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Before the Department of Health

State of Hawai'i

Sierra Club's Petition to Amend Hawai'i Administrative Rules Chapter 11-281, the Underground Storage Tanks Rules, to Protect the Southern O'ahu Basal Aquifer	))))	Petition; Exhibits 1-4

SIERRA CLUB'S PETITION TO AMEND HAWAI'I ADMINISTRATIVE RULES CHAPTER 11-281, THE UNDERGROUND STORAGE TANKS RULES, TO PROTECT THE SOUTHERN O'AHU BASAL AQUIFER

To protect our drinking water, the Sierra Club petitions the State of Hawai'i Department of Health to amend its rules. This petition is filed pursuant to Article IX sections 1 and 8, and Article XI sections 1, 7 and 9 of the Hawai'i State Constitution; HRS § 91-6; and HAR §11-1-51.

In short, Hawai'i State Constitution and HRS § 342L-32 require that the Department of Health amend its underground storage tank rules because the rules fail to protect the quality of the water that Sierra Club members and other residents of O'ahu drink.

I. The Sierra Club's Interest

Members of the Sierra Club, who live and work on O'ahu, depend on clean water for their very survival. More than 2500 dues paying members of the Sierra Club live on O'ahu and are dependent on water from the aquifer below Red Hill.

II. The Navy's Red Hill Bulk Fuel Storage Facility Threatens Our Water Supply

On November 30, 1987, the Environmental Protection Agency designated the Southern O'ahu Basal Aquifer, stretching from Schofield Barracks through urban Honolulu, as the "principal source of drinking water" that "if contaminated, would create a significant hazard to public health." 52 Federal Register 45497. The Environmental Protection Agency found:

> 1. The Southern Oahu 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.

Id. See Exhibit 1

The Navy's Red Hill Bulk Fuel Storage Facility threatens the Southern Oʻahu Basal Aquifer. The Red Hill Bulk Fuel Storage Facility holds twenty underground fuel storage tanks and is located a mere one hundred feet above the primary aquifer serving residents from Hālawa to Mānoa. Each tank can hold more than ten million gallons of petroleum. Since its construction in the 1940s, more than thirty leaks at the Navy's Red Hill Bulk Fuel Storage Facility have unleashed more than 170,000 gallons of fuel into the environment. Exhibit 4. In January 2014, the U.S. Navy spilled 27,000 gallons of jet fuel. Petroleum has been repeatedly detected in groundwater monitoring wells. The carcinogens naphthalene and benzene have been detected in wells at Red Hill. *Id;* and Exhibit 2.

III. The Department of Health's Legal Responsibilities

The Department of Health is constitutionally and statutorily obligated to enact rules that protect our drinking water from contamination.

A. The Department of Health's Constitutional Obligations

The Department of Health is constitutionally obligated to protect our drinking water from contamination. The mandate to protect our water is articulated repeatedly in our state constitution. Hawaiʻi State Constitution Article IX section 1, and Article XI sections 1 and 7. And the Hawaiʻi Supreme Court has consistently held that the public trust doctrine obligates the state, including the Department of Health, to protect the purity of our water.

> The 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 Kauaʻi, 133 Hawaiʻi 141, 172, 324 P.3d 951, 982 (2014)(brackets, citations and quotation marks omitted; emphasis added).

> When an agency is confronted with its duty to perform as a public trustee under the

> public trust doctrine, it must preserve the rights of present and future generations in the waters of the state. An agency must take the initiative in considering, protecting, and advancing public rights in the resource at every stage of the planning and decision-making process.

Id. (citations omitted). S*ee also* Article IX section 8 and Article XI section 9 of the Hawai‘i State Constitution. The Department of Health has the duty to protect our water quality. *Kelly v. 1250 Oceanside Partners*, 111 Hawai‘i 205, 140 P.3d 985 (2006)("As guardian of the water quality in this state, DOH then must not relegate itself to the role of a mere umpire ... but instead must take the initiative in considering, protecting, and advancing public rights in the resource at every stage of the planning and decision-making process."). These constitutional obligations require that the Department of Health act as a prudent trustee would.

B. The Department of Health's Statutory Obligations

The Department of Health is the state agency with the primary responsibility to protect water quality. *See e.g.* HRS §§ 174C-66, 340E-2, 342-1.1, 342D-4, and 342D-50.

In 1989, the legislature codified HRS chapter 342L, the underground storage tank law, to give the Department of Health the tools it needed to protect our water supply. The law contains nine exemptions to the term underground storage tank. HRS § 342L-1. "Field-constructed underground storage tanks" are not identified among the statutory exemptions.

In 1992, the legislature amended HRS §342L-32 to require the Department of Health to adopt rules to ensure that pre-existing underground storage were upgraded. Prior to 1992, the law required that the Department of Health enact rules related to "design, construction, installation, release detection and compatibility" for "underground storage tanks brought into use on or after the effective date of the standards." Act 212 1989 Hawai‘i Session Laws at 497. The 1992 legislature amended this requirement in three significant ways. First, it deleted the language limiting the requirement only to new tanks. Act 259 1992 Hawai‘i Session Laws at 683. Second, it added a requirement that the rules require that tanks be "upgraded." *Id.* Third, the legislature specifically added language requiring that existing tanks be upgraded within six years: "**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." Act 259 1992 Hawai‘i Session Laws at 683; HRS §342L-32(b)(3). There are no exemptions to this statutory requirement. These three statutory changes leave no room for a contrary interpretation. The Department of Health was required to enact rules for upgrading all underground storage tanks, including existing ones. These standards must ensure that the tank and tank systems 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). *See* Exhibit 3.

IV. Deficiencies in the Department of Health's Existing Underground Storage Rules

The Department of Health's underground storage tank rules suffer from two deficiencies that jeopardize our water supply. First, the Department of Health has created an exemption where

none is authorized by statute. Second, more than two decades after being commanded to act, it has failed to enact rules requiring the upgrading of existing tanks.

"It is axiomatic that an administrative rule cannot contradict or conflict with the statute it attempts to implement. Furthermore, an agency's authority to promulgate rules is limited to enacting rules which carry out and further the purposes of the legislation and do not enlarge, alter, or restrict the provisions of the act being administered." *Lales v. Wholesale Motors Company*, 133 Haw. 187, 328 P.3d 341, 363 (2014)(citations and quotation marks omitted)

The legislature created nine exemptions from the requirements of HRS chapter 342L. HRS § 342L-1(definition of "underground storage tank). It, however, did not create an exemption for "field-constructed underground storage tanks and tank systems located on military installations owned and operated by the United States Department of Defense." Nevertheless, the Department of Health exempted these dangerous facilities from many of the underground storage tank requirements. *See* HAR § 11-281-01(b)(2). This exemption contradicts the legislature requirement in HRS §342L-32 and undermines the legislative purpose in enacting HRS chapter 342L. It is particularly unwarranted where such an exemption jeopardizes public water. The purpose of Hawai'i Administrative Rules Chapter 11-281 is to "prevent releases." HAR § 11-281-11 and HRS §342L-32(b)(1). The Red Hill exemption is inconsistent with the Department of Health's public trust obligations. There is no logic in exempting the underground storage tanks that have proven to pose the greatest threat to our water supply.

More than two decades since the legislature commanded the Department of Health to enact rules, it has failed to do so. The Department of Health has failed to enact any rules that ensure that underground storage tank and tank systems are "upgraded" to prevent releases. Hawai'i Administrative Rule 11-281 contains ten subchapters (scope and applicability; design, construction, and installation; notification, permits and variances; general operating requirements; release detection; release reporting, investigation, and confirmation; release response action; closure and change-in-service; financial responsibility; and enforcement); none of these subchapters address upgrading underground storage tanks. Old underground storage tanks need to be upgraded to protect our drinking water from contamination. The releases from the Navy's Red Hill Bulk Fuel Storage Facility provide compelling evidence of this need.

V. Consequences of Not Amending Rule

> It is well settled that this court's foremost obligation in construing a statute is to ascertain and give effect to the intention of the legislature, which is to be obtained primarily from the language contained in the statute itself. And we must read statutory language in the context of the entire statute and construe it in a manner consistent with its purpose.

Hanabusa v. Lingle, 119 Hawai'i 341, 347, 198 P.3d 604, 610 (2008) (duty to act is enforceable when the duty is "postponed unreasonably" and not performed after the passage of an "unreasonable period of time"). Please keep in mind that

> public administrative agency possesses only such rule-making authority as is delegated to it by the state legislature and may only exercise this power within the framework of the

statute under which it is conferred. Administrative rules and regulations which exceed the scope of the statutory enactment they were devised to implement are invalid and must be struck down.

Stop H-3 Ass'n v. State [Dep't] of Transp., 68 Haw. 154, 161, 706 P.2d 446, 451 (1985) (internal citations omitted); *In re Doe Children,* 73 Haw. 15, 19, 827 P.2d 1144, 1146 (1992) (rules enacted by administrative agency cannot contravene the statute the agency is implementing); "[T]he court shall declare the rule invalid if it finds that it violates constitutional or statutory provisions or exceeds the statutory authority of the agency[.]" HRS § 91-7(b). The failure of the Health Department to amend its rules to conform them to the statutory mandate puts them -- like our water -- at risk.

VI. Text of the Proposed Rule Amendment

HAR 11-281-01(b) is amended by deleting the following stricken language:

> (b) Owners and operators of the following special types of underground storage tanks or tank systems, as more generally defined in section 11-281-03, are subject only to the requirements of subchapters 6, 7, 8 and the requirements of sections 11-281-12 and 11-281-13:
>
> ~~(1)~~ Airport hydrant fuel distribution USTs and tank systems directly connected to underground hydrant piping used to fuel aircraft.
>
> ~~(2) Field-constructed underground storage tanks and tank systems located on military installations owned and operated by the United States Department of Defense.~~

HAR §11-281-17(a) is amended by deleting the following stricken language:

> An UST or tank system ~~installed on or after the effective date of these rules~~ must be provided with secondary containment designed, constructed and installed in a manner consistent with the requirements of this subchapter.

A new subsection is added by adding the following underlined language:

> 11-281-20. Upgrades. All existing underground storage tanks as that term is statutorily defined must be upgraded to comply with requirements of this subchapter, including, but not limited to secondary containment.

VII. Conclusion

The time for the Department of Health to act is now. More than two decades after the state legislature ordered the department to enact rules to ensure that underground storage tanks are upgraded to prevent spills, the department has failed to do so. Moreover, its special exemption for department of defense field system has no basis in law and is indefensible given the damage that these tanks have caused to our aquifer and the threat they pose to our water supply. Failure

to commence the rulemaking process within thirty days of this petition unnecessarily jeopardizes our water supply — and subjects the department to litigation.

Dated: Honolulu, Hawai'i, May 24, 2017.

David Kimo Frankel
Martha Townsend
Sierra Club

Exhibit 1

SUMMARY: There will be a 1-day meeting of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Scientific Advisory Panel (SAP) to review a set of scientific issues being considered by the Agency in connection with the Special Review of Tributyltin (TBT); a set of scientific issues being considered by the Agency in connection with the peer review classification of: Aciflurofen as a Class B–2 oncogen; Assure as a Class C oncogen; Oxadixyl as a Class C oncogen; Methidathion as a Class C oncogen; Paraquat as a Class C oncogen; Savey as a Class B–2/C oncogen; Terbutryn as a Class C oncogen; Triadimenol (Baytan) as a Class C oncogen; and an information briefing on Part 158—Toxicology Data Requirements for Food Use Pesticides.

DATES: The meeting will be held on Tuesday, December 15, 1987, from 8:30 a.m. to 6:00 p.m.

ADDRESS: The meeting will be held at: Environmental Protection Agency, Rm. 1112, Crystal Mall Building No. 2, 1921 Jefferson Davis Highway, Arlington, VA 22202.

FOR FURTHER INFORMATION CONTACT:

By mail: Stephen L. Johnson, Executive Secretary, FIFRA Scientific Advisory Panel, Office of Pesticide Programs (TS–769C), 401 M Street SW., Washington, DC 20460.

Office location and telephone number: Rm. 1121, Crystal Mall Building No. 2, Arlington, VA, (703–557–7695).

SUPPLEMENTARY INFORMATION: The agenda for the meeting is: 1. Review of a set of scientific issues in connection with the Special Review of TBT. The Agency initiated a Special Review of TBT in January 1986, based on the Agency's determination that adverse acute and chronic effects of nontarget aquatic organisms may result from the use of TBT compounds as antifoulants.

2. Review of a set of scientific issues in connection with the Agency's classification of the peer review of Aciflurofen as a Class B–2 oncogen (probable human carcinogen). The classification of Aciflurofen as a B–2 oncogen was based on an increased incidence of combined malignant and benign liver tumors in two different studies employing different strains (B6C3F1 and CR-CD-1) of mice.

3. Review of a set of scientific issues in connection with the Agency's classification of the peer review of Assure as a Class C oncogen (possible human carcinogen). The classification of Assure was based on the incidence of liver tumors in CD–1 mice.

4. Review of a set of scientific issues in connection with the Agency's classification of the peer review of Methidathion as a Class C oncogen (possible human carcinogen). The classification of Methidathion as a Class C oncogen was based on an increased incidence of hepatocellular adenoma/adenocarcinoma, adenoma, and adenocarcinoma only in one sex (male) and one species mouse.

5. Review of a set of scientific issues in connection with the Agency's classification of the peer review of Oxadixyl as a Class C oncogen (possible human carcinogen) based on a significant increased incidence of benign hepatocellular tumors in both sexes in Han-Wistar rats.

6. Review of a set of scientific issues in connection with the Agency's classification of the peer review of Paraquat as a Class C oncogen (limited evidence for oncogenicity in animals). The classification of Paraquat as a Class C oncogen was based on one study which showed increased in incidences in squamous cell carcinomas in male rats.

7. Review of a set of scientific issues being considered by the Agency's classification of Savey as a Class B–2/C oncogen (intermediate between probable and a possible human carcinogen). The classification of Savey as a Class B–2/C was based on varying interpretation of the evidence from two animal studies, in two species.

8. Review of a set of scientific issues being considered by the Agency's classification of Terbutryn as a Class C oncogen. The classification of Terbutryn as a Class C oncogen was based on increased incidences of benign and/or combined malignant/benign tumors in one species, the rat.

9. Review of a set of scientific issues being considered by the Agency's classification of Triadimenol (Baytan) as a Class C oncogen based on increased incidence of benign tumors in female mice but not in male mice or male and female rats.

10. An information briefing on Part 158—Toxicology Data Requirements for Food Use Pesticides.

11. In addition, the Agency may present status reports on other ongoing programs of the Office of Pesticide Programs.

Copies of documents relating to items 1–9 may be obtained by contacting:

By mail: Information Services Branch, Program Management and Support Division (TS–757C), Office of Pesticide Programs, Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

Office location and telephone number: Rm. 1006, Crystal Mall Building No. 2, 1921 Jefferson Davis Highway, Arlington, VA., (703)–557–2805).

Any member of the public wishing to submit written comments should contact Stephen L. Johnson at the address or telephone number given above to be sure that the meeting is still scheduled and to confirm the Panel's agenda. Interested persons are permitted to file such statements before the meeting. To the extent that time permits and upon advance notice to the Executive Secretary, interested persons may be permitted by the chairman of the Scientific Advisory Panel to present oral statements at the meeting. There is no limit on written comments for consideration by the Panel, but oral statements before the Panel are limited to approximately 5 minutes. Since oral statements will be permitted only as time permits, the Agency urges the public to submit written comments in lieu of oral presentations. Information submitted as a comment in response to this notice may be claimed confidential by marking any part or all of that information as "Confidential Business Information" (CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2. A copy of the comment that does not contain CBI must be submitted for inclusion in the public docket. Information not marked confidential will be included in the public docket without prior notice. The public docket will be available for public inspection in Rm. 236 at the address given above, from 8 a.m. to 4 p.m., Monday through Friday, excluding legal holidays. All statements will be made part of the record and will be taken into consideration by the Panel. Persons wishing to make oral and/or written statements should notify the Executive Secretary and submit ten copies of a summary no later than December 8, 1987, in order to ensure appropriate consideration by the Panel.

Dated: November 23, 1987.

Victor J. Kimm,

Assistant Administrator for Pesticides and Toxic Substances.

[FR Doc. 87–27489 Filed 11–25–87; 11:16 am]

BILLING CODE 6560–50–M

[FRL–3296–4]

Southern Oahu Basal Aquifer in the Pearl Harbor Area of Oahu; Principal Source Aquifer Determination

AGENCY: Environmental Protection Agency.

ACTION: Final determination.

SUMMARY: Pursuant to section 1424(e) of the Safe Drinking Water Act, the

Exhibit 1

Regional Administrator in Region IX of the U.S. Environmental Protection Agency (EPA) has determined that the Southern Oahu Basal Aquifer is the sole or principal source of drinking water for the entire Districts of Wahiawa and Ewa, and the portion of the Honolulu District west of the Manoa Stream channel and this aquifer, if contaminated, would create a significant hazard to public health. As a result of this action, Federal financially assisted projects constructed anywhere in the Pearl Harbor area mentioned above will be subject to EPA review to ensure that these projects are designed and constructed so that they do not create a significant hazard to public health.

ADDRESSES: The data on which these findings are based are available to the public any may be inspected during normal business hours at the U.S. Environmental Protection Agency, Region IX, Water Management Division, Fifth Floor, 214 Fremont Street, San Francisco, CA 94105.

FOR FURTHER INFORMATION CONTACT: Chris Wohlers, Office of Groundwater Protection, Water Management Division, Environmental Protection Agency, Region 9, at (415) 974-0830.

