Red Hill UST Permit Application Proposed Decision & Order, Findings of Fact and Conclusions of Law

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DEPARTMENT OF HEALTH
STATE OF HAWAII

IN THE MATTER OF	Docket No. 19-UST-EA-01
US NAVY'S APPLICATION FOR A UST PERMIT FOR THE RED HILL BULK STORAGE FACILITY.	PROPOSED DECISION AND ORDER, FINDINGS OF FACT AND CONCLUSIONS OF LAW; CERTIFICATE OF SERVICE

I. PROPOSED DECISION AND ORDER, FINDINGS OF FACT AND CONCLUSIONS OF LAW

This matter concerns the application of the U.S. Navy for a permit to maintain and operate the Red Hill Underground Storage Tank Facility ("RHUSTF"), an underground fuel storage tank facility located in the Red Hill area which lies mauka of the Joint Base Pearl Harbor Hickam facility. In this matter, a contested case hearing was held on February 1 – 5, 2021. Closing arguments were presented on February 8, 2021. The hearings were re-opened on July 7, 2021 to receive additional evidence and testimony relating to a reported fuel release incident that occurred at the RHUSTF on May 6, 2021. The hearings were conducted upon orders of the Hearing Officer. With the concurrence of all parties, the hearings were held by videoconference utilizing the Zoom videoconferencing platform due to travel restrictions and health and safety concerns arising from the Covid emergency. The hearings were simultaneously live streamed on YouTube in order to permit interested observers to observe and monitor the hearings.

In connection with the hearings, an understanding was reached by and between the Hearing Officer and the parties that all identified and submitted exhibits would be deemed accepted and admitted in evidence unless a party raised an express objection in writing or verbally during the hearing and in the event that a party raised an objection to any exhibit(s), such objection would be considered and ruled upon by the Hearing Officer. Pursuant to Department of Health Hawaii Administrative Rule ("HAR") Sec. 11-1-24, the Hearing Officer admits into evidence each exhibit identified and submitted by the parties and those referenced herein based on his finding that the exhibits are relevant and material and that substantial justice warrants doing so.

A: The Parties and their Counsels

In this matter, the Parties and their Counsels are:

- The United States Navy ("Navy"), represented by Jonathan McKay, Esq., David Fitzpatrick, Esq., Michael Law, Esq., Karrin Minott, Esq. and Marnie Riddle, Esq.
- The Board of Water Supply ("BWS"), City and County of Honolulu represented by Ella Foley Gannon, Esq. and David Brown, Esq., of Morgan Lewis and Bockius, 300 Grand Ave., 22nd floor, Los Angeles, CA 90071 and Jeff A. Lau, Esq., Deputy Corporation counsel, Office of the Corporation Counsel, City and County of Honolulu, 567 S. King St., Honolulu, HI 96813.
- The Sierra Club, Hawaii Chapter ("Sierra Club"), represented by David Kimo Frankel, Esq., 1638-A Mikihala Way, Honolulu, HI 96816.
- The Environmental Health Administration ("EHA"), Department of Health ("DOH"), represented by James C. Paige, Esq. Deputy Attorney General, Office of the Attorney General, 425 Queen St., Honolulu, HI 96813.

The Parties and Standing

The Navy is the owner and operator of the Red Hill facility. (Exhibit B-1 at BWS000011.) The Navy is seeking a permit to operate the Red Hill facility under State law, including H.R.S. Chapter 342L and HAR Chapter 11-280.1. (Exhibits B-77, B-246 through 252, and B-301 through 304.)

The BWS is the largest municipal drinking water utility in the State of Hawaii and is responsible for managing Oahu's municipal water resources and distribution system. The mission of the BWS is to provide safe, dependable and affordable water now and into the future. The BWS has a public trust responsibility to protect the water resources that it manages and to preserve the rights of present and future generations in the waters of the State. The basal aquifer under the RHUSTF is the groundwater resource from which the BWS provides drinking water to residents and visitors from Moanalua to Hawaii Kai. As a direct result of the Navy's past fuel releases into the environment, the BWS has incurred substantial expense to monitor and investigate quality of the water resources and has devoted considerable time and resources to addressing the extent and possibility of damage to Oahu's sole source groundwater aquifer resulting from releases of fuel product from the Navy's RHUSTF. (Kawata Testimony at ¶¶ 6-7, 8 & 22.) The BWS has interests that are injured or likely to be threatened by releases of fuel products stored at the RHUSTF.

The Sierra Club is a nonprofit corporation with more than 2,700 dues-paying members who live on Oahu and depend on the clean drinking water from the sole source aquifer that underlies the Red Hill facility. The Sierra Club's mission includes the protection of natural resources, including the purity of groundwater. (Declaration of Jodi Malinoski, ¶ 7.) The Sierra Club and its members have interests in protecting and saving the purity and safety of the drinking water resources from damage and contamination resulting from releases of fuel products stored at the RHUSTF.

The Environmental Health Administration (EHA) is a division of the Department of Health that is tasked with reviewing, analyzing, and recommending how applications for USTs should be resolved and has been determined by the Director of the DOH to be a party in this contested case hearing process.

The Navy, BWS, The Sierra Club and EHA are proper and appropriate parties in this contested case hearing.

Position of the Parties

Position of the U. S. Navy

With respect to the Navy's application for a permit to maintain and operate a UST facility, the Navy submits that

1. the RHUSTF is designed, constructed, installed, upgraded, maintained, repaired and operated to prevent releases of stored regulated substances for the operational life of the tank system;
2. the material used in the construction or lining of the tank system is compatible with the stored substances;
3. the existing tank system is being maintained and upgraded to prevent releases for their operating life;
4. all applicable technical, financial and other requirements of the State's regulations are and can be met; and
5. the installation and operation of the tank system is being done in a manner protective of human health and environment.

The Navy submits that .... all nearby drinking water sources remain safe; the 2014 Tank Release was not due to corrosion and did not result in any exposure to humans, plants, or animals, and measures have been put in place to prevent any similar release in the future; fuel product has never been detected in any monitoring well; dissolved constituents from historical releases are naturally attenuated in the immediate vicinity of the tank farm; and perimeter wells show no indication of the presence of fuel constituents from the Facility. Thus, while no petroleum facility or activity is risk-free, operation of the Facility is currently protective of human health and the environment and is likely to remain so, especially within the 5-year Permit period and the timeframe within which the Navy has committed to implementing secondary containment, which the regulations only require to occur by 2038. Even though the Facility currently complies with the UST regulations, the Navy and Regulators have agreed to collect additional data, perform additional analyses, and make additional improvements over the years.

The Regulatory Agencies have demonstrated their attention to the details and continue, along with the Navy, to drive further improvements. Therefore, considering all the Facility upgrades made and planned to be made, along with all the data gathering and analyses, the Facility is protective of human health and the environment and should be permitted to continue to operate for the next 5 years under the watchful eye of DOH and EPA while additional improvements and progress continue to be made under the Administrative Order on Consent (AOC).

BWS opposition and concerns

On June 24, 2019, the BWS submitted to the DOH written comments on the Navy's permit application, asserting that "it is not appropriate for the DOH to issue an operating permit" for the USTs at Red Hill. (Exhibit B-22 at BWS006291.)

By letter and complaint dated October 29, 2019, the Honolulu Board of Water Supply ("BWS") timely requested this contested case to ensure meaningful participation in and the opportunity to be heard concerning the Navy's Red Hill UST permit application. (Updated Written Testimony of Erwin M. Kawata ("Kawata Testimony"), ¶ 37; Exhibit B-23.)

An administrative contested case hearing and process is an appropriate means to provide for constitutional due process and fair consideration of the concerns and interests of interested parties. ("[A]s a matter of constitutional due process, an agency hearing is ... required where the issuance of a permit implicating an applicant's property rights adversely affects the constitutionally protected rights of other interested persons who have followed the agency's rules governing participation in contested cases.") (emphasis and omission in original). Contested case hearing procedures are "designed to ensure that the record is fully developed and subjected to adversarial testing before a decision is made." *Mauna Kea Anaina Hou v. Bd. of Land and Nat. Res.*, 136 Haw. 376, 391, 363 P.3d 224 (2015) (emphasis in original).

As the largest municipal drinking water utility in Hawaii, the BWS has standing to bring this contested case because it has a significant interest in the outcome of the decision as to whether or not to issue the Navy a permit to operate the Red Hill UST facility. The BWS has a constitutional public trust responsibility to protect the water resources it manages and to preserve the rights of present and future generations in the waters of Hawaii.

In this contested case proceeding, the BWS opposes the issuance of an operating permit to the Navy for its RHUSTF. The BWS notes that the Red Hill USTs sit directly above Oahu's federally designated sole-source groundwater aquifer, the Southern Oahu Basal Aquifer, from which the BWS supplies 77 percent of the total island-wide water supply. (Written Reply Testimony of Nicole M. DeNovio, ¶ 3.b, Report: Sole Source Aquifer, Reply Testimony, 3.) In 1987, the United States Environmental Protection Agency ("EPA") determined that this aquifer is the "principal source of drinking water" for the island, and that "[i]f contaminated, would create a significant hazard to public health." Southern Oahu Basal Aquifer in the Peart Harbor Area at Oahu; Principal Source Aquifer Determination, 52 Fed. Reg. 45496, at 45497 (Nov. 30, 1987).

It is the BWS view that "the storage of up to 187 million gallons of fuel, 100 feet above Oahu's principal source of drinking water is" inherently dangerous." (Kawata Testimony. at ¶ 34; Exhibit B-21 at BWS006270.) The Department of Health concurs with this view. (Exhibit S-5 at p. 16.) Currently, fuel releases from the Red Hill facility have not caused any measurable impacts to the drinking water supplied by the BWS. (Hr'g Tr. Vol. V, Testimony of Erwin Kawata, 982:24-983:25.) However, the groundwater under the Red Hill facility has been impacted by Navy operations. (*Id.* at 985:11-19.) Given that the drinking water supply and the groundwater under the Red Hill facility come from the same aquifer (DeNovio Reply Expert Report, at 3), the drinking water supply could be impacted in the future.

The BWS asserts that the critical drinking water resources of Oahu are threatened by the Navy's operations at Red Hill. The BWS submits that the Navy has a long history of releasing fuel into the environment and believes that the underground storage tanks will continue to leak if the Navy is allowed to operate as proposed in its permit application. Of concern to the BWS is the risk of continuing backside corrosion of the steel tank liner and the risk of chronic leaks and potentially catastrophic fuel releases from the RHUSTF. Such risks are, in its view, unacceptably high. Past releases of fuel from the RHUSTF have caused the BWS to incur substantial costs and to take responsive actions to address the potential impacts to Oahu's drinking water. (Kawata Testimony at ¶¶ 22-28). The BWS submits that the issuance of a permit to operate the Red Hill USTs would directly impact the BWS' interests and threatens to continue to injure the BWS. (*Id.* at ¶ 38). In this contested case procedure, the BWS seeks a decision by the Department of Health denying the Navy's application for a permit to operate the RHUSTF until the Red Hill USTs are relocated or upgraded with a tank-within-a-tank secondary containment system that will provide relief to the BWS and its constituents by reducing the potential for further damage to Oahu's sole-source groundwater aquifer. (*Id.* at ¶ 41).

Sierra Club opposition and concerns

It is the view of the Sierra Club that water is a critical and precious resource that the Department of Health has a public trust duty to protect and preserve. The Navy's RHUSTF which has the capacity to store over 180 million gallons of petroleum fuel products presents an inherent and unacceptable risk of contamination to Oahu's sole-source aquifer and source of drinking water. The RHUSTF is an aging facility with a long history of fuel leakage. Available records reflect that from the 1940s to the present, the tanks at the Red Hill Bulk Fuel Storage Facility have leaked more than 178,434 gallons of fuel. (Golder Report at 50, attached to Testimony of DeNovio). The Sierra Club submits that past fuel releases at the RHUSTF have compromised and contaminated Oahu's groundwater resources and that the underground storage tanks will continue to leak into the future. The Sierra Club submits that the Navy has failed to take adequate measures to inspect, repair and upkeep the structural integrity of the underground storage tanks. Further, the Sierra Club submits that the Navy has failed to address the risks posed by potential seismic events and that the Navy ultimately has failed to establish that it can prevent releases of stored regulated substances for the operational life of the tank system and that it can operate its underground fuel storage facilities in a manner that is protective of the environment and critical water resources.

The Sierra Club notes that the Navy has replaced similar aging and at risk underground fuel storage tank facilities in California and Washington with aboveground storage tank facilities but has not done the same to replace the aging and leaking RHUSTF. The Sierra Club seeks denial of the Navy's application for an underground storage tank permit and an order from the Department of Health to ensure the prompt and orderly shutdown of those portions of the RHUSTF that pose the greatest threat to Oahu's groundwater resources and to impose stringent conditions necessary to protect groundwater resources.

EHA position and concerns

The Navy has failed to establish that its operation of the RHUSTF complies with corrosion protection requirements. The EHA submits that given the documented history of fuel releases at the RHUSTF site, the uncertainty associated with the Navy's groundwater model and the lack of treatment or recovery systems in place to address releases, the Navy is not able to establish that its operation of the RHUSTF is protective of human health and the environment. The EHA submits that it is appropriate that the DOH Director include conditions under HRS Sec. 342L-4 to address corrosion protection requirements pending the Navy's completion of an appropriate secondary containment system or relocation of the underground storage tanks.

Witnesses and Testimony.

The hearing officer received testimony from Navy witnesses: Blake Whittle, Danae Smith, John Floyd, Christopher Caputi, Frank Kern, Robert Jamond, Gaur Johnson, Darrel Frame, Curtis Stanley and Don Panthen. The hearing officer also received testimony from Board of Water Supply witnesses: Erwin Kawata, David Norfleet and Nicole DeNovio. The hearing officer also received testimony from Sierra Club witnesses: Jodi Malinoski, Neil Frazer and Laurence Thomas Ramsey. All the parties were given the opportunity to present all the witnesses and evidence that they wished.

Having heard the testimony of all witnesses, reviewed the exhibits offered into evidence and having considered the statutes and administrative rules applicable to this matter and the statements and arguments of counsel and Petitioners, the Hearing Officer makes the following findings of fact based on his assessment of the credibility of witnesses, his assessment and interpretation of exhibits found and determined to be relevant and material to the issues presented in this matter and his determination as to the weight to be given to the evidence received.

II. Findings of Fact

A, Laws and Regulations

Hawaii Constitution and the Public Trust Doctrine

1. The Hawaii Constitution guarantees that "[a]ll public natural resources are held in trust for the benefit of the people" and directs the State, and by extension the DOH, "to protect, control and regulate the use of Hawaii's water resources for the benefit of its people." In addition, Article XI, Section 9 of the Hawaii State Constitution guarantees the citizens of Hawaii the substantive "right to a clean and healthful environment." Haw. Const. Art. XI, §§ 1, 7 & 9.

2. The State and its Department of Health have a public trust responsibility to protect the water resources that they manage and to preserve the rights of present and future generations in the waters of the State. Public trust is the principle embedded in the Hawaii Constitution and State law that obligates the State to protect the purity of Hawaii's water:

> [T]he public trust doctrine applies to all water resources without exception or distinction. The state water resources trust thus embodies a dual mandate of 1) protection and 2) maximum reasonable and beneficial use. The public trust is, therefore, the duty and authority to maintain the purity and flow of our waters for future generations and to assure that the waters of our land are put to reasonable and beneficial uses. *Kauai Springs, Inc. v. Planning Comm'n of Cnty. of Kauai*, 133 Haw. 141, 172, 324 P.3d 951 (2014) (citations and internal quotation marks omitted).

3. Similarly, the BWS shares in the public trust responsibility to protect water resources and to manage and preserve the rights of present and future generations in the waters of Hawaii. The Revised Charter of the City and County of Honolulu, Article VII, Sections 7-103 and 7-117, empowers the BWS to manage, control, and operate its water systems and infrastructure and to take appropriate legal actions to protect the State's drinking water resources and the interests of the BWS and its constituents.

Federal and State Legislation

4. The State of Hawaii has adopted a State Water Code, HRS Ch. 174C. The State Water Code declares the policy of the State in HRS §174C-2 which states:

> **Declaration of policy.** (a) It is recognized that the waters of the State are held for the benefit of the citizens of the State. It is declared that the people of the State are beneficiaries and have a right to have the waters protected for their use.

(b) There is a need for a program of comprehensive water resources planning to address the problems of supply and conservation of water. The Hawaii water plan, with such future amendments, supplements, and additions as may be necessary, is accepted as the guide for developing and implementing this policy.
(c) The state water code shall be liberally interpreted to obtain maximum beneficial use of the waters of the State for purposes such as domestic uses, aquaculture uses, irrigation and other agricultural uses, power development, and commercial and industrial uses. However, adequate provision shall be made for the protection of traditional and customary Hawaiian rights, the protection and procreation of fish and wildlife, the maintenance of proper ecological balance and scenic beauty, and the preservation and enhancement of waters of the State for municipal uses, public recreation, public water supply, agriculture, and navigation. Such objectives are declared to be in the public interest.
(d) The state water code shall be liberally interpreted to protect and improve the quality of waters of the State and to provide that no substance be discharged into such waters without first receiving the necessary treatment or other corrective action. The people of Hawaii have a substantial interest in the prevention, abatement, and control of both new and existing water pollution and in the maintenance of high standards of water quality.
(e) The state water code shall be liberally interpreted and applied in a manner which conforms with intentions and plans of the counties in terms of land use planning. [L 1987, c 45, pt of §2; am L 1999, c 197, §1]

5. In 1984, the Federal government promulgated legislation, the Hazardous and Solid Waste Amendments of 1984, which created a federal program for the regulation of underground storage tanks. Those regulations provided that states could adopt their own regulatory programs by establishing state standards that least meet minimum federal standards.

6. In 1986, the Hawaii Legislature adopted a law that called upon the Department of Health (DOH) to "establish state standards to protect Hawaii's public health and the environment from ground and surface water contamination resulting from leaking underground storage tanks." Act 197, 1986 Hawai'i Session Laws At 340.

7. In 1989, the legislature adopted HRS Ch. 342L, Underground Storage Tanks. HRS §342L-31, which established a permit requirement for the installation and operation of underground storage tanks. HRS §342L-31(a) states:

> No person shall install or operate an underground storage tank or tank system brought into use after the effective date of the tank or tank system standards established in section 342L-32 unless a permit is obtained from the department and upon payment of a fee.

8. Consistent with the policy set forth in the State Water Code, State law governing underground storage tanks expressly provides that underground storage tank systems "shall be

designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system ...." H.R.S. § 342L-32(b)(1). Under Hawaii law, the term "release" in this context "includes, but is not limited to, any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an underground storage tank or tank system." H.R.S. § 342L-1.

9. Initially, the RHUSTF was not required to obtain a permit from the DOH. In 1992, the legislature amended the law to require DOH to adopt rules to ensure that pre-existing underground storage were upgraded and operated to prevent releases. Act 259, 1992 Hawai'i Session Laws. HRS §342L-32 set forth the following tank system standards:

> §342L-32 Standards for tanks and tank systems.
>
> (a) The department shall adopt standards under chapter 91 which shall apply to underground storage tanks and tank systems.
>
> (b) Underground storage tank and tank system standards shall include, but are not limited to the following specifications:
>
> **(1) The tank and tank system shall be designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system;**
>
> **(2) The material used in the construction or lining of the tank or tank system is compatible with the substance to be stored; and**
>
> **(3) Existing underground storage tanks or existing tank systems shall be replaced or upgraded not later than December 22, 1998, to prevent releases for their operating life.**
>
> (emphasis added) [L 1989, c 212, pt of §6; am L 1992, c 259, §22]

10. In July 2018, DOH adopted new rules, effective July 15, 2018, regulating underground storage tanks. HAR §§ 11-280.1-10(a)(1)(A) provides (in part) that:

> **(a) The requirements of this chapter apply to all owners and operators of an UST system as defined in section 11-280.1-12 except as otherwise provided in this section.**
> **(1)** Airport hydrant fuel distribution systems, **UST systems with field-constructed tanks**, and UST systems that store fuel solely for use by emergency power generators must meet the requirements of this chapter as follows:
>
> **(A)** Airport hydrant fuel distribution systems and **UST systems with field-constructed tanks must meet all applicable requirements of this chapter, except that those installed before the effective date of these rules must meet the applicable requirements of subchapters 4, 8, 10, and 12 no later than one year after the effective date of these rules**. (emphasis added) *Haw. Code R. § 11-280.1-10*

HAR §11-280.1-323 provides further that:

(a) No person shall install or operate an UST or tank system without first

obtaining a permit from the director.
(b) The director shall approve an application for a permit only if the applicant has submitted sufficient information to the satisfaction of the director that the technical, financial, and other requirements of this chapter are or can be met and the installation and operation of the UST or tank system will be done in a manner that is protective of human health and the environment.
(c) A permit shall be issued only in accordance with chapter 342L, Hawaii Revised Statutes, and this chapter, and it shall be the duty of the permittee to ensure compliance with the law in the installation and operation of the UST or tank system.
(d) Issuance of a permit shall not relieve any person of the responsibility to comply fully with all applicable laws. (emphasis added)
Haw. Code R. § 11-280.1-323 [Eff 7/15/2018] (Auth: HRS §§ 342L-3)

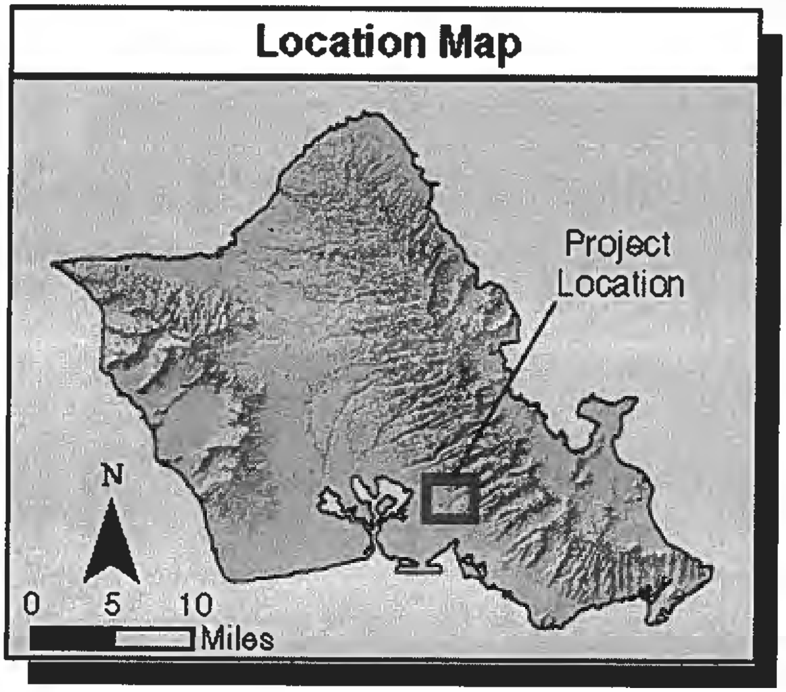
11. In addition, HAR §11-280.1-328 permits the Director of the Department of Health to impose conditions determined to be reasonably necessary. HAR §11-280.1-328 states:

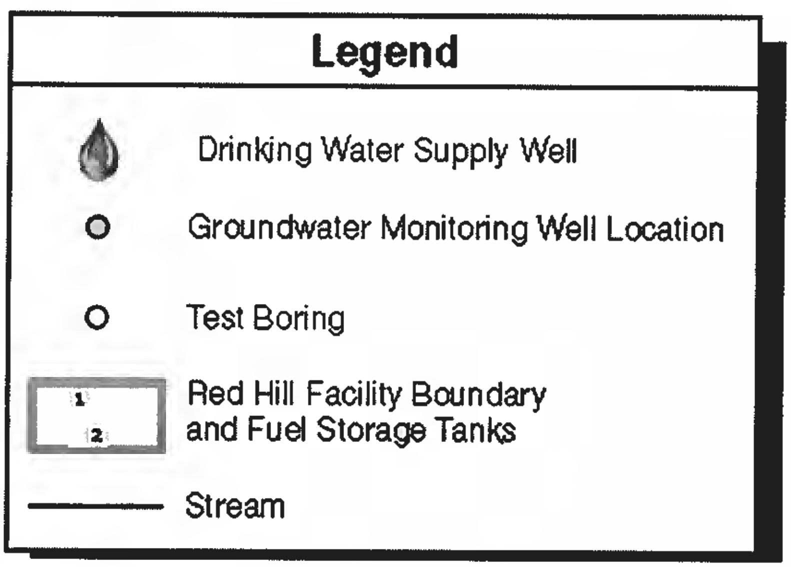
> **Permit conditions.** The director may impose conditions on a permit that the director deems reasonably necessary to ensure compliance with this chapter and any other relevant state requirement, including conditions relating to equipment, work practice, or operation. Conditions may include, but shall not be limited to, the requirement that devices for measurement or monitoring of regulated substances be installed and maintained and the results reported to the director, all costs and expenses to be borne by the applicant.

B, Factual Background and Context

1. Red Hill is located on the island of Oahu, Hawaii, approximately 2.5 miles northeast of Pearl Harbor along the western edge of the Koolau Range situated on a topographic ridge that divides the Halawa Valley and Moanalua Valley. The RHUSTF is bordered to the south by the Salt Lake volcanic crater and occupies approximately 144 acres of land. The surface topography varies from approximately 200 feet to 500 feet above mean sea level. (Exhibit B-2.) The aerial map on the following page shows the general area and layout of the RHUSTF and nearby features.


Camp H. M. Smith
(U.S. Marine Corps)
North Hālawa Stream
BWS Halawa
Shaft (2354-01)
North Hālawa
Valley
Hālawa
Quarry
South Hālawa Stream
South Hālawa
Valley
Red Hill
Ridge
H-3 Freeway
Hālawa
Correctional
Facility
Hālawa
Industrial
Park
Animal
Quarantine
Station
BHMW13
BHMW04
BHTB01
RHMW06
RHMW11
RHMW07
RHMW14
RHMW08
RHMW03
RHMW01
RHMW02
RHMW10
OWDFMW01
RHMW15
Navy Red Hill
Shaft (2254-01)
RHMW19
Moanalua
Valley
H-201 (Moanalua) Freeway
Moanalua
Village
Moanalua
Golf
Course
Moanalua Stream
Tripler Army
Medical Center
BWS Moanalua Wells
(2153-10, -11, -12)





2. The RHUSTF contains 20 underground storage tanks depicted by 20 yellow dots on the aerial map on the preceding page. The three major drinking water supply wells nearest to the

RHUSTF are depicted by a blue water drop icon on the aerial map above. The Navy Red Hill Shaft is the drinking water supply well operated and used by the Navy to supply drinking water to the nearby Pearl Harbor Hickam joint base facility. The Halawa shaft and Moanalua Wells are drinking water supply wells operated by the Board of Water Supply. Also depicted by light blue dots in the aerial map above are the locations of some but not all of the various groundwater monitoring wells installed and maintained by the Navy in the vicinity of the RHUSTF. Additional groundwater monitoring wells operated and maintained by the BWS which are near the two BWS drinking water wells (the Halawa shaft and the Moanalua Wells) are not depicted in this particular aerial map.

3. The RHUSTF is the state's largest field-constructed underground fuel tank complex. It is owned and operated by the United States Department of the Navy (Navy). (Exhibit B-1.) Currently, the Navy stores marine diesel (F-76) and two types of jet fuel, JP-5 and F-24, at Red Hill. (Testimony of Danae Smith ("Smith Testimony") at NAVY0027318.) Historically, the tanks have been used to store diesel oil, Navy Special Fuel Oil (NSFO), Navy distillate (ND), F–76, aviation gas (AVGAS), motor gas (MOGAS), JP–5 and JP–8. Over time, all tanks have been used store a variety of fuel. (Exhibit B–10, 2008 Groundwater Protection Plan). Two of the tanks have been removed from service (tanks 1 and 19), but not officially closed. (Kawata Testimony at ¶ 13; Exhibit B-1.) Another two to three tanks are generally empty as part of the Navy's ongoing clean, inspect, and repair program. The Navy generally stores fuel in 14 or 15 tanks at Red Hill, with a total capacity of over 187 million gallons of fuel. (Norfleet Expert Report at 3.)

