supplement 1 (submitted February 28, 2023) describe the DON's plan to clean the pipelines associated with the 20 large fuel storage tanks at the RHBFSF. Based on further analysis since that time, the DON has decided to remove and properly dispose of the three large fuel pipelines, rather than clean them in place as described previously.

With the pipelines removed, the tanks cannot be refilled with fuel. Thus, pipeline removal is a clear and tangible demonstration of the DON's commitment to the public, regulatory agencies, and other stakeholders that the Red Hill facility will never be used again for storage of fuel or hazardous chemicals. Additional benefits of pipeline removal include the following:

- Ensures the complete removal of any residual fuel that may be associated with the pipelines.
- Creates additional space within the tunnels, thereby providing the most flexibility for beneficial non-fuel reuse of the tanks and tunnels.
- Eliminates long term maintenance of pipelines that no longer have an operational use.

In general, pipelines must be designed for their intended purpose, so the Navy does not expect the existing fuel pipelines to be adequate for any beneficial non-fuel reuse. Instead, new pipelines would need to be designed and installed if required to support the selected reuse option.

2.1 Pipeline Configuration

A 3.2 mile tunnel system runs under non-Navy property and connects the 20 large fuel storage tanks of the RHBFSF to the Underground Pump House located on Pearl Harbor. The tunnels contain three common fill/issue fuel pipelines. The pipelines carry fuel as it is pumped uphill to the tanks from the Underground Pump House or flows downhill to Pearl Harbor by gravity.

The tunnel system includes the Upper Access Tunnel, Lower Access Tunnel, Tank Gallery, Makalapa Adit tunnel, and Harbor Tunnel. All tunnels are accessed by openings or access doors into the tunnels called "adits". The Tank Gallery provides access to the tank valves, sample stations, drain lines, electric room, and Gauger Station. The Tank Gallery is the widest tunnel at 20-24 feet in width, and the other tunnels are approximately 12 feet wide. The Upper Access Tunnel provides access to the tank manways and gauging platforms, but there are no fuel pipes installed in the Upper Access Tunnel. All tunnels have electrical infrastructure (lights and power) and ventilation.

2.2 General Considerations

Adit 3 currently contains a large diameter water line coming from the Harbor Tunnel and other equipment that restrict its use for equipment and material access. As a result, it is expected that pipe removal will be performed at Adit 2 or another adit selected by the contractor. The contractor will be required to determine the means and methods for removing the disassembled pipelines.

The capacity of the existing ventilation system may limit certain types of activities within the tunnel areas. For example, only minimal hot work (e.g., burning or arc-gouging of piping) can be performed. The contractor will develop health and safety plans for Navy review and approval.

Prior to pipeline removal activities, the piping will be drained and ventilated.

The Red Hill facility has limited parking, laydown, and storage areas; therefore, the contractor will need to take the pipe segments off site for recycling and proper disposal as they are removed.

2.3 Pipeline Removal

Removal efforts will include the three large fuel pipelines and associated valves, steel frame supports, and other appurtenances. The removal activities will occur from the lower tank gallery to the first flange at the underground pump house. Flanges at the outlet of the tanks will remain in place and sealed with a blind flange.

Due to access limitations at Adit 3, the piping and other materials will be removed through Adit 2 or one of the other adits. The contractor will be responsible for developing the method for removing and properly disposing of the disassembled pipeline. The area outside of Adit 2 is limited, but there is sufficient space to bring in containers for material removal. The existing overhead crane hoist system at Adit 2 may be used to assist with removal of the disassembled pipeline. Throughout the removal process, the water line from the Harbor Tunnel will be protected.

The most time-consuming activity will be moving the pipe through the tunnels for off-site transportation and disposal. The existing rail system does not go to all locations and is currently not inspected or rated. The contractor will determine the means and methods for pipe removal. One possible approach is to use custom electric industrial tuggers and carts to haul pipe and material to Adit 2. An electric industrial tugger is a utility vehicle designed to stack and store heavy materials such as pipe. Tuggers are commercially available, with standard off the shelf units having 5000 pounds of towing capacity. The contractor can select the tugger for maximum efficiency based on specific needs at the site. For example, a custom bi-directional tugger could be fabricated and purchased to reduce the need to turn around in the tunnels. Otherwise, the electric carts can be turned around in only a few locations within the tunnels, including the Adit 2 junction with the Harbor Tunnel, the Adit 3 junction, and the Tank Gallery. The contractor will protect fiberglass grates and cover the existing rail in areas where it would inhibit electric tugger and cart operation.