SUPPLEMENTARY INFORMATION: Notice is hereby given that pursuant to section 1424(e) of the Safe Drinking Water Act (42 U.S.C. 300h-3(e), Pub. L. 93-523) the Regional Administrator of the U.S. Environmental Protection Agency (EPA) has determined that the Southern Oahu Basal Aquifer of Oahu is the sole or principal source of drinking water for the Wahiawa District, the Ewa District, and the portion of the Honolulu District west of the Manoa Stream channel. Pursuant to section 1424(e), Federal financially assisted projects, constructed anywhere in the Pearl Harbor area mentioned above, will be subject to EPA review.

I. Background

Section 1423(e) of the Safe Drinking Water Act states:

If the Administrator determines, on his own initiative or upon petition, that an area has an aquifer which is the sole or principal drinking water source for the area and which, if contaminated, would create a significant hazard to public health, he shall publish notice of that determination in the **Federal Register.** After the publication of any such notice, no commitment for Federal financial assistance (through a grant, contract, loan guarantee, or otherwise) may be entered into for any project guarantee, or otherwise) may be entered into for any project which the Administrator determines may contaminate such aquifer through a recharge zone so as to create a significant hazard to public health, but a commitment for Federal financial assistance may, if authorized under another provision of the law, be entered into to plan or design the project to assure that it will not so contaminate the aquifer.

On May 3, 1983, Hazel Cunningham of Honolulu, Hawaii, petitioned the EPA to designate groundwater resources of the Pearl Harbor area as a principal source of drinking water. In response to this petition, EPA published a notice in the **Federal Register** on July 17, 1984, announcing receipt of the petition and requesting public comment. EPA prepared a draft technical document summarizing available information and proposing a sole or principal source aquifer designation. A public comment period, including a hearing on the proposed designation, was public noticed in the **Federal Register** on February 9, 1987. A public hearing was conducted on April 2, 1987, and the public was allowed to submit comments until April 16, 1987.

II. Basis for Determination

Among the factors to be considered by the Regional Administrator in connection with the designation of an area under section 1424(e) are: (1) Whether the aquifer is the area's sole or principal source of drinking water, and (2) whether contamination of the aquifer would create a significant hazard to public health.

On the basis of information available to this Agency, the Regional Administrator has made the following findings, which are the bases for the determination noted above:

1. The Southern Oahu Basal Aquifer currenty 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.

III. Description of the Southern Oahu Basal Aquifer

The aquifer is composed of a basal fresh water lens floating on sea water. The basal fresh water lens is a continuous, but compartmental aquifer situated in the coastal plain of southern Oahu. The aquifer is very thick, exceeding 1000 feet in some areas. Recharge is ultimately from rainfall as well as from excess irrigation. Total domestic water use in 1978 consisted of 68% groundwater resources from this system.

IV. Information Utilized in Determination

The information utilized in this determination includes the petition from Hazel Cunningham of Honolulu, Hawaii, research of available literature on the groundwater resources of Oahu, and written and verbal comments submitted by the public. This data is available to the public, and may be inspected during normal business hours at the Environmental Protection Agency, Region IX, 215 Fremont Street, San Francisco, CA 94105.

V. Project Review

EPA Region IX will work with the Federal agencies that may in the future provide financial assistance to projects in the area of concern. Interagency procedures will be developed in which EPA will be notified of proposed commitments by federal agencies for projects which could contaminate the aquifer. EPA will evaluate such projects and, where necessary, conduct an in-depth review, including soliciting public comments where appropriate. Should the Regional Administrator determine that a project may contaminate the aquifer through its recharge zone so as to create a significant hazard to public health, no commitment for Federal financial assistance may be entered into. However, a commitment for Federal assistance may, if authorized under another provision of law, be entered into to plan or design the project to assure that it will not contaminate the aquifer.

Although the project review process cannot be delegated, the U.S. EPA will rely upon, to the maximum extent possible any existing or future state and local control mechanisms in protecting the groundwater quality of the aquifer. Included in the review of any Federal financially assisted project will be the coordination with the state and local agencies. Their comments will be given full consideration and the federal review process will attempt to complement and

support state and local groundwater mechanisms.

VI. Summary and Discussion of Public Comments

Overall, commentors at the public hearing favored designation by a margin of 18 to 8. EPA received several comments concerning whether the technical document implies that groundwater in Sourthern Oahu occurs in only one aquifer. EPA responded by referring to the technical document which defines the sole or principal source aquifer as being composed os semi-independent reservoirs.

One comment concerned the inference that irrigation return flow is a potential source of contamination without stating clearly the importance of irrigation return as a source of recharge. It was pointed out that the techncial document does identify irrigation return flow as a source of recharge as well as a potential source of contamination.

EPA received several comments stating that the designation is unnecessary because the Honolulu Board of Water Supply maintains a distribution system which interconnects the island's other sources of drinking water. EPA responded by recognizing the suitability of using this distribution system as a possible emergency source of drinking water. EPA also noted that no demonstration has been made concerning the long-term capability of the system to meet the entire island's needs.

EPA received several comments doubting the reliability and applicability of the references cited in the technical document. EPA responded by taking into account any new information and corrections, and setting aside any new data whch did not substantially differ from existing data or significantly affect its interpretation.

VII. Economic and Regulatory Impact

Pursuant to provisions of the Regulatory Flexibility Act (RFA), 5 U.S.C. 605(b), I hereby certify that the attached rule will not have a significant impact on a substantial number of small entities. For purposes of this Certification, the term "small entity" shall have the same meaning as given in Section 601 of the RFA. This action is only applicable to the Pearl Harbor area. The only affected entities will be those businesses, organizations, or governmental jurisdictions that request Federal financial assistance for projects which have the potential for contaminating the aquifer so as to create a significant hazard to public health. EPA does not expect to be reviewing small isolated commitments of financial assistance on an individual basis, unless a cumulative impact on the aquifer is anticipated; accordingly, the number of affected small entities will be minimal.

For those small entities which are subject to review, the impact of today's action will not be significant. Most projects subject to this review will be preceded by a groundwater impact assessment required pursuant to other federal laws, such as the National Environmental Policy Act, as amended (NEPA), 42 U.S.C. 4321, et seq. Integration of those related review procedures with sole source aquifer review will allow EPA and other federal agencies to avoid delay or duplication of effort in approving financial assistance, thus minimizing any adverse effect on those small entities which are affected. Finally, today's action does not prevent grants of Federal financial assistance which may be available to any affected small entity in order to pay for the redesign of the project to assure protection of the aquifer.

Under Executive Order 12291, EPA must judge whether a regulation is "major" and therefore subject to the requirement of a Regulatory Impact Analysis. This regulation is not major because it will not have an annual effect of $100 million or more on the economy, will not cause any major increase in costs or prices, and will not have significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States enterprises to compete in domestic or export markets. Today's action only affects the Pearl Harbor area. It provides additional reviews of groundwater protection measures, whenever possible, for only those projects which request Federal financial assistance. This regulation was submitted to OMB for review under EO 12291.

Dated: November 2, 1987.

Judith E. Ayres,

Regional Administrator.

[FR Doc. 87-27418 Filed 11-27-87; 8:45 am]

BILLING CODE 6560-50-M

FEDERAL COMMUNICATIONS COMMISSION

Petitions for Reconsideration of Actions In Rulemaking Proceedings; Correction

November 23, 1987.

On November 20, 1987, the Commission published in the Federal Register (52 FR 44634), a Notice of Petitions for Reconsideration (Report No. 1690) in CC Docket No. 87-113 (Amendment of Part 69 of the rules, Access Charges, to conform to Part 36, Jurisdictional Separations). That Notice was released on November 13, 1987. In the Federal Register, the date on which opposition are due was misstated as being November 27, 1987. The correct date is *December 8, 1987.* Replies to oppositions will be due on *December 18, 1987.*

Federal Communications Commission.

William J. Tricarico,

Secretary.

[FR Doc. 87-27502 Filed 11-27-87; 8:45 am]

BILLING CODE 6712-01-M

FEDERAL EMERGENCY MANAGEMENT AGENCY

[FEMA-802-DR]

Amendment to Notice of a Major-Disaster Declaration; Texas

AGENCY: Federal Emergency Management Agency.

ACTION: Notice.

SUMMARY: This notice amends the notice of a major disaster for the State of Texas (FEMA-802-DR), dated November 20, 1987, and related determinations.

DATED: November 23, 1987.

FOR FURTHER INFORMATION CONTACT: Neva K. Elliott, Disaster Assistance Programs, Federal Emergency Management Agency, Washington, DC 20472 (202) 646-3614.

Notice

The notice of a major disaster for the State of Texas, dated November 20, 1987, is hereby amended to include the following areas among those areas determined to have been adversely affected by the catastrophe declared a major disaster by the President in his declaration of November 20, 1987:

The Counties of Burleson, Lee, Panola, Shelby, Smith, and Upshur for Individual Assistance only.

(Catalog of Federal Domestic Assistance No. 83.516, Disaster Assistance)

Dave McLoughlin,

Deputy Associate Director, State and Local Programs and Support, Federal Emergency Management Agency.

[FR Doc. 87-27385 Filed 11-27-87; 8:45 am]

BILLING CODE 6718-02-M

Exhibit 2

EXECUTIVE CHAMBERS

DAVID Y. IGE
GOVERNOR

HONOLULU

GOV. MSG. NO. 106

January 20, 2015

The Honorable Donna Mercado Kim,
President
and Members of the Senate
Twenty-Eighth State Legislature
State Capitol, Room 409
Honolulu, Hawaii 96813

The Honorable Joseph M. Souki, Speaker
and Members of the House of
Representatives
Twenty-Eighth State Legislature
State Capitol, Room 431
Honolulu, Hawaii 96813

Dear President Kim, Speaker Souki, and Members of the Legislature:

For your information and consideration, I am transmitting a copy of the Task Force to Study the Effects of the January 2014 Tank Leak at The Red Hill Fuel Storage Facility, pursuant to Senate Concurrent Resolution 73, Session Laws of Hawaii (SLH) 2014. In accordance with section 93-16, Hawaii Revised Statutes, I am also informing you that the report may be viewed electronically at http://co.doh.hawaii.gov/sites/LegRpt/2015/default.aspx.

Sincerely,

DAVID Y. IGE
Governor, State of Hawaii

Enclosure

Exhibit 2

REPORT TO THE TWENTY-EIGHTH LEGISLATURE
STATE OF HAWAII
2015

PURSUANT TO SENATE CONCURRENT RESOLUTION 73
REQUESTING THE DEPARTMENT 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

PREPARED BY:
STATE OF HAWAII
RED HILL FUEL STORAGE FACILITY TASK FORCE
DECEMBER 2014

Introduction

On April 24, 2014, the Hawaii State Legislature adopted Senate Concurrent Resolution (SCR) 73 which 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, including any proposed legislation, to the Legislature no later than 20 days prior to the convening of the Regular Session of 2015.

Under SCR 73, the Task Force is requested to examine:

1. 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,
2. Response strategies to mitigate the effects of future leaks at the Red Hill Fuel Storage Facility,
3. 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
4. Implications of closing the Red Hill Fuel Storage Facility.

Task Force members include 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. **Appendix A** contains a list of all the Task Force participants and alternates.

The Red Hill Fuel Storage Facility (Facility) is the state's largest field constructed underground storage tank (UST) complex, located in the south-central portion of the Island of Oahu, Hawaii. It is owned and operated by the United States Navy.

Background Provided By the Navy

From 1940 to 1943, twenty (20) cylindrical tanks, 250 feet tall and 100 feet in diameter, were built in place along the Red Hill ridgeline. The tanks were constructed using 475,000 cubic yards of concrete around 45,000,000 pounds of l/4-inch steel plates forming 2.5 to 4-foot concrete encased steel tanks. Each tank was originally built with a leak detection system that consisted of a series of pipes that could potentially collect any released fuel at a central location. The Navy later determined that this initial leak detection system had design flaws which resulted in numerous false reports. This system was subsequently removed. Eighteen (18) tanks are active, and two (2) are presently not in use. Each tank is able to store up to 12.5 million gallons of fuel. The Facility is located 100 feet above a major groundwater aquifer, which is also used as a source of drinking water. Of the 18 in use tanks, three (3) are empty awaiting various stages of a service life extension program. The remaining fifteen (15) tanks are in use, storing over 180 million gallons of fuel at any given time.

The Navy continues to operate and maintain the fuel tanks to support military operations in the Pacific. Modifications were accomplished to extend the service life of the tanks, add protective coatings, install new leak detection systems, and upgrade the facility's fire protection system.

The first major modification to the tanks came in 1960 when four of the tanks were modified to accommodate volatile fuels and to install inventory monitoring equipment. In 1970, a contract was awarded to clean and inspect tanks 5, 6 and 12. In 1978, the Navy made the determination to extend the service life and modernize all 16 non-volatile fuel storage tanks. During this project, the original leak detection system for each tank was removed as described above. In 1994, the Navy cleaned and inspected tanks 6-10, 12-14 and 16. Additional modifications were performed in 1997 for those same tanks to extend their service life.

The inspections and modifications conducted between 1994 and 1997 greatly resembled the same practices used in today's procedures. Since then the Navy has implemented 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. After each tank has been thoroughly inspected, improvements are completed to ensure the operability of the tank for an additional twenty years. The Navy has adopted this program as a modified API 653 certification process which was applied to tanks 1, 6, 15 and 16 between 2004 and 2007. Three tanks have been temporarily removed from service to continuously conduct the API 653 certification process on a rotational basis. Since 2008, the Navy has completed service life extension improvements for tanks 2 and 20 and is currently conducting inspections and improvements on tanks 5, 14, and 17.

Since initial construction, the Navy has commissioned a number of projects and studies to modernize the facility and stay abreast of industry standards. Most notably, the Navy has installed and continues to use a highly 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 automated tank gauging (ATG) system in tanks 17 – 20. Between 1972 and 1973, an identical ATG system was installed on the remaining 16 tanks to provide full visibility of the inventory levels within all 20 tanks. With the emergence of new technology, the Navy installed a Multi-function Tank Gauge (MTG) system in all 20 tanks by the end of 2002. This system has the capability of detecting a variance in fuel levels of l/16 of an inch and is based on mass and temperature measurements.

Over $156,000,000 was spent between 2006 and 2014 to inspect and improve the pipelines, install ground water and soil vapor monitoring, structurally reinforce the tunnels and passageways, improve the ventilation, upgrade the fire suppression system, and make other improvements. In addition, the Navy is constantly studying the industry's best technologies and practices to incorporate them into the management of this facility. In 2008, over $120,000 was spent researching secondary containment and leak detection technology options to improve the infrastructure. A redacted version of this study is available to the Legislature upon request. A similar study is currently being conducted that will be finalized in March 2015.

Environmental sampling over the years has shown a number of fuel releases dating back to 1947, including an oily waste disposal site. Exact qualities cannot be confirmed.

Installation of Monitoring Wells

After 2005, seven (7) groundwater monitoring wells (RHMW01-RHMW05, RH2254-01 and OWDFMW1) were installed to detect contamination into the groundwater. Upon determination that RH2254-01 (Red Hill Shaft) was also the Navy's Drinking Water Well, drinking water parameters were added to the groundwater list of constituents to be sampled. Refer to **Diagram 1** for the locations of all wells. Additionally, Diagram 1 shows the Commission on Water Resources Management's (CWRM's) Halawa Deep Monitoring Well which is also being monitored by the Navy. The wells are located on the mauka side of the Department of Public Safety's Halawa Correctional Facility. Outside the confines of the Facility are five (5) drinking water wells, (Halawa Shaft, Halawa Wells, Aiea Wells, Aiea Gulch Wells and Moanalua Wells), that are owned and maintained by the Honolulu Board of Water Supply. Only Halawa Shaft is shown in Diagram 1. In this report, there is a distinction made between drinking water samples from the Navy's drinking water well, RH2254-01 and the BWS wells, which are separate from groundwater samples taken at RHMW01-RHMW05 and OWDFMW1.

January 13, 2014 release from Tank No. 5

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 Tank 5 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.

In 2008, the Navy developed and implemented a Groundwater Protection Plan (GWPP), which the DOH approved. The plan was updated in 2009 and 2010. A 2014 interim update is under review by DOH. The Navy in consultation with the DOH, and EPA has initiated planning efforts to update the existing Groundwater Flow Model and Contaminant Transport Analysis which will also be incorporated into the GWPP. This Plan and the 2009 and 2010 updates are available online at: http://health.hawaii.gov/shwb/underground-storage-tanks/.

Negotiated Agreement Between EPA, DOH and the Navy

Separate from the Task Force activities, DOH, EPA, and the Navy continue to work together on a negotiated agreement to assess the reported release of petroleum and minimize the threat of future releases.

Senate Concurrent Resolution 73 & Red Hill Task Force

Meetings were held on September 3, October 7, November 6 and December 11, 2014 to discuss the effects of the January 2014 release, results of on-going Navy investigations on the tank leak, Navy response actions since the leak was discovered and recommendations for improving operations to ensure protection of Hawaii's drinking water. These included regulatory requirements, facility improvements and improved communication to the public. Three additional subgroup meetings were held on November 17, November 26, and December 3, 2014 to compile this report. Materials from the four Task Force meetings, and the three subgroup meetings, including attendance lists, minutes and other supportive materials are posted online at: http://health.hawaii.gov/shwb/underground-storage-tanks/.

This report contains the Task Force's findings and recommendations for each of the review topics in accord with SCR 73.

Findings and Recommendations

1. **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**

   Finding of Facts

   Short-term effects

In the 2008 Groundwater Protection Plan, Site-Specific Risk-Based Levels (SSRBLs) were established for this facility 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. Justification was made

because of the low solubility of jet fuel in water. Any exceedances of this level would evoke increased monitoring, notification and other actions. Refer to **Appendix F** for more information about SSRBLs for the Facility compared to EALs provided by the DOH.

After the January release, increased groundwater and soil vapor monitoring indicated contamination in the environment outside of Tank 5. Groundwater monitoring in 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. The Navy increased their sampling frequency to every two weeks.