4. The Red Hill USTs sit directly above Oahu's federally designated sole-source groundwater aquifer, the Southern Oahu Basal Aquifer, from which the BWS supplies 77 percent of the total island-wide water supply. In 1987, the United States Environmental Protection Agency ("EPA") determined that this aquifer is the "principal source of drinking water" for the island, and that "[i]f contaminated, would create a significant hazard to public health." Southern Oahu Basal Aquifer in the Pearl Harbor Area at Oahu; Principal Source Aquifer Determination, 52 Fed. Reg. 45496, at 45497 (Nov. 30, 1987). The EPA found:

> 1. The Southern O'ahu Basal Aquifer currently serves as the "principal source" of drinking water for approximately 763,000 permanent residents within the Pearl Harbor area.
> 2. There is no existing alternative drinking water source, or combination of sources, which provides fifty percent or more of the drinking water to the designated area, nor is there any demonstrated available alternative future source capable of supplying the area's drinking water needs.
> 3. Although the water quality over most of the study area is satisfactory for domestic use, widespread potential exists for degradation. The main threats to the quality of the basal aquifer include salt water intrusion; recharge from excess irrigation; industrial, military and urban sources; landfills; chemical spills; poorly situated injection wells; and cesspools. (Exhibit S-4 at 45497)

C, Geology and Subsurface Environment

1. The RHUSTF was constructed underground. The underground storage tanks were constructed in caverns excavated into geologic basaltic rock formations. The engineered underground storage tanks and associated infrastructure is surrounded by the Ko'olau formation, a geologic rock formation comprised of a series of fractured rock layers formed from basaltic lava flows. The lava flows range in thickness from several feet to 80 feet, averaging about 10 feet thick. The lava flows are highly variable with each lava layer having flow and transport characteristics. Because of the layered nature of the lavas, fluid flow generally prefers to follow the layers rather than moving vertically through the layers. (Golder Report, Evaluation of Hydrology, Groundwater Flow and Transport, Dec. 29, 2020, Revision 1, attached to Updated Testimony of DeNovio)

2. The main types of lava present at the RHUSTF include both pahoehoe and a'a lavas interspersed with a'a clinker beds and lava tubes. The permeability of these lavas once cooled into rock formations is variable and are described as follows

- Pahoehoe: formed lava flows that spread out. They may sometimes be thick accumulations of lava with very little fracturing. Most pahoehoe lava contains voids caused by cooling or breaks in the rock due to local variability at the time of the eruption. Pahoehoe flows are likely to have more permeability along the layers (horizontally) rather than perpendicular to it (vertically).
- A'a: lava flows typically containing a surface of course rubble (clinker) in a central core of massive rock several feet to tens of feet thick. As these lava flows harden, they tend to break up into angular rubble. Permeability tends to be low.
- Clinker: layers of course, fragmented (gravelly) rock that often forms on the top of a'a flows. These units typically provide preferential (fast) paths for fluid through the subsurface system.
  (Golder Report, Evaluation of Hydrology, Groundwater Flow and Transport, Dec. 29, 2020, Revision 1, attached to Updated Testimony of DeNovio).

3. The multiple layers of variable pahoehoe and a'a lava flows, interspersed with clinker beds and occasional lava tubes, irregular fracturing and different permeability characteristics present a very complex, non-uniform geology of the earth underlying and surrounding the underground storage tanks. . (Golder Report, Evaluation of Hydrology, Groundwater Flow and Transport, Dec. 29, 2020, Revision 1, attached to Updated Testimony of DeNovio). Consequently, the development of accurate and reliable groundwater flow models or a fate and transport model to determine where released fuel from the underground storage tanks at the RHUSTF would or might flow is extremely difficult.

D, Groundwater Protection Concern

1. The storage of up to 187 million gallons of fuel, 100 feet above Oahu's principal source of drinking water is inherently dangerous." (Kawata Testimony. at ¶ 34; Exhibit B-21 at

BWS006270.) The Department of Health concurs with this view. (Exhibit S-5 at p. 16.) Currently, fuel releases from the Red Hill facility have not caused any measurable impacts to the drinking water supplied by the BWS. (Hr'g Tr. Vol. V, Testimony of Erwin Kawata, 982:24-983:25.) Given that the drinking water supply and the groundwater under the Red Hill facility come from the same aquifer (DeNovio Reply Expert Report, at 3), the drinking water supply could be impacted in the future.

2. The protection of Hawaii's groundwater resources became an issue of heightened importance in the 1980s. At that time, it had been discovered that Heptachlor, an organic compound used as a pesticide by the agricultural industry had contaminated groundwater resources in central Oahu. In a groundwater protection report prepared by the Water Resources Research Center of the University of Hawaii at Manoa it was reported that:

> Until a few years ago, Hawaii groundwater contamination problems were few in number and investigations comparatively minor in scale (Lau and Mink 1987). The quality of much of Hawaii groundwater is outstanding; thus, water can be consumed safely without prior treatment. For this and other reasons, groundwater has been the prime source for municipal and general domestic supply throughout Hawaii, especially on Oahu, the most populous island in the State. It is not surprising, then, that the discovery of volatile organic chemicals in a number of wells in the Pearl Harbor aquifer, one of the principal sources of portable groundwater in Oahu, was a shock to the public as well as to the scientific and engineering community. (Exhibit B–4, Aquifer Identification and Classification for Oahu: Groundwater Protection Strategy for Hawaii, November 1987 (revised 1990), P. 1.)

3. In this case, the Program Administrator of the Water Quality Division at the BWS testified that:

> Previous to these findings of groundwater contamination in Oahu, the possibility of pesticide and other contamination of groundwater in Hawaii was believed to be remote based on the theory that Oahu's soil and geology would prevent contamination from reaching the groundwater. Since then, a number of groundwater wells on Oahu, and the neighbor islands, have been found to contain pesticide contamination. The data has dramatically reshaped earlier understanding of the soil's protective properties and brought with it new understanding and concerns about the vulnerability of our island's aquifers to contamination by activities taking place on the surface of the land and in the subsurface. (Updated written testimony of Irwin M. Kawata at ¶ 5)

<u>E, Petroleum Contaminant Constituents, EALs and SSRBLs as monitoring guides.</u>

1. It is certainly a theoretical possibility that escaped petroleum fuel product could flow through the earth and basaltic rock material under the RHUSTF and reach the groundwater resources contained in the aquifer

below. In that circumstance, because petroleum fuel products are lighter and less dense than water, petroleum fuel that reaches the groundwater resources will float above the water. With the combined effects of volatilization (evaporation), absorption into concrete earth and basaltic rock materials and bioremediation by various microbes, it is also possible, and more likely, that decomposed constituents of petroleum fuel can be found to have reached the groundwater resources in the aquifer below.

2. The Department of Health has established Environmental Action Levels (EALs) for hundreds of potential contaminants including lists of potential petroleum constituents that can be monitored from groundwater samples. The state DOH has issued guidance to address environmental concerns at sites with contaminated soil and groundwater. In 1996, the state DOH issued a guidance document entitled "Risk-Based Corrective Action and Decision Making at Sites With Contaminated Soil and Groundwater" which was updated in 2005 by the issuance of a technical report "Screening For Environmental Concerns at Sites With Contaminated Soil and Groundwater". These documents established Environmental Action Levels (EALs) for a long list of contaminants commonly found in soil and groundwater at sites where releases of hazardous substances have occurred. The EALs were screening levels established for each listed contaminant measured in parts per billion (ppb), micrograms per liter (ug/L) or micrograms per kilogram (mg/kg).

3. The EALs were developed to help address the following environmental goals for surface water and groundwater:

- Protection of drinking water resources
- Protection of aquatic habitats (discharges to surface water)
- Protection against vapor intrusion into buildings
- Protection against gross contamination conditions.

And for soil:

- Protection of human health (direct-exposure)
- Protection against vapor intrusion into buildings
- Protection against leaching and subsequent impacts to groundwater
- Protection of terrestrial (nonhuman) habitats
- Protection against gross contamination conditions.

4. These guidance documents addressed the complex consideration of the appropriate steps and actions to be taken in response to addressing soil and groundwater contamination by a wide range of chemicals or compounds presenting potential environmental and health risk concerns. The DOH guidance presented a three-tiered process. Tier 1 was an initial measurement or screening step. The presence of a chemical at concentrations in excess of an EAL does not necessarily indicate that adverse impacts to human health or the environment are occurring; this simply indicates that a potential for adverse risk may exist and that additional evaluation is warranted. If the initial measurement or screening reflected the presence of a contaminant at values higher than the EAL then consideration will be given as to whether a Tier 2 action was appropriate.

At Tier 2, site-specific conditions would be taken into account and Site Specific Risk Based Levels (SSRBL) would be established for further investigation and inquiry. Following such further investigation and inquiry, any additional information developed would then be taken into consideration to determine whether a Tier 3 environmental assessment would be appropriate.

5. The DOH guidance documents caution that:

- Use of the EALs is recommended not mandatory. The document may especially be beneficial for use at sites with limited impacts, however, where preparation of a detailed environmental assessment may not be warranted or feasible due to time and cost constraints.
- The EALs are considered to be conservative. Under most circumstances, and within the limitations described, the presence of a chemical in soil, soil gas or groundwater at concentrations below the corresponding EAL can be assumed to not pose a significant, long-term (chronic) threat to human health and the environment.
- Additional evaluation will generally be necessary at sites where a chemical is present at concentrations above the corresponding EAL.
- Active remediation may or may not be required, however, depending on site-specific conditions and considerations.

6. The DOH guidance documents also cautioned that:

1. The guidance document is not intended to establish policy or regulation.
2. The Environmental Action Levels presented are specifically not intended to serve as a stand-alone decision-making tool or as a rule to determine if a waste is hazardous under the state or federal regulations.
3. EALs presented for chemicals that are known to be highly biodegradable in the environment may in particular be overly conservative for use as final cleanup levels (e.g., many petroleum- related compounds).
4. Use of the EALs as cleanup levels should be evaluated in view of the overall site investigation results and the cost/benefit of performing a more site specific risk assessment.
5. Within noted limits, risks to human health and the environment can be considered to be insignificant at sites where concentrations of chemicals of concern do not exceed the respective EALs.
6. The presence of chemicals at concentrations above the EALs does not necessarily indicate that a significant risk exists at the site. It does, however, generally indicate that additional investigation and evaluation of potential environmental concerns is warranted. (Hawaii Department of Health, <u>Screening For Environmental Concerns At Sites With Contaminated Soil and Groundwater</u>, May 2005, Updated August 2006.)

(See also, Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)

7. The Department of Health has also published related guidance, "Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater" which describes how to use and interpret EALs. The DOH guidance is a technical report that can be used to expedite the identification of potential environmental hazards at sites with contaminated soil and groundwater as well as assist in the cleanup and redevelopment of these properties. The most current edition of the *EHE Guidance* is dated Fall 2017. Environmental Action Levels (EALs) were established by the DOH based on conservative risk-based exposure assumptions to the environment (including humans and aquatic life) as well as other factors such as taste, color, etc. (that may not necessarily be harmful to humans). EALs are concentrations of contaminants in soil, soil gas and groundwater below which the contaminants are assumed to not pose a significant threat to human health or the environment. Exceeding the Tier 1 EAL does not necessarily indicate that contamination at the site poses environmental hazards. It does, however, indicate that additional evaluation is warranted. This can include additional site investigation and a more detailed evaluation of the tentatively identified environmental hazards. These actions can vary, depending on the hazard present and site conditions. EALs:

1. serve as a screening method or an indicator that a health or environmental threat may exist and should be addressed or evaluated further.
2. are concentrations of contaminants in soil, soil gas, and groundwater that are used in decision making throughout the EHE process.
3. can be used as screening levels and evaluation starting points to be put into context of the specific site and other contamination found.
4. are NOT regulatory cleanup standards.

8. Exceeding an EAL for a specific chemical does not necessarily indicate that the contamination poses significant environmental concerns, only that additional evaluation is warranted. (EHE Guidance and Exhibit S-5, Red Hill Storage Facility Task Force Report, 2015).

Such guidance states:

- "Exceeding the Tier 1 EAL for a specific chemical does not necessarily indicate that the contamination poses significant environmental concerns, only that additional evaluation is warranted."
- "The Tier 1 EALs presented in the lookup tables are NOT regulatory "cleanup standards"."

9. When additional evaluation is warranted as specified above, the risks at the specific site are studied and Site Specific Risk Based Levels (SSRBLs) developed and submitted to the regulators. Data from a particular site should also be compared against the SSRBLs approved for the site.

10. In the Navy's 2008 Groundwater Protection Plan, Site-Specific Risk-Based Levels (SSRBLs)

were established for the RHUSTF and these levels were approved by DOH. These SSRBLs raised the Environmental Action Levels (EALs) from 100 ppb to 4500 ppb for TPH (d), for instance. Any exceedances of this level would evoke increased monitoring, notification and other actions. In addition, for the RHUSTF, the following SSRBLs were approved:

- SSRBL for benzene = 750 ug/1 in groundwater
- SSRBL for JP8/5 = 280,000 ppb per volume in soil vapors
- SSRBL for diesel = 14,000 ppb per volume in soil vapors.

(For an explanation of EALs and SSRBLs, see Appendix, How Red Hill Facility Site-Specific Risk-Based Levels Were Established in the Task Force Report, Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015.)

F. Overall History of Unintended Petroleum Releases at the RHUSTF

1. There have been historic releases of fuel from the RHUSTF. Historical records and accurate documentation of fuel releases during the early decades of operation of the RHUSTF are poor and incomplete. The total amount of fuel released from the RHUSTF, both attributable to the January 2014 event and historical releases is unknown. (Administrative Order on Consent, Exhibit N-1.) For the period of the 1940s until 1995, records of fuel releases from the RHUSTF were designated as classified information and thus not publicly reported or available. During such period, information concerning unintended fuel releases from the RHUSTF was not reported to the public or public agencies.

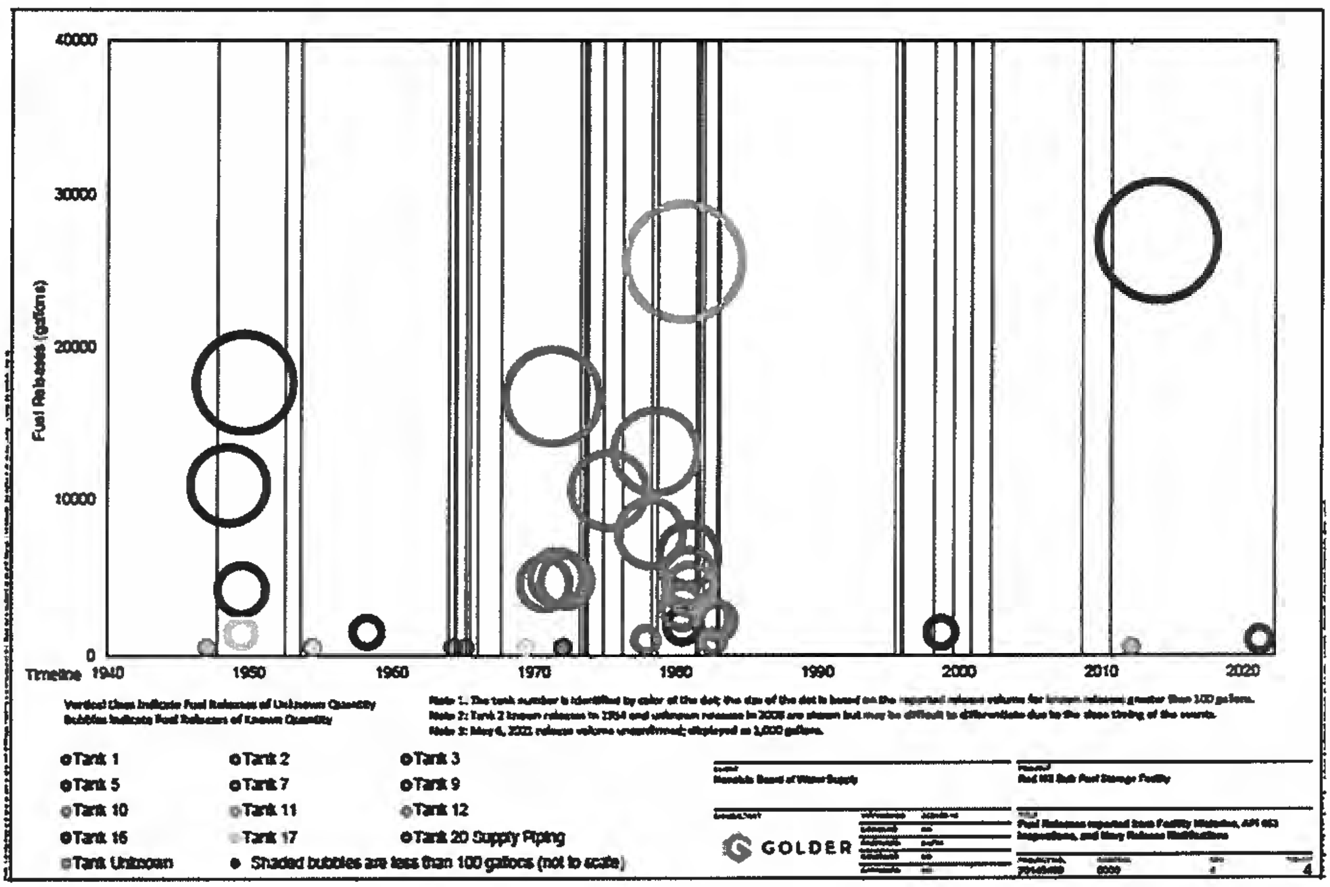
2. Some investigations (Ogden, 1995; AMEC, 2002; TEC, 2007) conducted between 1995 and 2007 indicated that "past inadvertent releases of [petroleum, oils and lubricants] have reached the basal aquifer'. (Ex. B-10, p. 1-2).

3. A historic review of available documentation of fuel releases from the RHUSTF reflects that at least 73 fuel release events have occurred or are believed to have occurred as documented by the Navy or reported in other sources. A release history table, compiled or reported by Golder Associates Inc. and DNV GL USA, Inc., setting forth the tank number, year dates, type of fuel and quantities of released fuel (if known) for each of the 72 fuel release events is attached hereto as Attachment A. (Note: The Golder Report addressed information available through December, 2020. In May, 2021, another release incident occurred which increases the total documented release events to 73 in number.)

4. However, the Navy provided information clarifying and contradicting the contention of the DeNovio/Golder Associates report of historical fuel releases. According to the Navy's analysis of the records, fourteen of the claimed 72 incidents of fuel releases are not determinative record evidence of fuel releases. Some are records of welding repairs that do not necessarily reflect that there was fuel released or relate to actions taken at tanks that according to the records were empty and did not contain fuel at the time. In addition, 23 of the 72 claimed release

incidents relate to tank 1 which has been removed from service since 1999. (Testimony of Frame). The Navy's clarification and asserted contradiction of these certain details of the DeNovio/Golder Associates analysis was not controverted. The Hearing Officer notes that the incidents cited by the Navy generally refer to claimed release incidents for which there is no documented quantity of fuel being released. So, substantively, the general thrust of the DeNovio/Golder Associates analysis of historical release events may not be as high as 72 incidents but the documented events where quantities of fuel recorded as being released are not controverted. Historically, the record reflects that there have been releases of fuel during the period from the 1940s to 2014 in the approximate quantities reflected in the DeNovio/Golder Associates analysis.

5. Dr. Nicole M. DeNovio prepared the following graphical "bubble" chart showing the general dates of occurrence and quantities of fuel believed to have been released during the period of 1940 through 2021. (Updated Supplemental Testimony of Nicole M. DeNovio (July 13, 2021) and Golder Associates Inc. report dated December 29, 2020, Revision 2, and testimony of David M. Norfleet, Evaluation Report of DNV GL USA, Inc., Appendix C)



6. From the information presented in the record and this chart, it is noted that:

1. The total number of actual fuel release incidents and the quantity of fuel released from the RHUSTF are not known and are not determinable due to the incompleteness of available records. It is also not determinable whether there have been more fuel release incidents associated with the RHUSTF during its operational life.
2. The great majority of documented fuel releases have occurred during the period of the 1940s to the early 1980s.
3. 30 of the 73 release incidents related to releases detected by a telltale system that had been installed as part of the original design and construction of the underground storage tank facility. The telltale system was a design feature intended to detect and collect fuel releases from behind the steel liners of the underground storage tanks. The original telltale system was installed during construction of the tanks, and it was used from 1943 through 1960 to indicate fuel loss. During a project which spanned from 1960 through 1962, the original telltale system was removed from tanks 17 through 20 and an upgraded tell-tale system was installed in those tanks. During a 1970 through 1972 project, upgraded tell-tale systems were also installed in tanks 5, 6, and 12. However, "[t]he original and upgraded tell-tales were completely removed from tanks 1-16 in 1978-1982, and from tanks 20 and 17 in recent years." (B-6 at BWS001128-29, 1305). There has been no documented engineering analysis of past fuel releases identified by the telltale leak detection system to determine whether the reported fuel releases were actual releases or failures of the telltale system (Testimony of Commander Darrel Frame; Tr. 548:12-22)
4. For 38 of the 73 release incidents, it is not known what quantity of fuel, if any, was released.
5. After 1983, there are four documented events of fuel releases, where quantities of released fuel is documented, one in 1998 involving 1469 gallons, one in 2012 involving 6 gallons, one in 2014 involving an estimated 27,000 gallons of fuel released for a total of 28,475 gallons for the first three release events. Then in 2021 there was a release of approximately 1,000 gallons of fuel with most of the released fuel captured and some undetermined small quantity of the released fuel getting into the environment under the RHUSTF.
6. Of the 73 fuel release events, 23 of the events or about 32% of the total number of events involved tank 1. Tank 1 was taken out of service sometime after September, 1999.
7. Of the 73 fuel release events, six involved quantities of 10,000 gallons to 30,000 gallons of fuel released. Five of those significant releases occurred prior to 1980 and one of those significant releases occurred in 2014.
8. In round numbers, prior to 1983, approximately at least 150,000 gallons of fuel was released from the RHUSTF and since 1983 approximately 30,000 gallons of fuel has been released from the RHUSTF.
9. With the exception of the 2014 fuel release incident which was extensively investigated, the reasons for or causes of each of the other incidents of fuel release (whether releases are due to operational error, leaks from nozzles or pipelines, equipment monitoring errors, leaks through corrosion of the tank steel liners, etc.) are

generally not identified.

7. Dr. Nicole M. DeNovio also prepared the following graph showing the cumulative quantity of fuel believed to have been released during the period of 1940 through 2020. (Testimony of Nicole M. DeNovio, Golder Associates Inc. report dated December 29, 2020, Revision 2, p. 22 and testimony of David M. Norfleet, Evaluation Report of DNV GL USA, Inc., Appendix C)

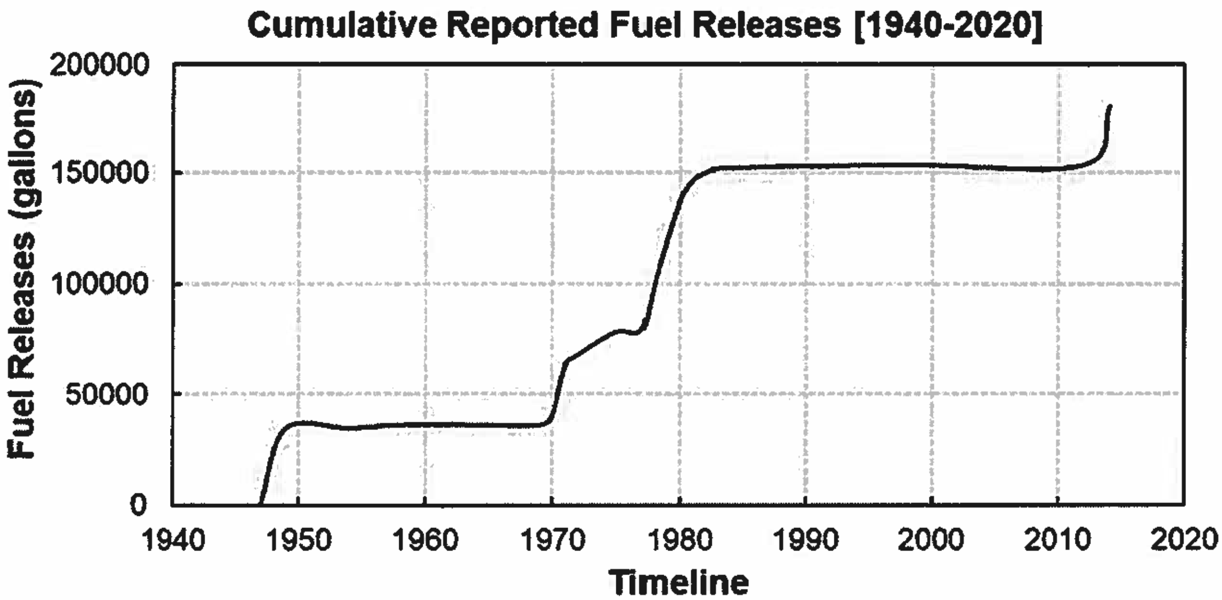


Figure 2.2-2 Cumulative fuel release volumes as reported from Facility histories, API 653 inspections, Navy release notifications, and Navy witness testimony.

8. Dr. DeNovio notes that because it is likely that not all incidents of fuel releases have been documented and not all documented release have volume estimates, the total release volume reflected in this chart should be considered a lower estimate which likely underrepresents the total volume of fuel released from the RHUSTF. From this graph, the Hearing Officer notes that:

a. The total quantity of documented fuel releases from the facility over its approximately 80 years of existence is around 180,000 gallons.
b. Significant quantities of fuel releases occurred during the three distinct periods of time, the 1940s, the decade between 1970 and the early 1980s and in 2014.
c. In the 1940s, approximately 35,000 gallons of fuel was documented to have been released from the facility. This quantity represents approximately 20% of the total documented fuel releases from the facility during its period of operation.
d. Between 1970 and 1983, approximately 115,000 gallons of fuel was documented to have been released from the facility. This quantity represents approximately 64% of the total documented fuel releases from the facility during its period of operation.

e. Of the approximate 180,000 gallons of known fuel releases into the environment, 150,000 gallons or approximately 84% of the quantity of fuel was released between the 1940s and 1983.
f. During the 30-year period between 1983 and 2013, there has been minimal releases of fuel from the facility.
g. In 2014, the documented release of 27,000 gallons of fuel represents approximately 15% of the total documented fuel releases from the facility during the period of its operation.

G. The RHUSTF and Fuel Release Contamination Concerns

1. The potential contamination of groundwater resources due to the presence or release of petroleum fuel products is a matter of significant concern to the DOH, EPA, BWS, Navy, the Sierra Club, Legislature and the public. From available records, it is known that there have been episodic fuel release incidents from the RHUSTF during its nearly eighty years of operation. Due to the previously classified status of the RHUSTF, public access and independent investigations of fuel releases were not conducted before 1995. Early efforts to examine and investigate the extent and impact of historical fuel releases included the following:

a. During the period of 1998 to 2002, the examination of colorings obtained from angle borings below each active tank indicated that light non-aqueous phase liquid (LNAPL) (organic chemicals such as gasoline, jet fuel, diesel and kerosene that are less dense than water and thus expected to "float" on top of water) had occurred from several of the tanks. However, the Navy was unable to determine the timing and magnitude of such releases.
b. In 2000, a deep groundwater monitoring well (HDMW 2253-03) was installed 1000 feet north of tank 13 to monitor the groundwater between the RHUSTF and the BWS Halawa Shaft.
c. In 2001, the monitoring well (RHMW-01) was installed inside the lower access tunnel southwest of tanks 1 & 2.
d. In 2001, soil vapor samples were also collected and analyzed from monitoring locations below tanks 6, 13 and 17.
e. The Navy began a long-term groundwater monitoring program in February 2005, when the Navy's network consisted of four monitoring wells (RHMW01 through RHMW04. (Golder Report, Evaluation of Hydrology, Groundwater Flow and Transport, Dec. 29, 2020, Revision 1, attached to Updated Testimony of DeNovio)

2. In 2008, working in conjunction with the State DOH, the Navy developed a Groundwater Protection Plan to mitigate the risk associated with inadvertent releases of fuel from the RHUSTF. The plan reported that previous environmental site investigations at the RHUSTF show that past inadvertent releases have contaminated the fractured basalt, basal groundwater, and soil vapor beneath the RHUSTF with petroleum hydrocarbons. In response to such findings, the State of Hawaii DOH requested that the Navy conduct a detailed environmental site

investigation and develop a groundwater model to evaluate the risk associated with petroleum releases to the groundwater and to prepare a contingency plan to protect the Navy's drinking water well 2254–01 which provides drinking water to the Navy's Pearl Harbor Water System.