The contractor will determine the means and methods for cutting pipe within the limited work area. Since the existing pipe is coated in lead paint, a strip of coating will be removed at each location where the pipes will be cut. The contractor will be required to remove lead based paint in accordance with federal, state and local regulations. The removed material will be sampled to determine the disposal method in accordance with applicable environmental laws and regulations. Piping and appurtenances that are left in place will be maintained by re-painting and sealing in accordance with EPA regulations for lead paint management. If painted pipe is removed, the scrap metal processor receiving the pipe will be notified that the paint may contain lead.

Due to the potential presence of residual fuel in low points and behind valves, the contractor will be responsible for primary and secondary containment, as well as proper removal and disposal of any residual fuel, in accordance with applicable environmental laws and regulations.

The pipe will be cut into sections and removed from the facility. The contractor will determine the length of each section for optimal removal efficiency. At each location, the pipe will be transported out of the facility for proper recycling and disposal. The contractor will determine the pipe cutting method and will either use cold cutting methods or obtain the necessary hot work permits.

Space limitations will hinder all removal activities, especially in the Harbor Tunnel where the large water line must remain in place and metal ribs provide structural support for the tunnel. In addition, a cable tray runs the entire length of the Lower Access and Harbor Tunnels.

The contractor will be responsible for safely cutting the pipe into sections and removing the pipe from the facility. Multiple solutions may be required, one for the Harbor and Lower Access Tunnels and one for the Tank Gallery.

The Navy estimates approximately 5% of the piping between Pearl Harbor (Adit 1) and the Red Hill tank farm may contain asbestos. Prior to cutting and removal of pipe, the contractor will remove and dispose of asbestos wraps in accordance with applicable laws and regulations. No regulated friable asbestos containing material (ACM) has been identified at Red Hill; however, the Navy has identified non-friable ACM in gaskets associated with the pipe flanges. Therefore, if a pipe flange must be disturbed or removed, the work will be conducted in accordance with the NESHAP 40 CFR Part 61, subpart M Standard for Demolition and Renovation, which includes notification 10 days prior to commencing work. When conducting demolition activities on asbestos-containing pipe flange gaskets, the contractor will establish and maintain worker protections as required by 29 CFR 1926.1101.

The contractor will remove the steel pipe supports from the Harbor Tunnel, the Lower Access Tunnel, and the side tunnels that extend to the tanks. As needed to allow for pipe removal, the contractor will cut the large frame supports into smaller sections. These sections can then be transported down the tunnel to the desired adit.

The contractor will sever the wall, ceiling, and floor connections as needed. Baseplates, anchors, and a maximum of 6-inches of connecting steel will be abandoned in place. Steel mainline supports (supports directly underneath the pipelines that run the length of the tunnel) in the Tank Gallery will remain as they support electrical, water, and other utilities that must stay in place. Thrust blocks and concrete supports for the largest pipeline will remain.

2.4 Engineering Feasibility

Engineering feasibility considers the use of practicable construction means and methods, recognizing the constraints within the Red Hill tunnel system for material supply or removal. The contractor will develop the construction means and methods related to pipeline removal in compliance with all local, state, and federal regulations. For pipeline removal, the contractor will have access to all tunnels but must accommodate existing utilities and other activities, including groundwater monitoring, electrical lighting, communication, water, power, ventilation, tunnel drainage, and ordinary fire sprinkler systems in the tunnels. All existing egress points in the tunnels will remain available to the contractor to allow for safe evacuation of workers in event of an emergency.

If the contractor uses Adit 2 for pipeline removal, there will be minimal impacts to the surrounding community; however, the occupants of buildings close to Adit 2 will experience construction noise, dust, and heavy volumes of construction traffic. The contractor will apply mitigation measures to reduce these impacts.

2.5 Schedule

As a rough order of magnitude (ROM) estimate, the duration of pipeline removal activities will be approximately three years. Pipeline removal can be scheduled at the same time as other Red Hill closure activities, which will include sludge removal and pressure washing inside the tanks. Coordination of contractor activities in the Lower Tank Gallery will be required. The three year estimate does not include preliminary processes such as project planning, programming of funds, design, and contractor procurement.

3. Assessment of the Long Term Structural Integrity of the Tanks

The DON commissioned Simpson Gumpertz & Heger Inc. (SGH) to assess the long term structural integrity of the 20 large underground storage tanks at Red Hill. The assessment provides further information in support of Closure in Place as the permanent closure method in accordance with Hawaii Administrative Rules (HAR). The complete SGH assessment is provided as Enclosure 1.

The structural assessment includes an evaluation of the long term durability of the tank steel liners and concrete walls under the condition that they are no longer filled with fuel. In addition, SGH performed computer modeling of earthquake effects on the tanks, both with and without the tank steel liner. Two earthquake levels were simulated.

- The first level was the "design earthquake" based on building code requirements for new construction in Honolulu.
- The second level was an "extreme earthquake event," which is typically considered only for critical infrastructure such as nuclear power plants.