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 soil vapor beneath the tanks closest to Tank 5. Refer to **Appendix B** for a summary of the maximum groundwater results at the Facility and soil vapor monitoring analysis from Tank 5 in the past and following the release. Refer to **Appendix C** for the Navy's current monitoring plan and an explanation of EALs and Site Specific Risk Based Levels (SSRBLs) from the Navy.

The Navy's sampling and analysis indicated that the increases of soil vapor volatile organic compound (VOC) concentrations beneath Tank 5 and nearby tanks may be attributed to the release of JP-8 from Tank 5 in January 2014. According to the Navy, results of groundwater sampling and analysis indicate the release of JP-8 from Tank 5 has had limited impact on the underlying groundwater and has not impacted any drinking water source. While, there has been detection of low levels of various petroleum chemicals in the RH2254-01 (Red Hill Shaft), there have been no detections from the accelerated and long-term monitoring since the reported January 2014 release.

Drinking water samples were collected from the 5 BWS drinking water sources and the regulatory drinking water distribution point for Navy Drinking Water Well RH2254-01, all samples have been non-detect for petroleum contamination since the January release. Analytical results from the drinking water samples data were within applicable safe drinking water standards or below any Federal maximum contaminant levels (MCLs). Refer to **Table 1 of Appendix B** for a comparison table.

The Task Force finds that the BWS and the Navy have undertaken significant efforts to assess the effects of the reported fuel leak on the environment and to protect drinking water resources. The Task Force acknowledges that the BWS has accelerated sampling at nearby drinking water sources. In addition, the Navy has performed extensive sampling and analysis of the groundwater, drinking water, and soil vapor at or near the Red Hill Fuel Storage Facility. The Navy has reported that their drinking water source remains safe based on analytical monitoring from certified laboratories that have been reviewed by DOH. The BWS has reported that 5 BWS drinking water wells in close proximity to Red Hill to date show no detections of petroleum chemical contaminants.

Long-term effects

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.

Refer to **Appendix B** for a more details on the soil vapor and groundwater monitoring results and **Appendix C** for the Navy's current monitoring plan and **Appendix F** is an explanation of EALs and SSRBLs provided by the DOH. Additional cumulative groundwater sampling results are posted online at: http://health.hawaii.gov/shwb/underground-storage-tanks/.

BWS will continue periodic monitoring of its drinking water sources for petroleum contamination. The Navy will also continue periodic monitoring of the groundwater, drinking water, and soil vapor at the Red Hill Fuel Storage Facility, in accordance with the Groundwater Protection Plan. The Task Force expects the BWS and the Navy to continue providing reports on those efforts to the DOH and the EPA. The reports are available to the public from the DOH.

DOH and BWS Comments & Recommendations

- Navy must comply with state requirements for investigation of release points within Tank 5 and characterization and delineation of contamination released, including the active remediation of free product to "the maximum extent practicable" to prevent any contamination from extending beyond the current location. The Navy has taken steps to determine where free product, if any, may be located. To date no free product has been found. The Navy is continuing efforts to investigate and recover retrievable free product.
- Request Navy to continue to provide to DOH all water quality data collected at the Facility by monitoring well location and contaminant.
- Continue groundwater modeling studies by the Navy and the BWS. The studies are critical to understanding the rate and direction of groundwater movement in the area to assess potential impacts to neighboring potable water wells. The studies will also complement groundwater monitoring well contaminant data collection to assess the overall condition of the aquifer and validate earlier studies that evaluate the direction of groundwater flow in the area including a northwesterly component towards the BWS Halawa Shaft drinking water source cited in an April 15, 2010 TEC Inc. Tier 3 letter report. The full report is available online: http://health.hawaii.gov/shwb/underground-storage-tanks/. According to the TEC report:

  "In the vicinity of the USTs, as before, the gradient indicates a regional component of groundwater flow to the west northwest and a local component to the southwest."

  "The northwest regional flow places the HBWS Halawa Shaft, a major drinking water source for south Oahu, down gradient from the USTs."

  "The northwest regional component of the groundwater flow may be transporting a petroleum plume or dissolved hydrocarbons in a direction that is not currently being monitored. Currently there are no compliance wells between the Halawa Shaft and the Facility to evaluate this possibility. For the HBWS Halawa Shaft to be threatened by contamination from the Facility a free product plume would have to be present within approximately 1200 ft. of this drinking water source."

- Navy to drill and install additional groundwater monitoring wells north and south of the facility to enable the collection of groundwater data and provide information for the updated area-wide groundwater modeling. This will increase and improve the scientific understanding of the present and long-term quality and condition of the aquifer beneath the Red Hill tanks and beyond its boundaries. Select sites for additional monitoring wells after sampling results are obtained from the two monitoring wells installed in September and October 2014. Obtain relative groundwater elevation data in the Halawa/Red Hill/Moanalua area for proper characterization.
- Devise a financial mechanism in which the Department of Health, the Honolulu Board of Water Supply, and the U.S. EPA may be reimbursed for site investigation activities needed to initiate (e.g. installation of additional monitoring wells, any increased groundwater and drinking water sampling, and any water treatment to remove contamination) within the area, to ensure that contamination is not migrating from the Red Hill facility into neighboring drinking water pump stations.
- Strengthen Hawaii's groundwater protection program by increasing surveillance and identification of potentially contaminating activities from other field constructed tanks to protect and mitigate impacts to groundwater aquifers. At this time there are 46 such facilities statewide with Red Hill being the largest in the State and the United States. See **Appendix E** for a full listing of these tanks, their location and current status and whether the tanks are located over a drinking water source.
- Navy and Department of Health, Safe Drinking Water Branch should monitor the drinking water by collecting and testing duplicate samples for the parameters identified in the existing groundwater and drinking water sampling schedules and others identified by the Honolulu Board of Water Supply. The Groundwater Protection Plan should be updated to include a Quality Assurance Project Plan that specifically identifies sampling methodology, data acceptance criteria and laboratory selection criteria to ensure that all sampling is consistent and replicable. The results should be shared with all interested parties to assure that all Quality Assurance/Quality Control procedures were followed.
- Request Navy to develop a system to continuously monitor the soil vapor probes as a form of leak detection, with alarm set points to alert operator(s) of organic vapors rising above pre-determined concentrations.

BWS Comments

- Mitigate existing contamination beneath the tanks starting with the area adjacent to Red Hill groundwater monitoring well #2, to contain and prevent contamination from extending beyond the current location. The Task Force deems prevention is less expensive than clean up and water treatment of all releases – large and small.
- Graph the Navy monitor well data and analyze for water quality data trends, correlation with past fuel release, interrelationships between wells and groundwater flow. Graphing data provides a pictorial view of trends over time. Comparing the data with other information is standard scientific practice in conducting a thorough analysis of the information collected. The comparisons can show any correlations between data points when compared with past fuel releases and contaminant presence or other monitoring wells.

All of this data analysis enables a better understanding of the "short and long term effects of the leak." in accordance with SCR 73.

- Fund and conduct a health effects study to assess the health significance of low level concentrations of petroleum chemicals in ground water and sources of drinking water in accordance with SCR 73 which requested the Task Force to "consider the short- 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." Presently there are no drinking water standards that define whether the amounts of petroleum contaminants and frequency being detected are safe to be in groundwater that is used as a source of drinking water. This study will scientifically assess and determine the maximum amount of petroleum contaminants that is safe to be in drinking water and provide the documentation to respond to any questions and concerns about the petroleum contaminants detected to date.

  According to the DOH document, **Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater (Interim Final, May 2005 and updates),** EALs were developed to help assess the risks of environmental contamination and make decisions regarding the need for additional site investigation, remedial action or a more detailed risk assessment. The EALs were developed, among others, to help protect drinking water resources and aquatic habitats (discharges to surface water). The DOH document indicates that "while 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." According to DOH, EALs for Total Petroleum Hydrocarbon (TPH) and many non-carcinogenic, petroleum related compounds (e.g., xylenes) are driven by the protection of groundwater quality. EALs therefore appear to be protective of the environment but is not a limit that when exceeded requires remedial action and clean up. This appears to infer an allowance of contamination to exist in the environment possibly for long periods as monitoring and testing continues without any mitigation. The BWS favors mitigating contamination before it travels and affects parts of the aquifer that are not contaminated. Maintaining drinking water quality criteria to the whole aquifer is favored over establishing a "risk based" level that appears to allow contamination at points in the aquifer in contact with a contaminating activity.

- Conduct a scientific peer review and evaluation of the sampling and test methods and detection limits used by the Navy to develop a uniform monitoring protocol. Understanding the short and long term effects of Red Hill leaks needs reliable peer-reviewed and vetted scientific data in order to accurately understand the issues and make sound decisions on those issues. Professional scientific peer-review and auditing is standard practice in all good testing and research studies undertaken to insure data validity, quality and transparency.

- A Red Hill Task Force Technical Subcommittee should be created to evaluate, comprehend and explain all of the complex and voluminous scientific information in support of the Task Force's discussion of issues and decision-making and to provide the Task Force and public with easily understandable technical information on Red Hill.

Navy Comments:

- The Navy will continue to ensure the safety of drinking water resources through implementation of the Groundwater Protection Plan. The Plan was published and approved by DOH in 2008 and has been updated in 2009 and 2010. A 2014 interim update was recently reviewed by DOH. The Plan will continue to be updated as additional information becomes available. The Groundwater Protection Plan and its 2009 and 2010 updates are available online at: http://health.hawaii.gov/shwb/underground-storage-tanks/.

- The Navy is actively investigating for the presence of free product and will remove free product to the maximum extent practicable. The Navy will continue soil vapor and ground water monitoring in accordance with the approved Groundwater Protection Plan.

Recommendations Agreed Upon By Task Force:

- Additional groundwater monitoring wells are warranted to adequately assess groundwater hydrology and to support fate and transport models for a facility of this size and unique geology. The number of additional wells will be based upon a technical discussion using available data, as well as any current and future studies.

- BWS will continue periodic monitoring of its drinking water sources for petroleum contamination. The Navy will also continue periodic monitoring of the groundwater, drinking water, and soil vapor at the Red Hill Fuel Storage Facility, in accordance with the Groundwater Protection Plan. The Task Force expects the BWS and the Navy to continue providing reports on those efforts to the DOH and the EPA. The reports are available to the public from the DOH.

2. Response strategies to mitigate the effects of future leaks at the Red Hill Underground Fuel Storage Facility

Finding of Facts

REGULAR MAINTENANCE

The Red Hill facility consists of field constructed USTs that are currently deferred from Federal and State UST regulations that require other regulated non-field constructed USTs to have secondary containment for all new tanks and piping. It also requires corrosion protection and leak detection for all existing tanks and piping. **Appendix D** shows a summary of regulatory requirements for all other underground storage systems and those provisions for which field constructed tanks (FCTs) are exempt from.

The Navy performs periodic inspection of all petroleum, oil, and lubricant tanks and pipelines to ensure that the Red Hill Bulk Fuel Storage Tank system is properly maintained. Other protective measures include a Mass Technology Measurement System used by the Navy to assess tank tightness for all active Red Hill tanks. The tank tightness testing is performed every two years. In addition, the Navy employs an Automated Fuel Handling System to detect

unscheduled fuel movements which alerts the operators of any potential fuel loss. Inventory levels are also assessed on a regular basis for trends that might reveal any potential fuel losses. Soil vapor monitoring equipment is also installed at the Facility to monitor hydrocarbon levels in the subsurface.

Recent maintenance cycles performed on tanks within Red Hill utilize a modified American Petroleum Institute (API) 653 procedure developed by the Navy, for determining integrity of steel plates and welds. According to the Navy, a general corrosion rate is used to estimate how much of the original steel will be thinned out from corrosion at the end of a 20 year operational cycle. The goal of tank maintenance is to have at least 0.1 inches of steel plate remaining from the original 0.25 inch steel. Regarding Tank 5, the Navy reported over 600 areas where tank thickness did not meet the appropriate standards. The required thickness was restored through additional weld patch plating within Tank 5 during its maintenance cycle that ended December 2013.

SECONDARY CONTAINMENT EVALUATION

In addition to the procedures mentioned above which monitor inventory levels to reveal potential fuel losses, the Navy uses soil vapor monitoring equipment to monitor hydrocarbon levels in the subsurface. However, these systems do not prevent leaks and fuel loss into the environment. A previous study conducted by the Navy in 2008 evaluated secondary containment options for the fuel tanks at Red Hill. The study included two options – a "tank within a tank" and a composite tank system. A redacted version of this report is available to the Legislature upon request. The Navy plans to continue studying secondary containment options as well as advanced leak detection technologies in collaboration with DOH and EPA.

At the October 7, 2014 Task Force meeting, the Navy stated the importance of the Facility and its need to continually maintain the capacity at Red Hill to support its fuel needs. The Task Force finds that the Navy plans to study secondary containment options and advanced leak detection technologies in collaboration with the DOH and EPA.

SITE ASSESSMENT & CONTINGENCY PLANS

In continuing efforts to monitor the groundwater for contamination and to better assess the fate-transport model, the seven (7) groundwater monitoring wells that were previously installed in and around the Facility will continued to be monitored on a regular basis, including the Navy's one drinking water well and the multiple drinking water wells maintained by the BWS. Monitoring of the CWRM Halawa Deep Monitoring Well and the Tripler Army Medical Center Monitoring Well could serve as sentinel well monitoring for any contaminant movement to the south towards BWS' Moanalua Wells.

Subsequent to the January 2014 release, the Navy, in coordination with the DOH and EPA, installed two additional groundwater monitoring wells in October 2014 (RHMW06 and RHMW07). Preliminary results from these two new wells have shown low levels of petroleum contamination 300 feet north of the facility. Refer to **Diagram 1** for locations of all wells.

When available, samplings results will be submitted to the DOH and EPA. DOH will make the data available to the public.

Additional wells may be necessary to adequately determine groundwater hydrology and support contaminant fate and transport models that are underway. **Diagram 1** maps the location of existing wells and the two new wells installed since the reported release from Tank 5.

The Navy has developed contingency plans with other federal agencies to address potential consequences from releases. These plans are periodically reviewed, updated and appropriate actions are taken by the Navy in response to these reviews and updates.

DOH Comments

- All current methods of release detection that the Navy implements at the Facility are reactionary. There is no 'alarm' until contamination has left the steel containment and then enters the environment. Secondary containment would capture fuel released from the inner wall into an interstitial space and alert Navy operators of releases. It could also be designed to allow for product recovery.

- As of December 24, 2014, DOH has not been able to verify the accuracy and precision of any Automatic Tank Gauging (ATG) system, any Automated Fuel Handling System or the "highly sophisticated inventory system" that the Navy is using.

- The Legislature should issue a resolution to encourage Navy to consider enhanced containment and improved leak detection at Red Hill.
- DOH should amend the State's UST regulations to require secondary containment and leak detection for all of Hawaii's field constructed USTs. Refer to **Appendix E** for a listing and maps of these FCTs.

DOH and EPA Comments

- The Navy should evaluate current release detection methods, tank tightness testing protocol, tank inspection and repair procedures, and corrosion and metal fatigue control practices at Red Hill and institute best available technology where feasible and appropriate.

BWS Comments

- Support proposed EPA regulatory changes to cancel the deferral of field constructed USTs from 40 CFR Parts 280 and 281. The changes will regulate field constructed tanks (FCTs) and require compliance with existing release detection, spill and overfill control protection, and cathodic corrosion protection requirements.
- The Legislature is urged to issue a resolution encouraging the President of the United States to pass the proposed changes out of the Office of Management and Budget as originally published.
- Revise the DOH UST leak response requirements to specify the Resource Conservation and Recovery Act (RCRA) methodology for characterizing the nature and extent of

contamination. The RCRA site characterization approach is a comprehensive data collection method for producing a clear understanding of the current contamination problem and its extent in the environment. From there, targeted measures can be developed to mitigate the situation that can lead to developing strategies to mitigate the effects of future leaks at Red Hill.

The major elements of the RCRA methodology are:

- Identify and determine the velocity of contaminant movement in the groundwater (saturated zone), amounts present, factors influencing plume movement and extrapolation of future movement (modeling).
- Examine the contamination in vadose zone (unsaturated zone), amounts present, factors influencing plume movement and extrapolation of future movement (modeling).
- Employ contaminant characterization presentation tools to create three-dimensional data plots to show lateral and vertical extent of contaminant plumes.
- Examine impacts to potential receptors such as potentially affected human populations, environmental systems, ecology, biota and endangered/threatened species.

- Release and use EPA Drinking Water State Revolving Fund (DWSRF) set-aside grants to fund the drilling and installation of additional monitor wells in the Red Hill area. The use of DWSRF set asides describes a specific funding source and strategy to mitigate the effects of future leaks at Red Hill. The installation of additional sentinel wells provides long range surveillance and advance planning information to mitigate the effects of past and future leaks. The number of additional monitor wells to drill should be based on sound science data generated through the RCRA site characterization process.

The Board of Water Supply believes the Hawaii State Legislature will expect the Task Force's report to contain specific targeted action steps, strategies and recommendations that are based on sound science and the most state-of-the-art technical approaches for characterizing and mitigating the short and long term effects of leaking Red Hill underground fuel tanks.