3. The Navy's 2008 Groundwater Protection Plan was approved by the Hawaii DOH. At that time (2008), the RHUSTF was not subject to many of the federal and state regulations relating to underground storage tanks. However, the State DOH strongly recommended that the Navy install a leak detection system to protect its drinking water well 2254– 01. As of and at the time of the groundwater protection plan report (2008), the Navy undertook the following actions:

a. Leak detection. To continue evaluating leak detection methods for the RHUSTF;
b. Groundwater monitoring. Implemented a groundwater monitoring program in which groundwater samples from the Navy's three groundwater monitoring wells (RHMW01, RHMW02 and RHMW03) that had been installed within and immediately proximate to the footprint of the RHUSTF and from the Navy's drinking water well 2254 – 012 are analyzed for specific petroleum compounds and concentrations that may indicate that petroleum fuel may be in direct contact with groundwater beneath the RHUSTF; and
c. Soil vapor monitoring pilot study. To conduct a soil vapor monitoring pilot study under seven of the eighteen then active underground storage tanks.

(Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)

H. Groundwater Monitoring (2008)

1. Both the Navy and the BWS conduct regular groundwater monitoring in the areas under and in the vicinity around the RHUSTF. The purpose of groundwater monitoring is to evaluate groundwater quality to determine whether contamination presents a risk to consumers of the water resources in the underground aquifers. As of the time of the Navy's 2008 Groundwater Protection Plan, the Navy had six monitoring wells in the area of the RHUSTF. (See the following map, Figure 1-4 from Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)

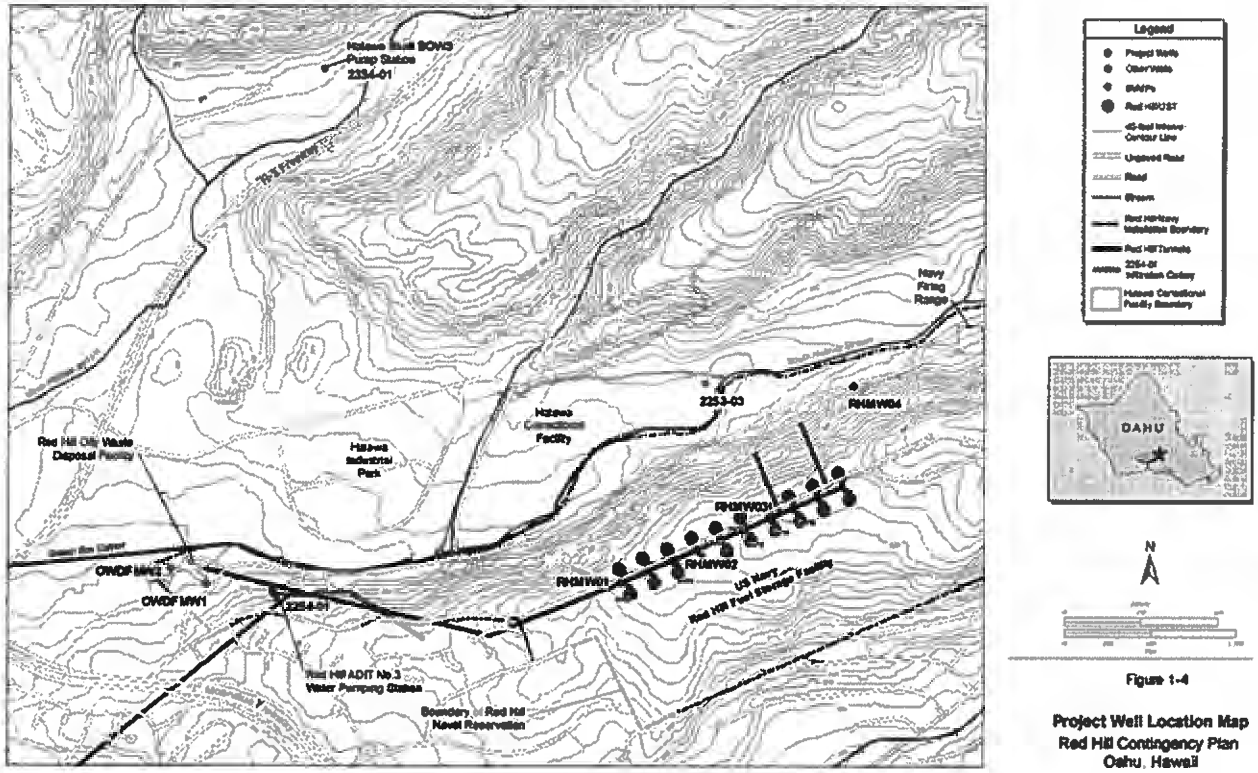


Figure 1-4

Project Well Location Map
Red Hill Contingency Plan
Oahu, Hawaii

- Three of the Navy's six groundwater monitoring wells (RHMW01, RHMW02 and RHMW03) are within the footprint of the tank farm and are located within the lower access tunnel of the underground storage tank facility, RHMW01 located at the southwest edge of the tank farm between tank 1 and the Navy's drinking water well 2254 – 01. RHMW01 is hydraulically downgradient from the RHUSTF and is considered to be the last sentry well between the tank farm and the Navy's drinking water well 2254-01. The Navy contemplated that RHMW01 would be the first point of detection for fuel releases occurring from tanks 1 through 6. (This presumes or assumes that if liquid petroleum fuel is released into the ground from the RHUSTF it would flow down gradient,) RHMW02 is approximately 600 feet up gradient of RHMW01 and was viewed to be the first point of detection for fuel releases occurring from tanks 7 through 14. RHMW03 is approximately 800 feet up gradient from RHMW02 and 600 feet down gradient from tanks 19 and 20 and was considered the first point of detection for fuel releases from tanks 15 through 20. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008, Section 3.2.2.)
- The remaining three groundwater monitoring wells are RHMW04, located to the north/northeast of the tank farm and two (OWDF MW1 and OWDF MW2 are located near the Oily Waste Disposal Facility to the east of the tank farm. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)

2. The Board of Water Supply also has groundwater monitoring wells near and in the vicinity around the RHUSTF. (See the following map.)

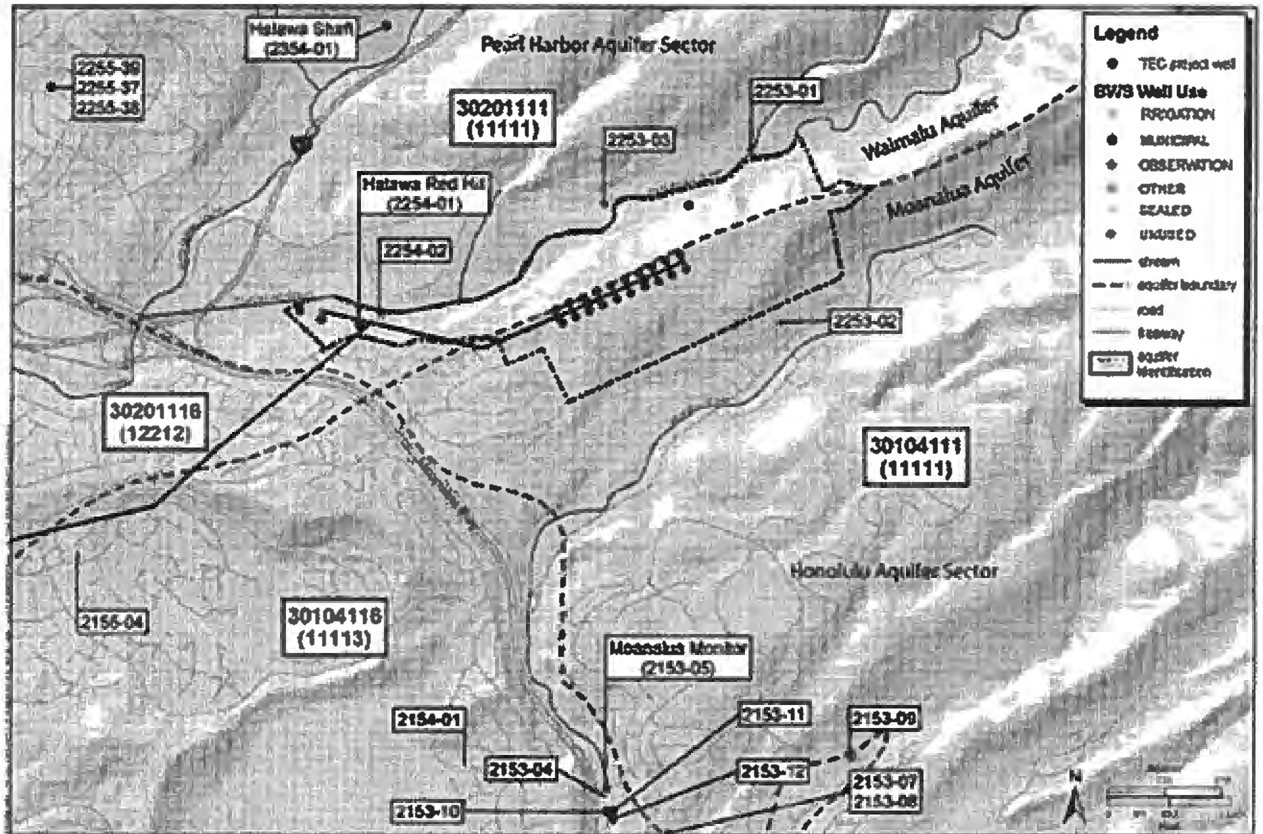


Figure 1-3
Area Wells and Aquifer Systems
Red Hill Contingency Plan
Oahu, Hawaii

This map shows the location of the three drinking water source wells in the Red Hill and Moanalua vicinity. Two BWS drinking water source wells are the Moanalua Monitor and Halawa Shaft wells. The third drinking water source well is the Navy's Halawa Red Hill Shaft (2254-01). The map also shows the location of more than a dozen monitoring wells in the area. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)

I. Soil Vapor Monitoring (2008)

1. A soil vapor monitoring system is one part of the Navy's system to monitor the release of fuel product from the underground storage tanks. As of the time of the Navy's 2008 Groundwater Protection Plan (Exhibit B-10), there had been core sample borings made into the basaltic soil and rock under some of the tanks in the RHUSTF. Borings were made at an angle of 10 to 15° from the floor of the lower tunnel adjacent to some of the underground storage tanks in

the RHUSTF. Boreholes were made to a distance of approximately 125 feet from the point of entry and ran from the inside edge to the outside edge of each underground storage tank to a depth of approximately 10 to 30 feet below the bottoms of each underground storage tank. (Testimony of Stanley, Facility Environmental Report, Appendix D, "Direct Aerobic NSZD of a Basaltic Vadose Zone LNAPL Source in Hawaii", Article in Journal of Contaminant Hydrology, Oct. 2020)

2. As part of the Navy's 2008 Groundwater Protection Plan, a soil vapor monitoring system was implemented. The soil vapor monitoring system contemplated the placement of two or more probes located at various points (short, middle and deep) in the existing boreholes beneath seven of the RHUSTF tanks (2, 6, 10, 11, 12, 14 and 16). The Navy contemplated and subsequently installed additional boreholes under another eleven of the underground storage tanks or a total of eighteen of the twenty tanks (tank 1 and tank 19 had at that time been placed out of service indefinitely). The soil vapor monitoring probes were used to draw vapor from the areas under the front, middle and back of the tanks. The vapor samples were to be measured for total volatile organic vapors compared to baseline measurements from the same location. Soil vapor monitoring system probes could be monitored periodically to indicate potential leaks from storage tanks. Increasing concentrations over time would be an indication of fuel leaks at the tested tank. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008, Section 3.2.1.)

3. As of 2008, petroleum contamination was evident in several of the cores, particularly under tanks 1, 6, 14 and 16. The most likely source of the petroleum contamination was from the underground storage tanks although it was noted that the contamination may possibly have been due to leaks originated from buried piping or spills in the tunnels under the tank facility. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008, Section 1.7.2.1.)

4. In the timeframe of the Navy's January 28, 2008 Groundwater Protection Plan. The Navy had undertaken the soil vapor monitoring program and a groundwater monitoring program of the Navy's three monitoring wells within the footprint of the RHUSTF and at the Navy's drinking water source well 2254-01. The Navy also committed to continue conducting its tank inspection and repair protocol at time intervals not exceeding 20 years and to continue evaluation of best available technologies for leak detection and tank integrity testing. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008, Section 3.3.)

J. January 2014 Fuel Release Incident and Legislative Task Force Report

1. On January 13, 2014, a substantial unintended release of fuel incident occurred when approximately 27,000 gallons of fuel product (JP-8) was released from tank 5. In 2013, the Navy had removed tank 5 out of service for the Clean-Inspect-Repair process. Prior to taking the tank out of service for maintenance, the tank was first confirmed to be intact via a tank tightness test. After tank 5 was inspected and repaired, the Navy placed tank 5 back into service on December 9, 2013, (Kawata Testimony at ¶ 20; Exhibits B-1 and B-

6.) Upon doing so, the Navy commenced filling the tank with petroleum fuel product. On January 13, 2014 the Navy discovered a loss of fuel from tank 5 and immediately notified DOH and U.S. Environmental Protection Agency (EPA). On January 13, 2014, the Navy began transferring fuel from tank 5 to other tanks at the facility, which transfer was completed on January 18, 2014. On January 16, 2014, the Navy verbally notified DOH and EPA of a confirmed release from tank 5 of an estimated 27,000 gallons of fuel. (Administrative Order on Consent, Exhibit N-1.)

2, There had not been confirmed release of substantial quantities of fuel from the RHUSTF since the early 1980s, a period of over 30 years. The 2014 release was substantial and caused great concern. On April 24, 2014, the Hawaii State Legislature requested the Director of Health to convene a Task Force to study the effects of the January 2014 fuel tank leak at the Red Hill Fuel Storage Facility and submit a report of the Task Force's findings and recommendations. The Task Force was requested to examine:

a. Short-term and long-term effects of the leak at the Red Hill Fuel Storage Facility, including effects relating to the health of residents, safe drinking water, and the environment,
b. Response strategies to mitigate the effects of future leaks at the Red Hill Fuel Storage Facility,
c. Ways to improve communication between the United States Navy, the State, and the public in the event of future leaks at the Red Hill Fuel Storage Facility; and
d. Implications of closing the Red Hill Fuel Storage Facility.

3. The Department of Health convened a task force whose members included the State of Hawaii Department of Health (DOH), the United States Environmental Protection Agency (EPA), the United States Navy (Navy), one member from the State House of Representatives, one member from the State Senate, the Department of Land and Natural Resources (DLNR), the Honolulu Board of Water Supply (BWS), and two members from the community. (Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).

4. The Task Force Report reported that with regard to the Navy's systems for the management and control of leaks or releases from the RHUSTF as of the time of Task Force Report (2015), the Navy had taken the following actions:

o **Tank gauging systems**. The Navy has installed and uses a sophisticated inventory system that provides real-time height measurements of the fuel in each tank and flow rates through pipelines. In 1960, the Navy installed an initial automatic tank gauging (ATG) system in tanks 17-20. Between 1972 in 1973, the ATG system was installed on the remaining sixteen tanks to provide full visibility of the inventory levels within all twenty tanks. As new technology emerged, the Navy had installed a Multi-Function Tank Gauge (MPG) system in all twenty tanks by the end of 2002. With such system, the Navy has the capability of detecting a variance in fuel levels of 1/16 of an inch.

- **Tank cleaning and inspection.** In 1970, contracts were awarded to clean and inspect tanks 5, 6 and 12. In 1994, the Navy cleaned and inspected tanks 6-10, 12-14 and 16.
- **Tank modernization.** In 1978, the Navy took action to extend the service life and to modernize sixteen fuel storage tanks. In 1997 the Navy undertook additional modifications to extend the service life of tanks 6-10, 12-14 and 16.
- **Tank inspection and repair**. Since 1994 and 1997, the Navy has implemented a tank inspection and repair program described as the "most stringent tank inspection and repair practices consistent with the American Petroleum Institute's (API) 653 standards that would apply to the Red Hill tanks." Under the adopted program, tanks were inspected and repairs made to ensure the operability of the tanks for an additional twenty years. The Navy follows a modified API 653 tank inspection and repair certification process and had applied it to tanks 1, 6, 15 and 16 between 2004 and 2007. Between 2008 and 2013, the Navy had completed service life extension improvements for tanks 2 and 20 and was in the process of doing the same for tanks 5, 14 and 17. Thus, between 1994 and 2013, the Navy had completed its tank inspection and repair program for six tanks and was in the process of doing the same for three tanks or a total of nine out of twenty tanks.
- **Pipeline inspection, groundwater monitoring, soil vapor monitoring, tunnel, ventilation, fire suppression improvements**. Between 2006 and 2014, the Navy expended $156 million to inspect and improve pipelines, install groundwater and soil vapor monitoring, structurally reinforce the tunnels and passageways, improve the ventilation, upgrade fire suppression system and other improvements. As of the 2008 Groundwater Protection Plan, the Navy had three groundwater monitoring wells (RHMW01, RHMW02 and RHMW03), all located within or proximate to the footprint of the RHUSTF. By 2014, the Navy had added four more groundwater monitoring wells (RHMW04 located up gradient and to the north, northwest of the tank farm, RHMW 2254-01 at the Navy's drinking water source well (the Red Hill Shaft), RHMW05 located down gradient and to the west of the tank farm and OWDFMW1 near the Navy's oily waste disposal facility located approximately one-half mile west of the tank farm).
- **Research and study.** The Navy was researching secondary containment and leak detection technology options.

(Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).

5. The task force submitted its report to the legislature in December 2014. With regard to the 2014 release, the task force report found that:

> In the course of refilling tank 5 following its service life extension work, a suspected fuel release was discovered and verbally reported to DOH on January 13, 2014. A release of Jet Propellant 8, also known as Jet Propulsion fuel, type 8 (JP-8) from t5 was confirmed and reported to the DOH on January 23, 2014. The estimated fuel loss was up to 27,000 gallons. Immediately after the release was detected, the Navy began draining the contents of tank 5 and collected soil vapor samples from existing vapor monitoring points and groundwater samples from the

existing monitoring wells. Results taken in and around tank 5, indicated a spike in levels of hydrocarbons in soil vapor and groundwater. The elevated groundwater samples came from groundwater monitor well 2 (RHMW02) which is the closest monitor well to tank 5. However, no free product was detected in the groundwater samples. In consultation with the EPA and DOH, the Navy is investigating the cause of the reported release from tank 5 and whether any free product is present outside the tank liner, the concrete surrounding the tank, or in the adjacent basalt rock. In the event that free product is detected, the Navy will remove it to the maximum extent practicable.

Following the reported release, drinking water samples were collected at an increased frequency from the Navy's Drinking Water Well Shaft (2254-01/Red Hill Shaft) and the Honolulu Board of Water Supply (BWS) Halawa Shaft, Halawa Wells, Aiea Wells, Aiea Gulch Wells and Moanalua Wells. Test results for of the BWS wells and the Navy's Drinking Water Well, were non-detect for petroleum constituents in the months following the release. Laboratory analytical results showed that the water was within applicable safe drinking water standards. Note, there is no drinking water standard for Total Petroleum Hydrocarbons as diesel (TPH(d)) and naphthalene. (Exhibit S-5)

6. In the December 2014 report task force, the DOH concluded that operation of Red Hill "should only exist on the condition that the facility be upgraded with secondary containment and state-of-the-art leak detection to ensure safe operations and prevent adverse impact to the environment." (Kawata Testimony at ¶ 40; Exhibit B-21 at BWS006270)

K. Navy Investigation of the 2014 release incident.

1. The Navy also conducted an investigation of the 2014 fuel release. The result of the investigation determined that the 2014 release was due to a confluence of contractor and operational errors attributed to human error related to inspection of repairs to gas test holes and defective welds on patch plates that were used to cover the gas test holes. Such workmanship errors were not caught through the project's quality control and quality assurance provisions. Specifically, the contractor failed to properly inspect the work, failed to properly test the repair work, failed to report the deficiencies, and failed to perform the mandated American Petroleum Institute Standard 653 inspection of repairs and failure to certify that tank 5 was suitable for service. In addition, the Navy failed to perform satisfactory quality assurance oversight and the Facility operators monitoring the system's monitoring and alarm systems failed to properly respond to the system's alarms.

2. The Navy concluded that the 2014 tank 5 release incident was the result of a "perfect storm" of errors during the repair project, *not* a failure stemming from corrosion of the tank. (Facility Environmental Report, December 1, 2020, p. 4. Exhibit to testimony of Curtis Stanley)

3. To ensure that none of these causes are repeated in the future, the Navy has implemented several measures to address each identified failure and ensure proper oversight for tank maintenance activities in the future (NAVFAC EXWC 2017). Additionally, the Navy implemented new standard operating procedures to increase contractor scrutiny and provide additional government oversight during construction. The Navy has put these and other measures into place to ensure that these types of errors and a release similar to what occurred in 2014 will not occur again.

L. Monitoring results following the January 2014 fuel release incident.

1. Following the January 2014 reported release, drinking water samples were collected at an increased frequency from the Navy's Drinking Water Well Shaft (2254-01/Red Hill Shaft) and the Honolulu Board of Water Supply (BWS) Halawa Shaft, Halawa Wells, Aiea Wells, Aiea Gulch Wells and Moanalua Wells. Test results for of the BWS wells and the Navy's Drinking Water Well, were non-detect for petroleum constituents in the months following the release. Laboratory analytical results showed that the water was within applicable safe drinking water standards.

2. After the January, 2014 fuel release incident, groundwater monitoring in one monitoring well (RHMW02), located near tank 5, showed an increase in total petroleum hydrocarbons diesel (TPH(d)) of up to 5000 ppb, 500 ppb higher than the SSRBL approved by DOH. Contaminant concentrations detected in wells RHMWO1 and RHMW05, which are down-gradient of Tank 5 and up-gradient of the Red Hill Shaft, are below the SSRBLs for TPH-d and below the DOH EALs for other chemicals. Monthly monitoring using an oil/water interface probe had not detected any measurable product at the well nearest to Tank 5 or any of the other groundwater monitoring wells. (Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).)

3. During the same period, soil vapor results increased from 794 ppbv to 204,000 ppbv (parts per billion by volume) under tank 5. There were also increases in petroleum related soil vapor beneath the tanks (tanks 3, 6, 7 & 8) closest to tank 5 but generally exhibited average vapor concentrations (less than 10% of the tank 5 vapor concentrations) over the following year. It was also observed that the fuel constituents detected in the vapor beneath tank 5 migrated toward the east (beneath tanks 6, 7 and 8) more than to the west (beneath tanks 2, 3 and 4). The eastward direction of vapor migration is noteworthy because the direction is away from the Navy's drinking water well, the Red Hill Shaft, that is down gradient in direction which was expected to be the primary groundwater flow direction. (Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report) and Golder Associates Inc. report dated December 29, 2020, Revision 2, p. 29 attached to Updated testimony of DeNovio.)

4. Navy and BWS experts differ on the interpretation of the available data. The Navy experts point to the generally decreasing levels of petroleum related constituents in the monitoring wells directly within the footprint of the tank farm (principally RHMW02) to support their view that the constituent levels decrease over time. The BWS experts point to increasing levels of one of the detected petroleum related constituents (TPH middle distillates) in the

monitoring well (RHMW03) that is located up gradient from RHMW02 to support their view that while fuel related constituents may be moving away from the Navy's drinking water source well (the Red Hill Shaft), the data may suggest that the rock beneath the RHUSTF does not have the renewing "sponge" or absorption capacity to hold contaminants from historical releases or future releases of significant quantities (120,000 gallons) of petroleum fuel products, should that occur. (Golder Associates Inc. report dated December 29, 2020, Revision 2, p. 29-35, attached to Updated testimony of DeNovio and Facility Environmental Report attached to Testimony of Stanley).

5. The Task Force Report reported the following "long-term effects" from its investigation:

> According to the most recent groundwater monitoring results dated, July 21, 2014, levels of TPH(d) still persist in the groundwater beneath tank 5, above DOH Environmental Action Levels (EALs), but are below the SSRBLs approved by DOH for this facility. The monthly soil vapor results also remain elevated, in the range of 100,000 — 200,000 ppbv, according to the latest report dated September 25, 2014. However, soil vapor results remain below the SSRBL of 280,000 ppbv approved by DOH. (Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).

6. In summary, as a result of the January 2014 fuel release incident:

   a. Soil Vapor Monitoring. Soil vapor monitoring confirmed an increase in petroleum related vapor in the 30 feet layer of earth and rock material under tank 5 and nearby tanks.

   b. Groundwater Monitoring. In the one monitoring well (RHMW02) in the immediate area under tank 5, groundwater sampling confirmed that certain petroleum constituents, principally TPH-d, had reached the groundwater resources under the monitoring well. Petroleum constituents were not detected in groundwater samples from the other two monitoring wells (RHMW01 and RHMW03) within or proximate to the footprint of the RHUSTF nor in any of the groundwater monitoring wells maintained by the Navy (RHMW04, RHMW05 and OWDFMW1) or the BWS wells in the area (wells at the Halawa Shaft, Halawa Wells, Aiea Wells, Aiea Gulch Wells and Moanalua Wells). Following the reported release, drinking water samples were collected at an increased frequency from the Navy's Drinking Water Well Shaft (2254-01/Red Hill Shaft) and the Honolulu Board of Water Supply (BWS) Halawa Shaft, Halawa Wells, Aiea Wells, Aiea Gulch Wells and Moanalua Wells. Test results for of the BWS wells and the Navy's Drinking Water Well, were non-detect for petroleum constituents in the months following the release. Laboratory analytical results showed that the water was within applicable safe drinking water standards.

   c. LNAPL. No free-flowing fuel product (LNAPL) was detected in

any of the groundwater samples.
(Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).)

7. Following the report of the January 2014 fuel release incident, the state DOH, the federal EPA and the Navy engaged in negotiations to assess the reported release of petroleum product and to assess actions to minimize the threat of future releases. (Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report). The 2015 Task Force Report made a number of recommendations to the Legislature. Among them, the task force recommended that the Legislature:

- Encourage the DOH, EPA, BWS, and the Navy to continue efforts to protect Hawaii's groundwater and drinking water sources.
- The Task Force further recommends that the Legislature encourage the DOH, EPA, and Navy to finalize a negotiated agreement for the Red Hill Fuel Storage Facility that protects drinking water resources, appropriately response to the reported release of petroleum, and minimizes the threat of potential future releases.
(Exhibit B-21, Report to the Twenty-Eighth Legislature, State of Hawaii, 2015 (Task Force Report).)

M. 2015 Administrative Order on Consent (AOC)

1. As a result of the 2014 fuel release from tank 5, the U.S. Environmental Protection Agency (EPA) and the Hawaii Department of Health (DOH) brought an enforcement action against the Navy and the Defense Logistics Agency (DLA) to address the fuel release and minimize the likelihood and impact of future releases. Those four agencies negotiated and entered into an agreement entitled the Administrative Order on Consent (AOC) on or about May 27, 2015. Consistent with the Task Force recommendation, the DOH, EPA, Navy and the Defense Logistics Agency (DLA) did enter into an Administrative Order on Consent (AOC) in September, 2015. The AOC is a joint administrative action taken by the DOH and EPA concurrently and pursuant to their respective state and federal authorities to regulate underground storage tanks and waste and to protect drinking water, natural resources, human health, and the environment. The AOC (Ex. N-001) is a binding agreement which the Navy and DLA entered into with DOH and EPA (the Regulating Agencies) following an accidental release of approximately 27,000 gallons of fuel from the Red Hill Facility in 2014 (Panthen Testimony at p. 4-5).

