Craig D. Jensen
Marnie E. Riddle
Jonathan C. McKay
Dave Fitzpatrick 6803
DEPARTMENT OF THE NAVY
OFFICE OF GENERAL COUNSEL
850 Ticonderoga Street, Suite 110
JBPHH, HI 96860
Telephone: (703) 727-6194

DEPARTMENT OF HEALTH

STATE OF HAWAII

ENVIRONMENTAL HEALTH DIVISION, DEPARTMENT OF HEALTH, STATE OF HAWAII, Complainant, v. UNITED STATES DEPARTMENT OF THE NAVY, Respondent.	Case No. 21-UST-EA-02 **DECLARATION OF MARNIE E. RIDDLE (EXHIBIT N-5)**

DECLARATION OF MARNIE E. RIDDLE

I, Marnie E. Riddle, declare as follows:

1. I am a Senior Trial Attorney at the Naval Litigation Office representing the United States Department of the Navy (Navy) in the above-captioned case. I am an attorney licensed to practice before all State and Federal Courts in the State of California and have been admitted *pro hac vice* in the following proceeding before the Hawaii Department of Health: In the Matter of Contested Case Hearing re Red Hill Permit Application, Docket No. 19-UST-EA-01.

2. I make this declaration in support of the Navy's contestation of the Emergency Order issued by the Hawaii Department of Health ("DOH") on December 6, 2021.

3. Attached to this declaration as Exhibit N-5A is a true and correct copy of the Administrative Order on Consent ("AOC") In the Matter of Red Hill Bulk Fuel Storage Facility, EPA Docket No. RCRA 7003-R9-2015-01, DOH Docket No. 15-UST-EA-01, dated September 29, 2015, available at https://health.hawaii.gov/shwb/files/2015/09/Red-Hill-AOC_Final_29SEP151.pdf.

4. Exhibit N-5A contains the following text:

"This AOC is a joint administrative action taken by the DOH and EPA concurrently and pursuant to their respective state and federal authorities to regulate underground storage tanks ("USTs") and waste and to protect drinking water, natural resources, human health, and the environment." ¶1(a).

"The Parties acknowledge that this AOC has been negotiated in good faith and that this AOC is fair, reasonable, protective of human health and the environment, and is in the public interest." ¶1(d).

"The actions Navy and DLA have agreed to perform in accordance with this AOC are necessary to address potential impacts to human health, safety and the environment, as envisioned by HRS §§ 340E-4, 342D-9, 342D-10, 342D-11, 342L-8, 342L-9 and 342L-52, due to historical, recent and potential future releases at the Facility." ¶5(a)(x).

"Additional Work. The Regulatory Agencies may determine, or Navy and DLA may propose, that certain tasks or activities are necessary in addition to or in lieu of the Work when such additional performance is necessary for protection of human health and the environment. The Regulatory Agencies may determine that Navy and DLA shall perform additional work and the Regulatory Agencies will specify, in writing, the basis for the determination that additional work is necessary. Within thirty (30) days after the receipt of such determination, Navy and DLA

shall have the opportunity to meet or confer with the Regulatory Agencies to discuss any additional work. Upon meeting or conferring, the Parties shall agree on a schedule for submitting a work plan for additional work; Navy and DLA shall either invoke dispute resolution or submit the schedule for approval within thirty (30) days from Navy and DLA's meeting or conferring on the additional work, unless otherwise agreed to by the Parties. Upon approval of a work plan, Navy and DLA shall implement the work plan in accordance with the schedule and provisions contained therein. The work plan shall be incorporated by reference into and made a part of this AOC and be enforceable as such." ¶8(c).

"The process for dispute resolution set forth in this Section shall be the exclusive remedy through which the Parties resolve any and all disputes arising from this AOC and the implementation and execution of the Work." ¶14(a).

"Within thirty (30) days after any action which leads to or generates a dispute, the disputing Party shall submit to the [dispute resolution committee] a written statement of dispute setting forth the nature of the dispute, the disputing Party's position with respect to the dispute and the technical, legal and factual information the disputing Party is relying upon to support its position." ¶14(b)(i).

"The Parties agree to exhaust their rights under Section 14 (Dispute Resolution), prior to DOH exercising any rights to pursue a civil action and seek judicial review that it may have." ¶16(a).

"Notwithstanding any other provisions of this AOC, the Regulatory Agencies retain their authority to take, direct, or order any and all actions necessary to protect public health, any source of drinking water or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid

waste or constituents of such wastes, on, at, or from the Facility, including but not limited to the right to bring enforcement actions under RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), the Clean Water Act ("CWA"), the Safe Drinking Water Act ("SDWA"); HRS chapters 340E, 342D and 342L; and any other applicable statutes or regulations. However, unless required on an emergency basis, no such action shall be taken in relation to any activity within the scope of this AOC unless a Party has first made good faith efforts to address the issue through a modification to this AOC and, if necessary, through the Dispute Resolution process set forth in Section 14." ¶18(a).

5. Attached to this declaration as Exhibit N-5B is a true and correct copy of the AOC Statement of Work, Attachment A to the Administrative Order on Consent In the Matter of Red Hill Bulk Fuel Storage Facility dated September 29, 2015, available at https://health.hawaii.gov/shwb/files/2015/09/Red-Hill-SOW__11SEP15.pdf.