Department of Land and Natural Resources Comments & Recommendations

- Provide an update on the wells which have been surveyed by US Geological Survey.
- Provide the date of distribution of the final USGS survey data.
- To effectively monitor the groundwater beneath a facility as large as Red Hill, with the complexities inherent in the fractured and porous basalts that underlie the facility, monitoring wells must be placed based upon a careful and thorough evaluation of the groundwater flow regime under and around the facility. Groundwater modeling will provide some insight and flow direction predictions, however, modeling and any other groundwater flow evaluation is dependent upon accurate water level data collected from monitoring wells with screened casings across the water table, and in locations that allow flow directions to be calculated. The linear locations of wells RH MW01, 02, 03, and 05, along the ridge, are too linear and too closely spaced to evaluate groundwater gradients.
- At this time, the CWRM recommends that two additional monitoring wells be installed and sampled: one monitoring well on the south side of the Facility (e.g. near the west end of Ala

Iolani Street), and one monitoring well on Icarus Way, west/northwest of RHMW01, near the entrance of the upper tunnel. These new wells, and all others associated with the Facility, should be surveyed to a common benchmark. A water level survey of all wells should then be conducted. Based on upon water levels, and sampling results, groundwater gradient/flow direction can be evaluated, and then if needed, additional monitoring well(s) can be installed and sampled.

Navy Comments

- The Navy will continue a service life extension program for the 12 remaining tanks.

- The Navy will explore additional containment protection solutions and seek funds to implement those that are likely to be effective in providing additional protection to the drinking water resources.

DOH, BWS and DLNR Comment

- Although the Navy has done, and continues to do, extensive repair work and improvements to this Facility, the best solution is some type of secondary containment. More research needs to be completed in regards to what technologies are available and if and how it can be successfully integrated.

3. Improve communications between the United States Navy, the State, and the public in the event of future leaks at the Red Hill Underground Fuel Storage Facility

Finding of Facts

The technical information on Red Hill is primarily communicated between the Navy and the DOH and EPA as required by state and federal regulations. Regulatory monitoring data is available to the public and other agencies through DOH.

DOH and BWS Comments

- DOH continue to maintain a public website containing all information from the Task Force, Navy, DOH, BWS, and other agencies (e.g., meeting notices, notes of meetings, reports, data, trend graphs, laboratory analysis, etc.) to provide easy access to information and improve transparency.
- Continue the work of the Red Hill Task Force to ensure the long-term management, information access and decision making on issues related to leaks at Red Hill and the protection of Oahu's ground water aquifer, environment and public health.
- Continue to utilize notification systems to communicate future leaks and incidences at Red Hill or other underground storage tanks located above or in the vicinity of drinking water aquifers. The alert system should be targeted to specific persons for first response action.

Department of Land and Natural Resources Comments

- To share a timeline for the distribution of any sampling results to the Task Force and/or involved parties (e.g. distribute results within 2 weeks of receipts of results).

Comments Agreed Upon by the Task Force

- The Task Force also finds that all parties have demonstrated and continue to be fully committed to communicating with the public for any matters of public interest regarding the Red Hill Fuel Storage Facility. The Task Force acknowledges that the DOH, EPA, BWS and the Navy have made significant efforts to keep the public informed on the reported fuel leak. This began with a joint press conference by the DOH, BWS and Navy immediately following the January 2014 release, and continued with participation in community outreach events, publication of numerous media releases, and active coordination between and among appropriate State and Federal agencies to remediate any potential contamination and prevent future leaks at the Facility. The Task Force expects that all parties will continue to keep the public informed of any events at the Red Hill Storage Facility that would impact the public or the environment.

4. Implications of Closing the Red Hill Underground Fuel Storage Facility

Finding of Facts

The Task Force finds that the Navy operates and maintains the Red Hill Fuel Storage Facility as a strategic petroleum facility that provides critical fuel to operating forces in the Pacific region. The Task Force acknowledges that the Navy has no plans to close the Facility. The Task Force expects that the Navy will inform the public should those plans change.

The Navy indicated at the October 7, 2014 meeting that assessments are underway to explore alternative fuel storage solutions in lieu of either continued full or partial use of the Red Hill Facility.

DOH & BWS Comments

- The Department of Health does not have information regarding implications of shutting down this facility. DOH's priority is the protection of the environment and it views the storage of up to 187 million gallons of fuel, 100 feet above a drinking water resource, is inherently dangerous. Therefore, the operation of this facility 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.

- Any secondary containment feasibility study should include a comparison with the creation of a new fuel farm consisting of above ground tanks (ASTs) or the use of other available fuel storage options (i.e. closed refineries, fuel tankers, etc…) that already have secondary containment.

- The Navy should have facility-wide implementation of secondary containment by December 31, 2024. DOH recommendations on this point may be altered through the negotiation of an enforceable agreement with the Navy.

- In the interim, while the Navy studies available technologies increased protection and monitoring must be applied until secondary containment can be implemented.

BWS Comments

- Given the age and condition of the Red Hill Fuel Storage Facility, and with its history of leaks dating back to 1947 to the present, the Navy should disclose all studies or reports conducted including possible catastrophic release scenarios (e.g. seismic related, accidents, etc.).

Navy Recommendations and Opinions

- The Navy has above described the actions taken to continually upgrade and modernize the Red Hill Bulk Fuel Storage Facility and intends to continue to implement a sound systematic phased approach using continual improvement processes to continue those upgrades. The initial phase consists of ongoing evaluation of additional containment protection solutions. The second phase would involve planning, programming and implementing those solutions that are likely to be effective in providing additional protection to drinking water resources.

- The Navy will continue a service life extension program for the 12 remaining tanks.

Legislative Recommendations from the DOH

- Passage of a resolution that would request owners and operators of the 46 field constructed tanks (FCTs) in Hawaii to update the Legislature and the Department of Health on the status and condition of each of their 70+ year old tanks (e.g. construction and operational history, past leaks, monitoring and water quality test data, leak detection and liner upgrades, visual inspections, maintenance procedures, etc…). This is currently not required of FCTs in the current UST rules. Refer to **Appendix E** for a listing and maps of the field constructed tanks in Hawaii.

- To increase DOH's portion of the current allocation of the Environmental Response, Energy, and Food Security Tax ("Barrel Tax"). The Barrel Tax places $1.05 levy on every barrel of oil imported into the State. Five cents of that tax goes to DOH's Environmental Response Revolving Fund (ERRF), which has not increased since the tax was created in 1993. As Hawaii undergoes its forward-looking transition to renewable energy and imports fewer barrels of oil, this also means that there is reduced funding available for the ERRF. An increase from 5 cents to 15 cents out of the $1.05 is needed to support current personnel and increase resources to the Solid & Hazardous Waste Branch, the Safe Drinking Water Branch, among other branches, to regulate Red Hill and manage other complex environmental issues. DOH recommends that an additional 10 cent contribution into the ERRF come from the 60 cents that currently goes into the general fund.

- Support adoption of revisions to existing DOH UST rules requiring increased protection from Hawaii's 46 field constructed tanks (FCTs), of which Red Hill tanks make up 24 (4 of Red Hill's surge tanks are also FCTs). All of these tanks are 70 years or older.

Legislative Recommendations from the BWS

- Provide additional resources to DOH to adequately monitor, study and regulate this Facility.

- Legislature issue resolution continuing the work of the Task Force until DOH is satisfied with progress and outcome on issues related to this Facility and will recommend suspension of the Task Force.

Task Force Recommendations to the Legislature

- Encourage the DOH, EPA, BWS, and the Navy to continue efforts to protect Hawaii's groundwater and drinking water sources.

- Encourage the DOH, EPA, BWS, and the Navy to keep the public informed on matters of public interest regarding the Red Hill Fuel Storage Facility.

- 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 responds to the reported release of petroleum, and minimizes the threat of potential future releases.

Appendices, Tables and Diagram

Glossary
Appendix A: List of Red Hill Task Force Members and Alternates
Appendix B: DOH and BWS Summary of Releases at Red Hill Facility
- **Table 1**: Petroleum Contaminants Detected in Navy Red Hill Groundwater Monitoring Wells 2005-2014
- **Table 2**: Soil Vapor Results from SV05
- **Figure 1**: Soil Vapor Measurements SV05

Appendix C: Navy Data, including Monitoring Plan, Laboratory Numerical Levels, Groundwater Data Beyond Tank 5, Soil Vapor Results, Free Product Floating on the Surface of the Groundwater
- **Table 1**: Data on Other Wells For Petroleum Contaminants of Concern

Appendix D: Hawaii UST Regulations and Exemptions for Field Constructed Tanks
Appendix E: List of Field Constructed Tanks in Hawaii and Maps
Appendix F: How Red Hill Facility Site-Specific Risk-Based Levels Were Established
- **Diagram 1**: Location of the seven monitoring wells routinely tested by the Navy in green, and the two new sentinel wells north installed in Sept/Oct 2014

GLOSSARY

API – American Petroleum Institute
API 653- American Petroleum Institute 653 repair standard for above ground tanks that was modified to be applied to the Red Hill underground storage tanks.
AST- above ground tanks
ATG- Automatic Tank Gauging system
BWS – Honolulu Board of Water Supply
CWRM- Commission for Water Resource Management, a division of the Department of Land and Natural Resources
DLNR- Department of Land and Natural Resources
DOH – State of Hawaii Department of Health
DWSRF- EPA Drinking Water State Revolving Fund
EALs – Tier 1 Environmental Action Levels
EPA – United States Environmental Protection Agency
ERRF- Environmental Response Revolving Fund
FCT – field constructed tank
GWPP- Groundwater Protection Plan 2008, updates in 2009 and 2010. An interim 2014 update is being reviewed by DOH at this time. This plan is available online at: http://health.hawaii.gov/shwb/underground-storage-tanks/,
HEER- DOH's Hazard Evaluation & Emergency Response Office
JP-8- Jet Propulsion fuel, type 8
MCL – maximum contaminant levels, federal drinking water standards
MTG – Multi-function Tank Gauge
PID- photo ionization detector
POU- permanently out of use
ppb- parts per billion
ppbv- parts per billion by volume (as a measure of soil vapor)
ppm- parts per million
RH2254-01 – The Navy's drinking water well, also known as the Red Hill Shaft
RHMW02 – Groundwater monitoring well No.2, which is located closest to Tank 5 and has the highest groundwater contamination concentrations
RHMW06 and RHMW07- two additional monitoring wells installed north of the Facility after the January release
RCRA- Resource Conservation and Recovery Act
SCR – Senate Concurrent Resolution
SSRBLs- Site-Specific Risk-Based Levels
TOU- temporarily out of use
TPH(d) – Total Petroleum Hydrocarbons, diesel range
ug/L – micrograms per Liter (also parts per billion)
USGS – United States Geological Survey
UST – underground storage tanks
VOC- volatile organic compound

APPENDIX A

Red Hill Task Force Members

1. Gary Gill, Deputy Director, Department of Health
2. Aaron Poentis, NAVFAC Hawaii
    a. Capt. Mike Williamson
3. Senator Mike Gabbard, Chair, Energy/Environment Committee
4. Representative Chris Lee, Energy/Environmental Committee
5. Steven Linder, EPA Region IX
    a. Dean Higuchi, Hawaii EPA representative
6. Ernest Y.W. Lau, P.E., Honolulu Board of Water Supply (HBWS)
    a. Erwin Kawata, - HBWS
7. Patrick N. Casey, P.G., CHG, Geologist, Commission on Water Resource Management
    a. Robert Chenet, alternate
8. Steven Y. Onoue, President, Moanalua Valley Community Association
9. David Yomes, Chair Aliamanu/Salt Lake Neighborhood Board

APPENDIX B

DOH and BWS Summary of Releases at Red Hill Facility

Navy studies and test reports show the Red Hill tanks have a history of fuel releases dating back to 1947 and the presence of fuel contaminants in groundwater and fractured rock beneath the tanks. Soil vapor and groundwater monitoring well data consistently show petroleum detections from 2005 to the present.

Samples from Red Hill groundwater monitoring well 2 (RHMW02), located in the tunnel near Tank 5 and Tank 6, contain the highest levels of total petroleum hydrocarbons as diesel (TPH-d) at 12 to 50 times above the DOH environmental action levels (EALs) of 100 µg/L (parts per billion) from 2005 to the present. The latest groundwater sampling event occurred on July 21, 2014 with 1,300 ppb of TPH-d (1.3 ppm). Based on Navy monitoring well test results submitted to DOH, the range of petroleum chemical contaminants detected and EPA health advisories, DOH Hazard Evaluation & Emergency Response Office Environmental Action Levels (DOH HEER EALs) and EPA safe drinking water Maximum Contaminant Levels (MCLs) are summarized in **Table 1.**

Soil Vapor sampling points were installed by the Navy beneath each of the 18 operational tanks at Red Hill. Tank 1 & Tank 19 were removed from service in the 1980s and lack soil vapor sampling points. The Navy has collected and reported monthly soil vapor for volatile organic compounds (VOCs) by photo ionization detector (PID) beneath each tank from 2008 to present.

Soil vapor VOCs spiked to 225,000 ppbv (parts per billion by volume) beneath Tank 5 in the sampling event of January 15, 2014. The prior event on December 23, 2013 showed 794 ppbv. The Navy increased SV monitoring to a weekly basis from Feb 2014 to July 2014. Maximum SV VOCs beneath Tank 5 increased to 450,000 ppbv on May 1, 2014 and have since declined to 208,000 ppbv on September 25, 2014.

Soil vapor sampling beneath the adjacent Tank 6 showed maximum VOCs of 43,600 ppbv on May 21, 2014 and 18,700 ppbv on September 25, 2014. Similar results were seen in the direction of Tanks 6-10 and sporadic high readings beneath Tanks 2, 3, 4 indicating air pathways thru the fractured basalt surrounding the tanks within the complex.

Monthly data from the Navy's soil vapor sampling report for Tank 5 is shown in **Table 2**. **Figure 1** illustrates this information in graphical form (Navy report, Oct 2014).

Table 1 of Appendix B Petroleum Contaminants Detected in Navy Red Hill Groundwater Monitoring Wells 2005 to 2014
(values that exceed DOH/EPA levels in Bold)

#	Contaminant	DOH EAL drinking water threatened > 150 m to surface water (ppb)	EPA drinking water MCL** (ppb)	EPA health advisory (ppb)	Minimum value reported (ppb)	Maximum value reported (ppb)
1	TPH-d (diesel)	100	None	None	<20	**6,300**
2	TPH-g (gasoline)	100	None	None	13.2	**660**
3	Xylene	20	10,000	None	0.37	1.1
4	Benzene	5	5	None	0.14	0.92
5	Toluene	40	1,000	None	0.5	2.5
6	Acenaphthene	20	None	None	0.02	0.86
7	Fluorene	240	None	None	0.03	16
8	1-methylnaphthalene	4.7	None	None	0.02	**109**
9	2-methylnaphthalene	10	None	None	0.007	**88.5**
10	Naphthalene	17	None	100	0.03	**180**
11	Ethyl benzene	300	700	None	0.15	1.3
12	Lead (dissolved)	15	15	None	0.14	11.9
13	Pyrene	68	None	None	0.03	0.11
14	Chrysene	1	None	None	0.0159	0.062
15	Phenanthrene	240	None	None	0.02	0.14
16	Fluoranthene	130	None	None	0.026	0.24
17	Benzo[k]fluoranthene	0.4	None	None	0.0068	0.051
18	Benzo[a]anthracene	0.092	None	None	0.077	0.071
19	Indeno[1,2,3-c,d]pyrene	0.092	None	None	0.0075	0.037
20	Benzo[a]pyrene	0.2	0.2	None	0.0086	0.045
21	Benzo[g,h,i]perylene	0.13	None	None	0.0057	0.034
22	1,2-dibromoethane (EDB)	0.04	None	0.05	ND*	ND*
23	1,2-dichloroethane (1,2 DCA)	0.15	None	5	ND*	ND*

ppb = parts per billion or micrograms per liter
MCL = maximum contaminant level (EPA safe drinking water standard)
*Non-Detectable however, minimum detection limits were higher than DOH HEER EALs
NOTE: Additional constituents have been analyzed but have not shown significant detections

Table 2 of Appendix B
Soil Vapor Results from SV05
Soil Vapor Monitoring Letter Report
Red Hill Bulk Fuel Storage Facility