2. The AOC calls for the Navy and DLA to engage in actions to perform a release assessment, address response(s) to release(s) and to take actions to minimize the threat of future releases in connection with the field-constructed bulk fuel USTs, surge tanks, pumps, and associated piping at the Red Hill Bulk Fuel Storage Facility ("Facility") and on any property that may be affected now or in the future by petroleum or other substances released from the Facility. (Exhibits N-001 and B-81, Administrative Order on Consent.)

3. The primary objectives of the AOC are to take steps to ensure that the groundwater resource in the vicinity of the Facility is protected and to ensure that the Facility is operated and maintained in an environmentally protective manner. (Exhibits N-001 and B-81, Administrative Order on Consent.)

4. The AOC includes a Statement of Work (SOW) that outlines steps "necessary to address potential impacts to human health, safety and the environment ... due to historical, recent and potential future releases at the [Red Hill] Facility." Exhibit B-81 at BWS008935. The AOC includes a Statement of Work (SOW) (Ex. N-001, Attachment A; Ex. B-82) that outlines steps the Navy and DLA must take, and that the Regulating Agencies agreed would ensure the Navy and DLA operate and maintain the Red Hill Facility in an environmentally protective manner (Ex. N-001, Attachment A, p. 1). The parties agreed that the objective of protecting the environment can be achieved by the Navy and DLA deploying the best available practicable technology ("BAPT") within twenty-two years of the effective date of the AOC (Ex. N-001/B-81, Attachment A, p. 1; Panthen Testimony at p. 4-5).

5. Under the terms of the AOC, the Navy and DLA agreed and were ordered to comply with the provisions of the AOC including the performance of actions outlined in a Scope of Work (SOW). The major components of the Work under this SOW included the following:

a. Navy and DLA will improve upon their existing tank inspection and repair process to ensure that the tank infrastructure prevents releases of fuel to the maximum extent practicable. (The purpose of the tank inspection, repair and maintenance work was to identify and evaluate tank inspection, repair and maintenance ("TIRM") procedures to ensure continued integrity of the tanks at the facility and to develop and implement improvements to those procedures to prevent releases to the environment.)
b. Navy and DLA will undertake a comprehensive study to investigate the feasibility of upgrading the tank structures including, but not limited to, installing secondary containment. This study will evaluate several technologies, building on similar efforts conducted by Navy in 1998 and 2008. After completing the study, a technology or technologies will be approved by DOH and EPA ("the Regulatory Agencies") and implemented by Navy and DLA Implementation will occur in phases so that all tanks in operation will deploy best available practicable technology ("BAPT), as approved by the Regulatory Agencies, within twenty-two (22) years of the effective date of the AOC or as otherwise provided for in the AOC or this SOW. (The purpose of the tank upgrade alternatives ("TUA") scope of work was to identify and evaluate various tank upgrade alternatives and then to

implement the best available practicable technology and TIRM procedures that can be applied to the in-service tanks at the RHUSTF to prevent releases into the environment.)

c. Navy and DLA will, as an interim measure, double the frequency of their tank tightness testing from biennial to annual and continue to continuously monitor the inventory of fuel in the tanks. Navy and DLA shall conduct the next round of tank tightness testing no later than one year from the effective date of the AOC. The Navy and DLA will also conduct a study to evaluate improvements to the tank tightness and release detection technologies deployed at the Facility and, pending the outcome of the study and approval by the Regulatory Agencies, implement improvements. (One of the purposes of the work relating to tank tightness was to evaluate the possibility and extent of corrosion and metal fatigue as well as practices to control corrosion in metal fatigue in the major components of the RHUSTF.)

d. Navy and DLA will further develop models to better understand groundwater flow in the areas around the Facility and evaluate the fate and transport of contaminants in the subsurface around the Facility. As set forth below, based on the modeling effort, as approved by the Regulatory Agencies, Navy and DLA will develop and improve the existing groundwater monitoring network to the extent determined necessary. (The purpose of the scope of work was to monitor and characterize the flow of groundwater around the RHUSTF. The Groundwater Protection Plan was to be updated to include response procedures and trigger points in the event that contamination from the RHUSTF shows movement toward any drinking water well. The scope of work sought to refine the existing Groundwater Flow Model and improve the understanding of the direction and rate of groundwater flow within the aquifers around the RHUSTF. The refined and improved Groundwater Flow Model was to be utilized to develop a contaminant Fate and Transport Model Report to improve the understanding of the potential fate and transport, degradation, and transformation of contaminants that have been and could be released from the RHUSTF. With a better understanding of the geology underlying the RHUSTF, the flow of groundwater in the area and the potential fate, transport, degradation and transformation of petroleum contaminants that may be released from the RHUSTF, such information could be utilized to evaluate the number and placement of groundwater monitoring wells required to adequately identify possible contaminant migration.)

e. Navy and DLA will develop a risk/vulnerability assessment, subject to approval by the Regulatory Agencies, in an effort to further understand the potential for and potential impacts of fuel releases from the Facility on the island's drinking and groundwater supplies and to inform the Parties in development of subsequent BAPT decisions. (Administrative Order on Consent, Exhibit N-1 Attachment A)

6. The AOC SOW sets forth the following eight sections of focus and attention:

Section 1: Overall Program Responsibility (project management of the AOC);
Section 2: Tank Inspection, Repair, and Maintenance (TIRM, evaluation of the Navy's tank inspection, repair and maintenance procedures and the development and implementation of improvements to such TIR and procedures to prevent fuel releases into the environment);
Section 3: Tank Upgrade Alternatives (TUA, development of plan to identify and evaluate Tank Upgrade Alternatives and to implement best available practicable technologies (BAPT);
Section 4: Release Detection / Tank Tightness Testing (evaluation and modification of RHUSTF release detection and tank tightness testing procedures);
Section 5: Corrosion and Metal Fatigue Practices (evaluation of the potential presence and extent of corrosion and metal fatigue and to identify appropriate control practices);
Section 6: Investigation and Remediation of Releases (investigation of the extent of past releases from the RHUSTF and appropriate responses);
Section 7: Groundwater Protection and Evaluation (groundwater monitoring and identification of groundwater flow around the Facility); and
Section 8: Risk/Vulnerability Assessment (development of a Risk/Vulnerability Assessment and consideration and identification of potential risks associated with acute and chronic leaks and external factors such as seismic events).
(Ex. N-001/B-81, Attachment A, p. i-iii; Panthen Testimony)

7. The work and scope of the AOC is a voluntary and binding agreement between the Navy and DLA and federal and state regulators (the EPA and state DOH) with the purpose and objective to minimize the risks of unintended fuel releases from the RHUSTF and to protect drinking water, natural resources, human health and the environment. Work under the AOC is not completed and is ongoing. Portions of the ongoing work under the AOC relate to issues and considerations pertinent to the issuance of a permit to the Navy of the continued operation of the RHUSTF.

8. Regulatory experience has shown that a negotiated agreement, such as an administrative order on consent, is the appropriate enforcement tool to address a unique facility like the RHUSTF and solve complex environmental problems since it allows for flexible, collaborative, and innovative solutions. The AOC-SOW is a proactive approach that goes beyond the normal scope of merely complying with current regulations. (Exhibit B-2)

9. This underground storage tank permitting process and the AOC share the same ultimate concern and objective of protecting the critical water resources of Oahu and protecting the public health and environment.

10. The AOC is a separate enforcement mechanism and procedure which is distinct and different from the issues, procedures and statutory and regulatory requirements involved in the underground storage tank permitting process involved in this contested case matter. By its terms, the parties to the AOC acknowledge that "Compliance by Navy and DLA with the terms of this AOC shall not relieve Navy and DLA of their obligations to comply with applicable local, state, or federal laws and regulations. (Exhibit B-81 at BWS 008954).

11. In this contested case regarding the application and issuance of a permit to maintain and operate an underground storage tank facility, the issues raised relate to whether the Navy meets the requirements for the issuance of a permit pursuant to HRS Chapter 342L and HAR Chapter 11-280.1. Whether the Navy is meeting the obligations and requirements of the AOC process is a separate matter beyond the scope of this contested case hearing concerning the issuance of an operating permit for the RHUSTF.

N. Extension of Underground Storage Tank Permit Requirements to RHUSTF

1. As a result of the adoption of HAR Chapter 11-280.1 effective July 15, 2018, large field-constructed USTs like those operated by the Navy at Red Hill for the first time became subject to the permitting requirements of the Department of Health's regulations and the Navy was required to meet the requirements of the regulations no later than one year after the effective date of such regulations, being July 15, 2019. HAR §§ 280.1-10(a)(1)(A), 280.1-323(a).

2. By an application dated March 13, 2019, the Navy submitted to the Department of Health its application seeking a permit to operate the Red Hill USTs. (Exhibit N–33.) By a letter dated April 12, 2019, the Department of Health responded to the application and requested certain revisions and additional information provided by the Navy. (Exhibit B–70.) By a letter dated May 15, 2019, the Navy submitted a revised application for an underground storage tank permit. (Exhibits N-95 and B-246 through 252). In June 2019, DOH issued a draft Operation Permit (Ex. N-038) for the Red Hill Bulk Fuel Storage Facility. In July 2019, DOH issued a letter to the Navy stating that it considered the permit application timely and that it intended to allow the Facility to continue to operate Red Hill until DOH rendered a decision on the Navy's permit application (Ex. N-41). The letter also indicated that DOH had requested public comment on the draft permit, and a contested case hearing had been requested (Ex. N-41; Whittle Testimony at p. 25; Smith Testimony at p. 4).

3. In this contested case hearing, the Navy, as the Applicant for a permit to operate its underground storage tanks facility, "bears the burden of establishing that the proposed use will not interfere with any public trust purpose." *In re Wai'ola O Moloka'i, Inc.*, 103 Hawai'i 401, 441, 83 P.3d 664, 704 (2004). The Navy, as the Applicant, has the burden in this case to prove that:

(a) it can meet the technical, financial and other requirements of HRS chapter 342L, HAR § 11-200.1-323(b);

(b) the operation of the underground storage tank or tank system will be done in a manner that is **protective of** human health and **the environment**, HRS §342L-4(c) and HAR § 11-200.1-323(b);

(c) the tank and tank system are designed, constructed, installed, upgraded, maintained, repaired, and operated to **prevent releases** of the stored regulated substances for the operational life of the tank or tank system, HRS § 342L-32(b)(1);

(d) the material used in the construction or lining of the tank or tank system is compatible with the substance to be stored, HRS § 342L-32(b)(2); and

(e) existing underground storage tanks or existing tank systems were replaced or upgraded not later than December 22, 1998, to prevent releases for their operating life, HRS § 342L-32(b)(3).

III. Issues Related to the Issuance of an Underground Storage Tank Permit

A. Issue: Is the Navy required to obtain a permit for the maintenance and operation of the RHUSTF?

1. In this matter, the Navy asserts that under the applicable statutes and rules that it is not required to obtain a permit for the maintenance and operation of the RHUSTF.

2. Federal facilities are required to comply with all federal, state, interstate, and local solid and hazardous waste requirements (including statutes, regulations, permits, reporting requirements, and administrative and judicial orders and injunctions). The express waiver of sovereign immunity contained in the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 *et seq.*, subjects the Navy to the same substantive and procedural requirements as any person under state laws regulating USTs. 42 U.S.C. § 6991f(a) provides that:

> Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any underground storage tank or underground storage tank system, or (2) engaged in

any activity resulting, or which may result, in the installation, operation, management, or closure of any underground storage tank, release response activities related thereto, or in the delivery, acceptance, or deposit of any regulated substance to an underground storage tank or underground storage tank system shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural (including any requirement for permits or reporting or any provisions for injunctive relief and such sanctions as may be imposed by a court to enforce such relief), respecting underground storage tanks in the same manner, and to the same extent, as any person is subject to such requirements, including the payment of reasonable service charges. The Federal, State, interstate, and local substantive and procedural requirements referred to in this subsection include, but are not limited to, all administrative orders and all civil and administrative penalties and fines, regardless of whether such penalties or fines are punitive or coercive in nature or are imposed for isolated, intermittent, or continuing violations. The United States hereby expressly waives any immunity otherwise applicable to the United States with respect to any such substantive or procedural requirement (including, but not limited to, any injunctive relief, administrative order or civil or administrative penalty or fine referred to in the preceding sentence, or reasonable service charge."

3. In 1992, the legislature amended the law to require DOH to adopt rules to ensure that pre-existing underground storage were upgraded and operated to prevent releases. Act 259, 1992 Hawai'i Session Laws. Since 1992, the legislature has required that DOH adopt rules that require that underground tanks and tank systems:

a. Be **designed, constructed, installed, upgraded, maintained, repaired, and operate to prevent releases of the stored regulated substances for the operational life of the tank or tank system**;

b. The **material used in the construction or lining of the tank or tank system is compatible with the substance to be stored**; and

c. Existing underground storage tanks or existing tank systems shall **be replaced or upgraded** not later than December 22, 1998, **to prevent releases for their operating life**. HRS §342L-32(b) (emphasis added)

.

4. In July 2018, DOH adopted new rules, effective July 15, 2018, regulating underground storage tanks. HAR §§ 11-280.1-10(a)(1)(A) provides (in part) that:

(a) The requirements of this chapter apply to all owners and operators of an UST system as defined in section 11-280.1-12 except as otherwise provided in this section.(1) Airport hydrant fuel distribution systems, **UST systems with field-constructed tanks**, and UST systems that store fuel solely for use by emergency power generators must meet the requirements of this chapter as follows:**(A)** Airport hydrant fuel distribution systems and **UST systems with field-constructed tanks must meet all applicable requirements of this chapter, except that those installed before the effective date of these rules must meet the applicable requirements of subchapters 4, 8, 10, and 12 no later than one year after the effective date of these rules.** (emphasis added) *Haw. Code R. § 11-280.1-10*

5. The RHUSTF maintained and operated by the Navy is an underground storage tank facility with field constructed tanks. Under the regulations set forth in HAR §11-280.1-10 and 12, the Navy is required to obtain a permit from the Department of Health for the maintenance and operation of the RHUSTF. Such permits are to be issued only upon submission of information that establishes to the satisfaction of the Director of the Department of Health that:

a. the technical, financial and other requirements of HRS Ch. 342L can be met, and

b. the operation of the UST tank system will be done in a manner that is protective of human health and the environment;

and that the tank system meets the established operational standard such that:

(1) The tank and tank system shall be designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system;
(2) The material used in the construction or lining of the tank or tank system is compatible with the substance to be stored; and
(3) Existing underground storage tanks or existing tank systems shall be replaced or upgraded not later than December 22, 1998, to prevent releases for their operating life.

B. <u>Principal Issues Related to the Issuance of an Underground Storage Tank Permit</u>

1. The principal issues raised by the parties in this contested case hearing relating to whether a permit should be issued to the Navy are:

a. Whether the tank and tank system are designed, constructed, installed, upgraded, maintained, repaired and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system;
b. Whether the material used in the construction or lining of the tank or tank system is compatible with the substance to be stored;
c. Whether the existing underground storage tanks or existing tank systems have been replaced or upgraded by not later than December 22, 1998, to prevent releases for their operating life;

d. Whether the operation of the RHUSTF tank system is being and will be done in a manner that is protective of human health and the environment;

e. Whether the Navy in its maintenance, repair and operation of the RHUSTF can meet the technical, financial and other requirements of HRS Ch. 342L; and

f. If a permit is to be issued, whether the DOH should impose conditions on the permit where "reasonably necessary to ensure compliance with applicable regulations and any other relevant state requirement, including conditions relating to equipment, work practice, or operation." HAR §§ 280.1-323(b), 280.1-328.

C. Issue: Whether the tank and tank system are designed, constructed, installed, upgraded, maintained, repaired and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system

1. Design and Construction of the RHUSTF.

a. The Red Hill Bulk Fuel Storage Facility consists of 20 field constructed, steel, vertical underground storage tanks, with capacities between 285,000 barrels (BBL) and 300,000 BBL. Each tank is approximately 250'(h) by l00'(w), with the upper dome of the tanks approximately 100' to 175 feet below ground surface. The bulk tanks, numbered 1 through 20, were constructed in a parallel series of two rows sloping south by southwest towards Pearl Harbor. The tanks are connected by main upper and lower subsurface service tunnels, which contain light rail systems, water and electrical utilities, and fuel pipelines. In the lower tunnel, each parallel tank is connected by a short access, which branches off the main service tunnel and terminates into a face-wall under each tank. Individual tank ancillary piping exits from each face-wall to connect to the fuel transmission lines. The fuel pipelines run approximately 2.5 miles from the bulk tanks to a Pearl Harbor pump station. (Exhibit N-111, p.8)

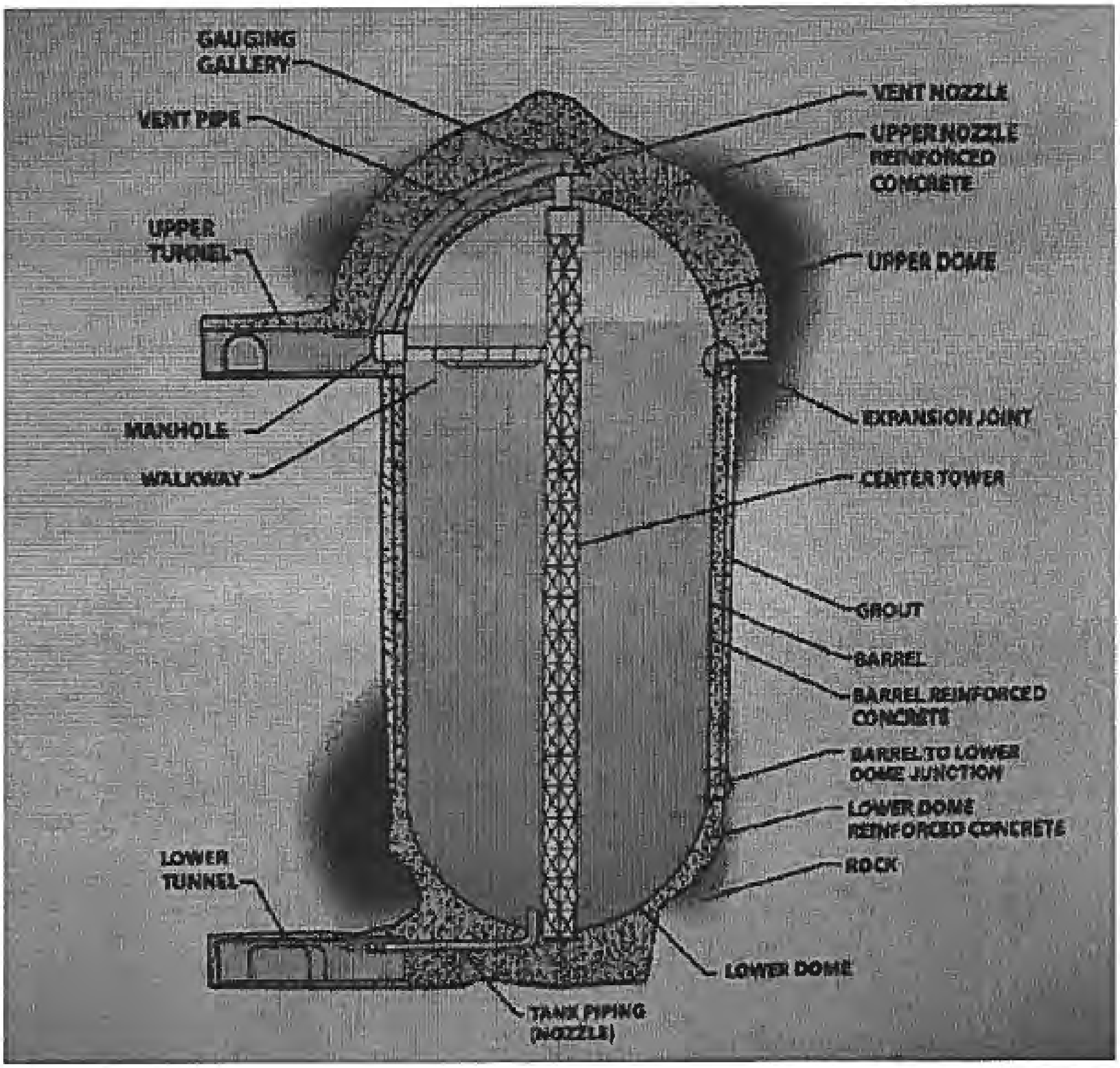
b. The Red Hill Facility includes the 20 fuel storage tanks, as well as the pipes, control room, tunnels, pumphouse, upper tank farm, Hickam product recovery tanks, Hickam airfield piping and hydrant pits, piers, and four surge tanks. The four surge tanks are not storage nor dispensing tanks, instead they serve as surge tanks to allow for the buffering of product pressure throughout the system during product movement. The airfield piping consists of two loops: Diamond Head Piping Loop and Ewa Piping Loop. The tanks are connected via three large pipelines located aboveground in an underground tunnel system that run approximately 2.5 miles through the Harbor Tunnel from Red Hill to the Pump House at Pearl Harbor. The Underground Pumphouse contains four more small underground surge tanks, which are buffer tanks, 11 pumps, and a control room operator. The Underground Pumphouse connects to Tank 301, which is an interface tank, and then to the commercial multiproduct pipeline which runs approximately from a refinery in Kapolei to commercial port facilities downtown. (Testimony of Whittle)

c. A pumping station at the end of the pipelines controls tank filling and dispenses fuel to ships and Hickam Air Field. The RHUSTF is a unique facility. It can operate without external power, is physically protected by the surrounding basalt rock, and is cyber-hardened and not connected to the internet or other external networks. Red Hill's physical security, capacity and gravity-fed distribution system provide a unique asset to the U.S. Pacific Fleet and other military forces. From Hawaii, the military can provide sea control, advance maritime security, and enhance regional stability in the Indo-Asia-Pacific region. Forward presence, supported by fuel from Red Hill, keeps sea lanes open, ensuring the free and secure flow of commerce to Hawaii, the mainland and throughout the world. (Testimony of Panthen.)

d. The RHUSTF provides the Defense Department ready access to fuel for needed mission readiness of the U.S. INDOPACOM. As a strategic reserve, it supports all U.S. military forces throughout the theater, including the Navy, Air Force, Marine Corps, Army, and Coast Guard requirements. Red Hill is a vital reserve fuel source for Hawaii during disasters and emergencies; it is available to support the Hawaii Army and Air National Guard and civil authorities, and supply fuel to the Daniel K. Inouye International Airport, Honolulu Harbor, Hawaiian Electric, and responding ships and aircraft. (Panthen testimony.)

e. Each of the twenty Red Hill USTs were field constructed in 1940 -1943 by excavating or mining into the ridge to create separate cavities or pits for the construction of the concrete tank shells. Each of the 20 fuel storage tanks is approximately 250 feet tall, 100 feet in diameter, and provides a fuel storage capacity of up to 12.5 million gallons. The barrels or sides of the steel tanks are lined with ¼-inch thick steel plates welded together. The barrel is welded and joined to the base or lower dome and the upper dome of the tank. The base and the upper dome of the steel tanks are lined with ½ inch thick steel plates welded together. The steel tank is encased in reinforced concrete around the outside of the upper dome by 8 feet thick concrete at the springline gradually narrowing to 4 feet thick at the crown. The reinforced concrete surrounding the lower dome is a minimum of 4 feet thick except for the 20 feet diameter flat bottom plate at the center of the lower dome which sits on top of a plug of concrete approximately 20 feet thick. The reinforced concrete surrounding the cylindrical barrel of the UST is an estimated minimum of 2.5 to 4 feet of concrete. The engineered design of the tank system sought to have the steel tank liner pressed against and bonded to the reinforced concrete with the lower alkaline content of the reinforced concrete providing a corrosion protection function for the backside of the steel liner. The entire steel tank and reinforced concrete shell system is constructed up against and is surrounded by basalt bedrock and the barrel of the tanks are covered with a six inch thick application of Gunite (spray applied concrete). In addition, upon completion of the steel and reinforced concrete tank, small diameter holes were drilled in the sides of the tank and through the concrete bed. A 10 to 1 grout mixture was injected between the Gunite layer and the reinforced concrete shell at approximately 300 pounds of pressure per square inch (psi). This method was utilized to close all possible seams and blasting fractures that may have been created during construction and to further minimize any air space or gaps that may have existed in the space between the concrete and the Gunite coated basalt pit. (Exhibits N-33, N-111 and testimony of Frank Kern)

f. A drawing depicting the design and construction of a Red Hill underground storage tank appears below. (Navy exhibit 90)



g. The welded steel tank consisting of the tank barrel, it's lower dome and its upper dome, is encased by a reinforced concrete shell (depicted by a slightly darker grey layer dotted to reflect the aggregate in the concrete) which is in turn encased by a layer of Gunite (not depicted int the drawing) separating the tank structure from the surrounding basaltic bedrock (incompletely depicted by dark grey shading).

h. As designed, fuel flows through a piping distribution system from the bottom of the storage tank through piping running through an underground lower tunnel distribution facility to distribution points at the Pearl Harbor Hickam Military facility.

2. **Navy's System for Operation, Maintenance, Repair, Detection and Prevention of Leaks.**

a. HAR §§ 11-280.1-41(a)(3) applies to "UST systems with field-constructed tanks with a capacity greater than 50,000 gallons" that are installed before the effective date of the rules "must be monitored for releases at least every thirty-one days using one of the methods listed in section 11-280.1-43 (4), (7), (8), and (9) or use one or a combination of the methods of release detection listed in section 11-280.1-43 (10)." That referenced provision, HAR §§ 11-280.1-43(10) provides as follows:

> Methods of release detection for field constructed tanks. One or a combination of the following methods of release detection for tanks may be used when allowed by section 11-280.1-41.
>
> (A) Conduct an annual tank tightness test that can detect a 0.5 gallon per hour leak rate;
>
> (B) Use an automatic tank gauging system to perform release detection at least every thirty-one days that can detect a leak rate less than or equal to one gallon per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon per hour leak rate performed at least every three years;
>
> (C) Use an automatic tank gauging system to perform release detection at least every thirty-one days that can detect a leak rate less than or equal to two gallons per hour. This method must be combined with a tank tightness test that can detect a 0.2 gallon per hour leak rate performed at least every two years;
>
> (D) Perform vapor monitoring (conducted in accordance with paragraph (5) for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon per hour leak rate at least every two years;
>
> (E) Perform inventory control (conducted in accordance with Department of Defense Directive 4140.25, ATA Airport Fuel Facility Operations and Maintenance Guidance Manual, or equivalent procedures) at least every thirty-one days that can detect a leak equal to or less than 0.5 percent of flow-through; and
>
> (i) Perform a tank tightness test that can detect a 0.5 gallon per hour leak rate at least every two years; or
>
> (ii) Perform vapor monitoring or groundwater monitoring (conducted in accordance with paragraph (5) or (6), respectively, for the stored regulated substance) at least every thirty-one days; or
>
> (F) Another method approved by the department if the owner and operator can demonstrate that the method can detect a release as effectively as any of the methods allowed in subparagraphs (A) to (E). In comparing methods, the department shall consider the size

of release that the method can detect and the frequency and reliability of detection. (emphasis added).

b. The Navy does a number of things to operate, maintain and repair the underground storage tank system in order to maintain its operational integrity. The Navy employs a multiplicity of system features which it describes as a "system of systems" designed or intended to monitor, prevent, detect and mitigate leaks or releases of fuel from its underground storage tanks and to ensure the safe operation of the Red Hill facility. Among the system features are the following:

1. A computerized tank facility monitoring system monitored by personnel on a 24 hour, 7 days a week, 365 days a year basis;
2. A program for tank tightness testing;
3. Scheduled routine inspection, maintenance and repair of the underground storage tanks;
4. A multi-faceted storage tank system with a welded steel tank liner that is itself coated with an internal membrane with the steel liner encased in a reinforced concrete tank or shell that is pressure grouted and encased in a Gunite (sprayed concrete) covered underground chamber excavated into basaltic rock;
5. An underground tunnel system for access, maintenance and routing of piping and aeration;
6. Inventory management systems including around-the-clock tank gauging and monitoring systems,
7. Fuel level monitoring and alarm systems;
8. Soil vapor monitoring points: and
9. A network of groundwater monitoring wells.

c. Under these regulations, an annual tank tightness test that can detect a .5 gallon per hour leak of the underground storage tanks is sufficient to satisfy the requirements of the regulation. (Presently available technology apparently is not available to detect chronic small quantity leaks. (Ex. S-18, p. 2; Ex. B-11, p. 17). The Navy has been conducting periodic and regular tank tightness tests of the underground storage tanks. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020, p. 47). The Navy has also committed to conduct these tank tightness tests twice as often as required by the Hawaii UST regulations. In addition to the leak detection and tank tightness testing being performed, the Navy has also adopted additional leak detection measures to provide additional protection. Such additional measures include:

1. More accurate inventory monitoring and trend analysis using automated fuel handling equipment;
2. Improvements to identification and repair of existing concrete tanks and steel liners; and

3. Improved standards for tank inspection, repair and maintenance. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020,.pp. 46-51 and 54) .

d. The Navy also proposes to increase and improve soil vapor monitoring, expand the number of soil monitoring wells, improvements to the epoxy coating applied to the interior of the steel tank lining, improvements to the automatic tank gauging process and decommissioning small nozzles. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020,.pp. 46-51 and 54-55) .

e. The Navy seeks to provide three layers of protection related to releases that are implemented at the Red Hill Facility -- *prevention, detection, and mitigation.* Among the prevention components of the Navy's fuel management system are the following:

1. Tank Inspection Repair and Maintenance (TIRM) process. The basic process involves three steps. First, the tank is scanned with non-destructive technologies, then, for safety, holes are drilled, tested for gas, and repaired. Finally, patch plates are welded on, inspected, and tested for integrity. In addition to the repair process, portions of the tank interior steel liners are recoated to prevent corrosion as specified by coating specialists.
2. Removal of small nozzles that are too small to allow for human inspection. Such small nozzles are decommissioned and replaced with larger nozzles that can be inspected. However, as of the date of the February, 2021hearings in this matter, the Navy has only replaced the small nozzle in tank 5.
3. Revised and standardized operator training and enhanced contractor qualification processes to improve tank inspection and repairs. (Testimony of John Floyd.)

f. The Navy's system for leak detection protection includes the following:

1. Automated Fuel Handling Equipment system and Automatic Tank Gauging systems for fuel inventory monitoring which is monitored on a 24 hour, 7 days a week, 365 days of the year basis. The Automated Monitoring system is capable of detecting unscheduled fuel movements of one-half inch of fuel in the tanks and will sound an alarm to notify control room operators of the event and trigger an investigation;
2. Daily visual inspections conducted twice per shift by a roving system operator;
3. Daily manual fuel inventory management and trend analysis;
4. Pipeline monitoring system senses and records pipeline pressures at specific locations and transmits this information back to the Control Room via pressure indicating transmitters (PITs). This system is monitored 24 hours a day, seven days a week from the AFHE Control Room;
5. Increased tank tightness testing from annual to semi-annual, twice the state

requirement;
6. Soil vapor monitoring points;
7. Groundwater monitoring; and
8. An overfill protection system.
(Testimony of John Floyd.)