6. Exhibit N-5B contains the following text:

"Navy and DLA will develop a risk/vulnerability assessment, subject to approval by the Regulatory Agencies, in an effort to further understand the potential for … fuel releases from the Facility …" (p. 2)

7. Attached to this declaration as Exhibit N-5C is a true and correct copy of the document titled Section 8.2: Risk/Vulnerability Assessment Scope of Work, dated April 13, 2017, prepared for the Administrative Order on Consent In the Matter of Red Hill Bulk Fuel Storage Facility, available at https://www.epa.gov/sites/production/files/2017-04/documents/red_hill_risk_assessment_scope_of_work.pdf.

8. Exhibit N-5C contains the following text:

"**Vulnerability**: Weakness in the design or operation of a system, component, or structure that could increase the probability of disabling its function and, thus, contribute, in a potentially significant way, to overall facility risk." (p. 8)

"In the vulnerability assessment, the consolidated baseline risk is decomposed into elements contributing to risk in a number of ways to help facilitate prudent decision-making concerning potential risk reduction alternatives for the facility." (p. 24)

9. Attached to this declaration as Exhibit N-5D is a letter from DOH and U.S. EPA re: Section 8 of the Red Hill Administrative Order on Consent ("AOC") Statement of Work ("SOW") Approval of Section 8.3 and Requirement to Complete Additional Work, dated September 23, 2019, available at https://www.epa.gov/sites/production/files/2019-10/documents/red-hill-risk_assessment_approval_and_additional_work_requirement_2019-10-28.pdf.

10. Exhibit N-5D contains the following text:

"The U.S. Environmental Protection Agency ("EPA") and Hawaii Department of Health ("DOH"), collectively the "Regulatory Agencies", have received the U.S. Department of Navy's ("Navy's") letter dated May 29, 2019 ("Transmittal Letter"), the Quantitative Risk and Vulnerability Assessment Phase 1 (Internal Events without Fire and Flooding/ ("Risk Assessment"), and the Red Hill Alternative Location Study. As required by Section 8 of the Red Hill AOC SOW, the Risk Assessment has provided information to the Regulatory Agencies, Navy and Defense Logistics Agency ("DLA") that will assist in subsequent decisions related to Section 3 of Red Hill AOC SOW and evaluate the level of risk the Red Hill Bulk Fuel Storage Facility ("Facility") may pose to groundwater and drinking water aquifers. Therefore, the

Regulatory Agencies are approving the Risk Assessment as satisfying, in part, the requirement under Section 8.3-Risk/Vulnerability Assessment Report."

11. Attached to this declaration as Exhibit N-5E is a true and correct copy of 33 CFR § 154.105, Definitions, available at https://www.govinfo.gov/content/pkg/CFR-2011-title33-vol2/pdf/CFR-2011-title33-vol2-sec154-105.pdf. 33 CFR § 154.105 is contained within Title 33 - Navigation and Navigable Waters, Chapter I - COAST GUARD, DEPARTMENT OF HOMELAND SECURITY (CONTINUED), Subchapter O – POLLUTION, Part 154 - FACILITIES TRANSFERRING OIL OR HAZARDOUS MATERIAL IN BULK.

12. Exhibit N-5E, 33 CFR § 154.105, contains the following text: "*Marine transfer area* means that part of a waterfront facility handling oil or hazardous materials in bulk between the vessel, or where the vessel moors, and the first manifold or shutoff valve on the pipeline encountered after the pipeline enters the secondary containment required under 40 CFR 112.7 or 49 CFR 195.264 inland of the terminal manifold or loading arm, or, in the absence of secondary containment, to the valve or manifold adjacent to the bulk storage tank, including the entire pier or wharf to which a vessel transferring oil or hazardous materials is moored."

13. Attached to this declaration as Exhibit N-5F is an excerpt consisting of true and correct copies of the front matter and pages 1-1, 1-9, 1-10, 6-3 and 6-4 of the document titled Coast Guard Regulated Facility Compliance Program, COMDTINST M16600.10, dated March 2020, available in full at https://media.defense.gov/2020/Mar/09/2002261356/-1/-1/0/CIM_16600_10.PDF.

14. Exhibit N-5F contains the following text:

"For facilities regulated under 33 CFR Part 127 and 33 CFR Part 154, portions of the facility that fall within the definition of the Marine Transfer Area (MTA) for the specific facility are regulated by the Coast Guard for safety purposes." (p. 1-1)

"33 CFR Parts 154. These regulations apply to all onshore and offshore facilities capable of transferring oil or liquid hazardous material, in bulk, to or from any vessel with a capacity of 250 barrels or more on the navigable waters or contiguous zone of the United States." (p. 1-9)

"Jurisdiction on facilities regulated under this Part are generally limited by regulation to the MTA. The MTA extends from the part of a waterfront facility handling oil or hazardous materials in bulk between the vessel, or where the vessel moors, and the first manifold or shutoff valve on the pipeline encountered after the pipeline enters the secondary containment required under 40 CFR § 112.7 or 49 CFR § 195.264 inland of the terminal manifold or loading arm, or, in the absence of secondary containment, to the valve or manifold adjacent to the bulk storage tank, including the entire pier or wharf to which a vessel transferring oil or hazardous materials is moored." (p. 1-10)