Date	SV05S	SV05M	SV05D
3/24/2008	1295	716	697
5/6/2008	5441	4214	4012
5/29/2008	6523	4636	3984
7/3/2008	5195	4218	3957
7/31/2008	5190	3785	2894
9/2/2008	6905	5581	3681
9/29/2008	7149	6405	3960
10/23/2008	3497	3690	2518
11/25/2008	3750	5221	3741
1/14/2009	9519	20567	12473
2/5/2009	1744	1824	1638
2/26/2009	7015	2820	1616
4/1/2009	1178	996	1179
4/20/2009	1209	1146	1326
5/27/2009	1120	1054	1123
6/29/2009	1055	1061	1131
7/20/2009	1237	1296	1582
8/28/2009	1776	1314	1457
9/24/2009	1901	1722	1906
10/29/2009	1430	1507	1724
11/19/2009	780	2100	2715
12/16/2009	210	2068	3418
1/28/2010	818	976	1227
2/22/2010	487	1453	2234
3/25/2010	1028	1473	1484
4/28/2010	398	1417	1532
5/26/2010	1002	980	1147
6/28/2010	64900	42100	25600
7/28/2010	38167	46633	59433
9/29/2010	NC_1	NC_1	NC_1
10/18/2010	NC_1	NC_1	NC_1
11/16/2010	NC_1	NC_1	NC_1
12/14/2010	NC_1	NC_1	NC_1
1/13/2011	NC_1	NC_1	NC_1
2/15/2011	NC1	NC1	NC1
3/15/2011	NC_1	NC_1	NC_1
4/18/2011	NC_1	NC_1	NC_1
5/18/2011	NC_1	NC_1	NC_1
6/22/2011	NC_1	NC_1	NC_1
7/27/2011	NC_1	NC_1	NC_1
8/26/2011	NC_1	NC_1	NC_1
9/22/2011	NC_1	NC_1	NC_1
10/27/2011	NC_1	NC_1	NC_1
11/22/2011	NC_1	NC_1	NC_1
12/16/2011	NC_1	NC_1	NC_1
1/20/2012	NC_1	NC_1	NC_1
2/23/2012	NC_1	NC_1	NC_1
3/13/2012	NC_1	NC_1	NC_1
4/16/2012	NC_1	NC_1	NC_1
5/15/2012	NC_1	NC_1	NC_1
6/19/2012	NC_1	NC_1	NC_1
7/10/2012	NC_1	NC_1	NC_1
8/14/2012	NC_1	NC_1	NC_1
10/24/2012	NC_1	NC_1	NC_1
11/26/2012	NC_1	NC_1	NC_1
12/18/2012	NC_1	NC_1	NC_1
1/31/2013	NC_1	NC_1	NC_1
2/28/2013	NC_1	NC_1	NC_1
3/28/2013	NC_1	NC_1	NC_1
4/25/2013	NC_1	NC_1	NC_1
5/30/2013	215	221	184
6/27/2013	115	233	232
7/25/2013	208	218	322
8/29/2013	63	68	161
9/26/2013	14	29	114
10/24/2013	229	250	201
11/21/2013	94	120	109
12/23/2013	50	622	794
1/15/2014	96	225000	204000
1/30/2014	818	150000	176000
2/24/2014	597	68200	100000
3/5/2014	492	96600	217000
3/10/2014	308	111000	204000
3/21/2014	593	99600	182000
3/25/2014	3144	271000	209000
4/3/2014	43700	384000	426000
4/7/2014	76100	413000	401000
4/16/2014	106000	437000	398000
4/22/2014	105000	383000	381000
5/1/2014	159000	450000	426000
5/8/2014	130000	377000	327000
5/15/2014	165000	401000	337000
5/21/2014	131000	415000	380000
5/27/2014	125000	369000	349000
6/3/2014	134000	341000	359000
6/11/2014	105000	288000	279000
6/19/2014	173000	284000	309000
6/23/2014	34500	45600	78700
7/9/2014	39700	277000	267000
7/21/2014	111000	234000	237000
8/27/2014	148000	205000	222000
9/25/2014	94500	208000	195000

ppbv: parts per billion by volume
NC_1: Not collected due to maintenance work

Date	SV05S	SV05M	SV05D
3/24/2008	1295	716	697
5/6/2008	5441	4214	4012
5/29/2008	6523	4636	3984
7/3/2008	5195	4218	3957
7/31/2008	5190	3785	2894
9/2/2008	6905	5581	3681
9/29/2008	7149	6405	3960
10/23/2008	3497	3690	2518
11/25/2008	3750	5221	3741
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6/29/2009	1055	1061	1131
7/20/2009	1237	1296	1582
8/28/2009	1776	1314	1457
9/24/2009	1901	1722	1906
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5/26/2010	1002	980	1147
6/28/2010	64900	42100	25600
7/28/2010	38167	46633	59433
9/29/2010	NC_1	NC_1	NC_1
10/18/2010	NC_1	NC_1	NC_1
11/16/2010	NC_1	NC_1	NC_1
12/14/2010	NC_1	NC_1	NC_1
1/13/2011	NC_1	NC_1	NC_1
2/15/2011	NC1	NC1	NC1
3/15/2011	NC_1	NC_1	NC_1
4/18/2011	NC_1	NC_1	NC_1
5/18/2011	NC_1	NC_1	NC_1
6/22/2011	NC_1	NC_1	NC_1
7/27/2011	NC_1	NC_1	NC_1
8/26/2011	NC_1	NC_1	NC_1
9/22/2011	NC_1	NC_1	NC_1
10/27/2011	NC_1	NC_1	NC_1
11/22/2011	NC_1	NC_1	NC_1
12/16/2011	NC_1	NC_1	NC_1
1/20/2012	NC_1	NC_1	NC_1

Date	SV05S	SV05M	SV05D
2/23/2012	NC_1	NC_1	NC_1
3/13/2012	NC_1	NC_1	NC_1
4/16/2012	NC_1	NC_1	NC_1
5/15/2012	NC_1	NC_1	NC_1
6/19/2012	NC_1	NC_1	NC_1
7/10/2012	NC_1	NC_1	NC_1
8/14/2012	NC_1	NC_1	NC_1
10/24/2012	NC_1	NC_1	NC_1
11/26/2012	NC_1	NC_1	NC_1
12/18/2012	NC_1	NC_1	NC_1
1/31/2013	NC_1	NC_1	NC_1
2/28/2013	NC_1	NC_1	NC_1
3/28/2013	NC_1	NC_1	NC_1
4/25/2013	NC_1	NC_1	NC_1
5/30/2013	215	221	184
6/27/2013	115	233	232
7/25/2013	208	218	322
8/29/2013	63	68	161
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11/21/2013	94	120	109
12/23/2013	50	622	794
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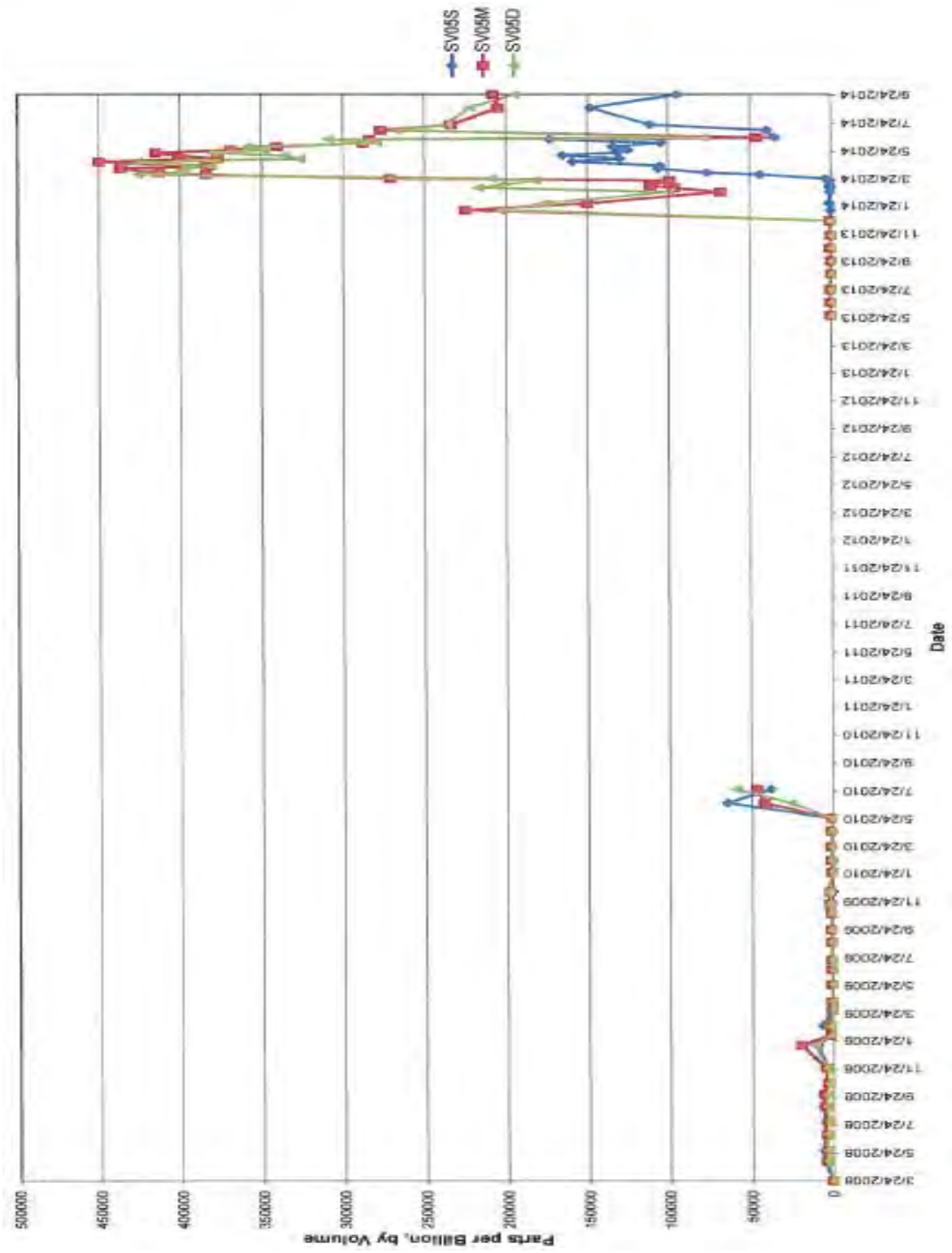
1/30/2014	818	150000	176000
2/24/2014	597	68200	100000
3/5/2014	492	96600	217000
3/10/2014	308	111000	204000
3/21/2014	593	99600	182000
3/25/2014	3144	271000	209000
4/3/2014	43700	384000	426000
4/7/2014	76100	413000	401000
4/16/2014	106000	437000	398000
4/22/2014	105000	383000	381000
5/1/2014	159000	450000	426000
5/8/2014	130000	377000	327000
5/15/2014	165000	401000	337000
5/21/2014	131000	415000	380000
5/27/2014	125000	369000	349000
6/3/2014	134000	341000	359000
6/11/2014	105000	288000	279000
6/19/2014	173000	284000	309000
6/23/2014	34500	45600	78700
7/9/2014	39700	277000	267000
7/21/2014	111000	234000	237000
8/27/2014	148000	205000	222000
9/25/2014	94500	208000	195000

ppbv: parts per billion by volume
NC_1: Not collected due to maintenance work

Figure 1 of Appendix B
Soil Vapor Measurements
SV05



APPENDIX C

Navy Data

Current Red Hill Monitoring Plan

This data is provided in addition to the information provided by DOH and BWS in Appendix B. The Navy monitors at many wells and tanks. The current regulatory approved monitoring plan includes:

- 50 soil vapor monitoring points (2 to 3 monitors beneath the 18 tanks) –measures volatile organic compounds (VOC) vapors in the soil/rock beneath the tanks. The data is collected monthly.
- 7 groundwater monitoring wells and 2 new wells – groundwater samples are analyzed for chemical contaminants at least quarterly and the groundwater is also monitored for free product monthly.
- Drinking water monitoring at Red Hill Water Shaft – samples are routinely analyzed according to Safe Drinking Water standards. Additional analyses are performed to check for petroleum products.

All monitoring plans and sampling results are provided to the Department of Health.

Laboratory Numerical Levels

The results from the drinking water wells are compared against ***Maximum Contaminant Levels (MCLs)*** under the Safe Drinking Water Act. These MCLs were established considering human health risk, technology for testing and treatment and several other factors. The MCLs are the specified standard appropriate for source wells used for drinking water distribution.

The results from the ground water monitoring wells are compared against the ***Environmental Action Levels (EALs)*** and ***Site Specific Risk Based Levels (SSRBLs)***. The EALs were established by the DOH based on the most 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 can be used as screening levels and evaluation starting points to be put into context of the specific site and other contamination found.

The Department of Health's guidance, "Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater" describes how to use and interpret EALs:

- ***"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"."***

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. For Red Hill, the following SSRBLs were approved:

- SSRBL for TPH-d = 4,500 ug/l in groundwater
- SSRBL for benzene = 750 ug/l 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

As the derivation of EALs did not incorporate technology and are the most conservative levels based on numerical assessments, a consistent detection level can be a challenge for laboratories. When testing for drinking water consumption, there is normally an expectation of the range of results (usually near the MCL.) However when testing for groundwater for possible contamination, the range of concentration is less defined and, due to the exploratory nature of the investigation, could be very wide.

Groundwater Data Beyond Tank 5

Contaminant concentrations detected in wells RHMW01 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. Similarly, the data from the well between Tank 5 and the Halawa Shaft are below the DOH EALs. The data for the contaminants marked as a concern in the BWS table in Appendix B are summarized for the other relevant wells below. (60+ other low level chemical results are not listed in table.) Values are displayed in in parts per billion (ppb).

Table 1 of Appendix C – Data on Other Wells
For Petroleum Contaminants of Concern in Listed Appendix B
Navy Red Hill Groundwater Monitoring Wells 2005 to 2014
(values that exceed SSRBLs or DOH EALs in Bold)

#	Contaminant	DOH EAL (ppb)	EPA drinking water MCL (ppb)	EPA health advisory (ppb)	Min. value reported (ppb)	Max value reported (ppb)	SSRBL (ppb)
RHMW02 (nearest to Tank 5)							
1	TPH-d (diesel)	100	None	None	<20	**6,300**	4,500
2	TPH-g (gasoline)	100	None	None	13.2	**660**	
8	1-methylnaphthalene	4.7	None	None	0.02	**109**	
9	2-methylnaphthalene	10	None	None	0.007	**88.5**	
10	Naphthalene	17	None	100	0.03	**180**	
RHMW01 (down-gradient of Tank 5)							
1	TPH-d (diesel)	100	None	None	<80.8	**1500**	4500
2	TPH-g (gasoline)	100	None	None	<13	16.6	
8	1-methylnaphthalene	4.7	None	None	<.05	0.101[a]	
9	2-methylnaphthalene	10	None	None	<0.015	3.07	
10	Naphthalene	17	None	100	<.050	5.61	

RHMW05 (down-gradient of Tank 5, up-gradient of Red Hill Shaft)							
1	TPH-d (diesel)	100	None	None	<10	**673**[b]	4500
2	TPH-g (gasoline)	100	None	None	<30	13.2	
8	1-methylnaphthalene	4.7	None	None	<0.0158*	0.0335*	
9	2-methylnaphthalene	10	None	None	<0.0158*	0.0246*	
10	Naphthalene	17	None	100	<0.0326*	0.17*	
****RHMW04** (between Tank 5 and Halawa Shaft)							
1	TPH-d (diesel)	100	None	None	new	17	
2	TPH-g (gasoline)	100	None	None	new	<60	
8	1-methylnaphthalene	4.7	None	None	<0.0162 *	<0.052*	
9	2-methylnaphthalene	10	None	None	<0.0162 *	<0.052*	
10	Naphthalene	17	None	100	<0.0335 *	<0.073*	

* Concentration is below the DOH EAL

** Data for RHMW04 represents the re-start of testing in July 2014. HDMW2253-03 tested and levels also below DOH EALs and SSRBLs, but well suitability for groundwater testing is questionable. Data from new monitoring wells are not yet available.

a – The max value reported was 9.44 ppb; however, previous and subsequent analytical results were non-detect and the consultant indicated that the outlier is likely not representative of the true groundwater condition at the site. The next highest value reported was 0.101 ppb.

b – The max value reported was 2060 ppb; however, the laboratory indicated that this value may have included compounds unrelated to Facility stored fuels (specifically, caprolactam and DEET). The analytical method quantifies the total concentration of all compounds within the diesel fuel range. The next highest value reported was 673 ppb.

Soil Vapor Results

Soil vapor results at Tank 5 are represented in the graph in Appendix B. The comparison to the SSRBL of 280,000 ppbv prompted more frequent monitoring. Increases at neighboring tanks were also detected.

Free Product Floating on the Surface of the Groundwater

Monthly monitoring using an oil/water interface probe has not detected any measurable product at the well nearest to Tank 5 or any of the other groundwater monitoring wells.

APPENDIX D

Hawaii UST Regulations and Exemptions for Field Constructed Tanks

1. Design, construction, and installation
2. Notification, permits, and variances
3. General operating requirements (i.e. spill & overfill protection, repairs, recordkeeping)
4. Release detection
5. **Release reporting, investigation & confirmation***
6. **Release response action***
7. **Closure***
8. Financial Responsibility
9. **Enforcement***

*Hawaii UST regulations require Field Constructed USTs to comply with only 5, 6, 7 and 9.