3, Corrosion Protection

a. As designed, constructed and installed, the outside or backside of these steel liners as well as the concrete tank shells cannot be physically inspected or directly accessed for visual inspection or maintenance. (Updated Written Testimony of David M. Norfleet ("Norfleet Testimony"), Expert Report: Evaluation of Underground Storage Tanks at the Red Hill Bulk Fuel Storage Facility ("Norfleet Expert Report"), 12-17.)

b. A significant contested factual issue raised in this case by the BWS and the Sierra Club relates to the adequacy of corrosion protection of the steel tank liners for the underground storage tanks. As designed and constructed, the backside face of the steel plate liners is pressed against the concrete shell and thus cannot be regularly inspected or monitored to determine the degree of any corrosion that may be occurring the backside of steel tank liners. In this case, the BWS and Sierra Club are extremely concerned and contend that the steel lining of the underground storage tanks are corroding and that such ongoing corrosion has led or will lead to the development of holes in the steel tank liner that will allow fuel to be released into the environment. The concern is that moisture that somehow becomes trapped between the outside face of the Red Hill USTs steel liner and concrete shell will cause corrosion to form on the backside of the steel liner and that the corrosion will progress over time. (Norfleet expert report at p. 27)

c. DOH's UST regulations require that underground storage tanks must be designed to prevent releases due to structural failure, corrosion, spills or overfills and be properly protected from corrosion. HAR § 11-280.1-20 provides in pertinent part:

> **Performance standards for UST systems.** (a) In order to prevent releases due to structural failure, corrosion, or spills and overfills for as long as the UST system is used to store regulated substances, owners and operators of UST systems must meet all applicable requirements of this subchapter....
> (b) Tanks. Each tank must be properly designed, constructed, and installed, and any portion underground that routinely contains product must be protected from corrosion, in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below....
> (c) Piping. The piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, installed, and protected from corrosion in accordance with a code of practice developed by a

nationally recognized association or independent testing laboratory as specified below... HAR § 11-280.1-20.

d. The rules prescribing UST system performance standards require that every UST, not just those in contact with the ground, "must be properly designed, constructed, and installed, and any portion underground that routinely contains product must be protected from corrosion" using one of the prescribed codes of practice. HAR § 11-280.1-20(b). Such DOH regulations also require UST systems with field-constructed tanks like those at Red Hill to be upgraded to comply with the codes of practice in corrosion protection performance standards found at § 11-280.1-20(b), among others, or be closed. HAR § 11-280.1-21(a). HAR § 11-280.1-20(b) enumerates the following five criteria by which a UST can comply with the performance standards for corrosion protection:

(1) the UST is constructed of fiberglass reinforced plastic;
(2) the UST is constructed of steel and cathodically protected;
(3) the UST is constructed of steel and clad or jacketed with a non-corrodible material;
(4) the UST is installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life; or
(5) the UST construction and corrosion protection are determined by the DOH to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than criteria (1) through (4). *See* HAR § 11-280.1-20(b).

e.........The underground storage tanks at the RHUSTF were designed and constructed with the following features:

1. Steel tank constructed with one quarter-inch thick steel plates welded together to create the steel tank barrel with the base and upper dome of the steel tank constructed with ½ inch thick steel plates welded together;
2. The steel tank is encased in reinforced concrete that was poured around the steel tank with 2 ½ to 4 feet of concrete around the barrel, 4 to 8 feet of concrete at the dome of the tank and 4 feet to 20 feet of concrete at the base of the tank;
3. The steel tank and concrete encasement were constructed in underground caverns excavated out of native basaltic rock material;
4. The face of the excavated basaltic rock material was covered with Gunite applied six inches thick; and
5. Grout was pressure injected between the Gunite and the concrete encasement around the tank with the objective of sealing any openings or cracks in the area.

f..........As designed and constructed, the underground storage tanks at the RHUSTF are constructed of steel and clad or jacketed with a non-corrodible material (concrete) as enumerated in HAR § 11-280.1-20(b)(3). The Department of Health has determined that "The tanks meet the corrosion protection requirement in § 11-280.1-20(b) because the tanks are steel and clad or jacketed with a non-corrodible material (concrete)." (Exhibit N–34)

g. The design intent in the construction of the RHUSTF was that steel tanks would be completely encapsulated by the reinforced concrete shell. The reinforced concrete had an alkaline content and would be considered a non-corrodible material. On-site testing and laboratory testing of concrete powder samples indicated that the concrete behind the steel tank liner is alkaline and in sound condition. Alkaline concrete is necessary to avoid corrosion. No cracks or spalling was detected, and the concrete is in good condition. (Exhibit B-14, p. 61) With the additional pressure injected grout installed to fill any gaps or cracks in the concrete it appears that the design objective was to prevent water coming into contact with the outside surface of the steel tank and thus provide protection from corrosion. However, the record reflects that the outside surfaces of the steel tanks, in many spots are not in intimate and complete contact with concrete, and that some moisture has been able to get between the steel and the concrete thus creating conditions conducive to causing spots or areas of the steel tank liner to corrode.

h. The Navy has an ongoing integrity management or TIRM (Tank Inspection, Repair and Maintenance) program to clean, inspect and repair the Red Hill tanks to be fit for 20-year service intervals. The standard of care used to assess integrity on the tanks is modified from and consistent with API Standard 653, Tank Inspection, Repair, Alteration, and Reconstruction. The Navy has a manual or policy statement pertaining to Maintenance of Fuel Facilities (UFC 3-460-03), which provides as follows:

> Perform an out-of-service API Std 653 or STI SP001 inspection to evaluate the tank for conditions which may affect the operational integrity of the tank floor, shell, roof and floating roof or pan. API Std 653 or STI SP001 provides a checklist to be used as part of the assessment. This inspection must be performed by an appropriately certified API Std 653 or STI SP001 inspector. Inspection shall include all components and equipment located inside the tank containment area such as piping, pipe supports, containment valves, and product saver tanks.
> Frequency: Every ten years or as recommended by an appropriately certified tank inspector in the previous API Std 653 or STI SP001 inspection report."
> This allows the Government to schedule the next tank inspection as recommended by the API Std 653 Inspector. Therefore, the next inspection should be in ten (10) years, unless the corrosion rate is such that it can be inspected later (ie: 20 years) as recommended by the API Std 653 Inspector. The current Navy/DLA's repair program is to repair all corrosion areas while the tank is out of service, so that the corrosion rate on non-repaired corrosion areas will allow the next inspection to be in twenty (20) years. (Exhibit N-71 at 19-6)

i. Under the TIRM process, storage tanks are emptied and taken out of service for maintenance inspection and repair. The entire interior of the tank and the condition of any interior protective coating is manually and visually inspected. The condition and integrity of the steel tank liner is inspected. Because the backside of the steel liner cannot be manually or physically inspected, nondestructive technologies and tools are used to measure the existing thickness of the welded steel plates of the tank to detect areas where the tank steel plating may have deteriorated due to corrosion to an insufficient functional thickness. Where spots or areas of insufficient steel plate thickness are detected, those sections of the steel plate lining are cut out and replacement steel plate sections are welded into place. Through this process, the entirety of the steel tank liner is restored to the required minimum thickness determined by the inspecting engineer as sufficient to provide an operating life of at least 10 years before the tank is to be next inspected. If inspecting engineer determines that the condition of the tank and the thickness of the steel plate lining are sufficient, the inspector engineer can certify the operating life of the tank for up to 20 years before the tank next needs to be inspected. (Testimony of Robert Jamon, John Floyd, Donald Panthen and Frank Kern)

j. Improvements to TIRM procedures are continuous. For example, according to the Red Hill AOC SOW Section 2.4 TIRM Procedure Decision Document (Ref 7), the TIRM process had previously involved a single individual being responsible for quality assurance (QA) in design management, construction management, and project management during cleaning inspection and repair at Red Hill. After investigating the root causes of the 2014 release at tank 5, the Navy updated its TIRM procedure so that three different individuals are responsible for each type of QA, and in turn, more-thorough QA is conducted in future TIRM processes at Red Hill. (Exhibit B-14).

k. The TIRM program goal of the Navy is to have the underground storage tanks inspected and certified for an operating life of 20 years. However, the Navy's actual performance of inspections and repairs to the Red Hill tanks is sorely deficient. Two of the twenty tanks (tanks 1 and 19) have been taken out of active service many years. The available records and testimony presented during the course of the hearings conducted in this matter reflects that only seven out of eighteen active tanks (tanks 2, 5, 6, 15, 16, 17 and 20) have been inspected in conformity with the TIRM program within the last 20 years. Eight tanks have not undergone inspections in conformity with the TIRM program for over 23 to 40 years (23 years for tanks 7, 8 and 10, 26 years for tanks 9 and 12, 38 years for tanks 3 and 4 and 40 years for tank 11). Tanks 13, 14 and 18 and also had not undergone or completed the TIRM inspection and repair process for periods as long as 26 to over 30 years. (Exhibit N-77, 2016 TIRM report and testimony of John Floyd).

4. **Monitoring Wells.**

a. Beginning in 2005, the Navy began to install a series of groundwater monitoring wells to sample and monitor the condition and quality of water in the groundwater aquifer that is located some 100 feet below the tank farm footprint. The purpose of the groundwater monitoring wells is to monitor groundwater conditions throughout the Red Hill area and to permit verification that the drinking water resources of the sole-source aquifer remain safe. Initially, the Navy installed six groundwater monitoring wells directly under and proximate to the location of the 20 underground storage tanks. By 2014 and before the last significant fuel release incident, the Navy had installed six such groundwater monitoring wells. The location of the 6 pre-2014 groundwater monitoring wells is depicted as white circles on the following illustration.

Pre-2014 Release Network (6 Wells)

b. After the January 2014 release incident and through 2020, the Navy expanded the groundwater monitoring well network to a total of 19 monitoring wells. All groundwater monitoring wells in the Red Hill network are sampled at least quarterly with the results reported to the Department of Health. Four of the groundwater monitoring wells are innovative multilevel wells with multiple discrete sampling zones extending deep into the aquifer. These multilevel wells are believed to be among the first of their kind in Hawaii. Each multilevel well has multiple sampling ports installed at different levels to enable the assessment of conditions at various depths

Today's Network (19 Wells)

c. Expansion of the monitoring well system to a total of 27 wells is planned by 2023. The location of the system at 27 groundwater monitoring wells is depicted on the following illustration with the planned additional wells depicted by green circles.

Future Wells (Planned by 2023)

(Facility Environmental Report, December 1, 2020, section 2.3, Sidebars 11 and 15, pp. 19, 43 & 55. Exhibit to testimony of Curtis Stanley)

5. Impact and effect of unintended releases of fuel into the environment.

a. The storage of over 180 million gallons of petroleum fuel products 100 feet above Oahu's sole source aquifer is inherently dangerous. (Ex. B-21) The risk of potential pollution of the Red Hill potable water aquifer is real. (Ex. B-145 at BWS023203).

b. The Navy recognizes that an inadvertent fuel release from the RHUSTF can be a significant risk to contamination of groundwater resources. The RHUSTF is constructed approximately 100 feet above the basal groundwater table on the boundary of the Waimalu and Moanalua aquifer systems of the Pearl Harbor and Honolulu aquifer sectors. Both aquifers are sources of potable water for public water systems and for the Navy's primary potable water source. The Navy's potable water well (Halawa Red Hill Shaft 2254-01) is located approximately 3000 feet west and hydraulically down gradient from the RHUSTF. In addition, the BWS Halawa shaft (well number 2354-01) is located approximately 5000 feet northwest of the RHUSTF and the BWS Moanalua wells (2153-10, 2153-11, 2153-12) are approximately 6700 feet south of the RHUSTF. (Ex. B-10, 2008 Groundwater Protection Plan)

6. Health and Environmental Impacts as a Result of Releases

a. Determining and understanding where fuel products go and what happens to petroleum fuel products that are released into the environment is critical to assessing the health and environmental impacts that can result. Petroleum fuel products are volatile products that tend to evaporate upon exposure to the atmosphere or warmer temperatures. Any fuel products that are not contained by physical or mechanical containment mechanisms at the RHUSTF can be absorbed into the cement, rock and earth surrounding and beneath the RHUSTF. It is known that petroleum fuel products exposed to the surrounding cement, rock and earth will also be subject to natural attenuation or bioremediation. Released fuel products exposed to these environmental mechanisms (evaporation or volatilization, absorption, bioremediation) go through a decomposition process over time.

b. The underground storage tanks at the RHUSTF are surrounded by rock consisting primarily of layered basalts in an unsaturated (or vadose) zone. If petroleum fuel products are released into the vadose zone, several processes redistribute and/or degrade the contaminant mass including the following:

Volatilization: fuel releases undergo evaporative weathering by losing volatile compounds to gas-filled pore space in the vadose zone.

Capillary Forces: as liquid fuel product migrates through the vadose zone, some mass is retained within the basalt matrix by surface tension and capillary action.

Dissolution: compounds and fuels transfer into pore water that contacts the fuel.

Microbial Degradation: Indigenous microbial populations degrade petroleum fuels under both aerobic and anaerobic conditions.
(Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, p. 5-1)

c. In the event that fuel is released from the underground storage tanks or its associated pipeline distribution system and the released fuel is not captured by the various capture systems in place, fuel can be released into the environment below and surrounding the RHUSTF. The geology of the substrate below the RHUSTF is known to be an area of multiple overlapping lava flow basaltic rock materials. Typically, such overlapping lava flow areas are comprised of dissimilar, irregular and discontinuous layers of basaltic lava (a'a, pahoehoe and clinker) with each layer having different characteristics of permeability, impermeability and absorption capacity. Extensive efforts are being made in the contemporaneous and ongoing AOC process to attempt to develop an accurate understanding of the complex geology that underlies the RHUSTF and to develop a model for the flow of released fuel that escapes into the environment. Such efforts to develop improved groundwater modeling and "fate and transport" models are ongoing in the AOC process.

d .For the consideration of the impact of unintended fuel releases occurring at the RHUSTF, this report will discuss releases that have occurred during three general periods of time:

Historic Releases (pre-2014);
2014 Fuel Release; and
May 6, 2021 Release.

7. <u>Historic Releases (pre-2014)</u>

a. With regard to fuel releases that occurred in the period of the "Historic Releases" (1940s through 2013), available historical records are incomplete. For the period prior to 1995, the RHUSTF was a security classified facility and thus public access and independent investigations were not conducted prior to 1995. (Exhibit B–10, 2008 Groundwater Protection Plan). Information relating to unintended fuel releases from the RHUSTF was deemed to be classified information and was not publicly reported prior to 1995. There is incomplete information and documentation to confirm the quantities of fuel that may have been inadvertently released into the environment and a lack of data monitoring and recording the impact, if any, caused to the environment from such releases.

b. From the study and review of available fuel release records conducted by Dr. Denise DeNovio discussed above, of the total quantity of documented fuel releases from the RHUSTF (approximately 180,000 gallons), 150,000 gallons were released during the period of the 1940s through 2013. That quantity constitutes approximately 83-84% of the total quantity of documented fuel released from the RHUSTF over the entire approximate 80 years of the operational history of the RHUSTF. (Testimony of Nicole M. DeNovio, Golder Associates Inc. report dated December 29, 2020, Revision 2, p. 22.)

c. The first report by the Navy to the state Department of Health of a release from the RHUSTF occurred on November 10, 1998 when petroleum-stained basalt cores were discovered beneath the tanks. In 1998, there is a documented fuel release of 1469 gallons of fuel product.

d. With respect to Historic Releases (pre-2014):

1. Core samples and soil vapor monitoring of the upper 10 to 30 feet of earth beneath the RHUSTF tank farm footprint confirms that petroleum fuel has been released into the earth during this period.
2. In 2005, groundwater sampling was conducted on five monitoring wells (three monitoring wells within the footprint of the RHUSTF tank farm (RHMW01, 02 and 03), RHMW04 located north of the tank farm footprint and at the Navy's drinking water well (RHMW2254-01). The tests sampled for seven volatile constituents, eighteen semi-volatile constituents, total petroleum hydrocarbons (TPH) in the gasoline range and for total petroleum hydrocarbons in the diesel range. The sampling for one monitoring well (RHMW-02) detected one of the seven volatile constituents (trichloroethylene) and one of the eighteen semi-volatile constituents (naphthalene) and total petroleum hydrocarbons in the diesel range (TPHd) at levels which exceeded State of Hawaii Environmental Action Levels. Total petroleum hydrocarbons in the diesel range (TPHd) at levels which exceeded State of Hawaii Environmental Action Level was also detected in the sample from RHMW-03 and RHMW-04. No petroleum or petroleum related compounds were detected in the other monitoring wells or in the Navy drinking water well 2254-01. The sampling results were reported to the DOH. (Ex. B-10, 2008 Groundwater Protection Plan, Sec. 1.7.2.2 and pp. 110-113).
3. Samples the same monitoring wells were again taken in July, 2006. Only one of the eighteen semi-volatile constituents (naphthalene) was detected in RHMW-02 at levels exceeding DOH EALs. No other petroleum fuel constituents were detected in any of the other four monitoring wells. The sampling results were also reported to the DOH. (Ex. B-10, 2008 Groundwater Protection Plan, Sec. 1.7.2.2 and pp. 121-124).
4. Groundwater sampling taken by the Navy at its drinking water source well showed no evidence of petroleum or petroleum constituents. (Exhibit B-10, Red Hill Bulk Fuel Storage Facility Final Groundwater Protection Plan, January 2008.)
5. Water quality sampling tests done by the BWS have not detected petroleum or petroleum fuel constituents in the BWS drinking water and monitoring wells in the Halawa and Moanalua vicinities. (Testimony of Kawata).

From the water sampling tests done by the Navy and BWS for the period prior to the 2014 release incident, it thus appears that drinking water source wells in the area (the Navy's Red Hill Shaft, the BWS Halawa Shaft and the BWS Moanalua Wells have not been contaminated by petroleum fuel products or petroleum constituents.

8. January 2014 Release Incident.

a. In January, 2014, a release of a reported 27,000 gallons of fuel was reported from tank 5. From available Navy records, this 2014 release incident was the first significant release from the RHUSTF since the early 1980s. With regard to the release incident, documents and available information are available and are substantially complete. In addition, the 2014 release incident became the subject of an intensive investigation conducted by a legislative task force comprised of legislative representatives and regulatory and involved agencies. This release incident prompted the 2014 legislative task force investigation discussed above and led to the Administrative Order on Consent (AOC) between the Navy, the Defense Logistics Agency (DLA) Department of Health and the Environmental Protection Agency (EPA). The task force concluded that there had been a spike in levels of hydrocarbons in soil vapor and groundwater. The elevated groundwater samples came from groundwater monitor well 2 (RHMW02) which is the closest monitor well to Tank 5. However, no free product was detected in the groundwater samples.

b. Tank 5 had been removed from service in 2010 in order to undergo a three year modified API 653 tank inspection and repair process. Following such repair, tank tightness testings were conducted prior to refilling of the tank. Tank 5 had passed all four of its tank tightness tests conducted during the tank refilling process. (Panthen testimony that p. 7; Frame testimony at p. 7).

c. The 2014 Release was not due to corrosion of the tank; rather, prior to taking the tank out of service for maintenance (which is routinely conducted for all tanks to *prevent* failures due to corrosion), the tank was first confirmed to be intact via a tank tightness test. The release occurred after the repairs were made and was due to a confluence of errors, which were primarily traceable to human error related to inspection of repairs to gas test holes and defective welds on patch plates that were used to cover the gas test holes. Unfortunately, these errors were not caught through the project's quality control and quality assurance provisions, which could have prevented the release. Specifically, the contractor failed to properly inspect the work, failed to properly test the repair work, failed to report the deficiencies, and failed to properly perform the mandated American Petroleum Institute Standard 653 certification that tank 5 was suitable for service. In addition, the Navy failed to perform satisfactory quality assurance oversight and the Facility operators failed to properly respond to the system's alarms. Thus, the 2014 Tank 5 Release was essentially a perfect storm of errors during the repair project, *not* a failure stemming from corrosion of the tank.

d. As part of its environmental investigation for the AOC SOW, the Navy analyzed the capacity of the subsurface underneath the Red Hill fuel storage tanks to retain released fuel in naturally occurring pockets and impede its downward migration to groundwater (DON 2018b, at

Secs. 6 & 9). The analyses considered both hypothetical sudden releases and hypothetical chronic releases. Evaluation of available monitoring data indicated that the 2014 Tank 5 Release (approximately 27,000 gallons of JP-8 fuel) was likely retained within the top one-third (approximately 30 feet) of the subsurface between the lower access tunnel (underneath the tanks) and the water table (i.e., the "vadose zone") with no significant impact to groundwater. No LNAPL was observed in any monitoring well, and there was little to no change in dissolved constituents as measured prior to and after the release as part of a forensics analysis. Based on this finding, the 2014 release was used along with site-specific geologic data and data from scientific literature to estimate the vadose zone holding capacity for LNAPL. This estimated holding capacity was then used to evaluate the LNAPL volume that would be retained mostly or exclusively in the vadose zone for a hypothetical future release that results in no significant impact to groundwater. Based on this and a parallel evaluation of whether groundwater was impacted from the 2014 Tank 5 Release and reached Red Hill Shaft, the 27,000-gallon release of jet fuel:

- Did not result in the observation of LNAPL in any of the monitoring wells and the Facility.
- Did not result in any measurable increase in chemical concentrations in Red Hill Shaft.

e. Since the 2014 incident, the Navy has implemented several measures to address each identified failure and ensure proper oversight for tank maintenance activities in the future (NAVFAC EXWC 2017). Additionally, the Navy implemented new standard operating procedures to increase contractor scrutiny and provide additional government oversight during construction. The Navy has put these and other measures into place to ensure that these types of errors and a release similar to what occurred in 2014 will not occur again. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020, p.4).

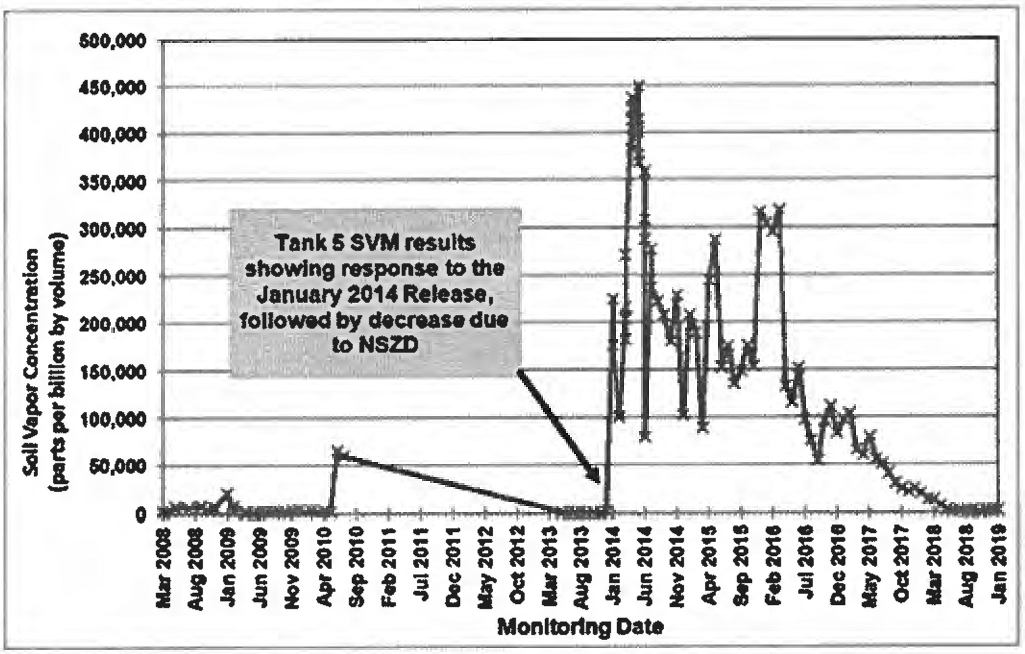
f. A report dated June 12, 2020 presented data from soil vapor monitoring testing for the period from January, 2014 through May 22, 2020. Soil vapor samples taken from shallow, middle and the probes present beneath each of the twenty underground storage tanks were tested for soil vapor the volatile organic compounds (VOC) concentrations. The report set forth what it termed to be a "conservative approach" to assess the integrity of the tank system if VOC concentrations exceed 280,000 ppbv (parts per billion by volume) in soil vapor monitoring points beneath tanks containing JT-5 fuel or JP-8 fuel or 14,000 ppbv in soil vapor monitoring points beneath tanks containing Marine diesel fuel. The monitoring results over the period from January 2014 to May, 2020 only found elevated concentrations of VOCs in the monitoring probes under tank 5. Tank 5 was the tank involved in the January, 2014 release incident. The tests showed elevated levels of VOCs under tank 5 for the period of January, 2014 and June, 2014. The elevated levels moderated from July 2014 through March 2016 and dropped to negligible levels by May 2018 through May, 2020. All other soil vapor monitoring samples taken for tanks other than tank 5 were negligible and described in the report as being 54 to 1400 times below action levels. As of May or June 2020, the report found no evidence of a leaking tank in the RHUSTF complex. (Navy exhibit NAVYREF0005181).

g. In the December 1, 2020 Facility Environmental Report, the following chart presents soil vapor monitoring results for the period March 2008 to January 2019.