"Federal facilities, regardless of the type of the vessels they service, come under the purview of 33 CFR Parts 154 and 156 (this includes DoD and Coast Guard facilities)." (p. 1-10)

"MTA – the MTA is the Coast Guard regulated portion of a facility regulated under 33 CFR Part 154. The MTA extends from the vessel or where the vessel moors to the first valve inside secondary containment required by the EPA or PHMSA, which is sometimes miles from the vessel or where the vessel moors. Jurisdictional concerns should be discussed directly with EPA and/or PHMSA to determine the jurisdictional boundary, noting the facility may have secondary containment along the transfer pipeline not required by EPA or PHMSA." (p. 6-4)

15. Attached to this declaration as Exhibit N-5G is a true and correct copy of a Memorandum from the Office of Pipeline Safety, U.S. Department of Transportation, and the Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, dated February 4, 2000, re: Jurisdiction Over Breakout Tanks/Bulk Oil Storage Tanks (Containers) at Transportation-Related and Non-Transportation-Related Facilities, available at https://www.phmsa.dot.gov/sites/phmsa.dot.gov/files/docs/2000_DOT_EPA.pdf.

16. Exhibit N-5G contains the following text: "Attachments 1-10 provide practical examples of complex facilities showing jurisdictional delineation to minimize potential confusion over regulatory responsibility" (p. 2) and a diagram (Attachment 10), illustrating "EPA, OPS, AND COAST GUARD JURISDICTIONAT A COMPLEX FACILITY." The diagram indicates that Coast Guard jurisdiction extends from the part of the diagram marked "MARINE LOADING DOCK" to the valve adjacent to the part of the diagram marked "Product Tank (Storage) & (Breakout)."

17. Exhibit N-5H is a true and correct, redacted copy of the Final 2016 Regulation Applicability Study of 22 Fueling Systems, Joint Base Pearl Harbor-Hickam, prepared for Defense Logistics Agency Energy, Fort Belvoir, Virginia, dated 13 March 2018.

18. Exhibit N-5H contains the following text: "The Department of Transportation (DOT) and United States Coast Guard (USCG) jurisdictional valves are located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valves is included in this calculation." (pp. 3, 10)

19. Exhibit N-5I is a true and correct, redacted copy of an email exchange between John Floyd, Deputy Director, Fuel and Facilities Management, NAVSUP Fleet Logistics Center Pearl

Harbor, and Hugh Myers, Red Hill Project Engineer, State of Hawaii, Solid Hazardous Waste Branch (Department of Health), that occurred between February 23, 2021 and March 15, 2021.

20. Exhibit N-5I contains the following text in an email from Hugh Myers: "The normal routing of the [] de-fuel line when it is used goes from Hotel pier, to VS-3, to VS-1 then to Tank [] which is an above ground storage tank. My understanding is Jan/Feb 2021 line test is the first pressure testing for the [] defuel line, the line does not routinely contain fuel, and that this line was not part of your permit application."

21. Attached hereto as Exhibit N-5J is a true and correct copy of the December 2021 Drinking Water Distribution System Recovery Plan signed by representatives of the Navy, U.S. Army, U.S. EPA, and Hawaii DOH.

22. Attached hereto as Exhibit N-5K is a true and correct copy of excerpted pages from Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater, Volume 1: User's Guide, prepared by Hawaii DOH Environmental Management Division, dated Fall 2017. The document is available in its entirety at https://health.hawaii.gov/heer/files/2019/11/Volume-1-HDOH-2017.pdf."

I declare under penalty of perjury that the foregoing facts are true and correct to the best of my knowledge and belief.

Dated: December 18, 2021. /S/ Marnie E. Riddle
Marnie E. Riddle

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9

THE DEPARTMENT OF HEALTH
STATE OF HAWAII

IN THE MATTER OF:

THE UNITED STATES DEPARTMENT OF THE NAVY	)	EPA DKT NO. RCRA 7003-R9-2015-01
AND	)	DOH DKT NO. 15-UST-EA-01
DEFENSE LOGISTICS AGENCY	)	
RESPONDENTS	)	
RED HILL BULK FUEL STORAGE FACILITY, OAHU, HAWAII	)	

ADMINISTRATIVE ORDER ON CONSENT

1. INTRODUCTION

(a) This administrative order on consent ("AOC") is entered into voluntarily by the DEPARTMENT OF HEALTH, STATE OF HAWAII ("DOH"); the UNITED STATES ENVIRONMENTAL PROTECTION AGENCY ("EPA") Region 9; the UNITED STATES DEPARTMENT OF THE NAVY ("Navy"), acting by and through the COMMANDER, NAVY REGION HAWAII ("CNRH"); and DEFENSE LOGISTICS AGENCY ("DLA"). DOH, EPA, Navy, and DLA are collectively referred to as the "Parties." DOH and EPA are collectively referred to as the "Regulatory Agencies." This AOC is a joint administrative action taken by the DOH and EPA concurrently and pursuant to their respective state and federal authorities to regulate underground storage tanks ("USTs") and waste and to protect drinking water, natural resources, human health, and the environment.