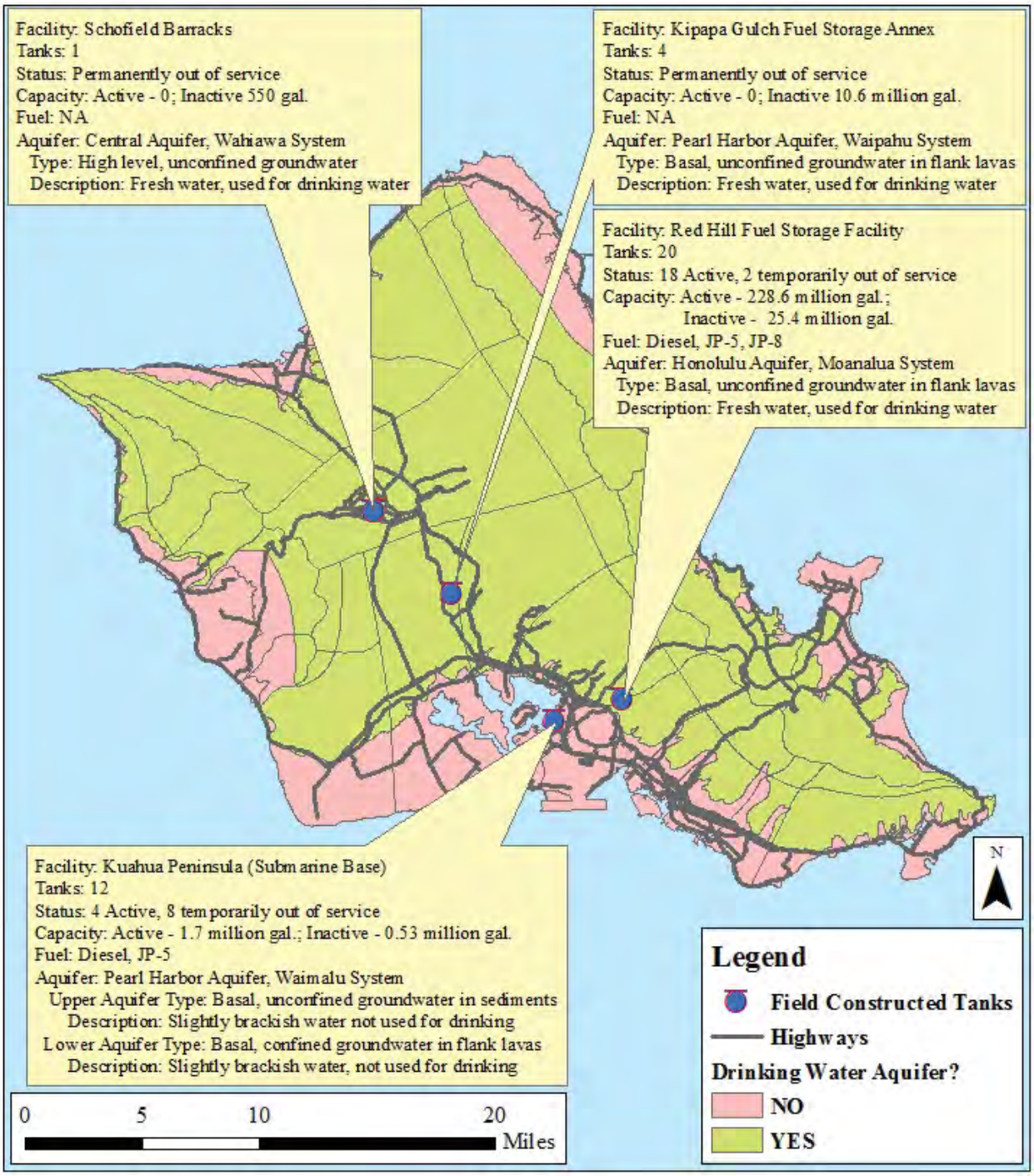
APPENDIX E

List of Field Constructed Tanks in Hawaii

Location	Status	Qty	Capacity of each tank (gallons)	Composition	Installation Date	Over Drinking Water Resource	NOTES
Kipapa Gulch Fuel Storage Annex	**POU*** In 2002	**4**	**2,650,000**	Bare Steel	May 1941	Yes	DOH Office of Hazard Evaluation & Emergency Response is overseeing remediation (bioventing) for a release
Red Hill Facility	**TOU*** Tank 19 in 1986 Tank 1 in 1997	**2**	**12,700,000**	Bare Steel, encased in concrete	May 1941	Yes	
Red Hill Facility	**In use**	**18**	**12,700,000**	Bare Steel, encased in concrete	May 1941-1943	Yes	DOH Office of Solid & Hazardous Waste Branch is responding to a release from Tank 5
Kuahua Pennisula – Submarine Base Pearl Harbor	**TOU*** In 1990	**3**	**20,000**	Concrete	May 1943	No	
Kuahua Pennisula – Submarine Base Pearl Harbor	**TOU*** In 1990	**5**	**94,000**	Concrete	May 1943	No	
Kuahua Pennisula – Submarine Base Pearl Harbor	**In use**	**4**	**425,000**	Bare Steel	May 1941	No	Surge tanks used at Red Hill Facility
Pacific Missile Range	**In use**	**9**	**50,000**	Cathodically Protected Steel	April 1942	No	
Schofield Barracks	**POU*** In 1996	**1**	**550**	Concrete	Unk	Yes	
TOTAL	**In use**	**31**					
	TOU/POU*	**15**					
		46					

*TOU – temporarily out of use, subject to additional information from the tank owners
*POU – permanently out of use/closed

NOTE: Safe Drinking Water Branch has mapped out these tanks on the following pages.



There are 5 fuel storage facilities that utilize field constructed tanks. Four of these facilities are located on Oahu and shown in the map above. Labels for the each facility list the name, number of tanks, fuel capacity, fuel type, and describe the aquifer below the tanks. The map also shows those aquifers that are sources of fresh drinking water. In most areas of Oahu, freshwater resides in single aquifer. However, in areas with extensive caprock such as the Kuahua Peninsula (Submarine Base, Pearl Harbor), groundwater in the sedimentary formations overlies groundwater in the lava formations

below. The sediments confine the groundwater in the lava formations providing it with protection from contamination. Where the layered aquifers do not exist there is no natural hydraulic protection from fuel leaks.

The Pacific Missile Range Facility is the only Hawaii location outside of Oahu where field constructed tanks are in service. The 9 tanks for this facility are located over a sedimentary aquifer that is not used for drinking water due to excessive salinity and low productivity. Below this sedimentary aquifer is confined groundwater that could potentially be used for drinking water. The potential drinking water aquifer is protected from contamination by the overlying sedimentary aquifer.

APPENDIX F

How Red Hill Facility Site-Specific Risk-Based Levels Were Established

In setting Tier 1 Environmental Action Levels (EALs), DOH assumes that components of each TPH mixture consist of the most toxic fraction. These levels then serve as a screening method or an indicator that a health or environmental threat may exist and should be addressed or evaluated further.

In the case of Red Hill, after Tier 1 levels were exceeded, indicating that groundwater under the facility did not meet criteria for potable water need, a Tier 2 assessment was completed. The Tier 2 evaluation looks at migration pathways for contaminants. It determined that no seepage of leachate was occurring to the water table and that soil vapor pathways were not a significant concern. A Tier 3 assessment was then conducted to evaluate the future risk to the potable water production well, the Navy's drinking water pump station (Red Hill Shaft) that is the nearest and most vulnerable to contamination from Red Hill.

During the Tier 3 assessment, Site-Specific Risk-Based Levels (SSRBLs) were established for TPH, benzene and soil vapor at the Red Hill facility, the basis of which were made through modeling efforts, groundwater elevation studies and pump tests. In these models, certain assumptions were made.

- Concentrations of dissolved hydrocarbons measured with EPA Method 8015 is limited to 4500 ug/L – the computed maximum solubility of JP-5 in direct contact with the aquifer.
- Groundwater flows "mauka to makai" and updated with a slight northwesterly component, but assumes that Red Hill Shaft is still down-gradient and the most vulnerable receptor
- The dissolved fuel hydrocarbons will degrade at a Bulk Degradation Rate of 0.009% per day. In other words, half-life = 0.693/[rate constant] = 0.693/0.009 = 77 days. The initial concentration of TPH in groundwater is assumed to be reduced by half every 77 days due to biodegradation and attenuation as groundwater migrates away from the release area. This allows down-gradient concentrations of TPH in groundwater to be predicted based on the concentration in groundwater immediately under the tank and the estimated groundwater flow rate.
- It also looked at the maximum pumping rate at the Red Hill Shaft that could be sustained for five days (approximately 4.6 million gallons per day).

The Tier 3 assessment also recommended that groundwater samples be treated to remove petroleum-related breakdown products using "silica gel" prior to analysis. This would reduce the reported amount of contamination in the samples. The DOH recently clarified that this method is not acceptable for sample data that will be used to evaluate the threat to human health or the environment. Data from untreated samples are still required to make this evaluation.

It is estimated that the Navy's drinking water well, 2254-01, is approximately 3,000 feet down-gradient from the Red Hill facility. The upper entrance of the infiltration gallery is located approximately 1,600 feet from Tank 1 and 2. According to the Navy's 2007 petroleum fate and transport model, releases from the tank farm would be unlikely to migrate more than approximately 1,100 feet away from the release location above levels of potential concern for impacts to drinking water.

Using this data, SSRBLs were established based on distance of the Facility to the eastern end of the infiltration to the Navy's drinking water well, 2254-01. These SSRBLs were based upon the assumption that free product would be present in the groundwater at the Facility monitoring wells and correspond to the solubility limit of TPH from JP-5 and benzene. Soil Vapor SSRBL was also set.

TPH is the risk driver because modeling indicates that it would be the first contaminant of concern to reach unacceptable concentrations in this scenario. Other, individual compounds, including benzene, naphthalene and methylnaphthalene, have also been reported in groundwater samples collected beneath the Red Hill tanks but are less likely to reach the infiltration gallery and drinking water well above drinking water action levels due to their initially very low concentration.

Action Level Table

	Drinking Water EAL	Tank Farm SSRBL	Soil Vapor
TPH(d)	100 (µg/L)	4,500 (µg/L)	280,000 µg/m^3
Benzene	5 (µg/L)	750 (µg/L)	NA

DOH has examined these studies and accepts appropriateness and applicability of these SSRBLs, provided that they be reviewed as additional data are collected from the site.

The SSRBLs were incorporated into the Red Hill Groundwater Protection Plan. This plan was developed to mitigate the risk associated with inadvertent releases of fuel from Red Hill and to provide an overview of actions (or contingency plans) that would be required for detections below but approaching the SSRBLs as well as actions to mitigate large releases if they were to migrate to the water table. For instance if RHMW02 exceeds 1/2x SSRBL or 2,250 ppb then reporting, monitoring and immediate evaluation of tanks for leaks would be required.

It also includes quality assurance project plans for sampling and analysis.

This plan is updated periodically and submitted to DOH for approval.
These plans are available online at: http://health.hawaii.gov/shwb/underground-storage-tanks/.

- 2008 Red Hill Groundwater Protection Plan: 2008GWprot.pdf
- 2010 Re-evaluation of the Tier III Risk Assessment: 2010RedHillTierIII

Diagram 1

Locations of the seven monitoring wells routinely tested by the Navy in green, and the two new sentinel wells north installed in Sep/Oct 2014 in blue.

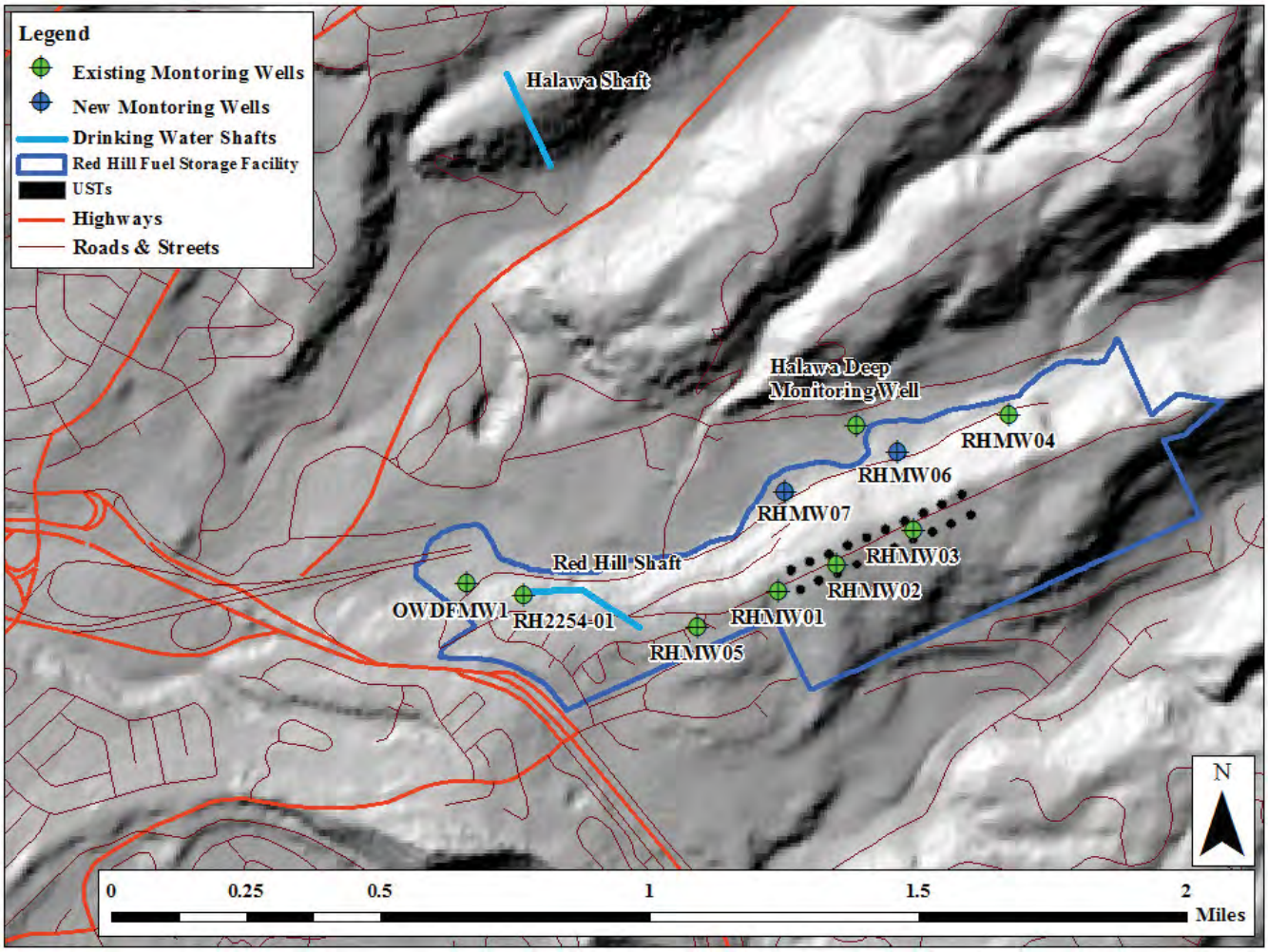


Exhibit 3

by December 31, 1989, of the existence
specify the age, size, type, location, and
m. Notice shall be made on an approved
ent.
nderground storage[1] tank or existing tank
January 1, 1974, and May 19, 1986, shall
1, 1989, of the existence of the tank[,] or
s the] tank or tank system [subsequently]
to May 8, 1986. Notices shall include, to
the following specifications:
system was taken out of operation;
ank system on the date taken out of opera-

on of the tank[;] or tank system; and
f substances left stored in the tank or tank
out of operation.
to use an underground storage tank or tank
fy the department within thirty days after the
tem, specifying the age, size, type, location,

all not apply to tanks or tank systems for
section 103(c) of the federal Comprehensive
tion, and Liability Act of 1980, Public Law

ownership of an underground storage tank or
89, shall notify the department within thirty
Act whether or not the erson still owns th e
stem. An erson who ac uires ownershi of p
nk system after the effective date of this Act
hirty days of acquiring ownership. If there is a
ound storage tank or tank system, the owner
hirty days of the change of operator. Notifica-
the owner or operator of an underground stor-
ide on a form provided by the department.
nderground storage tank or tank system taken
ury 1, 1974, [is] shall not be required to notify

lls a tank or tank system intended to be used as
nk system shall notify the purchaser of [such]
r's notification requirements established under

7, 1989, and for eighteen months thereafter,
substances into an underground storage t
vner of [such] the tank or tank system of the
established under this section.
vith the re uirements of this section includi
n shall be sub ect to the enalties set fo
each day of each violation." p

L-31, Hawaii Revised Statutes, is amended

mit] Permit requirements and transfer

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

(b) No permit to own or operate an underground storage tank or tank system shall be transferred to any person without prior written approval of the director.

[(b)] (c) The department shall prepare a form [which provides for the acceptance of] for an application to request the director's approval to transfer a permit of ownership or operation of an underground storage tank or tank system. A person wishing to accept the obligations of a transferred permit [by any person who is to assume the ownership of] to own or operate an underground storage tank or tank system from the previous owner[. That person shall complete the form accepting the obligations of the permit and submit the completed form within thirty days after the date of transfer of ownership of the underground storage tank.] or operator shall complete an application form and submit the form to the director. The director shall review the application and issue an approval of the transfer if the applicant proves to the satisfaction of the director that the applicant is able to comply with the conditions of the permit."

SECTION 22. Section 342L-32, Hawaii Revised Statutes, is amended to read as follows:

"**[[]§342L-32[] New tank standards.] Standards for tanks and tank systems.** (a) The department shall adopt [performance] standards under chapter 91 which shall apply to underground storage tanks [brought into use on or after the effective date of such standards. The performance standards for new underground storage tanks shall include, but are not limited to, design, construction, installation, release detection, and compatibility standards.] and tank systems.

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

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

[(2) The tank is cathodically protected against corrosion, constructed of noncorrosive material, or steel clad with a noncorrosive material, or designed in a manner to prevent the release or threatened release of the stored regulated substance; and

(3)] (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."

SECTION 23. Section 342L-33, Hawaii Revised Statutes, is amended to read as follows:

"**[[]§342L-33[] Leak] Release detection [and record maintenance].** [(a)] The department, pursuant to chapter 91, shall adopt [under chapter 91] standards of performance for maintaining a [leak] release detection system, [an]

Exhibit 3

Exhibit 4

BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843
www.boardofwatersupply.com

October 3, 2016

Mr. Bob Pallarino
EPA Red Hill Project Coordinator
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

and

Mr. Steven Chang, P.E.
DOH Red Hill Project Coordinator
State of Hawaii
Department of Health
P.O. Box 3378
Honolulu, Hawaii 96801-3378

Dear Messrs. Pallarino and Mr. Chang:

Subject: Board of Water Supply (BWS) Comments on the Red Hill Bulk Fuel Storage Facility (RHBFSF) Administrative Order on Consent (AOC) Work Plans and Associated Scoping Meetings

From June 2015 to the date of this letter, the BWS has sent 34 letters on the AOC and its work plans to the AOC Parties and received only 11 responses. We strongly believe these letters demonstrate our commitment to lend our assistance and expertise in good faith and at a minimum deserve the courtesy of a reply to each one. The number of responses, however, received to date is disappointing given the serious threat these aging underground fuel storage tanks pose to the environment and our high quality drinking water resource.

The BWS continues to be concerned about the petroleum contamination that is still present in the rocks and groundwater underneath and near the Red Hill fuel tanks and the risk for potential future, perhaps catastrophic leaks. The Navy has been testing the groundwater since 2005. However, tests conducted by the Navy from 2014 to 2016 indicate the amount of petroleum contamination in the groundwater underneath Tank 5 is rising.

Exhibit 4

Navy studies and reports on the condition of the tanks also show many holes forming from corrosion of the steel tanks which is requiring the Navy to hire contractors to weld patch plates to cover the holes. Maintaining the inside of the tank but not the outside which cannot be reached is not reducing the risk of more leaks.