Sidebar 13: Soil Vapor Monitoring Results [Section 2.3 (k)]

Since 2008 as required by DOH in accordance with the GWPP (DON 2014), the Navy measures concentrations of volatile organic compounds under the Facility's active fuel storage tanks on a monthly basis. The results are compared to action levels initially established in the GWPP (DON 2014) as updated by the AOC Regulatory Agencies in 2015 (EPA Region 9 and DOH 2016); the results are reported to DOH monthly (DON 2008a). An exceedance of the action level triggers contingency actions in accordance with the GWPP. In addition, analysis of soil vapors resulting from the 2014 release has been used to modify the Navy's monitoring program so that concentration trends can be more reliably evaluated.

As shown in the below chart, soil vapor results related to the 2014 Tank 5 Release demonstrate that soil vapor monitoring can provide a robust system for detection of this type of release. Soil vapor concentrations in the monitoring locations below Tank 5 spiked with the release, with high concentrations continuing through early 2016. Concentrations also increased in this time frame under other nearby tanks. The concentrations later decreased in essentially exponential fashion, as would be expected for conditions related to such a release.



Soil vapor response under Tank 5 after the January 2014 Release

Facility Environmental Report for Contested Case Hearing December 1, 2020, p.45, attached to the testimony of Stanley.

h. From the June, 2020 report (Ex. NavyREF0005181) and the above chart, soil vapor monitoring data from soil monitoring probes inserted ten to thirty feet under each of the tanks in the RHUSTF reflect the following:

a. VOC levels were at low or negligible levels during the 2008 to 2013 period before the January 2014 release incident.

b. Within four months of the January 2014 release incident, soil vapor measurements taken from probes located under tank 5 spiked from negligible values to 450,000 ppbv;

c. After one year, soil vapor measurements under tank 5 dropped below the

280,000 ppbv action level and remained elevated for a period of approximately 3 years;

d. Soil vapor measurement levels under tank 5 returned to the negligible base values after 4 years;

e. Soil vapor monitoring measurements taken under the remaining active tanks (2, 3, 4, 6 through 18 and 20) did not reflect significant increases and remained in the generally low base values throughout the 2014 to 2020 time period. (Ex. NavyREF000518)

i. From such data, the Hearing Officer finds that soil vapor monitoring for VOCs (volatile organic compounds) appears to be a sensitive, timely and effective mechanism to confirm the presence of petroleum fuel products released into the ten to thirty feet of earth immediately under the tanks of the RHUSTF. Following a release of a significant quantity of fuel product (27,000 gallons) as occurred in 2014, vapor levels drop sharply within one year and continue to decrease and return to base negligible values over a span of four years. (Ex. NavyREF0005181).

9. <u>May 2021 Release Incident.</u>

a. During the pendency of this contested case hearing, it happened that another unintended fuel release event occurred on May 6, 2021. To the extent possible, available information regarding this most recent release incident will also be addressed.

b. On the morning of May 7, 2021, the Navy provided DOH with a voice notification of a release of fuel from a pipeline in the Facility's lower access tunnel during a fuel transfer that occurred the evening of May 6 (Exs. N-116, N-169). The Navy provided DOH a Hazardous Substance Release Notification for Case 20210507-0852LG (Ex. N-143). Initially, the Navy reported that less than 1000 gallons of JP-5 fuel had been released from a failed piping sleeve coupling and was subsequently captured in the waste sump below the piping. The Navy reported that the release occurred in less than one minute during the refilling of tank 20 and was immediately observed by site monitors and that there was no release of fuel to the environment. May 2021 (Ex. N-143A).

c. The quantity of fuel released in this incident is comparatively small (less than 1000 gallons). The Navy reported that the released fuel was captured in the sump capture system in the lower tunnel through which the distribution pipeline runs. The release occurred from a pipeline sleeve coupling that failed and was not a tank failure. From the information presented in the record regarding the May, 2021 release incident, the quantity of released fuel actually captured and the quantity of released fuel that may have been released into the environment are not clearly established. (Ex. N-143A).

d. The soil vapor monitoring measurements taken during the first three weeks following the May 6, 2021 release incident reflect the following:

1. In the months prior to the May 6, 2021 release incident, baseline measurements of VOC

under tanks 15, 16, 17, 18 & 20 were very low and in the negligible range of 100 to 1,200 ppbv.

2. One week after the May 6, 2021 release, on May 13, 2021, measured VOCs spiked from negligible values to over 200,000 ppbv under tank 20, over 120,000 ppbv under tank 18 and over 50,000 ppbv under tank 17. The measured high values on May 20, 2021 are below the 280,000 ppbv action level;
3. Within two weeks of the release, on May 20, 2021, measured VOCs under tank 20 had dropped to 24,000 ppbv and 105,000 ppbv under tank 18. VOC levels under tank 17 increased to 96,000 ppbv.
4. In the third week following the release, on May 25, 2021 VOC levels under tanks 17, 18 and 20 had further dropped to the 25,000 ppbv level.
5. Throughout the period of available soil vapor monitoring data, VOC levels under all of the other tanks in the RHUSTF (tanks 2 through 16) were found to be in the relatively negligible range under 2,000 ppbv. After two weeks, soil vapor measurements under tanks 17, 18 & 20 drops back to relatively negligible levels, near base levels.
   (Ex. N-174, Ex. NavyREF0005181 and supplemental testimony of DeNovio).

e.........From such data, the Hearing Officer notes the following:

- Baseline levels of VOCs are low and at negligible levels in the period prior to a release incident.
- Following a release incident, the soil immediately under the tank source of the release will show increased levels of VOCs indicating that soils vapor monitoring is a sensitive and effective detection method for detecting the release of petroleum fuel products into the earth beneath the underground storage tanks.
- After an initial spike in VOC levels, VOC levels drop fairly steeply, returning to base negligible levels very quickly. This may be reflective of a low quantity release given the available information that the release involved a release of approximately 1,000 gallons of which some significant portion was reported to have been captured or contained.
- There appears to be limited lateral movement of released fuel product. (Ex. N-174, Ex. NavyREF0005181 and supplemental testimony of DeNovio).

f. With respect to the May, 2021 release incident, the Navy initiated soil vapor monitoring (SVM) sampling (Ex. N-144) and ground water monitoring are ongoing and are not yet complete. Early groundwater sampling taken from the monitoring wells within the footprint of the RHUSTF and in the immediate vicinity (RHMW01, RHMW02, RHMW03 and RHMW05 found no evidence of fuel product. (Ex. N-149). To date, there has been no evidence of groundwater sampling done by the Navy or BWS presented in this contested case process showing any presence of petroleum products in the groundwater caused by the May 7, 2021 release incident.

10. <u>Investigation of impacts and effects of fuel releases from the facility.</u>

a. Following the 2014 release incident and as part of the AOC efforts to determine and understand groundwater flow, the behavior of contaminants in the environment of the RHUSTF, contaminant transport pathways and the potential for exposure of human beings to potentially impacted drinking water, the Navy developed a conceptual site model to identify and evaluate site-specific characteristics and processes that control the fate and transport of released fuel products and its constituent chemicals. From such study, key findings include the following:

- Long-term monitoring (LTM) and associated studies do not indicate that the 2014 release from tank 5 impacted groundwater at Red Hill Shaft.
- Based on thermal natural source-zone depletion (NSZD) studies, LTM, and other studies indicate that LNAPL is retained in the pore spaces of the rock within approximately 30 feet beneath the tanks and has not reached groundwater.
- Natural attenuation is occurring in both the unsaturated and saturated zones and it acts to degrade petroleum contaminants in the environment.

(Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, pp. iii-iv)

b. In a detailed study that sought to evaluate the flow of groundwater, behavior of contaminant flow, contaminant pathways and the potential of human exposure conducted as part of the AOC process, the 2019 Report concluded from a comprehensive evaluation of extensive monitoring data that the 2014 release incident involving fuel product from tank 5 did not indicate that such release impacted groundwater. The report concluded that impacts to groundwater found in some of the tanks within the immediate footprint of the tank farm (RHMW01, RHMW02 and RHMW03) are likely attributable to historical (pre-2014) leaks.

c. Among the key findings of the report was a finding that there is evidence of a pre-2006 release of LNAPLs (light non-aqueous phase liquid) that impacted groundwater upgradient of RHMW02. (Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, Sec. 7, pp. 7-1-7-26)

d. The report observed that lower concentrations of chemicals of potential concern (CRPC) at RHMW01 and RHMW03 compared to RHMW02 were not indicative of LNAPL release to groundwater in the vicinity of those two wells. (Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, Sec. 7, pp. 7-1-7-26)

e.......In a 2020 Facility Environmental Report, the Navy attempted to address whether the operation of the RHUSTF is and will continue to be "protective of human health and the environment" such that an operating permit for the facility should issue in accordance with Hawaii's Underground Storage Tank statute and regulations. The report points out that:

- From over 900 tests conducted during the period of 2005 to 2020, no measurable petroleum "separate phase product" has ever been detected on the groundwater in any monitoring well or supply well.

- There is no evidence of fuel constituents near the Navy's drinking water supply well (Halawa Red Hill Shaft).
- There is no evidence of fuel constituents at any of the sixteen perimeter monitoring wells (monitoring wells other than the three (RHMW01, RHMW02 and RHMW03) located within the footprint of the tank farm). Groundwater sampling has detected a few petroleum constituents (TPH, naphthalene and methylnaphthalenes) primarily in RHMW02 and to a lesser extent in RHMW01 and RHMW03. The presence of dissolved petroleum constituents in these three monitoring wells within the footprint of the tank farm appear to have occurred as a result of historical releases prior to 2005 However, all other perimeter monitoring wells have not been impacted by the operation of the RHUSTF over its eighty-year period of existence.
- Groundwater tests of the Navy's Red Hill shaft drinking water well and the BWS Halawa shaft drinking water well to not show the presence of petroleum constituents reflecting that the drinking well water resources remain safe.
 (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020.)

11. <u>Steel tank and inspection.</u>

a. A vigorous and reliable maintenance and repair program such as through the modified API 653 inspection and repair protocol being followed by the Navy is critical to ensure the safe operation of the RHUSTF and the integrity of steel tank liners of the underground storage tanks. (Testimony of Whittle, p. 75:22; Testimony of Kern, p. 277:1-5).

b. The Navy has a Tank Inspection Repair and Maintenance (TIRM) process for the RHUSTF. All active Facility fuel storage tanks undergo scheduled routine maintenance upgrades; the upgrade process typically occurs over a 3-year period once a tank is taken out of service. The steel tanks are periodically emptied, cleaned, inspected and repaired to protect the tank from backside corrosion and to maintain sufficient thickness of the welded steel tank to assure functional capacity of the tanks to store fuel without leakage. The TIRM process at Red Hill includes recoating areas of the tank interior steel liners to prevent corrosion as specified by the coating specialist; decommissioning smaller nozzles (piping at bottom of tank) and replacing them with larger nozzles that can be more readily inspected to reduce risk; enhanced contractor qualification process to improve the reliability of tank inspection and repairs; updated processes and procedures for inspection, testing, quality control, and quality assurance; enhanced procedures for returning tanks to service; and standardized operator UST training (Floyd Testimony at p. 14; Kern Testimony at p. 10-12). The process can take several months for each tank (Kern Testimony at p. 26)

c. From the investigation conducted into the circumstances relating to the January 2014 release incident, the Navy determined that the release was the result of a confluence of errors that occurred during the tank inspection and repair process and operator and operational errors following the refilling of tank. The underlying cause of that release was defective repair work by the contractor, who installed gas test holes and covered them with patch plates containing defective welds. Defective workmanship in welding was found in tank 5. The defective welds had not been discovered and corrected due to poor inspection and ineffective quality control. From the initial and follow-on investigations, it was determined the release was not caused by deficient inspection methodology or corrosion of the tank shell. The underlying cause of the release from tank 5 was unrepaired gas test holes and defective fillet welds on patch plates which covered the gas test holes. Contributory factors to the underlying cause of the release were identified, all of which were related to human failures. (Ex. N-77, October, 2016 TIRM Report). The inspection and repair process used at the time was not able to identify this error before the tank was brought back into service (Kern Testimony at p. 17-18). Monitoring and alarm systems detected a suspected release but monitoring personnel ignored the alarm. Since the 2014 release incident, the current TIRM process and procedures for inspection, testing, quality control, and quality assurance have been revised. The Navy has upgraded its procedures for returning tanks to service, and revised and standardized its operator training and enhanced contractor qualification processes (Floyd Testimony at p. 15).

d. Other inspection activities include the tower inspection, the atmospheric vent inspection, the cross-tunnel piping inspections, the hydrostatic test on the nozzle piping, and the valve inspections (Kern Test. at p. 26-27). The Navy utilizes hydrostatic testing of the nozzle piping at a water pressure of greater than 1.6 times the maximum pressure the piping will experience (Kern Test. at p. 27). The Navy has determined that certain nozzles in the pipe distribution system are too small for humans to visually inspect. The Navy is decommissioning fuel tank nozzles that are too small for humans to visually inspect, and is converting them to double-wall piping (Floyd Test. at p. 14-15).

e...The Navy inspects system constituents at Red Hill as frequently or more frequently than the schedule specified in HAR § 11-2.80.1-36 requires (Smith Test. at p. 21-22), including visually inspecting the pipelines in the tunnels at least three times per day (Smith Test. at p. 8).

f...A regulator-led inspection team that included representatives from EPA and DOH conducted a 4-day inspection of the Red Hill Facility in 2016, and reported that systems and management practices in place meet or exceed best practices for petroleum terminals and bulk fuel storage facilities, and that key construction components of the tanks exceed or meet most modern day construction standards (Ex. N-071 at p. 1; Floyd Test. at p. 38; Johnson Test. at p. 11-12).

g. A DOH inspection team conducted a 2-week UST and Airport Hydrant Systems compliance inspection of the Red Hill Facility during September–October 2020, focusing on the Facility's physical integrity as well as an examination of various records and record keeping. The inspectors reported the infrastructure was clean and pristine with no fuel leaks, stated that all alarms were responded to correctly, and did not indicate any major negative findings at the time of the inspection (Floyd Test. at p. 44-45).

h. From the record presented in this matter, the Hearing Officer finds and determines the following:

1. The tanks and tank system at the RHUSTF have been designed, constructed and installed with multiple features to prevent releases of stored fuel products which include a concrete encased steel tank encapsulated in a pressure injected grout sealed excavated basalt rock cavern that is coated with a 6 inch layer of Gunite (sprayed concrete).
2. The Navy has adopted and implemented numerous automated fuel level, tank gauging, overfill protection, inventory monitoring systems and pipeline monitoring systems with around the clock operator monitoring and daily visual inspections.
3. Since the last significant fuel release incident in 2014, the Navy has implemented numerous system upgrades and leak detection components and systems such as increased soil vapor monitoring, increased ground water monitoring, more frequent tank tightness testing than required by applicable regulations, system alarm and monitoring and operational and system protocol changes to provide improved operational performance and greater and improved protection from unintended releases from the RHUST over the operational life of the facility.
4. Since 2014, the Navy has substantially increased the numbers and locations of groundwater sentinel or monitoring wells from the six that existed pre-2014 to nineteen at the present time with plans to further increase the number of monitoring wells to twenty seven by 2023.
5. The Navy has adopted a tank integrity repair protocol (the modified API 653, that, if followed, provides for regular inspections and repairs to obtain engineer certified tank performance integrity for periods of up to 20 years of operational life for an underground storage tank.
6. In 2017, the Navy developed a Polysulfide Modified Novolac Epoxy coating for application as a corrosion protective coating on the interior of the steel tank liners to replace the fluoro-polyurethane coating that had been applied to the tanks on or after the 1960s. The Navy is only beginning to include application of this epoxy coating to tanks that it is inspecting and repairing under the modified API 653 repair protocol.

i. The Hearing Officer finds and concludes that except for deficiencies noted with respect to the completion of API 653 tank inspection, repair and certification for all tanks in active use at the RHUSTF, the RHUSTF tank and tank system are designed, constructed, installed, upgraded and maintained, repaired and operated to prevent the releases of stored regulated substances for the operational life of the tank or tank system.

D. Issue: Is the material used in the construction or lining of the tank or tank system compatible with the substances to be stored?

1. The underground storage tanks at the RHUSTF were designed and constructed with the following features:

   a. Steel tank constructed with ¼ inch thick steel plates welded together to create the steel tank barrel with the base and upper dome of the steel tank constructed with ½ inch thick steel plates welded together;

b. The steel tank is encased in reinforced concrete that was poured around the steel tank with 2 ½ to 4 feet of concrete around the barrel, 4 to 8 feet of concrete at the dome of the tank and 4 feet to 20 feet of concrete at the base of the tank;
c. The steel tank and concrete encasement were constructed in underground caverns excavated out of native basaltic rock material; and
d. Between the basaltic rock cavern and the concrete encased steel tank is a 6 inch layer of sprayed Gunite.

2. Beginning in 1960 the interiors of the tanks were coated in their entirety with a fluoro-polyurethane coating as a protective coating to control corrosion, protect the stored fuel and prevent contamination. More recently, in 2017, the Navy has developed a high performance Polysulfide Modified Novolac Epoxy as an internal coating that can be sprayed onto the interior of the tanks. (Testimony of Jamond). The record presented in this case does not reflect the extent to which this new epoxy coating is being or has been applied to the interiors of the tanks in the tank farm.

3. As designed and constructed, the underground storage tanks at the RHUSTF are constructed of steel and clad or jacketed with a non-corrodible material (concrete) as enumerated in HAR § 11-280.1-20(b)(3). The Department of Health has determined that "The tanks meet the corrosion protection requirement in § 11-280.1-20(b) because the tanks are steel and clad or jacketed with a non-corrodible material (concrete)." (Exhibit N–34)

4. In this case, there has been little evidence presented to support any contention that the materials used in the construction or lining of the tank system, the steel lining of the tank system or the protective interior coating applied and to be applied to the interiors of the tank are not compatible with the fuel products being stored in the tanks at the RHUSTF.

5. From the record presented in this matter, the Hearing Officer concludes that the materials used in the construction and lining of the tanks or tank system (including the concrete encasement, steel lining and interior protective coating of the steel lining) are compatible with the petroleum fuel products stored in the RHUSTF.

E. <u>Issue: Have the existing underground storage tanks or existing tank systems been replaced or upgraded to prevent releases for their operating life?</u>

1. The RHUSTF was constructed in wartime, 1941-1943. The facility was strategically designed to serve a critical mission and buried and located in a unique uphill underground location with the capability of being operational by energized or gravity fed means. The design of the facility included multiple redundant components and systems to assure safe and proper functionality.

2. Despite the multiple redundant components and systems to assure safe and proper

functionality, the RHUSTF has had a history of unintended releases of fuel products from its tank system. Early releases in its period of existence identified performance deficiencies with a designed leak detection feature associated with the underground storage tanks, the tell-tale system. As many as 30 of the 73 identified instances of possible release incidents related to the tell-tale system. Ultimately, the tell-tale system needed to be scrapped. (Testimony of Commander Darrel Frame; Tr. 548:12-22)

3. Tank 1 seemed to be particularly involved with unintended releases. Of the 73 identified instances of possible release incidents, 23 involved releases from tank 1. In the 1970s and early 1980s, releases from tank 1 totaled more than 69,000 gallons of petroleum fuel product or approximately 39% of all releases with documented release quantities over the nearly 80 years of the facilities existence. Ultimately, in 1997, tank 1 was taken out of service. (Updated Testimony of DeNovio, and the Golder Report attached thereto, see Table 1 1-1 from the Golder Report, attached hereto as Attachment A).

4. Today, nearly 80 years later, the facility has aged and maintenance and repair required to update the system in order to prevent unintended releases of stored product and potential damage to health and the environment is increasingly costly and difficult. Corrosion to the back side of the steel tank liner is known to exist and the Navy program for the inspection, repair and certification of the tanks to be operational for further periods of 10 to 20 years under the API 653 maintenance protocol has not been performed for all 18 tanks in active use.

5. <u>Adequacy of Corrosion Protection for Prevention of Leaks</u>

Underground Storage Tanks:

a. DOH regulations require UST systems with field-constructed tanks like those at Red Hill to be upgraded to comply with the codes of practice in corrosion protection performance standards found at § 11-280.1-20(b), among others, or be closed. HAR § 11-280.1-21(a). HAR § 11-280.1-20(b) enumerates the five criteria by which a UST can comply with the performance standards for corrosion protection. They are:

(1) the UST is constructed of fiberglass reinforced plastic;

(2) the UST is constructed of steel and cathodically protected;

(3) the UST is constructed of steel and clad or jacketed with a non-corrodible material;

(4) the UST is installed at a site that is determined by a corrosion expert not to be corrosive enough to cause it to have a release due to corrosion during its operating life; or

(5) the UST construction and corrosion protection are determined by the DOH to be designed to prevent the release or threatened release of any stored regulated substance in a manner that is no less protective of human health and the environment than criteria (1) through (4). *See* HAR § 11-280.1-20(b).

b. With respect to the design and construction of the underground storage tanks at the RHUSTF, the design intent appears to have been to obtain a complete encasement of the steel tank liner by an alkaline reinforced concrete shell further sealed by an application of pressure injected grout to minimize backside corrosion of the steel tank liner material. The design of the USTs has multiple layers or elements of leak prevention capability including the steel tank lining, concrete encasement, installation of pressure grouting, six inches of Gunite and a basalt rock cavern. But all components of the multiple layers of leak prevention capability are not completely fail safe with respect to developing conditions that could facilitate the release of stored fuel product. However, it is evident from previous inspections and repairs of tanks that the design and construction of the tanks have not prevented moisture from coming into contact with the backside of the steel tank liner thereby allowing corrosion of the steel tank liner. While there is little evidence of product leakage due to corrosion of the steel tank liner, regular inspection, maintenance and repair of the steel liner can be critically important to maintain fundamental leak prevention integrity of the steel tank liner.

c. If there is unrepaired corrosion of the steel tank liner, there is a risk that a fuel release due to corrosion of the steel tank liner might migrate through the reinforced concrete, the layer of pressure injected grout, and the layer of Gunite into the surrounding lava rock, travel downward through the lava rock, and contaminate the aquifer underlying Red Hill. The tanks at the RHUSTF are an estimated 100-feet above the groundwater lens. The Navy operates a drinking water source well under Red Hill about 1000-feet makai (towards Pearl Harbor) of the RHUSTF tank farm and the Honolulu Board of Water Supply operates drinking water source wells (the Halawa Shaft located north and the Moanalua Well located south on either side of the RHUSTF tank farm. (Ex. N-77). While past releases from the RHUSTF have not impacted or contaminated the drinking water resource wells of the Navy or the BWS, there is no assurance that a future release of significant quantities of petroleum fuel products from the RHUSTF will not.

d. Hawaii UST regulations do not prescribe a schedule for the inspection and repair of an underground storage tank. Such regulations instead require that the operator of a UST system follow a code of practice prescribed by a nationally recognized association or an independent testing laboratory. HAR § 11-280.1-33(a)(1) states:

(a) Owners and operators of UST systems must ensure that repairs will prevent releases due to structural failure or corrosion as long as the UST system is used to store regulated substances. The repairs must meet the following requirements:

(1) Repairs to UST systems must be properly conducted in accordance with a code of practice developed by a nationally recognized association or an independent testing laboratory.

e. Subsequent to the 2014 release incident, the Navy adopted an upgraded tank clean, inspect and repair (CIR) program. (Ex. N-42, p. 10). The Navy follows a Department of Defense Unified Facilities Criteria (UFC), UFC 3-406-03 applicable to the maintenance of petroleum fuel systems. UFC 3-406-03 calls for the performance of a modified API 653 internal inspection to evaluate the tank for conditions which may affect the operational integrity of the tank floor, shell, columns and roof by a certified API 653 inspector and sets the recommended inspection interval for USTs like those at Red Hill at 10 years, unless recommended otherwise by a certified inspector (Ex. B-6; Tr. Vol. 2 at p. 322-23).

f. The Navy recognizes that inspections should be performed once every ten years

unless the corrosion rate for the tank is such that tanks can be inspected at longer intervals (i.e. every 20 years) as recommended by the certified inspector. Ex. N-77 at 19-6; testimony of Floyd, transcript 2/1/21 at 189; testimony of Frame, transcript 2/3/21 at 638.

g. For the inspection and repair process, the Navy engages engineers to apply industry guidelines (American Petroleum Institute Standard 653 (modified)) and to make a determination as to the desired or requisite thickness of the welded steel tank liner plates to assure satisfactory integrity of the steel liner to provide proper service for the anticipated period of service years before the tank will need to be inspected and repaired again. Generally, the anticipated period of service years is 20 years. (Kern Testimony at p. 12)

h. The Navy's inspection and repair work is done in accordance with API Standard 653, with the addition of modifications for use at the Red Hill Facility (Kern Test. at p. 10, 12-13). American Petroleum Institute (API) standards are widely used by government and

industry around the world and include the accepted standard for petroleum tank inspections

(Kern Test. at p. 8). The API 653 standard allows UST owner/operators to determine inspection cycles based on recommendations from certified API inspectors (Tr. Vol. 2 at p. 317).

i. The API 653 inspection and repair process is extensive, very involved and time-consuming to complete. Tanks must be emptied, cleaned, thoroughly inspected, repaired and tested before they can be returned to service. Completion of an API 653 inspection and repair process for an individual tank takes a year or more to complete. There are also mission and logistical requirements that need to be satisfied. There must be a sufficient number of tanks to store each type of stored petroleum fuel product needed to support the mission of the RHUSTF as a defense logistics component for the Indo-Pacific region.

j. The Clean-Inspect-Repair process entails emptying the tank of fuel and cleaning the interior of the tank to permit inspection personnel to visually inspect and test the entire interior surface of the steel tank liner to determine the integrity of the steel tank liner and whether the steel tank liner continues to have sufficient thickness of the metal to satisfactorily perform for a designated period of time. The API 653 inspection and repair process includes nondestructive examination, calculating corrosion rates and minimum plate thickness, establishing inspection intervals, confirming suitability for service, assessing joint efficiency of welds, settlement evaluation, welding patch plates, and post-repair inspection and testing (Kern Test. at p. 8-9, 12; Floyd Test. at p. 14). The backside (the side facing the reinforced concrete shell) cannot be physically or visually inspected. Since it is impractical to remove the tank plates for inspection, NDE (non-destructive examination) methods – commonly used in underground storage tank inspections – are used to evaluate inaccessible tank components (Kern Test. at p. 20-24).53. Nondestructive examination in the Red Hill API 653 inspection process includes low frequency electromagnetic technique (LFET) and balanced field electromagnetic technique (BFET) (Kern Test. at p. 20). Quality control and validation of the data obtained using LFET and BFET is obtained using a phase array ultrasonic testing (PAUT) (Kern Test. at p. 22).

k. Contractors and welders are engaged to perform the inspection, identify spots or areas of the steel tank liner that may not have the engineer specified desired minimum remaining thickness of the steel and to perform any necessary welding repair work to restore any areas of the steel tank liner that do not have the desired metal thickness. The minimum permissible wall thickness acceptable at the end of a storage tank service interval under API 653 is 0.100 inch (Kern Test. at p. 9). The Navy has modified the API 653 standard to require a minimum acceptable remaining wall thickness of 0.160 inch, which is more conservative and results in the performance of more repairs than the API 653 standard alone (Jamond Test. at p. 8-11; Kern

Test. at p. 25).

l. In 1978 through 1985, tanks 1 through 16 were cleaned, inspected (not considered as "API Std 653"), and repaired. The following chart shows the dates and duration of the cleaning, inspection and repair of the tanks in that time frame:

Tank	Start	End	Duration in days
1	10/23/1981 4/19/1983	4/19/1983	543
2	12/29/1981	3/15/1983	441
3	3/5/1982	4/19/1983	410
4	4/22/1982	2/24/1983	308
5	8/26/1981	5/31/1984	1009
6	6/30/1981	1/31/1985	1311
7	10/24/1978	12/12/1982	1510
8	4/18/1981	6/6/1983	779
9	7/25/1978	6//9/1981	1050
10	10/24/1978	4/18/1984	2003
11	7/10/1978	1/27/1981	932
12	2/27/1980	10/15/1982	961
13	5/30/1980	4/19/1982	689
14	4/17/1980	5/18/1982	761
15	8/4/1980	5/18/1982	652

16	2/12/1981	2/12/1982	365
			Average duration 858

(Ex. N-77, p. 19-9)

m. Over the past four years, four tanks (5, 13, 14 & 17) have been inspected and undergone the TIRM process (Exhibits. N-80 through N-83; Kern Testimony at p. 32). Under the Department of Defense Unified Facilities Criteria, it is recommended that the storage tanks be inspected every 10 years. However, if the tanks undergo a certified inspection process such as that set forth in the American Petroleum Institute Standard 653 (modified) procedure, the tanks can be certified for operation for a period of 20 years. (Exhibit B-6).

n. The record in this case reflects that the Navy has failed to have all of the tanks inspected and/or certified to conform to the recommendation under the Department of Defense Unified Facilities Criteria or under the certified American Petroleum Institute Standard 653 (modified) procedure.

o. Two of the twenty Red Hill tanks (Tanks 1 and 19) have been taken out of service for several decades. Of the remaining 18 tanks, the Navy reportedly takes one to four tanks out of service to have them undergo a Clean-Inspect-Repair process. Thus, at any given time, fourteen to eighteen tanks may contain stored inventory of fuel. (Testimony of Danae Smith ("Smith Testimony"), 24:14-19; Testimony of Frank Kern, 12:2-9; Exhibit N-76 at NAVY0011785-90.)

p. The following chart reflects the dates when each tank was last inspected, when the tank is next due for inspection and the present inspection status of each tank.