(b) This AOC provides for the performance by Navy and DLA of a release assessment, response(s) to release(s), and actions to minimize the threat of future releases in

connection with the field-constructed bulk fuel USTs, surge tanks, pumps, and associated piping at the Red Hill Bulk Fuel Storage Facility ("Facility"), located near Pearl Harbor, on the island of Oahu in the State of Hawaii, and on any property that may be affected now or in the future by petroleum or other substances released from the Facility, as specified in Attachment A ("Statement of Work" or "SOW"). The term "Site" as used in this AOC includes the Facility and any area where petroleum or other substances released from the Facility come to be located. The primary objectives of this AOC are to take steps to ensure that the groundwater resource in the vicinity of the Facility is protected and to ensure that the Facility is operated and maintained in an environmentally protective manner.

(c) Navy and DLA's participation in this AOC shall not constitute or be construed as an admission of liability. Navy and DLA neither admit nor deny the factual allegations and legal conclusions set forth in this AOC (Sections 4 and 5, Findings of Fact and Conclusions of Law).

(d) The Parties acknowledge that this AOC has been negotiated in good faith and that this AOC is fair, reasonable, protective of human health and the environment, and is in the public interest.

2. JURISDICTION

(a) The State of Hawaii obtained EPA state program approval, effective on September 30, 2002, for Hawaii's UST program to operate in lieu of EPA's UST program under Subtitle I of the Resource Conservation and Recovery Act of 1976 ("RCRA"), as amended, 42 United States Code ("U.S.C.") § 6901 *et seq*. DOH enters into this AOC in accordance with its authority, vested in the Director of Health, to regulate USTs in conformance with EPA state program approval and the provisions of chapters 340E, 342D and 342L of the Hawaii Revised Statutes ("HRS") and the rules promulgated pursuant thereto.

(b) EPA Region 9 enters into this AOC pursuant to the authority vested in the Administrator of EPA by Section 7003 of RCRA, 42 U.S.C. § 6973, which authority has been delegated to the Regional Administrators of EPA by Delegations 8-22-A and 8-22-C (April 20, 1994), and redelegated to, among others, the Director of the Land Division of EPA Region 9 by Delegations R9-8-22-A (October 10, 2014) and R9-8-22-C (October y 10, 2014).

(c) Navy and DLA agree to undertake and complete all actions required by the terms and conditions of this AOC.

3. PARTIES BOUND

(a) This AOC shall apply to and be binding upon the Parties and their successors and assigns. Navy and DLA are jointly and severally liable under this AOC.

(b) Navy and DLA shall notify the Regulatory Agencies in writing as soon as the decision to transfer or sell any property covered by this AOC is known by Navy or DLA but no later than prior to the sale or transfer. In addition, Navy and DLA shall provide a copy of this AOC to any successor to the Site prior to the effective date of such change. No change in ownership or operation of any property covered by this AOC or in the status of Navy and DLA shall in any way alter, diminish, or otherwise affect Navy and DLA's obligations and responsibilities under this AOC, except by agreement of the Parties in accordance with Section 8 or as required by subsequently enacted legislation pertaining to transfer of the Facility.

(c) Navy and DLA shall provide a copy of the AOC, or a website address for accessing this AOC, to all of its supervisory personnel who work on actions related to this AOC and prime contractors or prime consultants retained to conduct or monitor any portion of work performed pursuant to this AOC within seven (7) days of the date that the last Party signs the AOC as described in Section 25 ("Effective Date") or date of such retention, whichever is later. Navy and DLA shall condition all contracts with the aforementioned on compliance with the terms and conditions of this AOC. Navy and DLA shall instruct all supervisory personnel who work on actions related to this AOC and prime contractors or prime consultants retained to conduct or monitor any portion of work to perform such work in accordance with the requirements of this AOC.

4. FINDINGS OF FACT

(a) CNRH is a division of Navy. CNRH is the command responsible for providing, maintaining, and improving shore infrastructure, service, support, and training to enable fleet operations; CNRH oversees all Navy supporting commands involved in the operation or maintenance of the Facility.

(b) DLA is a combat logistics support agency of the United States Department of Defense ("DoD") providing the military services with the full spectrum of logistics, acquisition, and technical services. As the DoD executive agent for bulk petroleum, DLA executes the integrated materiel management responsibility for bulk petroleum owned by the DoD and is

responsible for bulk petroleum supply management from source of supply to the point of customer acceptance, with emphasis on improving efficiency. In accordance with DoD policy, DLA plans, programs, budgets, and provides funding for the operation, maintenance and repair of the Facility.

(c) Navy and DLA are the operators of the Facility.

(d) The Facility is located near Pearl Harbor on the island of Oahu, State of Hawaii.

(e) The Facility includes twenty (20) field-constructed steel USTs ("Tanks"). The Tanks are constructed of steel, encased by an estimated minimum of 2.5 to 4 feet of concrete surrounded and supported by basalt bedrock.

(f) Each tank has a fuel storage capacity ranging from approximately 12.5 to 12.7 million gallons for a total of approximately 250 million gallons of fuel. However, as of the Effective Date of this AOC, two (2) of the twenty (20) Tanks are not currently in operation.

(g) The Facility was constructed and became operational in the 1940s. The Tanks and related components at the Facility are unique.