The BWS would like to remind the signatories of the Red Hill Bulk Fuel Storage Facility AOC of their respective mission statements and Article XI of the Hawaii State Constitution that holds all public natural resources in trust and protected for the benefit of the people of Hawaii.

In keeping with the Hawaii State Constitution, the BWS firmly maintains its position of:

1. Accepting no more fuel leaks from the Red Hill tanks and to restore the groundwater to its original pristine condition by cleaning up the fuel contamination that exists there now and preventing future leaks regardless of amount.
2. Zero risk of fuel leaks to the environment.
3. Relocating the fuel to a different facility at a different location or locations, or retrofitting all Red Hill Bulk Fuel Storage Facility (RHBFSF) active tanks with double walls (tank-within-a-tank).
4. Maintaining public transparency and not sign any non-disclosure statement.
5. Finding the 2014 fuel leak by installing more groundwater monitoring wells to get the information needed to completely understand the groundwater contamination underneath and near the tanks.

To date, the BWS has fully participated in AOC scoping discussions and shared its knowledge by submitting pages and pages of comments and recommendations to the AOC parties. So far our comments and recommendations appear to be ignored and unused.

However, your September 15, 2016 letter to the Navy and the Defense Logistics Agency (DLA) rejecting their submittal for Sections 6 and 7 which incorporated our June 3, 2016 letter has given us hope that this trend will not continue. We ask the Environmental Protection Agency (EPA) and the Hawaii Department of Health (DOH) to reply to those letters that have not been responded to. We also offer our latest comments below.

Non-Aqueous Phase Fuel in Groundwater

There are multiple lines of evidence that indicate non-aqueous phase fuel has been and continues to be present in or near monitoring well RHMW02, yet EPA and DOH have not directed the Navy to remediate this contamination of our drinking water supply aquifer. Regardless of the AOC, the EPA and DOH remain responsible for enforcing

the regulations for responding to contamination of Oahu drinking water by light non-aqueous phase liquids (LNAPLs) (HAR Subchapter 7 §11-281-74(5) and CFR Title 40, Chapter I, Subchapter I, Subpart F Part 280.62(a)(5)) and those actions required by the Navy's own Groundwater Protection Plan (GWPP) (TEC, 2008; HDR, 2014).

Monitoring well RHMW02 is located near Tanks 5 and 6, both of which have held Navy Special Fuel Oil, naval distillate, and JP-5 from 1942 to about 2002 (AMEC, 2002). Tank 6 also held F-76 fuel from 1982 to 1994 (AMEC, 2002). Tank 5 was used to store JP-8 at the time of the January 2014 fuel spill.

Our understanding of the leak history at the RHBFSF is limited. Based on the reports available to BWS, we have developed the following table that outlines our understanding of reported releases and amounts. Please note that there are several reported releases that do not report a volume and that there is no data available for BWS regarding leaks after 1983, with the exception of the January 2014 27,000-gallon release of JP-8 from Tank 5.

Fuel Type	Estimated Release Volume (gallons) 1944 - 1983	Number of Releases with Unknown Volume Released
Navy Special Fuel Oil	30,500	4
Navy Distillate	0	3
Diesel Oil	0	6
Diesel Fuel, Marine	26,505	14
JP-5	71,045	7
JP-8*	27,000	0
Total	**155,050**	**34**

Notes: * = Release occurred in January 2014
No data for years between 1984 to present
Fuel type estimated release volumes and number of releases (AMEC, 2002)

One line of evidence for the presence of fuel NAPL in groundwater is the historical total petroleum hydrocarbon – diesel (TPH-d) data for groundwater at monitoring well RHMW02. Average TPH-d concentrations at RHMW02 have exceeded 5,000 micrograms per liter (µg/L) five times since 2005: once in 2008 and four times since the January 2014 fuel spill at Tank 5 (Element Environmental, LLC, 2016). The most recent sample's value was slightly below the GWPP Site-Specific Risk-Based Screening Level (SSRBL) of 4,500 µg/L (Element Environmental, LLC, 2016). According to ASTDR (2016), the water solubility for JP-5 and JP-8 is 5,000 µg/L (ATSDR, 2016), which is also the water solubility for the F-76 marine diesel fuel (CITGO, 2015) that was stored at the nearby Tank 6 (AMEC, 2002). It should be noted that the Navy uses a SSRBL of

4,500 µg/L in their GWPP which is based on their understanding of JP-5 solubility in groundwater and is not based a health-based value (TEC, 2008; HDR, 2014). TPH-d concentrations at RHMW02 have exceeded the ATSDR 5,000 µg/L fuel solubility value for JP-5, JP-8, and F-76 five times since 2005 and four times since the January 2014 fuel spill at Tank 5. The TPH-d concentrations are likely an accurate indicator of contamination from diesel fuels such as F-76, as well as the jet fuels according to statements made by the Navy during the recent risk assessment work plan meeting. Thus, the historical TPH-d concentrations indicate the presence of NAPL from one or more of the F-76, JP-5, and JP-8 fuel types in tanks in or near RHMW02.

The second line of evidence for the presence of fuel NAPL in groundwater is historical naphthalene concentrations in groundwater at RHMW02. Naphthalene is a carcinogenic constituent of jet fuels and F-76 fuel stored at the RHBFSF and has effective solubility values of about 360 to 960 µg/L in JP-8, about 260 µg/L in JP-5, and about 660 to 2060 µg/L in F-76 fuel based on our calculations using mass fractions and pure phase solubilities at 25 degrees Celsius from the ATSDR (2016) and mass fractions from Ritchie et al. (2003). Average naphthalene concentrations at RHMW02 exceeded 200 µg/L eight times and 300 µg/L twice during 2006 and 2008 (Element Environmental, LLC, 2016). These observed concentrations were above or near the effective solubility of JP-5 and near that for JP-8 during 2006 and 2008, indicating that fuel NAPL was likely present in or near RHMW02. These observed naphthalene values likely indicate a fuel release that occurred in 2006 or earlier. Since late 2014, observed average naphthalene concentrations have reached values between 100 and 150 µg/L on five occasions (Element Environmental, LLC, 2016). These values are a significant fraction of the effective solubility for JP-5 and JP-8, and thus corroborate the presence of fuel NAPL in or near RHMW02.

Another line of evidence for the presence of fuel NAPL in groundwater is that the observed concentrations of naphthalene have exceeded or approached 1% of the pure phase solubility values. As stated in the EPA website Contaminated Site Clean-up Information (https://clu-in.org/): *As a rule of thumb, if dissolved concentrations are at or above 1 percent of effective solubility, it is likely that the well is completed in the vicinity of a NAPL zone* (EPA, 1997 and 2001). Pure phase solubility at 25 degrees Celsius for naphthalene is 31,700 µg/L (ATSDR, 2016). RHMW02 naphthalene concentrations have exceeded 1% of the pure phase solubility value (317 µg/L) twice from 2006 to 2009 and recently approached about 50% of this value (Element Environmental, LLC, 2016), demonstrating that fuel NAPL has entered the well or is currently near to the well.

The fuel NAPL near monitoring well RHMW02 has been and will continue to degrade the water quality of our drinking water aquifer. The BWS requests that EPA and DOH require the Navy to investigate and remove the NAPL in and around monitoring well RHMW02 and anywhere else in the surrounding vicinity of the RHBFSF.

Parties Appear to Ignore Agreed-Upon Groundwater Protection Plan (GWPP)

As outlined in the GWPP, groundwater action levels used for decisions at the RHBFSF include general DOH Environmental Action Levels (EALs) for groundwater protection and SSRBLs for TPH-d and benzene (TEC, 2008; HDR, 2014). The actions to be taken for exceedances at specific monitoring wells and for specific categories are listed in Table 4-2 of the GWPP (TEC, 2008; HDR, 2014). The actions to be taken are dependent on the concentration of a compound at a specific well related to EALs and SSRBLs and groundwater concentration trends:

> **Results Category 1**: Result above detection limit but below drinking water EAL and trend for all compounds stable or decreasing.
>
> **Results Category 2**: Trend for any compound increasing or drinking water EAL exceeded; as specified in the GWPP, trends are to be evaluated using the Mann-Kendall statistical test.
>
> **Results Category 3**: Result between 1/10X SSRBL and SSRBL for benzene, or between 1/2X SSRBL and SSRBL for TPH.
>
> **Results Category 4**: Result exceeding any SSRBL or fuel NAPL is measured or observed.

From comparison of concentrations in Navy monitoring wells to EALs and SSRBLs, groundwater concentrations in samples collected from monitoring wells RHMW01, RHMW02, and RHMW03 indicate required action-level responses that fall into Category 2. The Category 2 response can be determined from the exceedance of drinking water EALs, as noted in the Second Quarter (April) Groundwater Monitoring Report (Element Environmental, 2016). However, trend analysis of the data has not been conducted using the Mann-Kendall nonparametric statistical test as outlined in the GWPP (TEC, 2008). The Navy has been remiss in evaluating trends per the GWPP and should immediately begin evaluating for statistically significant trends for all contaminants of concern. Category 2 triggers quarterly monitoring reports sent to DOH and development of a program to determine the source of the leak. Even though increasing concentrations for various constituents since 2014 have been attributed to a known release in 2014, it is imperative that constituents be continually evaluated for changes in relative concentrations so that new releases, should they occur, can be detected as early as possible. The BWS understands that the quarterly monitoring work has been initiated for these monitoring wells, but the BWS has seen no evidence that the Mann-Kendall nonparametric statistical test been performed. The BWS requests that either the DOH and EPA provide evidence of such analysis or require the Navy to follow their own GWPP and perform the analysis.

Since 2005, TPH-d concentrations in monitoring well RHMW02 have exceeded SSRBLs 6 times, and 4 of those have been since the first quarter of 2014. The response to an exceedance of the SSRBLs falls into Category 4. Category 4 responses indicate very specific actions and responses that the Navy has, in part, neglected to implement. The responses required by Category 4 include (lettering from GWPP):

A. Send quarterly reports to DOH

C. Notify DOH verbally within 1 day and follow with written notification in 30 days

D. Notify NAVSUP FLC PH Chain of Command within 1 day

E. Send Type 1 Report to DOH

- Re-evaluate Tier 3 Risk Assessment/groundwater model results
- Proposal to *DOH* on a course of action

F. Send Type 2 Report to DOH – Proposal for Groundwater Treatment

I. Remove sampling pumps (see Appendix C), measure product in pertinent wells with interface probe, re-install pumps if product is not detected.

J. Immediately evaluate tanks for leaks

K. Collect samples from nearby Halawa Deep Monitoring Well (2253-03) and OWDF MW01

M. Prepare for alternative water source at U.S. Navy Well 2254-01

N. Re-measure for product every month with reports to DOH

To our understanding, two of these required actions have not been addressed by the Navy, including items F and M (**bold** above). This is indicative of a lack of initiative on the part of the Navy to act in good faith to protect the natural resources of Hawaii, and to reduce the risk to the Navy's own water supply at Red Hill Shaft (Navy Well 2254-01). Furthermore, it is noted that in order to prepare a proposal for groundwater treatment, the extent of groundwater contamination must first be fully characterized. It is the Navy's responsibility to first implement a plan for characterizing the distribution of groundwater and vadose-zone contamination in the vicinity of tanks, especially near monitoring well RHMW02, and then design a proposal for treating contamination found in the groundwater and the vadose zone. The BWS requests that the EPA and DOH provide evidence if our understanding is incorrect and those items in bold above have been addressed. If a Type 2 Report has been submitted, please provide a copy for BWS to review. The BWS would also like to review documentation that the Navy has prepared for an alternative water source at Red Hill shaft. If those items outlined in **bold** above have not been initiated, the BWS would like the DOH and EPA to require the Navy to so implement these actions immediately as outlined in their own GWPP.

Critical Flaws in the Approaches for Flow and Transport Modeling

Based on our review of the available data, proposed work plans, and meetings with the Parties, the BWS has identified critical flaws and data gaps in the flow and contaminant transport modeling described under Section 7 of the Statement of Work (SOW) of the AOC. The EPA and DOH should direct the Navy to resolve these important deficiencies as soon as possible. Otherwise, the Parties will not achieve the stated objective for Task 7 to: "monitor and characterize the flow of groundwater around the Facility" and will put our drinking water supply at unacceptable risk.

The proposed flow modeling will not be defensible unless the following issues are resolved:

1. The regulators should direct the Navy to hire experts familiar with Oahu geology and the hydrologic and geologic scientific literature. An important example of this lack of an adequate understanding is demonstrated by Figure 6 Geological Cross Section in AECOM (2016), which exaggerates the widths of Halawa valley fills by at least 50% beyond those shown in Sherrod et al. (2007) or Stearns (1939). The authors of Section 3.6.2 and Figure 6 in AECOM (2016) have also ignored previous work by Wentworth (1942) and Izuka (1992) that show the uncertainty about the depth of valley fill sediments in Halawa valleys. Furthermore, the Navy has either ignored or is unaware that preliminary results of the 2015 USGS pump test showed responses in Red Hill monitoring wells to changes in pumping at Halawa Shaft.
2. EPA and DOH should direct the Navy to determine the thickness and properties of the valley fill sediments (in North and South Halawa valleys and Moanalua valley) and they should not allow continued use of the geometry and properties assumed in the Rotzoll and El Kadi (2007) flow model or the AECOM (2016) conceptual model. It is our view that any flow and transport model built using this unjustified assumption about the extent and properties of the valley fill sediments in both North and South Halawa and Moanalua valleys disregards the available site-specific scientific evidence and will likely lead to decisions and actions that endanger our water supply facilities and aquifer. If the Navy thinks valley fill sediments will interfere with contaminant migration from Red Hill, they should determine the hydraulic properties and three-dimensional extent of all nearby valley fill sediments (North and South Halawa Valleys and Moanalua Valley) using an extensive drilling and hydraulic testing program.
3. We have previously mentioned the large errors in elevation measurements for different groundwater monitoring wells. These errors must be corrected before the existing wells can be used to discern groundwater flow patterns or to provide data for flow model calibration. The synoptic water level measurements

proposed by the Navy should only be made after all measuring points at the monitoring wells have been surveyed to an appropriately high degree of accuracy.

4. The most defensible groundwater flow model to date, Oki (2005), has shown that the groundwater head data available for flow model calibration cannot be used to determine whether valley fill sediments in Halawa or Moanalua Valleys impede groundwater flow. Without the addition of monitoring points within and alongside the valley fill sediments, no future model calibration will be able to resolve whether the sediments impede groundwater flow from the RHBFSF toward Halawa shaft or toward the Moanalua wells. EPA and DOH should acknowledge this fact and direct the Navy to implement the necessary amount of monitoring wells, monitoring well construction and monitoring well testing to use to adequately calibrate the model.
5. Given the importance of understanding the direction of groundwater flow in and around Moanalua and Halawa valleys, EPA and DOH should direct the Navy to implement long-term monitoring of heads in the extended well network using transducers to provide sufficient data for model calibration. EPA and DOH should also instruct the Navy to conduct large scale pumping tests such as that conducted by the USGS in 2015 to generate data with which to calibrate the flow model. Such tests will require additional monitoring wells in and around the valley fill sediments in order to determine their effects on drawdown.
6. If the EPA, DOH, and Navy are unwilling to collect the necessary data to resolve the role of valley fill sediments on groundwater flow from the RHBFSF toward Halawa shaft or toward the Moanalua wells, then the regulators must direct the Navy to use a conservative approach in constructing the flow model to reflect this data gap such as that evaluated by Oki (2005). In the absence of defensible data about valley fill sediments, the flow model should conservatively assume that valley fill sediments do not significantly affect groundwater flow across Halawa and Moanalua valley. Such an appropriately conservative flow model would be similar to the "no valley fill" scenario in Oki (2005) or would reflect the available data and cross-section line A in Figure 25 of Wentworth (1942).
7. EPA and DOH must ensure that the transport modeling is carried out using the flow model constructed with this conservative assumption about valley fill sediments in North and South Halawa valleys and Moanalua valley. EPA and DOH should make it clear to the Navy and others that any modeling based on unjustified non-conservative assumptions about the valley fill properties and geometry is unacceptable.
8. The numerical model for groundwater flow near the RHBFSF and its vicinity should be based on site-specific data, not an assumed groundwater flow pattern.

Questions about groundwater flow direction and rate between the Moanalua and Halawa valleys have remained since 1942 (see Wentworth, 1942; Wentworth, 1951; and Mink, 1980). Despite these questions, the Rotzoll and El-Kadi (2007) groundwater flow model assumed regional groundwater flow was from the northeast to the southwest, and instead of adopting the more defensible approach used in Oki (2005) or addressing this critical data gap, they forced the groundwater model boundary conditions to match this assumption. EPA and DOH should direct the Navy to install and monitor a sufficient number of monitoring wells that will definitively establish area-wide groundwater flow directions. If there is significant uncertainty about the regional groundwater flow direction and rate, then the flow model should be constructed using conservative assumptions about the regional direction. For example, a model that conservatively assumes groundwater flows from the RHBFSF toward Halawa shaft and a flow model that assumes groundwater flows from the RHBFSF toward Moanalua wells. EPA and DOH should make it clear to the Navy and others that any modeling based on unjustified non-conservative assumptions about the regional groundwater flow direction is unacceptable.

9. EPA and DOH should ensure that the groundwater flow model files and draft report will be peer-reviewed by the BWS and an independent third-party expert. The independent third-party expert should be hired by either the EPA or DOH.