Tank	In Service	Last Inspected	Next Inspection Due	Inspection Status
1	Permanently removed from service			
2	X	2008	2028	Current
3	X	1983		Uncertain, Appears Overdue- 28 years

4	X	1983		Uncertain, Appears Overdue- 28 years
5	X	2018	2038	Current
6	X	2006	2026	Current
7	X	1998	2018	Overdue- 3 years
8	X	1998	2018	Overdue- 3 years
9	X	1995	2015	Overdue- 6 years
10	X	1998	2018	Overdue- 3 years
11	X	1981		Uncertain, Appears Overdue- 30 years
12	X	1995	2015	Overdue- 6 years
13	X	2018	2038	Current
14	X	2017	2037	Current
15	X	2005-6	2025	Current
16	X	2006	2026	Current
17	X	2018	2038	Current
18	X	1960		Uncertain, Appears Overdue- 51 years
19	Permanently removed from service			
20	X	2008	2028	Current

(Ex. N-77 October 2016 TIRM Report, Testimony of Floyd and Testimony of Frame, Exs. N-80-83) Note; Some of the source data for this table is from a 2016 TIRM Report. There likely have been additional tanks that have undergone the cleaning, inspection and repair process since 2016 to the present. According to the testimony of Navy representative, John Floyd, four tanks were undergoing the maintenance process as of February, 2020 and two more were expected to undergo the Clean, Inspect & Repair process by mid-2021 (the identity of the specific tanks presently undergoing the API 653 repair process is not stated). (Testimony of Floyd, p. 186-188). Several tanks (tanks 7, 8, 9, 10, & 12), are overdue by three to six years for inspections and repairs to confirm their ongoing serviceability. Four tanks (tanks 3, 4, 11 and 18 are overdue by 28 to 51 years. (Testimony of Frame, pp. 611-616; Testimony of Floyd, pp. 189-193).

q. The Hearing Officer finds and determines that the RHUSTF tank system is presently being maintained and operated in a manner designed to prevent releases of stored fuel products. However, while the Navy follows the Department of Defense Unified Facilities Criteria (UFC), UFC 3-406-03 which prescribes that underground storage tanks should be inspected at least every ten years and repaired under the modified API 653 procedure or at least every twenty years if recommended by the API 653 inspector, some of the tanks in the RHUSTF in active use are not currently inspected, repaired and certified under the API 653 modified protocol for inspection after a longer operating term as certified by the API 653 inspector.

F. <u>Issue: Will the operation of the RHUSTF tank system be done in a manner that is protective of human health and the environment?</u>

1. DOH regulations provide that:

> The director shall approve an application for a permit only if the applicant has submitted sufficient information to the satisfaction of the director that the technical, financial, and other requirements of this chapter are or can be met and the installation and operation of the UST or tank system will be done in a manner that is protective of human health and the environment. HAR § 11-200.1-323(b).

2. The Navy submits that it has and maintains a "system of systems" designed and intended to assure the safe and proper installation, maintenance and operation of the RHUSTF in a manner that is protective of human health and the environment.

3. The design and construction of the underground storage tanks at the RHUSTF includes multiple or redundant components that serve to provide tank integrity. Those multiple or redundant components include:

a. Protective coating of interior areas of the steel tank liner;
b. the steel tank liner;
c. concrete encasement;
d. pressure injected grout;
e. excavated basaltic rock cavern; and
f. Gunite coating of the excavated basaltic rock.

4. Each of these components provide a degree of leak prevention capability. While the components may be redundant, they are not failure proof. The protective coating on the interior of the steel tank liner can deteriorate over time. The steel tank liner if exposed to moisture can corrode. The concrete encasement can develop cracks. The pressure injected grout may not achieve the complete sealing of gaps between the tank components. The excavated basaltic rock cavern can have cracks and fissures and the sprayed cementitious Gunite coating can also develop cracks. Together, the multiple components appear to provide a substantial degree of tank integrity . But it is evident that the tank system needs constant periodic inspection, maintenance and repair.

5. Pipeline Distribution System.

a. The RHUSTF also includes a pipeline distribution system. The pipelines distribute fuel from the underground storage tanks to a pumphouse located at Joint Base Pearl Harbor Hickam. The pipeline distribution system at the RHUSTF has a number of physical or mechanical capture systems incorporated into the design and operation of the RHUSTF. Such capture systems include the lower concrete tunnel through which distribution pipelines run, sumps, spill buckets and catch drains. Following the 2014 release incident, the Navy installed or upgraded six oil-tight doors in the lower access tunnel panel to contain released fuel in the event of an emergency. In addition, five new sumps were installed near the doors with each sump capable of pumping released fuel, firefighting foam or water to a 150,000 gallon retention tank in the event of a release or flood. (Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, p. 4-6)

b. DOH regulations require an operator of a UST system to have an appropriate method for release detection. HAR §11-280.1-40 sets forth general requirements that owners and operators of an UST system must provide a method, or combination of methods, of release detection that can detect a release from any portion of the tank and the connected underground piping that routinely contains product. HAR §11-280.1-41 (a)(3) and HAR §11-280.1-43 (10) sets forth that UST systems with field-constructed tanks with a capacity greater than 50,000 gallons must conduct an annual tank tightness test that can detect a 0.5 gallon per hour leak rate.

c. In the aftermath of the 2014 release incident and the Legislative Task Force Report and through the AOC process, the Navy maintains that it is meeting and exceeding regulatory requirements pertaining to the maintenance and operation of an underground storage tank facility. Regulations require corrosion protection, tank tightness testing, release detection, automatic tank gauging and inventory management systems. The Navy submits that it is satisfying all those requirements and more. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020,.pp..46-54).

d. In 2015, following the 2014 release incident and prior to the amendment of Hawaii DOH regulations requiring the RHUSTF to comply with Hawaii's underground storage tank regulations, the Navy engaged a contractor to evaluate the facility's operations
against existing and likely forthcoming state and federal UST requirements for field-constructed tanks and to conduct a baseline evaluation of the underground storage tank (UST) system and
peripheral equipment at the Red Hill Bulk Fuel Storage Facility (Red Hill Facility).

e. The evaluation team did not identify areas of noncompliance with current state or federal regulations; however, most of the regulations for UST systems were not yet in effect at the Red Hill Facility, due to EPA's deferral of regulations for field constructed tanks. The valuation team generally found that systems and management practices in place at the Red Hill Facility meet or exceed best practices for petroleum terminals and bulk fuel storage facilities.

f. The Red Hill Facility employs three methods of leak detection: (1) annual tank tightness testing; (2) ATG (automatic tank guage); and (3) soil gas monitoring.

g. The Navy also employs an Automatic Fuel Handling Equipment (AFHE) System to detect any unscheduled fuel movements (UFMs), including leaks, from their UST system by collecting and processing ATG data. The Navy's Control Room operators receive alerts of any potential unscheduled fuel movements. The AFHE system accounts for volumes that move through the UST system using flow meters, and ATG data combined with strapping charts. Under static conditions (no fuel transfers), the AFHE system generates a warning alarm any time there is an apparent net loss or gain of more than half an inch of fuel in one of the tanks, and a critical alarm for more than 0.75 inches. During scheduled fuel transfers, the AFHE generates a warning alarm for more than one inch and a critical alarm for more than 1.5 inches. (Ex. N-71, June 2017 Underground Storage Tank System Evaluation Final Report)

h. The AFHE system provides remote, real-time monitoring of the fuel distribution. system using inventory data, alarm conditions, system pressures via remote transmitters, fuel metering, high pressure and low pressure conditions, valve position indicators, and pump controls and status (Floyd Testimony at p. 16).

i. The AFHE Control Room is manned at all times by a Control Room Operator (Ex. N-91; Floyd Testimony at p. 17).

j. Unscheduled fuel movements that could indicate a release trigger alarms that are monitored both in the Control Room and by a "rover" who moves around the Red Hill Facility personally gauging tanks and visually inspecting system components for leaks, safety hazards, and security violations (Ex. N-45; Floyd Testimony at p. 18-22).

k. The Automatic Tank Gauging (ATG) system records product storage and inventory information (e.g., liquid level, temperature, and density) via probes located in each tank, and displays this data on AFHE screens (Floyd Testimony at p. 17-18).

l. Beginning in 2015, tank tightness testing at the Red Hill Facility occurs on an annual basis for all in-service storage tanks and surge tanks. The tank tightness testing system is Mass Technology Corporation's Mass Technology Precision Mass Measurement System **(MTPMMS).** It uses a flexible probe inserted to the bottom of the tank through the gauge port on the top of the tank. The device measures the differential pressure between a point at the bottom of the tank and another point immediately above the surface of the fuel, over a period of five days when the tank is closed to any fuel transfer. At the conclusion of the test, the tester conducts a statistical trend analysis of the pressure data to determine whether a leak exists. The Navy's consultant reports that this test can detect a total leak of as little as 0.5 gph, with a 95 percent confidence and a five percent probability of false alarm. 0.5 gph is the current detection limit specified in the regulations for tank tightness testing. (Ex. N-71, June 2017 Underground Storage Tank System Evaluation Final Report)

m. While the regulations require annual tank tightness testing that can detect a 0.5 gallon per hour leak rate or better is performed on each operating field-constructed UST, the Navy performs such testing twice a year (Ex. N-71 at p. 4; Ex. N-28 at p. 6; Ex. N-42 at p. 35; Caputi Supplemental Testimony attached report at 10). Tank tightness test reports are provided to DOH on a semiannual basis (Smith Testimony at p. 9-10).

n. All Red Hill tanks in operation have passed tank tightness tests. (Floyd Testimony at p. 38-39; Panthen Testimony at p. 15; FER Attachment A at p. 3).

o. The EPA and DOH have agreed that the method used for tank tightness testing at Red Hill is appropriate and meets the regulatory standard of 0.5 gallons per hour (Caputi Supplemental Testimony and attached report at p. 10, 14-15).

p. HAR §11-280.1-41(b) sets forth general requirements that owners and operators of an UST system with field-constructed tanks with a capacity greater than 50,000 gallons must conduct an annual line tightness testing. HAR § 11-280.1-44(4) allows, as a method of release detection for piping, the performance of a semiannual or annual line tightness test at or above the piping operating pressure in accordance with the table set forth in the rule (Smith Testimony at p. 9). The underground pipelines that are connected to the airport hydrant system are tested annually in accordance with HAR § 11-280.1-44(4)(A)(i) (Smith Testimony at p. 10).

q. In addition to twice-yearly tank tightness testing, release detection methods at the Red Hill Facility include: (1) conducting fuel inventory monitoring using Automated Fuel Handling Equipment (AFHE) system and Automatic Tank Gauging systems; (2) conducting daily visual inspections; (3) conducting manual fuel inventory, including trend analysis that detects tiny long-term changes in fuel volume; (4) pipeline monitoring; (5) soil vapor monitoring; (6) groundwater monitoring (Floyd Testimony at p. 15; Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020, pp..46-54).

r. DOH regulations require that piping that routinely contains regulated substances and is in contact with the ground must be properly designed, constructed, installed and protected from corrosion in accordance with a code of practice developed by a nationally recognized Association or independent testing laboratory. HAR § 280.1-20 (c).

s. The pipelines leading from the Red Hill tanks down to the pump house are located in a tunnel, and are therefore considered aboveground pipelines that are not in contact with the ground and do not require cathodic protection against corrosion (Ex. N-71 at p. 6; Ex. N-034 at p. 2). Pipelines are visually inspected three times daily. (Testimony of Smith, p. 8) The pipeline at Joint Base Pearl Harbor Hickam that is underground is cathodically protected by an impressed current system (Ex. N-095 at p. 3). Cathodic protection surveys are conducted annually for all piping segments in contact with the ground (Smith Testimony At p. 8; Ex. N-95 at Enclosure 9; Whittle Testimony at p. 20-21)

t. The RHUSTF has inventory monitoring systems that deactivate bombs and activates isolation valves in the event of an overfill in addition to multiple audible and visual alarms. (Testimony of Smith, Testimony of Kern).

u. While the regulations require annual tank tightness testing that can detect a 0.5 gallon per hour leak rate or better is performed on each operating field-constructed UST twice a year (Ex. N-71 at p. 4; Ex. N-28 at p. 6; Ex. N-42 at p. 35; Caputi Supplemental Testimony attached report at 10). Tank tightness test reports are provided to DOH on a semiannual basis (Smith Testimony at p. 9-10). All Red Hill tanks in operation have passed tank tightness tests (Floyd Testimony at p. 38-39; Panthen Testimony at p. 15; FER Attachment A at p. 3).

v. The EPA and DOH have agreed that the method used for tank tightness testing at Red Hill is appropriate and meets the regulatory standard of 0.5 gallons per hour (Caputi Supplemental Testimony and attached report at p. 10, 14-15).

w. HAR §11-280.1-41(b) sets forth general requirements that owners and operators of an UST system with field-constructed tanks with a capacity greater than 50,000 gallons must conduct an annual line tightness testing. HAR § 11-280.1-44(4) allows, as a method of release detection for piping, the performance of a semiannual or annual line tightness test at or above the piping operating pressure in accordance with the table set forth in the rule (Smith Testimony at p. 9). The underground pipelines that are connected to the airport hydrant system are tested annually in accordance with HAR § 11-280.1-44(4)(A)(i) (Smith Testimony at p. 10).

x. In addition to twice-yearly tank tightness testing, release detection methods at the Red Hill Facility include: (1) conducting fuel inventory monitoring using Automated Fuel Handling Equipment (AFHE) system and Automatic Tank Gauging systems; (2) conducting daily visual inspections; (3) conducting manual fuel inventory, including trend analysis that detects tiny long-term changes in fuel volume; (4) pipeline monitoring; (5) soil vapor monitoring; (6) groundwater monitoring (Floyd Testimony at p. 15; Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020, pp..46-54).

y. An initial and important question is what happens to fuel that is not captured or contained and is released into the environment? Petroleum fuel products are organic chemical compounds. Fuel products are volatile and can be vaporized into the air or dissolved in water. Fuel products that are released from underground storage tanks which are not contained or captured become subject to various processes of decomposition including:

1. evaporation upon exposure to the atmosphere;
2. absorption upon contact with concrete, cementitious materials; soil, earth and rock; and
3. bioremediation due to exposure to bacteria and other microbes in the soil, earth and rock. (Testimony of Stanley, Facility Environmental Report, Appendix D, "Direct Aerobic NSZD of a Basaltic Vadose Zone LNAPL Source in Hawaii", Article in Journal of Contaminant Hydrology, Oct. 2020) (This research utilized two methods (CO2 flux and heat flux) to measure the rate of Natural Source Zone Depletion due to aerobic biodegradation and concluded that petroleum degradation rates at the RHUSTF were between 4600 to 7400 gal/year to 8600 to 13,000 gallons per year.)

z. To the extent that this is the range of the capacity of the earth under the RHUSTF to bioremediate petroleum fuel products released into the environment, it would appear that bioremediation alone is not sufficient to mitigate the effects of larger fuel releases like the 2014 release of 27,000 gallons of fuel product or a more catastrophic release. (Golder Report, Evaluation of Hydrology, Groundwater Flow and Transport, Dec. 29, 2020, Revision 1, Sec. 2.3, attached to Updated Testimony of DeNovio)

aa. A pertinent fear and concern is that released fuel that is not contained or captured and which is not absorbed or bioremediated can drain through the soil, earth and rock and ultimately reach and contaminate the drinking water resources in the aquifer system that underlies much of Oahu. Such contamination can either be the presence of free-flowing fuel product or LNAPL (light non-aqueous phase liquid) that can float on the top of the water resources in the aquifer or the presence of dissolved, degraded or decomposed chemical constituents that remain following the effects of aeration, absorption and bioremediation of the hydrocarbons that make up the released fuel product.

bb.Since the early 1980s, a period of nearly 40 years, the RHUSTF has had one significant release of petroleum fuel products, the 2014 release of approximately 27,000 gallons of product. That release incident was the result of improper repair and inspection, exacerbated by operator error in failing to respond to a warning system alarm. The cause of the release was not due to leaks through corrosion of the steel tank liner system.

cc. For the RHUSTF, different monitoring systems have been implemented in an attempt to detect and monitor the presence of released fuel product and/or the dissolved, degraded and decomposed fuel constituents contained in the soil, earth and rock beneath and around the underground storage tank facility. The monitoring systems include the following:

1. Soil vapor monitoring points in borings made under the 18 underground storage tanks that remain in active use;
2. Groundwater monitoring wells drilled into the earth under and in

the vicinity of the underground storage tank farm;

3. Water sampling monitoring systems at water pumping wells maintained by the Board of Water Supply at the Halawa Shaft Pumping Station and by the Navy at the Navy Pumping Station at Red Hill

6. Soil Vapor Monitoring.

a. Soil vapor monitoring data from 2008 to date shows that it is a sensitive and effective monitoring strategy to confirm the release of fuel products into the earth beneath the RHUSTF. Soil vapor monitoring data from 2008 through 2013 before the January 2014 release incident showed negligible or low baseline levels of petroleum related constituents indicating an absence of chronic or episodic fuel release incidents in that period prior to the January, 2014 release incident. Immediately after such incident, soil vapor monitoring detected a spike in levels of petroleum related constituents in the layer of earth immediately below the RHUSTF tank footprint which declined and returned to negligible base levels over a three to four years period following the January 2014 release incident. Soil vapor monitoring data for the period prior to the next reported fuel release incident in May, 2021 reflects that VOC levels prior to the release incident were at low and negligible levels. Such data also appears to support a conclusion that there is no significant release of fuel products due to corrosion of the USTs or chronic undetected releases from other parts of the pipeline distribution system.

7. Groundwater Monitoring.

a. The Navy collects groundwater samples from four wells located in the lower access tunnel, one sampling point in the Red Hill Shaft, and five groundwater monitoring wells outside of the Red Hill Facility tunnel system. The Navy collects samples on a quarterly basis and analyzes the samples for petroleum constituents. The Navy compares results to site specific risk-based levels (SSRBLs) for total petroleum hydrocarbons as diesel fuel (TPH-d) and benzene, as well as HDOH Environmental Action Levels (EALs). The Navy also measures each well in the Red Hill Facility tunnel for the presence of light non-aqueous phase liquids.

b. As of the Navy's 2008 Groundwater Protection Plan (Ex. B.10), the Navy's records did not indicate that there were any major fuel releases that had occurred from the external pipelines that could be a source of contamination reaching the basal groundwater. (Ex. B-10, Sec, 1.7.1).

c. In 2016, an inspection team that included representatives from the EPA and DOH inspected the RHUSTF and reported that systems and management practices in place meet or exceed best practices for petroleum terminals and bulk fuel storage facilities, and that key construction components of the tanks exceed or meet most modern-day construction standards. (Ex. N-71, Testimony of Floyd. P. 38, Testimony of Johnson, pp, 11-12).

d. A 2017 evaluation of the Facility conducted for the EPA found the following:

o Piping components in the tunnel system between the Red Hill Facility storage tanks in the pumphouse and piping components from the surge tank into the pump manifolds appear to be in generally good condition, with minor surface defects and pitting on the pipeline in some areas.

o No major issues were observed on the piping.

o Any potential leak paths in those areas would likely be contained by the tunnel system and the air-tight doors and would likely be detected by pressure drops monitored in the control room.

o Piping systems at the upper tank farm area are in generally good shape and have been designed and maintained to modern standards.

(Exhibit B-352, Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, June 30, 2019 revision 1, p. 4-6)

e....In September – October 2020, a DOH inspection team conducted a 2 week compliance inspection of the RHUSTF focusing on the facility's physical integrity, examination of records and record keeping. The inspectors reported the infrastructure was clean and pristine with no fuel leaks, bound that all alarms were responded to correctly and indicated no major negative findings. (Testimony of Floyd, p. 44-45)

f....The recent May 6, 2021 release incident resulted from a sleeve coupling failure in the pipeline distribution system. With an estimated quantity of 1,000 gallons of fuel product released and the Navy's reported containment or capture of most of the released fuel, soil vapor monitoring tests still confirmed the presence of petroleum fuel vapors in the earth beneath the facility. Thus, even the physical capture and containment features of the pipeline distribution system of the RHUSTF are not completely sufficient to prevent the release of some released fuel into the environment.

g. The RHUSTF has had a history of unintended fuel releases from underground storage tanks and the pipeline distribution system. Roughly 150,000 gallons out of a total of approximately 180,000 of fuel product has been released into the environment from the RHUSTF during the historical period of the 1940s to the early 1980s.

h. From the early 1980s through 2013 there have been no significant unintended fuel releases from the RHUSTF.

i. From groundwater testing done prior to 2014, it appears that there has been no detection of LNAPL petroleum fuel reaching the groundwater resources below the RHUSTF. However, there was detection of some petroleum fuel constituents, likely the remnant results of the aeration, absorption and bioremediation (natural attenuation or natural source zone depletion) that occurs over time to petroleum fuel products in the earth, primarily at the monitoring well (RHMW02) built within the footprint of the tank farm near tanks 5, 6, 7 & 8 with lesser levels of petroleum constituents found in the other two monitoring wells (RHMW01 and RHMW03) built within the footprint of the tank farm.

j. From groundwater testing done following the January, 2014 release incident, there has been no detection of LNAPL petroleum fuel reaching the groundwater resources below the

RHUSTF. However, there was detection of some petroleum fuel constituents in RHMW02 with some lesser quantities of petroleum constituents in nearby monitoring wells (RHMW01 and RHMW05);

k. No LNAPL petroleum fuel or petroleum constituents has been detected to have reached any of the other monitoring wells surrounding the RHUSTF tank farm footprint or in the drinking water wells of the Navy (Red Hill Shaft) or the BWS (Halawa Shaft and Moanalua Wells) reflecting to date limited lateral movement of petroleum fuel products or petroleum constituents from fuel releases at the RHUSTF.

l. Drinking water resource wells of the Navy and BWS in the area remain safe and free of contamination from LNAPL petroleum fuel or petroleum constituents. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020,.pp. i-ii; Testimony of Kawata).

m....From the record and evidence submitted in this case, the following can be noted:

1. There has been no contamination of the Navy's or BWS drinking water resources (Navy Red Hill Shaft and BWS Halawa Shaft and Moanalua Wells) by released petroleum fuel products from the RHUSTF.
2. The Navy implemented its long-term groundwater monitoring program in 2005. The BWS has also been monitoring groundwater at its drinking water resource wells and monitoring wells over a very long time. From more than 900 groundwater sampling tests done by the Navy since 2005 and from the BWS ongoing groundwater sampling, no fuel product has been detected to have reached the drinking water resource wells in the Red Hill, Halawa or Moanalua areas;
3. Certain decomposed petroleum fuel constituents (total petroleum hydrocarbons (TPH)) were detected in groundwater sampling taken in the monitoring well (RHMW02) immediately in the vicinity of tank 5 (the source of the 2014 release). No specific fuel constituents have ever been detected at concentrations exceeding the highly protective regulatory screening levels in over 6,800 analyses of over 650 samples collected from the "perimeter wells" (i.e., the 16 groundwater monitoring wells other than the 3 wells in the immediate vicinity of the Facility's fuel storage tanks). (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020,.pp. i-ii; Testimony of Kawata).
4. The 2014 Tank Release was the result of contractor error in making faulty welding repairs, inspection, quality control errors, monitoring operator error in failing to properly respond to system alarms.
5. Since the 2014 release incident, many system operation practices have been implemented to provide increased assurance that such operational errors will not reoccur.
6. The release was not due to unaddressed corrosion of the steel tank liner. The release did not result in contamination of the Navy's or BWS' drinking water

resource wells nor did it cause any harmful exposure to humans, plants, or animals. (Testimony of Stanley, Facility Environmental Report for Contested Case Hearing December 1, 2020, pp.4 & 61)

n. The Hearing Officer finds and concludes that the operation of the Facility has not contaminated the Navy's or the BWS drinking water resource wells in or around the Red Hill, Halawa or Moanalua area and is currently and will be protective of human health and the environment and is likely to remain so within the 5-year permit period and should be permitted to continue to operate for the next 5 years.

G. Issue: Whether the Navy in its maintenance, repair and operation of the RHUSTF can meet the technical, financial and other requirements of HRS Ch. 342L

1. Hawaii's statute regarding underground storage tanks, HRS Chapter 342L sets forth permitting and notification and reporting requirements and certain general standards applicable to the maintenance and operation of underground storage tanks. HRS §342L-31 established a permit requirement for the installation and operation of underground storage tanks. HRS §342L-31(a) states:

> No person shall install or operate an underground storage tank or tank system brought into use after the effective date of the tank or tank system standards established in section 342L-32 unless a permit is obtained from the department and upon payment of a fee.

2. The legislation authorized the Department of Health to adopt rules to ensure that pre-existing underground storage were upgraded and operated to prevent releases. The legislation also adopted standards applicable to underground storage tanks and tank systems. HRS §342L-32 set forth the following tank system standards:

> §342L-32 Standards for tanks and tank systems. (a) The department shall adopt standards under chapter 91 which shall apply to underground storage tanks and tank systems.
> (b) Underground storage tank and tank system standards shall include, but are not limited to the following specifications:
> **(1) The tank and tank system shall be designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system;**
> **(2) The material used in the construction or lining of the tank or tank system is compatible with the substance to be stored; and**
> **(3) Existing underground storage tanks or existing tank systems shall be replaced or upgraded not later than December 22, 1998, to prevent releases**

for their operating life. (emphasis added) [L 1989, c 212, pt of §6; am L 1992, c 259, §22]

3. In addition, the legislation requires owners of underground storage tanks to notify the Department of Health regarding the storage tank system (HRS §342L -30) and to provide pursuant to regulations notices to the Department of Health with regard to suspected or confirmed releases from the underground storage tanks (HRS §342L -34).

4. The Navy has complied with its obligations to notify the Department of Health with regard to its ownership and maintenance of an underground storage tank system and has been providing the required notices to the Department of Health with regard to suspected or confirmed releases from the RHUSTF.

5. With regard to the Navy's compliance with standards for tanks and tank systems as set forth in HRS §342L-32, the specifications set forth in HRS §342L-32(b)(1), (2) and (3) have been addressed in other portions of this report.

6. HRS Chapter 342L-36 also authorizes the Department of Health to adopt requirements for the owners and operators of underground storage tank facilities to demonstrate or provide assurances of financial responsibility for taking responsive actions and for compensating third parties for injury and loss arising from the operation of brown storage tank facility. In view of the fact that the Navy is an agency of the United States government, the Hearing Officer determines and concludes that the Navy is able to meet financial and operational requirements for the maintenance and operation of the RHUSTF.

7. The Hearing Officer finds and determines that the Navy is able to meet all technical, financial and other requirements of HRS Chapter 342L with regard to its ownership and maintenance of the RHUSTF.

H. Issue: If a permit is to be issued, whether the DOH should impose conditions on the permit where "reasonably necessary to ensure compliance with applicable regulations and any other relevant state requirement, including conditions relating to equipment, work practice, or operation."