(h) Federal and State programs for the management of USTs were first published in the 1980s. In January 2000, the State of Hawaii promulgated rules requiring owners and operators of such facilities to report suspected or confirmed releases from USTs. EPA granted final approval for the State of Hawaii's UST program on September 30, 2002, in lieu of Federal rules regarding USTs. On November 18, 2011, EPA proposed revisions to strengthen the 1988 Federal UST regulations including requirements for field-constructed USTs and new requirements for secondary containment and operator training. On April 16, 2012, the public comment period for the proposed regulations closed. Under the proposed rules, most provisions of the proposed regulations would become effective three years after the final rule is issued.

(i) The Tanks at the Facility have been used at various times to store the following fuels: diesel marine fuel, diesel oil, Navy Special Fuel Oil ("NSFO"), Navy distillate ("ND"), aviation gasoline ("AVGAS"), motor gas ("MOGAS"), Jet Propulsion Fuel No. 5 ("JP-5") and Jet Propulsion Fuel No. 8 ("JP-8").

(j) As of the Effective Date of this AOC, Navy stores three types of fuels at the Facility: JP-5, JP-8, and diesel marine fuel.

(k) The Waimalu and Moanalua Aquifers ("Aquifer identification and classification for Oahu: Groundwater protection strategy for Hawaii," February 1990), which are underground sources of drinking water, are located near the Facility. The Waimalu Aquifer covers an area of 15,193 acres and the Moanalua Aquifer covers an area of 4,442 acres.

(l) Navy Well 2254-01 is located west and hydraulically downgradient from the Facility. This well feeds into the Joint Base Pearl Harbor-Hickam Water System.

(m) The Honolulu Board of Water Supply's ("BWS") Halawa Shaft, which is part of a public water system, is near the Facility.

(n) The BWS's Moanalua Well, which is part of a public water system, is near the Facility.

(o) The first report by Navy to DOH of a release from the Facility occurred on November 10, 1998, when petroleum-stained basalt cores were discovered beneath the Tanks.

(p) In the early 2000s, Navy performed transverse cores beneath each tank and discovered evidence of staining beneath nineteen (19) of twenty (20) Tanks.

(q) On December 9, 2013, Navy placed one of the Tanks (Tank #5) at the Facility back into service after it had undergone routine scheduled maintenance. The maintenance work consisted of cleaning, inspecting, and repairing multiple sites within the tank. Upon placing Tank #5 back into service, Navy commenced filling the tank with petroleum.

(r) On January 13, 2014, Navy discovered a loss of fuel from Tank #5 and immediately notified DOH and EPA. On January 13, 2014, Navy began transferring fuel from Tank #5 to other Tanks at the Facility. The transfer of all fuel from Tank #5 was completed on January 18, 2014. On January 16, 2014, Navy verbally notified DOH and EPA of a confirmed release from Tank #5. On January 23, 2014, Navy provided written notification to DOH. Navy estimates the fuel loss at approximately 27,000 gallons.

(s) The total amount released to the environment, both attributable to the January 2014 event and historical releases, is unknown.

(t) Following the January 2014 release, Navy increased the frequency of monitoring and performed additional monitoring of Navy Well 2254-01 and shall continue to monitor Navy Well 2254-01 in accordance with the Groundwater Protection Plan approved by DOH and that will be updated in accordance with the SOW. Current drinking water monitoring results

confirmed compliance with federal and state Maximum Contaminant Levels for drinking water both before and after the January 2014 release.

(u) Marine diesel and jet fuels in general, and Jet Propulsion Fuels 5 and 8 (JP-5 and JP-8) in particular, are composed of a broad, dynamic and heterogeneous mixture of chemical constituents. Chronic exposure to these constituents can be harmful to human health. The rates at which these constituents naturally degrade in the environment are highly variable.

5. CONCLUSIONS OF LAW AND DETERMINATIONS

(a) Hawaii Conclusions of Law and Determinations:

(i) Navy and DLA are "persons" as defined in HRS §342L-1 [40 C.F.R. § 280.12].

(ii) Navy is the "owner" of the Facility as defined in HRS §342L-1 [40 C.F.R. § 280.12].

(iii) Navy and DLA are the "operators" of the Facility as defined in HRS §342L-1 [40 C.F.R. § 280.12].

(iv) The Waimalu and Moanalua Aquifers are "underground sources of drinking water" as that term is used in HRS chapter 340E and are "State Waters" as defined in HRS §342D-1.

(v) BWS's Halawa Shaft and Moanalua Well are parts of a "public water system" as defined in HRS §340E-1 and are "State Waters" as defined in HRS §342D-1.

(vi) There have been "releases" of "regulated substances" into the environment from Tanks at the Facility, as those terms are defined by HRS §342L-1 [40 C.F.R. § 280.12].

(vii) There have been releases of "contaminants" into the environment from Tanks at the Facility, as that term is defined in HRS §340E-1.

(viii) There have been discharges of "wastes" and "water pollutants" as those terms are defined in HRS §342D-1.

(ix) Navy and DLA, as the owner and/or operator of the Facility are subject to requirements regarding response and remediation in HRS chapter 342L and Hawaii Administrative Rules ("HAR") chapter 11-281 [40 C.F.R. § 280 Subpart E] and are subject to orders which may be necessary to protect the health of persons who are or may be users of a public water system as provided in HRS chapter 340E and the rules promulgated pursuant

thereto including, but not limited to, HAR §11-19 and 11-20, and are subject to administrative orders and civil actions which are necessary to address discharges to state waters as provided for in HRS chapter 342D. Additionally, the Facility, which is federally owned and operated, is subject to "all administrative orders and all civil and administrative penalties or fines, regardless of whether such penalties or fines are punitive or coercive in nature or are imposed for isolated, intermittent, or continuing violations in the same manner and to the same extent as any person is subject to such requirements," as codified in 42 U.S.C. § 6991f.