The proposed transport modeling will not be defensible unless the following issues are resolved:

1. The regulators should direct the Navy simulate contaminant transport under a number of different source scenarios determined by the characteristics of the a'a and pahoehoe flows in the vadose and saturated zones. The scenarios should represent release and migration of different volumes (e.g., 50,000, 100,000, 1,000,000, 12,000,000 gallons, and larger (e.g., multi-tank releases) through the vadose zone surrounding the tanks. According to the cross-sections from MacDonald (1941), the upper parts of the tanks appear to abut a'a flows and the lower parts appear to abut pahoehoe flows, so the transport modeling must include migration of the released fuel volumes through the preferential pathways common to these types of lava flows.
2. EPA and DOH should direct the Navy to evaluate contaminant transport for scenarios in which the high-permeability and laterally extensive elements of Red Hill a'a flows allow the various volumes of fuel NAPL to migrate several thousands of feet away from the Red Hill tanks before entering the aquifer. Ko'olau Basalt a'a lava flows present beneath the Red Hill area are typically characterized by the presence of a jumble of irregular crustal rubble and fragmental debris ("clinker") which ranges in size from less than 0.1 inch in

diameter to greater than 2 feet in diameter (MacDonald, 1941). In most cases the a'a clinker essentially surrounds the center of the lava flow, with the thickest accumulations typically occurring on top of the flow and along its margins, i.e., levees (Wentworth, 1942; Wentworth and MacDonald, 1953; Peterson and Tilling, 1980; Lipman and Banks, 1987; Kilburn, 2000). Lipman and Banks (1987) have observed that the more typical a'a flow channel morphology can evolve into more complex alternatives. The interior (center) portion of the a'a basalt flow (Figure 3.5a) typically consist of dense, blocky jointed lava (locally called "blue rock"; Wentworth, 1945) which has a vesicularity (relative abundance of vesicles to dense basalt) as great as 50%, but more typically is less than 30% (Wentworth, 1945; Wentworth and MacDonald, 1953). In the Red Hill area, a'a lava flows range from 5 to 60 feet in thickness with the clinker portion of the flow comprising 15% to 45% of the total flow thickness (MacDonald, 1941; Wentworth, 1945; Wentworth and MacDonald, 1953). Open lava tubes are rarely found within a'a lava flows, but do exist (Wentworth and MacDonald, 1953; MacDonald, 1972; Lipman and Banks, 1987; Kilburn, 2000). EPA and DOH should direct the Navy to carry out simulations of contaminant transport from fuel NAPL where the NAPL has migrated laterally away from the tank farm hundreds to several thousands of feet through these high-permeability elements of Red Hill a'a flows.

3. EPA and DOH should direct the Navy to evaluate contaminant transport for scenarios in which the high-permeability and laterally extensive elements of Red Hill pahoehoe flows allow the various volumes of fuel NAPL to migrate several hundreds of feet away from the Red Hill tanks either in the vadose zone or in the aquifer. Ko'olau Basalt pahoehoe lava flows present beneath the Red Hill area are characterized by a relatively smooth to hummocky, glassy upper surface and the general lack of rubble and fragmental debris ("clinker") (MacDonald, 1941). Pahoehoe lava flows typically have similar flow field dimensions to a'a flow fields, but the pahoehoe lava advance rate is typically ten times slower than a'a lava flows (Kilburn, 2000). This reduced pace of lava advance allows for a crust to form across the entire flow to advance via the formation of lobes and tongues that are fed and inflated by lava moving through lava tubes. Historical pahoehoe flows that traveled the greatest distance from their source vent in Hawaii (greater than 20 miles) were emplaced primarily by lava tubes) Sterns and MacDonald, 1946; MacDonald et al., 1983; Greeley, 1987). Open lava tubes are often found in vertical and lateral exposures through pahoehoe lava flows, with small 1 foot- to 3 foot-diameter lava tubes being common while larger 5 foot to greater than 50 foot-diameter tubes being uncommon (Wentworth and MacDonald, 1953; MacDonald, 1972; Greeley, 1987; Cooper and Kauahikaua, 1992; Hon et al., 1994; Peterson et al., 1994; Kauahikaua et al., 1998). EPA and DOH should direct the Navy to carry out simulations of contaminant transport from fuel NAPL

where the NAPL has migrated laterally away from the tank farm hundreds to several thousands of feet through these high-permeability lava tubes Red Hill pahoehoe flows.

4. EPA and DOH should ensure that the groundwater transport model files and draft report will be peer-reviewed by the BWS and an independent third-party expert. The independent third-party expert should be hired by either the EPA or DOH.
5. EPA and DOH should ensure that these release mechanisms are included in the Task 8 Risk Assessment scope of work as they will likely have a significant impact on redistribution of fuel releases into the environment. For example, the risk assessment should include fuel NAPL migrating hundreds to thousands of feet away from the tank farm in the subsurface as well as discharging into the Moanalua and South Halawa streams.

Additional Well Locations

Given the geologic complexity and thickness of Ko'olau a'a and pahoehoe basalt flows that form the vadose zone beneath the Red Hill Facility, it is critical that a very thorough vadose zone investigation be conducted to understand where released fuel (from numerous historic releases and the most recent January 2014 release) has traveled in the subsurface. Also additional characterization of dissolved-phase contamination in the basal aquifer is necessary to assess the geometry of the current plume. Within the boundaries of the Navy property where the RHBFSF is located, a number of additional monitoring well site locations have been identified for both vadose zone monitoring wells and basal aquifer groundwater monitoring wells (see Figure 1). The red colored points represent locations for needed vadose zone monitoring wells and the blue colored points represent good locations for additional basal aquifer groundwater monitoring wells. All these proposed monitoring well locations assume that the Navy will install their proposed monitoring wells RHMW08 through RHMW11 as outlined in the Navy's Monitoring Well Installation Plan (AECOM, 2016).

The purpose of the vadose zone monitoring wells is to characterize the basalt vadose zone complexity and to install vadose zone monitoring wells to collect needed measurements of LNAPL and soil vapor. The purpose of the basal aquifer groundwater monitoring wells is to better characterize the dissolved-phase contaminant plume and to allow LNAPL measurement and groundwater sampling. Both vadose zone and basal aquifer monitoring wells would need to be constructed accordingly for data collection. Several of the proposed monitoring wells coincide with locations where monitoring wells already exist (and are being monitored), but there are issues regarding basal aquifer water level data collected from these existing wells. To address these issues, we have proposed installation of new water table monitoring wells adjacent to OWDFMW01 and the CWRM well HDMW2253-03 because fuel contaminants have been observed in

these wells even though they are open 12 ft. and 50 ft., respectively, below the water table. A new water table monitoring well should be constructed adjacent to monitoring well RHMW07 to confirm its much higher water levels.

Characterization and Design for Remediation Should Begin Immediately

Given that there is currently contamination in the groundwater and until the quantitative risk and vulnerability assessment (QRVA) is completed, the risk of future releases continues. The BWS would like the Navy to proceed with the design, construction, and operation of a groundwater treatment facility at the RHBFSF. There is currently contamination in the groundwater and the risk to our drinking water supply from future releases continues to be significant based on our review of the available evidence. The QRVA may help constrain the risk from fuel contamination to our drinking water and health, but this will strongly depend on the still unfinished work plan and will likely take many months or years to complete. Therefore, the BWS requests that the Navy proceed with the design, construction, and operation of a groundwater treatment facility at the RHBFSF. This will allow the treatment of current contaminants and provide the ability to clean up continuing or future releases.

Because of the time involved to implement all sections of the AOC, the underlying aquifer is currently at risk of additional impact. An active treatment system is the only reasonable action that the Navy could take to help ensure that potential receptors, e.g., public and military water supplies, are not exposed to contaminated groundwater. The design of such a system should include additional Site characterization and pilot study work to ensure that an adequate groundwater treatment facility is constructed. Further, the design and installation of a treatment system is required because of the SSRBL exceedances observed at monitoring well RHMW02 as per the GWPP (TEC, 2008; HDR, 2014).

List of COPCs Analyzed Should Be Expanded

As was clearly outlined in our letter to the regulatory agencies dated 29 March 2016, the BWS strongly disagrees with any reduction in the list of contaminants of potential concern (COPCs) for the RHBFSF. We do not support EPA's and DOH's February 2016 approval of the reduced COPC list. Optimization of a groundwater sampling program is typically completed once a site has fully been characterized and remedial measures have already been put in place to reduce contaminant concentrations (EPA, 2005). The current disposition of the leaked fuel (historic and recent) and the environmental impacts to the vadose zone and underlying sole source aquifer are not yet adequately understood; therefore, all volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), dissolved lead, and biodegradation parameters

should be considered necessary to providing valuable information on contaminant location and migration.

The current reduced COPC list is limited to those analytes associated with fuels currently stored at the RHBFSF that have been detected in monitoring wells currently sampled as part of RHBFSF groundwater monitoring activities at or above their respective Tier 1 environmental action levels (EALs) (NAVFAC, 2016a). The reduced list fails to include fuels stored in the past at the RHBFSF. According to the Navy, if a constituent is detected at a concentration that exceeds the corresponding Tier 1 EAL and is related to fuels stored at RHBFSF, then this constituent should be retained as a COPC (NAVFAC, 2016a).

A more comprehensive COPC list, not a reduced COPC list based on Tier 1 EALs, should be analyzed for the following reasons:

- The disposition of the fuel in the vadose zone and underlying aquifer is not fully understood (the site is not fully characterized).
- Contaminant concentrations indicate that non-aqueous phase fuel has been and continues to be present in or near monitoring well RHMW02 (no remedial measures have been implemented to reduce contaminant concentrations).
- Groundwater monitoring wells are sampled as part of the release detection system for the RHBFSF (NAVFAC, 2016b).

Specifically, the COPC list should include VOCs (EPA Method 8260 full list), SVOCs (EPA Method 8270 full list), dissolved lead, and petroleum hydrocarbon biodegradation parameters (iron, manganese, and sulfate). At a minimum all VOCs and PAHs detected since 2010, as listed in Table 1, should be included on the current COPC list.

EPA and DOH must direct the Navy to add a number of COPCs to the Navy's June 2016 list of additives to be quantified in groundwater. The following chemical additives known to have used in fuels stored over the last several decades should be added to the COPC list: 2-methoxy ethanol (EGME), diethylene glycol monomethyl ether (DiEGME), 2,6-di-tert-butyl-4-methylphenol, 6-tert-butyl-2,4-dimethylphenol, 2,6-di-tert-butylphenol, N,N'-disalicylidene-1,2-propanediamine, tertiary butylated phenol, and phenol. These include all antioxidants, not just phenol, and all fuel system icing inhibitors. Also, the Navy should provide a list of additives used in fuels that were stored at RHBFSF prior to the 1970s.

Ethylene glycol monomethyl ether (EGME or 2-methoxy ethanol, CAS number 109-86-4) was initially used as a fuel system icing inhibitor in JP-5 for many years but was replaced with diethylene glycol monomethyl ether (DiEGME or 2,2-methoxy ethoxy ethanol, CAS number 111-77-3). However, EGME and combinations of EGME and DiEGME were reported to still be in use at military bases by Ritchie et al. (2003). The Navy COPC list did not include EGME and so should be revised to include it. EPA and

DOH should direct the Navy to provide the scientific evidence that DiEGME (and EGME) have "a short half-life", as was stated in their June 2016 list. Our review of the literature available to us revealed two papers about DiEGME degradation, both of which have no applicability to the groundwater environment beneath the RHBFSF. A theoretical model of DiEGME degradation in a five-day biochemical oxygen demand (BOD_5) test suggested that the half-life was 2 to 16 days for these conditions (Mushrush et al., 1997). Meshako et al. (1999) measured the BOD_5 for DiEGME by inoculating with the supernatant from untreated sewage and estimated that the half-life would be roughly double that from Mushrush et al. (1997). However, these studies represent the conditions expected in a sewage treatment plant and do not represent conditions in the CSM subsurface or groundwater. EPA and DOH should direct that the Navy test for these two toxic chemicals throughout the extended monitoring well network, including the oil waste disposal facility well (OWDFMW01), because the Navy has not provided evidence applicable to Red Hill groundwater in support of their statement about that short half-life.

In summary, EPA and DOH should direct the Navy to test for all the additives discussed above: EGME, DiEGME, 2,6-di-tert-butyl-4-methylphenol, 6-tert-butyl-2,4-dimethylphenol, 2,6-di-tert-butylphenol, N,N'-disalicylidene-1,2-propanediamine, tertiary butylated phenol, and phenol. Also, they should direct the Navy to provide a list of additives used in fuels stored at RHBFSF from 1942 through the 1970s and analyze groundwater for any chemicals not already included in this list.

Upper Tank Farm Holds Less Fuel but has Several Times the Number of Monitoring Wells

There are 13 Remedial Action Areas (RAA) located in the Pearl Harbor Naval Complex, Halawa Main Gate Geographical Study Area. These are located near or adjacent to the Upper Tank Farm (UTF) (DON, 2013). The Upper Tank Farm (UTF) is adjacent to the Remedial Action Area (RAA) 2 site (DON, 2012). On April 26, 2007, a diesel fuel release was detected at Tank 48 of the UTF. A 1.5-inch by 3-inch hole was discovered around the tank's sump pit. At that time, it was estimated that approximately 359,000 gallons of DFM/F-76 had leaked into the subsurface caprock formation beneath the tank. It is estimated that approximately 5 million gallons of fuel remained in the subsurface resulting from petroleum product releases from various tanks within UTF between World War II and the 2007 Tank 48 release (DON, 2013).

Our understanding is that at least 74 monitoring wells are associated with the investigation and/or remediation of the release of Tank 48 and other releases associated with RAA-2 (DON, 2012). BWS believes that the methodology for investigation and remediation performed by the Navy at the UTF should be applied to the RHBFSF. Our understanding is that the Navy's UTF stores a far smaller volume of

fuel than the RHBFSF yet the extent of the investigation and amount of monitoring wells at the UTF far exceeds what has taken place at the RHBFSF. The BWS asks that the EPA and DOH require the Navy perform investigative work to these same or stricter standards given the direct risk the RHBFSF poses to the drinking water aquifer located directly below this facility, starting with extensive investigation work by increasing the amount of monitoring wells at the RHBFSF drastically and immediately.

CONTINUING FACILITY CONCERNS

The Navy needs to consider some of the obvious tank upgrade alternatives (TUAs) that have been omitted from the AOC SOW for Section 3.

The TUA section outline does not include or consider tank relocation as an upgrade alternative. Tank relocation should be added as an alternative to be considered as part of the cost-benefit and risk/vulnerability analysis. Closure of the Red Hill Bulk Fuel Storage Facility (RHBFSF) and relocation of the tanks to another location such as Hickman Field should be considered as an option for comparison along with other tank repair and re-design options. This option, although potentially expensive, is one of the best options from the BWS's viewpoint, as it has the greatest ability to reduce the risk of future leaks into the water supply. In addition, by relocating on Oahu, the "hardened target" strategic reasons given by the Navy as to why they cannot relocate the tanks appear (to us) to be addressed. By not considering relocation as a viable option, BWS's preferred option is not even compared and contrasted to the other options. It is important that this alternative be included in this analysis. We understand that this may have already been investigated by the Navy in 2009.

The Navy needs to evaluate the extent to which the RHBFSF tanks and associated piping systems (including the pipe supports) meet current seismic requirements.

The RHBFSF tanks were shown to be vulnerable to seismic loading when they leaked after a moderate earthquake in 1948; ongoing corrosion since then has likely made the tanks, piping, and associated utilities (including connections) even more vulnerable. Seismic design principles, codes, and methodologies have improved tremendously since the design and construction of the RHBFSF, and it is unlikely that the tanks and associated piping systems meet current seismic requirements.

The Navy should immediately perform a risk and vulnerability analysis of the current RHBFSF tank design.

There is no reason to delay a risk and vulnerability analysis of the current RHBFSF tank design. This could be done to a Level 2 evaluation now and updated to a Level 3 and 4 analysis later. This analysis would be more accurate if it was done after performing the

additional tank liner characterization work outlined below. Once this analysis is complete, the various design alternatives can be compared.

The Navy needs to perform additional characterization and non-destructive examination to fully understand the condition of the steel tank liners.

The BWS remains concerned about the lack of information in the AOC SOW documentation regarding the current condition of the steel tank liners. We are aware that the steel liners in the 20 RHBFSF tanks are and have been corroding from both the inside and outside since their construction in the early 1940s (Anonymous, Undated; Weston, 2007a; Weston, 2007b). However, there is no evidence to indicate that the non-destructive testing (NDT) methods (ultrasonic, dye penetration, etc.) have been appropriately evaluated to determine the reliability of detection of flaws of a certain size. Tanks that are currently out of service can be used to determine the minimum detection limits of each technique on the actual tank liners. Many different sections of the tank liners can be examined with the various NDT methods (looking for both corrosion-induced wall loss, weld defects (cracks), and other defects). After NDT has been completed, defect-containing and defect-free areas can be cut from the tanks and examined destructively using standard metallurgical techniques to assess the validity of the NDT techniques. In addition, destructive metallurgical analysis should provide a better picture of the nature of the steel used, the size distributions of weld defects, and the distributions of inner diameter and outer diameter corrosion feature depths. Current weld patching procedures can also be performed on these tanks to determine the propensity of porosity and cracking when welding new steel to old steel. This will help the Navy understand the potential for weld defects forming in newly-patched areas.

The Navy needs to provide third-party subject matter experts access to release detection and inventory records so that the reported leak detection sensitivities can be validated.

The Navy should provide all release detection records that are available as well as any monthly visual inspections of the underground storage tank systems. The Navy has been using the Mass Technology release detection system since 2009, and a review of the records would be useful. Any additional inventory records that are available would also be helpful, regardless of the age of the records. We know that internal systems on large underground storage tanks are only effective at finding large volume releases; they are not reliable or effective for small volume releases, as pointed out in the 2010 audit by the Naval Audit Service. As such, the Navy needs to immediately validate the sensitivity of their existing leak detection technologies and explore more accurate methods of low leak rate detection and inventory control.

If you have any questions, please feel free to contact me at 808-748-5061.

Very truly yours,

ERNEST Y. W. LAU, P.E.
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Enclosures: Figure 1
Table 1

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