1. The Hawaii regulations on underground storage tanks permits the DOH to impose conditions on a permit where "reasonably necessary to ensure compliance with this chapter and any other relevant state requirement, including conditions relating to equipment, work practice, or operation." HAR § 280.1-328 provides that:

Permit conditions. The director may impose conditions on a permit that the director deems reasonably necessary to ensure compliance with this chapter and any other relevant state requirement, including conditions relating to equipment, work practice, or operation. Conditions may include, but shall not be limited to, the requirement that devices for measurement or monitoring of regulated substances be installed and maintained and the results reported to the director, all costs and expenses to be borne by the applicant.

2. Despite the multiple systems and technologies in place to provide for an underground fuel storage facility that does not allow petroleum fuel products to escape into the environment and threaten to contaminate the critical drinking water resources of Oahu, corrosion to the steel liner component of the storage tanks is occurring and rigorous inspection, repair and certification for further safe operational capability is required. Despite the extensive "system of systems" implemented by the Navy to provide for continued safe and proper function of the RHUSTF, it is known that there will still exist risk of operational error as occurred in the 2014 release incident where a confluence of repair contractor error, quality assurance inspection error and system monitor human error can result is an unintended release of 27,000 gallons of petroleum fuel product. Further, there is also the continuing risk that some component of the pipeline distribution system, even with daily visual inspections, cathodic protection of underground piping, capture and containment features, replacement of small nozzles with larger, more easily inspected nozzles, there can still occur some failure in the pipeline distribution system which allows escaped fuel product to get into the environment and threaten the water supply as occurred recently with the May, 2021 release incident.

3. Such ongoing risks give cause for the concerns articulated industry professionals such as David Norfleet, the oil and gas industry engineer consultant for the BWS to opine that the only way to eliminate the risk that future fuel releases will impact drinking water resources is by moving the RHUSTF to another location that does not have the potential to adversely impact Oahu's sole-source groundwater aquifer. He further opines that if the RHUSTF is to remain in its present location, upgrading the facility to a tank within a tank secondary containment facility would be the best and most protective way to address existing tank integrity issues. (Testimony of David M. Norfleet.) That concern and view is shared by the BWS water quality division program administrator, Erwin Kawata, who asserts that relocation of the Navy's fuel storage tank facility to a location that sits above bedrock and not over the aquifer resources of the island is a safer and preferred option. Absent that, modification of the RHUSTF by the addition of a secondary containment tank within the tank capability would be necessary. (Testimony of Erwin Kawata).

4. The consideration of modifying the RHUSTF with a tank within a tank secondary containment facility or the relocation of the aging RHUSTF to a location that removes the storage facility from its present location above Oahu's critical sole source aquifer are long term options beyond the term and scope of the permit application at issue in this matter. Also, such considerations are presently matters being addressed in the ongoing AOC process.

5. With regard to the factual finding that the Navy has failed to have all of the tanks inspected and/or certified to conform to the recommendation under the Department of Defense Unified Facilities Criteria or under the certified American Petroleum Institute Standard 653 (modified) procedure such that some of the tanks in the RHUSTF in active use are not currently inspected, repaired and certified for a continuing period of years and the fact that some of the

tanks in active service appear to be overdue for such inspection and repair by as many as 28 to 51 years is a circumstance that requires immediate correction.

Any finding of fact that is or should be a conclusion of law is to be taken as such notwithstanding its denomination as a finding of fact.

IV. Conclusions of Law

Constitutional, Charter, Statutory and Regulatory Requirements

A. Constitutional Requirements

1. The Hawaii Constitution guarantees that "[a]ll public natural resources are held in trust for the benefit of the people" and directs the State, and by extension the DOH, "to protect, control and regulate the use of Hawaii's water resources for the benefit of its people." Haw. Const. Art. XI, §§ 1, 7.

2. The citizens of Hawaii are afforded the substantive "right to a clean and healthful environment." Haw. Const. Art. XI, §§ 9.

3. The State and its Department of Health has a public trust responsibility to protect the water resources that they manage and to preserve the rights of present and future generations in the waters of the State. The public trust doctrine applies to all water resources and obligates the State to protect the purity of Hawaii's water and grants it the authority to maintain the purity and flow of our waters for future generations and to assure that the waters of our land are put to reasonable and beneficial uses. *Kauai Springs, Inc. v. Planning Comm'n of Cnty. of Kauai*, 133 Haw. 141, 172, 324 P.3d 951 (2014)

B. City Charter Requirements

1. The Board of Water Supply ("BWS"), City and County of Honolulu, shares in the public trust responsibility to protect water resources and to manage and preserve the rights of present and future generations in the waters of Hawaii. The BWS is empowered to manage, control, and operate its water systems and infrastructure and to take appropriate legal actions to protect the State's drinking water resources and the interests of the BWS and its constituents. Revised Charter of the City and County of Honolulu, Article VII, Sections 7-103 and 7-117

C. Statutory Requirements

1. The Federal government promulgated the Hazardous and Solid Waste Amendments of 1984, which created a federal program for the regulation of underground storage tanks which provided that states could adopt their own regulatory programs by establishing state standards that least meet minimum federal standards.

2. Pursuant to the express waiver of sovereign immunity contained in the Resource Conservation and Recovery Act, 42 U.S.C. § 6901 *et seq.*, the Navy is subject to the same substantive and procedural requirements as any person under state laws regulating USTs. 42 U.S.C. § 6991f(a) provides that:

> Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any underground storage tank or underground storage tank system, or (2) engaged in any activity resulting, or which may result, in the installation, operation, management, or closure of any underground storage tank, release response activities related thereto, or in the delivery, acceptance, or deposit of any regulated substance to an underground storage tank or underground storage tank system shall be subject to, and comply with, all Federal, State, interstate, and local requirements, both substantive and procedural (including any requirement for permits or reporting or any provisions for injunctive relief and such sanctions as may be imposed by a court to enforce such relief), respecting underground storage tanks in the same manner, and to the same extent, as any person is subject to such requirements, including the payment of reasonable service charges. The Federal, State, interstate, and local substantive and procedural requirements referred to in this subsection include, but are not limited to, all administrative orders and all civil and administrative penalties and fines, regardless of whether such penalties or fines are punitive or coercive in nature or are imposed for isolated, intermittent, or continuing violations. The United States hereby expressly waives any immunity otherwise applicable to the United States with respect to any such substantive or procedural requirement (including, but not limited to, any injunctive relief, administrative order or civil or administrative penalty or fine referred to in the preceding sentence, or reasonable service charge."

3. The Hawaii legislature adopted underground storage tank legislation (HRS Ch. 342L). HRS §342L-31 established a permit requirement for the installation and operation of underground storage tanks. HRS §342L-31(a) states:

> No person shall install or operate an underground storage tank or tank system brought into use after the effective date of the tank or tank system standards established in section 342L-32 unless a permit is obtained from the department and upon payment of a fee.

4. The legislation also adopted standards applicable to underground storage tanks and tank systems. HRS §342L-32 set forth the following tank system standards:

> §342L-32 Standards for tanks and tank systems. (a) The department shall adopt standards under chapter 91 which shall apply to underground storage tanks and tank systems.

(b) Underground storage tank and tank system standards shall include, but are not limited to the following specifications:

(1) The tank and tank system shall be designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system;

(2) The material used in the construction or lining of the tank or tank system is compatible with the substance to be stored; and

(2) **Existing underground storage tanks or existing tank systems shall be replaced or upgraded not later than December 22, 1998, to prevent releases for their operating life**. (emphasis added) [L 1989, c 212, pt of §6; am L 1992, c 259, §22]

D. **Regulatory Requirements**

1. HRS Ch. 342L also authorized the Department of Health to adopt rules to ensure that pre-existing underground storage were upgraded and operated to prevent releases.

2. In 1992, the legislature amended the law to require DOH to adopt rules to ensure that pre-existing underground storage were upgraded and operated to prevent releases. Act 259, 1992 Hawai'i Session Laws. Since 1992, the legislature has required that DOH adopt rules that require that underground tanks and tank systems:

a. Be **designed, constructed, installed, upgraded, maintained, repaired, and operate to prevent releases of the stored regulated substances for the operational life of the tank or tank system**;

b. The **material used in the construction or lining of the tank or tank system is compatible with the substance to be stored**; and

c. Existing underground storage tanks or existing tank systems shall **be replaced or upgraded** not later than December 22, 1998, **to prevent releases for their operating life**. HRS §342L-32(b) (emphasis added).

3. The DOH adopted new rules, effective July 15, 2018, regulating underground storage tanks. HAR §§ 11-280.1-10(a)(1)(A) provides (in part) that:

(b) The requirements of this chapter apply to all owners and operators of an UST system as defined in section 11-280.1-12 except as otherwise provided in this section.(1) Airport hydrant fuel distribution systems, **UST systems with field-constructed tanks**, and UST systems that store fuel solely for use by emergency power generators must meet the requirements of this chapter as follows:**(A)** Airport hydrant fuel distribution systems and **UST systems with field-constructed tanks must meet all applicable requirements of this chapter, except that those installed before the**

effective date of these rules must meet the applicable requirements of subchapters 4, 8, 10, and 12 no later than one year after the effective date of these rules. (emphasis added) Haw. Code R. § 11-280.1-10

4. HAR §11-280.1-323 provides further that:

> **(a) No person shall install or operate an UST or tank system without first obtaining a permit from the director.**
> **(b) The director shall approve an application for a permit only if the applicant has submitted sufficient information to the satisfaction of the director that the technical, financial, and other requirements of this chapter are or can be met and the installation and operation of the UST or tank system will be done in a manner that is protective of human health and the environment.**
> **(c)** A permit shall be issued only in accordance with chapter 342L, Hawaii Revised Statutes, and this chapter, and it shall be the duty of the permittee to ensure compliance with the law in the installation and operation of the UST or tank system.
> **(d)** Issuance of a permit shall not relieve any person of the responsibility to comply fully with all applicable laws. (emphasis added) *Haw. Code R. § 11-280.1-323* [Eff 7/15/2018] (Auth: HRS §§ 342L-3)

5. As a result of the adoption of HAR Chapter 11-280.1 effective July 15, 2018, large field-constructed USTs like those operated by the Navy at Red Hill for the first time became subject to the permitting requirements of the Department of Health's regulations and the Navy is required to meet the requirements of the regulations no later than one year after the effective date of such regulations, being July 15, 2019. HAR §§ 280.1-10(a)(1)(A), 280.1-323(a).

6. Pursuant to such statutory and regulatory provisions, the Navy is obligated to comply with the requirements of Hawaii's underground storage tank regulations and must obtain a permit from the Department of Health to operate the RHUSTF.

E. Burden of Proof

1. In this matter, the Navy is an applicant for the issuance of a permit to maintain and operate an underground storage tank facility. Hawaii courts have ruled that permit applicants bear the burden to establish that the proposed use does not conflict with the principles and purposes of the public trust doctrine. It has been ruled that:

> [I]t is manifest that a government body is precluded from allowing an applicant's proposed use to impact the public trust in the absence of an affirmative showing that the use does not conflict with those principles and purposes. Therefore, the applicant is "obligated to demonstrate affirmatively that the proposed [use] [will]

not affect [a protected use]," *Wai'ola O Moloka'i*, 103 Hawai'i at 442, 83 P.3d at 705 (emphases omitted). In other words, "the absence of evidence that the proposed use would affect [a protected use] [is] insufficient [.]" Id. (emphasis added). Kauai Springs has asserted "the public trust doctrine imposes a duty to assess, but does not empower an agency to deny an application simply because it claims it lacks information within its power to obtain, thus shifting the burden to the applicant." However, contrary to Kauai Springs' assertion, a lack of information from the applicant is exactly the reason an agency is empowered to deny a proposed use of a public trust resource. *Kauai Springs, Inc. v. Planning Comm'n of Kaua'i,* 133 Hawai'i 141, 174, 324 P.3d 951, 984 (2014).

2. The Hawaii Administrative Procedure Act, HRS Chapter 91, addresses rules of evidence applicable in administrative proceedings. HRS § 91-10(5) provides that:

> In contested cases, …
> Except as otherwise provided by law, the party initiating the proceeding shall have the burden of proof, including the burden of producing evidence as well as the burden of persuasion.

3. In this matter regarding the Navy's application for a UST permit, the U.S. Navy, as the applicant, is determined to be the "party initiating the proceeding". Accordingly, in accordance with HRS § 91-10(5), it is determined that the U.S. Navy shall have the burden of proof, including the burden of producing evidence as well as the burden of persuasion on issues relating to whether the Navy's application for an underground storage tank permit to operate its bulk storage facility at Red Hill satisfies the requirements imposed by applicable laws, rules and regulations and should be granted and, if so, on what conditions.

4. As the applicant the Navy "bears the burden of establishing that the proposed use will not interfere with any public trust purpose." *In re Waiola O Moloka'i, Inc.*, 103 Hawai'i 401, 441, 83 P.3d 664, 704 (2004).

F. <u>Compliance with Requirements</u>

1. Based upon the Findings of Facts set forth above, the Hearing Officer determines that the Navy as an owner and operator of an underground storage system with field constructed tanks and as the applicant for a permit to operate the RHUSTF has submitted sufficient evidence to establish the RHUSTF meets the requirements applicable to underground storage tank systems with field constructed tanks as set forth in HAR 11-280.1-10(a)(1)(A).

2. Based upon the Findings of Facts set forth above, the Hearing Officer determines that the Navy as an owner and operator of a underground storage system with field constructed tanks and as the applicant for a permit to operate the RHUSTF has submitted sufficient evidence to establish that the technical, financial and other requirements of HAR 11-280.1 are or can be met and the installation and operation of the tank system will be done in a manner that is protective

of human health and the environment.

3. HAR §11-280.1-328 permits the Director of the Department of Health to impose conditions determined to be reasonably necessary. HAR §11-280.1-328 states:

> **Permit conditions.** The director may impose conditions on a permit that the director deems reasonably necessary to ensure compliance with this chapter and any other relevant state requirement, including conditions relating to equipment, work practice, or operation. Conditions may include, but shall not be limited to, the requirement that devices for measurement or monitoring of regulated substances be installed and maintained and the results reported to the director, all costs and expenses to be borne by the applicant.

4. Based upon the Findings of Facts set forth above, the Hearing Officer determines that the Navy as the applicant for a permit to operate the RHUSTF has submitted sufficient evidence to establish the RHUSTF meets the tank system standards set forth in HRS §342L-32(b) that:

   1. The RHUSTF tank system is designed, constructed, installed, upgraded, maintained and operated to prevent releases of the stored regulated substances for the operational life of the tanks and tank system; and
   2. The materials used in the construction or lining of the tanks or tank system are compatible with the substances stored.

5. With respect to meeting the system standard requiring that existing underground storage tanks and tank systems be upgraded to prevent releases for their operating life, the Findings of Fact set forth above reflect that two of the twenty tanks (tanks 1 & 19) have been removed from service indefinitely. Of the eighteen tanks in active service, nine (tanks 2, 5, 6, 13, 14, 15, 16, 17 and 20) have undergone tank inspection and repair under the Department of Defense Unified Facilities Criteria and the API 653 (modified) repair protocol and such tanks have been certified to be appropriate to be in operation for operating lives extending to the years 2025 and up to 2038. Of the remaining nine tanks (tanks 3, 4, 7, 8, 9, 10, 11, 12 and 18) presently in active service, the Navy is presently having four to six of such tanks undergo the repair protocol with three tanks remaining which have not been currently inspected and repaired under the repair protocol.

6. The Director of the Department of Health is authorized pursuant to HAR §11-280.1-328 to issue a permit to the Navy for the operation of the RHUSTF subject to conditions deemed to be reasonably necessary to ensure compliance with the regulation and any other relevant state requirement, including conditions relating to equipment, work practice, or operation of the RHUSTF.

7. The Director of the Department of Health is authorized to revoke or suspend the permit if there is a release or threatened release of regulated substances deemed to constitute an immediate and substantial risk to human health or the environment. HAR §11-280.1-330 states:

> The director may revoke or suspend a permit if the director finds any one of the following:
>
> (1) There is a release or threatened release of regulated substances that the department deems to pose an imminent and substantial risk to human health or the environment…

Any conclusion of law that is or should be a finding of fact is to be taken as such notwithstanding its denomination as a conclusion of law.

V. HEARING OFFICER'S PROPOSED DECISION AND ORDER

Based upon the Findings of Fact and Conclusions of Law set forth above, the Hearing Officer proposes and recommends that the Department of Health of the State of Hawaii issue a permit to the US Navy that authorizes the US Navy to operate and maintain the RHUST Facility on the Island of Oahu for a period of five years subject to and upon the following conditions:

1. By no later than December 31, 2024, all tanks in active use at the RHUSTF are to have been inspected and repaired in accordance with the applicable Department of Defense Unified Facilities Criteria and/or under the American Petroleum Institute Standard 653 (modified) procedure, adopted by the Navy and determined to be in operational condition for a term of years extending and ending beyond the term of the operating permit issued to the Navy for the maintenance and operation of the RHUSTF. Any tank in active use that has not been inspected and repaired, by December 31, 2024, in accordance with the applicable Department of Defense Unified Facilities Criteria and/or under the American Petroleum Institute Standard 653 (modified) procedure, adopted by the Navy and determined to be in operational condition for a term of years extending and ending beyond the term of the operating permit issued to the Navy for the maintenance and operation of the RHUSTF shall be drained and removed from active use until it has been been so inspected, repaired and determined to be in operating condition for a term of years extending and ending beyond the term of the operating permit.

2. The Navy shall provide reports annually to the DOH, the first due by no later than July 1, 2022, for all tanks in the RHUSTF that are in active service reporting the following information:

    - The present inspection status;
    - The dates of last inspection and whether such inspection was in accord with the applicable Department of Defense Unified Facilities Criteria and/or under the American Petroleum Institute Standard 653 (modified) procedure, adopted by the Navy;
    - The term or period of time that each inspected and repaired tank has been determined or certified to be in operational condition;

- Whether small nozzles presently utilized in the distribution system for such tank has been replaced with larger nozzles that will permit regular visual inspection;
- Whether and to what extent the Navy's inspection and repair protocol for the tanks includes the application of the Polysulfide Modified Novolac Epoxy coating on the interior of the tanks and identify the tanks that have had the coating applied and the anticipated schedule for the application of such coating on all active tanks.

The report shall include information for any tanks that are then presently undergoing an inspection and repair process to include the date when such inspection and repair process commenced, the anticipated completion date and whether such inspection and repair process is in accord with the applicable Department of Defense Unified Facilities Criteria and/or under the American Petroleum Institute Standard 653 (modified) procedure adopted by the Navy and whether the repair process includes the replacement of small nozzles with larger nozzles that will permit regular visual inspection and the application of the Polysulfide Modified Novolac Epoxy coating on the interior of the tanks.

3. Issuance of a permit to the US Navy to operate and maintain the RHUST Facility on the Island of Oahu shall not alter or diminish the Navy's obligations and responsibilities nor the rights and authority of the DOH under applicable laws and regulations and/or under the AOC.

DATED: Honolulu, Hawaii, Sept. ___, 2021.

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LOU CHANG
Hearing Officer
Department of Health

Table 1.1-1 Record of Known Fuel Release Events at the Red Hill Facility

Release	Tank	Year	Volume (gallons)	Reference
1	1	1947	5	B-15 at BWS005166; B-195 at BWS027743; B-214; B-216.
2	1	1953	UK	B-15 at BWS005166; B-195 at BWS027744; B-197 at BWS027814; B-214; B-216.
3	1	1964	UK	B-15 at BWS005166; B-195; B-197 at BWS027814; B-214; B-216.
4	1	1964		B-15 at BWS005166; B-195 at BWS027745; B-197 at BWS027814; B-214; B-216.
5	1	1964		B-15 at BWS005166; B-195 at BWS027745; B-197 at BWS027814; B-214; B-216.
6	1	1965	UK	B-15 at BWS005166; B-195 at BWS027747; B-197 at BWS027814; B-214; B-216.
7	1	1965	UK	B-15 at BWS005166; B-195 at BWS027747; B-197 at BWS027814; B-214; B-216.
8	1	1966	UK	B-15 at BWS005166; B-195 at BWS027747; B-197 at BWS027814; B-214; B-216.
9	1	1967	UK	B-15 at BWS005166; B-195 at BWS027747; B-197 at BWS027814; B-214; B-216.
10	1	1970	4623	B-15 at BWS005166; B-216; B-214; B-195 at BWS027748; B-197 at BWS027814.
11	1	1971	16830	B-15 at BWS005166; B-195 at BWS027748; B-197 at BWS027814; B-214; B-216.
12	1	1971	5031	B-15 at BWS005166; B-195 at BWS027748; B-197 at BWS027814; B-214; B-216.
13	1	1972	4810	B-15 at BWS005166; B-195 at BWS027748; B-197 at BWS027814; B-214; B-216.
14	1	1975	10671	B-15 at BWS005166; B-195 at BWS027750; B-197 at BWS027814; B-214; B-216.
15	1	1977	999	B-15 at BWS005166; B-195 at BWS027750, B-197 at BWS027814; B-214; B-216.
16	1	1978	7874	B-15 at BWS005166; B-195 at BWS027750; B-197 at BWS027814; B-214; B-216.
17	1	1978	13221	B-15 at BWS005166; B-195 at BWS027751; B-197 at BWS027814; B-214; B-216.

Release	Tank	Year	Volume (gallons)	Reference
18		1982	2417	B-15 at BWS005166; B-195 at BWS027752; B-197 at BWS027814; B-214; B-216.
19		1982	871	B-15 at BWS005166; B-195 at BWS027753; B-197 at BWS027814; B-214; B-216.
20		1983	2229	B-15 at BWS005166; B-195 at BWS027754; B-197 at BWS027814; B-214; B-216.
21		1983	-1090	B-15 at BWS005166; B-195 at BWS027755; B-214; B-216.
22	1	'1983	-1004	B-15 at BWS005166; B-195 at BWS027755; B-214; B-216.
23		1999	UK	B-15 at BWS005166; B-195 at BWS027755; B-214; B-216.
	1	1997	Out of Service	B-197 at BWS027904.
24		1947	UK	B-15 at BWS005166; B-197 at BWS027814; B-214; B-216; B-231.
25		1954	0.375	B-15 at BWS005166; B-214; B-216; B-231 at BWS028473.
26	2	1954	10	B-15 at BWS005166; B-214; B-216; B-231 at BWS028473.
27		2008		B-15 at BWS005166; B-216; B-238 at BWS029230.

Release	Tank	Year	Volume (gallons)	Reference
28		2008		B-15 at BWS005166; B-216; B-238 at BWS029230.
29	3	1949	4260	B-15 at BWS005166; B-216; B-214.
	4		No Leaks	B-197 at BWS027814; B-213.
30	5	1964	1	B-15 at BWS005166; B-214; B-216; B-231 at BWS028479.
31		1965	1	B-15 at BWS005166; B-197 at BWS027815; B-214; B-216; B-231 atBWS028479.
32		1972	0.5	B-15 at BWS005166; B-197 at BWS027815; B-214; B-216; B-231 at BWS028480.
33		2010	UK	B-15 at BWS005166; B-214; B-216; B-242 at BWS029889.
34		2014	27000	B-15 at BWS005166; B-214; B-216.
35	6	1952	UK	B-15 at BWS005166; B-190 at BWS025861; B-216.
36		2002	UK	B-15 at BWS005166; B-216.
37	7	1973	UK	B-15 at BWS005166; B-184 at BWS025697; B-196 at BWS027765; B-197 at BWS027815; B-216.
38		1978	UK	B-15 at BWS005166; B-184 at BWS025697; B-197 at BWS027815; B-214; B-216.
39		1980/81	6505	B-15 at BWS005166; B-184 at BWS025698; B-197 at BWS027815; B-214; B-216.
40		1998	UK	B-187 at BWS025779.
No Leaks	8	—	No Leaks	B-197 at BWS027815; B-213 at BWS028411.
41	9	1958	1500	B-15 at BWS005166; B-197 at BWS027815; B-214 at BWS028414; B-216; B-285.
42		1978		B-15 at BWS005166; B-197 at BWS027815; B-216.
43		1980	1900	B-15 at BWS005166; B-197 at BWS027815; B-214 at BWS028414; B-216; B-285.
44		1996	UK	B-197 at BWS027815; B-233 at BWS028517.
45	10	1973	UK	B-15 at BWS005166; B-176 at BWS025438; B-197 at BWS027815; B-214 at BWS028414; B-216.
46		1976	UK	B-15 at BWS005166; B-176 at BWS025438; B-196 at BWS027766; B-216.

Release	Tank	Year	Volume (gallons)	Reference
47		1980	3123	B-15 at BWS005166; B-176 at BWS025439; B-214 at BWS028414; B-216.
48		1981	5097	B-15 at BWS005166; B-176 at BWS025439; B-197 at BWS027815; B-216.
49		1996	UK	B-228 at BWS028466; B-233 at BWS028529.
50		1998	UK	B-180 at BWS025588.
51	11	1980	25,628	B-15 at BWS005166; B-197 at BWS027816; B-214 at BWS028414; B-216; B-226 at BWS028445.
52	12	1964	UK	B-15 at BWS005166; B-197 at BWS027816; B-216; B-226 at BWS028447.
53		1973	UK	B-15 at BWS005166; B-197 at BWS027816; B-216; B-226 at BWS028447.
54	12	1981	4280	B-15 at BWS005166; B-197 at BWS027816; B-214 at BWS028414; B-216; B-226 at BWS028446.
55	13	1976	UK	B-15 at BWS005166; B-197 at BWS027816, B-216; B-226 at BWS028443, BWS028451.
56		1981	UK	B-15 at BWS005166; B-197 at BWS027816; B-216; B-226 at BWS028443, BWS028451.
57	14	1982	UK	B-15 at BWS005166; B-216.
58		1995	UK	B-223 at BWS028433; B-233 at BWS028617.
59	15	1981	UK	B-15 at BWS005166; B-197 at BWS027816; B-214 at BWS028414; B-216; B-223 at BWS028439.
60	16	1948/49	11009	B-15 at BWS005166; B-194; B-197 at BWS027816; B-214 at BWS028414; B-216.
61		1949	17737	B-15 at BWS005166; B-194; B-197 at BWS027816; B-214 at BWS028414; B-216.
62		1973	UK	B-15 at BWS005166; B-194 at BWS027728; B-197 at BWS027816; B-214 at BWS028414; B-216.
63		1981	UK	B-15 at BWS005166; B-194 at BWS027730; B-214 at BWS028414; B-216.
64		1981	UK	B-15 at BWS005166; B-194 at BWS027730; B-197 at BWS027817; B-214 at BWS028414; B-216.

Release	Tank	Year	Volume (gallons)	Reference
65		1998	1469	B-15 at BWS005166; B-194 at BWS027738, BWS027739; B-214 at BWS028414; B-216.
66		1949	1420	B-15 at BWS005166; B-214 at BWS028414; B-216.
67	17	1969	1	B-15 at BWS005166; B-197 at BWS027817; B-214 at BWS028414; B-216; B-221 at BWS028425.
68		1975	UK	B-15 at BWS005166; B-197 at BWS027817; B-214 at BWS028414; B-216; B-221 at BWS028426.
No Leaks	18	—	No Leaks	B-197 at BWS027817; B-213 at BWS028412.
69		1964	UK	B-15 at BWS005166; B-191 atBWS026699; B-197 at BWS027817; B-214 at BWS028414; B-216; B-232.
70		2000	UK	B-204 at BWS028333
	19	1997	Out of Service	B-197 at BWS027904.
71		1998	UK	B-15 at BWS005166; B-197 at BWS027817; B-214 at BWS028414; B-216.
72	UK	2012	6	B-198 at BWS028133.
		TOTAL VOLUME	178,434 gallons	

Notes: UK = Unknown

Docket No. 19-UST-EA-01

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the following documents:

PROPOSED DECISION AND ORDER, FINDINGS OF FACT AND CONCLUSIONS OF LAW,

was duly served upon the following parties, by electronic filing pursuant to Joint Stipulation Concerning Electronic Filing dated January 15, 2021 as indicated below, on September __, 2021:

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DATED: Honolulu, Hawaii, September__, 2021.

LOU CHANG
Hearing Officer – Department of
Health