(x) The actions Navy and DLA have agreed to perform in accordance with this AOC are necessary to address potential impacts to human health, safety and the environment, as envisioned by HRS §§ 340E-4, 342D-9, 342D-10, 342D-11, 342L-8, 342L-9 and 342L-52, due to historical, recent and potential future releases at the Facility.

(b) EPA Conclusions of Law and Determinations:

(i) Navy and DLA are "persons" as defined in Section 1004(15) of RCRA, 42 U.S.C. § 6903(15).

(ii) EPA has determined that any fuel released from the Facility would be a "solid waste" within the meaning of Section 1004(27) of RCRA, 42 U.S.C. § 6903(27).

(iii) EPA has determined that Navy and DLA have contributed to or are contributing to the handling, storage, treatment, transportation or disposal of solid waste at the Facility.

(iv) EPA has determined that Navy and DLA's handling, storage, treatment, transportation, or disposal of solid waste may present an imminent and substantial endangerment to health or the environment.

(v) The actions required by this AOC may be necessary to protect health and the environment.

(vi) Navy and DLA are departments, agencies or instrumentalities of the Executive Branch of the federal government, and as such, are persons subject to the requirements of Sections 6001 and 9007 of RCRA, 42 U.S.C. §§ 6961, 6991f.

6. WORK TO BE PERFORMED

(a) Based upon the administrative record for the Site and the Findings of Fact (Section 4) and Conclusions of Law and Determinations (Section 5) set forth above, and in

consideration of the promises set forth herein, it is hereby agreed to and ordered that Navy and DLA comply with all provisions of this AOC, including, the SOW, Attachment A, which is incorporated into and made an enforceable part of this AOC. The term "Work" shall mean all the activities and requirements, including but not limited to all deliverables, specified in the AOC and SOW. A deliverable is any report or other document listed under Section 9 of the SOW or otherwise expressly required to be submitted under this AOC.

(b) The Work undertaken pursuant to this AOC shall be conducted in accordance with all applicable EPA and DOH guidance, policies and procedures, and this AOC, and is subject to approval by the Regulatory Agencies.

(c) Navy and DLA shall undertake and complete all of the Work to the satisfaction of the Regulatory Agencies.

(d) Navy and DLA shall commence performing their obligations under this AOC upon its Effective Date.

(e) The DOH Project Coordinator shall be DOH's designated representative for the Site. As of the Effective Date of this AOC, the DOH Projector Coordinator shall be:

Steven Y.K. Chang, P.E., Chief
Solid and Hazardous Waste Branch
Department of Health
919 Ala Moana Blvd., Room 212
Honolulu, Hawaii 96814
(808) 586-4226
Steven.Chang@doh.hawaii.gov

The EPA Project Coordinator shall be EPA's designated representative for the Site. As of the Effective Date of this AOC, the EPA Project Coordinator shall be:

Bob Pallarino
U.S. EPA Region 9
Underground Storage Tank Program Office
75 Hawthorne Street (LND-4-3)
San Francisco, California 94105
(415) 947-4128
Pallarino.Bob@epa.gov

The Navy and DLA Project Coordinator shall be Navy and DLA's

representative for the Site. As of the Effective Date of this AOC, the Navy and DLA Project Coordinator shall be:

Jimmy Miyamoto
Deputy Operations Officer
NAVFAC Hawaii
400 Marshall Road
JBPHH, HI 96860-3139
(808) 471-0196
james.miyamoto@navy.mil

Any of the Parties may change their Project Coordinators at any time. Any of the Parties making such change will provide the other Parties with written notice within fourteen (14) days of such a change.

(f) Unless otherwise provided in this AOC, all reports, correspondence, notices, or other submittals relating to or required under this AOC shall be in writing and shall be sent to the "Project Coordinators" at the addresses specified above. Unless otherwise specified in the SOW, all reports, correspondence, notices or other submittals related to or required under this AOC may be delivered via email to the addresses above, or if otherwise agreed to by the Parties, by U.S. Postal Service or private courier service to the address above. The Regulatory Agencies may require Navy and DLA to submit a follow-on paper copy of any submission. All correspondence shall include a reference to the "Red Hill Administrative Order on Consent."

7. REGULATORY AGENCIES' APPROVAL OF DELIVERABLES

(a) Deliverables required by this AOC shall be submitted to the Regulatory Agencies for approval or modification pursuant to Subparagraph (b). The Regulatory Agencies must receive all deliverables by the due date specified in this AOC or by schedules developed pursuant to this AOC.

(b) After review of any deliverable that is required pursuant to this AOC, the Regulatory Agencies will: (a) approve, in whole or in part, the submission; (b) approve the submission upon specified conditions; (c) modify the submission to cure the deficiencies; (d) disapprove, in whole or in part, the submission, directing that Navy and DLA modify the submission; or (e) any combination of the above. However, the Regulatory Agencies will not modify a submission without first providing Navy and DLA at least one notice of deficiency and an opportunity to cure within thirty (30) days, except where the Regulatory Agencies determine

that to do so would cause serious disruption to the Work or where the Regulatory Agencies have disapproved previous submission(s) due to material defects and the Regulatory Agencies determine that the deficiencies in the submission under consideration indicate a bad faith lack of effort to submit an acceptable deliverable.