The durability evaluation indicated no significant deterioration of the tank steel liners within the next 50 years. After 100 years, SGH estimates that the atmosphere within the empty tanks will cause internal corrosion of approximately half the thickness of the steel liner. External corrosion of the steel liner will likely be localized and will not affect the overall structural integrity of the liner. Deterioration of the concrete is not expected to occur for approximately 300 years. After that time, localized deterioration of the concrete will likely result from corrosion of the embedded reinforcing steel.

Based on computer simulations both with and without the tank steel liner, the design earthquake will not cause cracking or other damage to the tanks. The extreme earthquake event may cause localized cracking in the concrete without the steel liner, but no significant damage. Both with and without the steel liner, the analysis indicates the tanks will remain stable and able to withstand the extreme earthquake event.

Overall, even if corrosion completely eliminates the steel liner and an extreme earthquake event occurs, the assessment indicates the Red Hill tanks will remain stable.

4. Process for Cleaning the Surge Tanks

The four surge tanks near the underground pump house each has a capacity of approximately 370,000 gallons. As described in Tank Closure Plan Supplement 1 (submitted to DOH on February 28, 2023), the DON will clean the surge tanks in accordance with Unified Facilities Guide Specifications (UFGS) Section 33 01 50.55. Furthermore, as indicated in the third party analysis of alternatives for tank closure (submitted to DOH on December 22, 2022), the Navy intends to permanently close the surge tanks by filling with inert material, following American Petroleum Institute (API) Recommended Practice 1604. Upon closure of the surge tanks, the piping and valves connected to the tanks will be removed for proper disposal, and the openings will be sealed.

Prior to filling, the DON will clean the surge tanks as described in Tank Closure Plan Supplement 1. In summary, the contractor will perform the following steps:

- Ventilate tanks until a marine chemist determines they are safe for worker occupancy
- Establish waste accumulation area with secondary containment and spill response equipment in accordance Joint Base Pearl Harbor-Hickam (JBPHH) Waste Accumulation Point Manual.
- Remove sludge for proper disposal
- Pressure wash tanks
- Remove residual wastewater for proper disposal

Following cleaning, the contractor will fill the surge tanks with inert material. Options for inert material include clean sand, soil, concrete, flowable fill, or UST foam. The contractor will specify the inert material in their work plan, which will be approved by the DON and submitted to DOH and EPA for review and comment. The DON will label each surge tank adjacent to the manway with the date of closure, contractor name, and contractor address.

5. Conclusion

The DON, in collaboration with Federal, State, and community stakeholders, is committed to the successful permanent closure of the 20 Red Hill underground storage tanks (USTs), surge tanks, and associated pipelines. The DON will continue to work with DOH and the EPA to implement the permanent closure of the RHBFSF in a manner that complies with applicable laws and regulations. Concurrent with the tank closure efforts, the DON will continue to implement long-term monitoring and release response actions, which are already ongoing, to address risk to public health and the environment.

Appendix A: Updated Plan of Action and Milestones

Target Month	Responsibility	Milestone or Deliverable
NOV 2022	SECNAV	Closure Plan Submittal
NOV 2022	CNRH	Press Release
NOV 2022	CNRH	Public Stakeholder Engagement
DEC 2022	CNRH	Notice of Intent to Close Underground Storage Tanks (30 days before closure complete)
DEC 2022	NAVFAC Pacific	Provide 3rd party analysis of alternatives for closure to DOH
JAN 2023	CNRH	Beneficial Reuse Engagement
JAN 2023	NAVFAC Hawaii	Acquisition Strategy Planning Begins
FEB 2023	CNRH	Closure Plan Supplement 1 – Cleaning
MAR 2023	CNRH	Public Stakeholder Engagement
APR 2023	NAVFAC Hawaii	Structural Analysis Completed
MAY 2023	CNRH	Closure Plan Supplement 2 – Structural Analysis, pipe removal
MAY 2023	CNRH	Press Release
JUN 2023	CNRH	Public Stakeholder Engagement – FTAC
JUL 2023	NAVFAC EXWC	Contract Award – Tank Cleaning
NOV 2023	CNRH	Public Stakeholder Engagement – FTAC, Public Outreach Results
NOV 2023	NAVFAC Hawaii	Draft Sampling and Analysis Plan
DEC 2023	CNRH	Press Release
FEB 2024	SECNAV	Beneficial Non-fuel Reuse Report submitted to Congress and report available to public
JUN 2024	CNRH	Press Release (Semi-annually as needed during closure)
NLT JUL 2024	NAVFAC Hawaii	Tank cleaning begins
NLT AUG 2027	NAVFAC Hawaii	Tank cleaning ends
NLT AUG 2027	CNRH	Press Release
NLT SEP 2027	CNRH	UST Closure Assessment Report (within 30 days after UST permanently closed)