(c) In the event of approval, approval upon conditions, or modification by the Regulatory Agencies, pursuant to Subparagraph (b), Navy and DLA shall proceed to take any action required by the deliverable, as approved or modified by the Regulatory Agencies subject only to Navy and DLA's right to invoke the Dispute Resolution procedures set forth in Section 14 (Dispute Resolution) with respect to the modifications or conditions made by the Regulatory Agencies. In the event that the Regulatory Agencies modify the submission to cure the deficiencies pursuant to Subparagraph (b) and the Regulatory Agencies determine the submission has a material defect, the Regulatory Agencies retain their right to seek stipulated penalties, as provided in Section 15 (Penalties).

(d) Upon receipt of a notice of disapproval, in whole or in part, Navy and DLA shall, within thirty (30) days or such longer time as specified by the Regulatory Agencies in such notice, correct the deficiencies with respect to any disapproved part and resubmit the deliverable for approval. Any stipulated penalties applicable to the submission, as provided in the stipulated penalty provisions of Section 15 (Penalties), shall be stayed during the thirty (30) day opportunity to cure period or other specified period. A written explanation will accompany any disapproval, in whole or in part, by the Regulatory Agencies, including the identification of a material defect.

(e) Notwithstanding the receipt of a notice of disapproval, Navy and DLA shall proceed, at the direction of the Regulatory Agencies, to take any action required by any unrelated non-deficient portion of the submission. Implementation of any unrelated non-deficient portion of a submission shall not relieve Navy and DLA of liability for stipulated penalties for the disapproved portion under Section 15 (Penalties).

(f) In the event that a resubmitted deliverable, or portion thereof, is disapproved by the Regulatory Agencies, the Regulatory Agencies may again require Navy and DLA to correct the deficiencies, in accordance with the preceding Paragraphs. The Regulatory Agencies also retain the right to modify or develop the plan, report or other item, consistent with Subparagraph

(b). Navy and DLA shall implement any action as required in a deliverable which has been modified or developed by the Regulatory Agencies, subject only to Navy and DLA's right to invoke the procedures set forth in Section 14 (Dispute Resolution).

(g) If upon resubmission, a deliverable is disapproved or modified by the Regulatory Agencies due to a material defect previously identified by the Regulatory Agencies in accordance with Subsection 7(d), Navy and DLA shall be deemed to have failed to submit such deliverable timely and adequately unless Navy and DLA invoke the dispute resolution procedures set forth in Section 14 (Dispute Resolution) and the Regulatory Agencies' action to disapprove or modify a deliverable is overturned pursuant to that Section. The provisions of Section 14 (Dispute Resolution) and Section 15 (Penalties) shall govern the implementation of the Work and accrual and payment of any stipulated penalties during Dispute Resolution. If the Regulatory Agencies' disapproval or modification is upheld, stipulated penalties shall accrue for such violation from the date on which the initial submission was originally required, as provided in Section 15 (Penalties).

(h) All deliverables required to be submitted to the Regulatory Agencies under this AOC, shall, upon approval or modification by the Regulatory Agencies, be incorporated into and made enforceable under this AOC. In the event the Regulatory Agencies approve or modify a portion of a deliverable required to be submitted to the Regulatory Agencies under this AOC, the approved or modified portions shall be enforceable under this AOC. Navy and DLA shall implement all deliverables in accordance with the schedule and provisions approved by the Regulatory Agencies.

8. MODIFICATION OF THE SOW AND THIS AOC AND ADDITIONAL WORK

(a) Modification of the Work in the SOW

(i) If at any time during the implementation of the SOW, Navy and DLA identify a need for a compliance date modification or modification of the Work in the SOW, Navy and DLA shall submit a memorandum documenting the need for the modification to the Project Coordinators of the Regulatory Agencies. The Project Coordinators of the Regulatory Agencies will determine if the modification is warranted and will provide written approval or disapproval. If disapproved, the Regulatory Agencies will provide a written explanation of the reason for the disapproval. Any approved, written modification of a compliance date or

modification of Work required by this AOC shall be incorporated by reference into this AOC.

(ii) In the event that during the performance of this AOC, Navy and/or DLA encounters any condition or situation that constitutes an emergency situation or may present an immediate threat to human health or the environment, Navy and DLA shall immediately take all appropriate actions to prevent and/or minimize such emergency or threat, and shall immediately notify the DOH Project Coordinator and the EPA Project Coordinator. Navy and DLA shall take such immediate and appropriate actions in consultation with the DOH Project Coordinator and the EPA Project Coordinator. Navy and DLA shall then submit to DOH and EPA written notification of such emergency or threat at the Site within twenty-four (24) hours of such discovery and, if further action is required, submit a plan to further mitigate the threat within seven (7) days of sending the written notification of the emergency. After approval or approval with modification of the plan by the Regulatory Agencies, Navy and DLA shall implement the plan as approved or modified and the plan shall be incorporated by reference into and made part of this AOC and be enforceable as such. In the event that Navy and DLA fail to take appropriate response action as required by this Paragraph, either or both of the Regulatory Agencies may take a response action consistent with their statutory and regulatory authorities and may require Navy and DLA to reimburse them for their response costs pursuant to those authorities.

(b) Modification of this AOC

(i) This AOC may be modified only by the mutual agreement of the Parties. Any agreed modifications shall be in writing; be signed by all the Parties; have as their effective date the date on which the last Party signs the modification; and be incorporated into and be enforceable under this AOC.

(ii) No informal advice, guidance, suggestion, or comment by the Regulatory Agencies regarding deliverables submitted by Navy and DLA shall relieve Navy and DLA of their obligation to obtain such formal approval as may be required by this AOC, and to comply with all requirements of this AOC unless it is modified as provided under this AOC. Any deliverables, required by this AOC are, upon approval by the Regulatory Agencies, incorporated into and enforceable under this AOC.

(iii) In the event future regulatory requirements for field-constructed USTs are determined by the Regulatory Agencies to conflict with the Work to be performed under this

AOC, such that Navy and DLA could not comply with both this AOC and the regulatory requirements, the Parties will make good faith efforts to promptly resolve such conflict.

(c) Additional Work. The Regulatory Agencies may determine, or Navy and DLA may propose, that certain tasks or activities are necessary in addition to or in lieu of the Work when such additional performance is necessary for protection of human health and the environment. The Regulatory Agencies may determine that Navy and DLA shall perform additional work and the Regulatory Agencies will specify, in writing, the basis for the determination that additional work is necessary. Within thirty (30) days after the receipt of such determination, Navy and DLA shall have the opportunity to meet or confer with the Regulatory Agencies to discuss any additional work. Upon meeting or conferring, the Parties shall agree on a schedule for submitting a work plan for additional work; Navy and DLA shall either invoke dispute resolution or submit the schedule for approval within thirty (30) days from Navy and DLA's meeting or conferring on the additional work, unless otherwise agreed to by the Parties. Upon approval of a work plan, Navy and DLA shall implement the work plan in accordance with the schedule and provisions contained therein. The work plan shall be incorporated by reference into and made a part of this AOC and be enforceable as such.

9. DOCUMENT CERTIFICATION

(a) Any deliverable specifically listed in the SOW and submitted by Navy and DLA pursuant to this AOC shall be certified by the Commander of Navy Region Hawaii or the Regional Engineer for CNRH or designee but no lower than the Deputy Regional Engineer. Certification of additional deliverables may be required, if specified as a requirement in an approved implementation plan.

(b) The certification required by Paragraph 9(a) above, shall be in the following form:

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to be the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fines and imprisonment for knowing violation.

Signature:_____

Name:_____

Title:_____

Date:_____

10. SAMPLING, ACCESS AND DOCUMENT AVAILABILITY

(a) Sampling and Analysis

(i) All results of sampling, testing, modeling or other data generated (including raw data, which shall be made available if requested) by Navy and DLA, or on Navy and DLA's behalf, during implementation of this AOC shall be submitted to the Regulatory Agencies within thirty (30) calendar days of Navy and DLA's receipt of the data. Data shall be provided in the same format that it was provided to Navy and DLA unless a different format is otherwise agreed to by the Parties. Upon request, the Regulatory Agencies will make available to Navy and DLA data generated by DOH or EPA for the purposes of oversight of the Work unless it is exempt from disclosure by any federal or state law or regulation. All sampling and analysis shall be subject to a quality assurance and control process as specified in the SOW.

(ii) Navy and DLA shall provide written notice to the Regulatory Agencies at least seven (7) calendar days prior to conducting field sampling, or as otherwise agreed to by the Parties. At the Regulatory Agencies' request, Navy and DLA shall allow split or duplicate samples to be taken by the Regulatory Agencies.

(b) Access to Areas Controlled by Navy and/or DLA

(i) EPA has the authority to enter the Site under federal environmental law and DOH has authority to enter the Site under state law.

(ii) Navy and DLA shall provide the Regulatory Agencies and/or their representatives with access to the Site at all reasonable times for the purposes consistent with the provisions of this AOC. Such access shall include, but not be limited to: inspecting records, logs, contracts, and other documents relevant to implementation of this Agreement; reviewing and monitoring the progress of Navy and DLA, their contractors, and lessees in carrying out the activities under this AOC; conducting tests that the Regulatory Agencies deem necessary;

assessing the need for planning additional response actions at the Site; and verifying data or information submitted to the Regulatory Agencies.

(iii) Navy and DLA shall honor all requests for access to the Site made by the Regulatory Agencies subject to the requirements in Subparagraph (v). Navy and DLA may require presentation of credentials showing the bearer's identification and that he/she is an employee or agent of the Regulatory Agencies, including contractors employed by either of the Regulatory Agencies. Navy and DLA's Project Coordinator or his/her designee shall provide briefing information, coordinate access and escort to restricted or controlled-access areas, arrange for base passes, and coordinate any other access requests that arise. Navy and DLA shall use their best efforts to ensure that conformance with the requirements of this Subsection do not delay access.

(iv) The rights granted in this Section to the Regulatory Agencies regarding access shall be subject to regulations and statutes, as may be necessary to protect national security information ("classified information") as defined in Executive Order 12958. Such requirement shall not be applied so as to unreasonably hinder the Regulatory Agencies from carrying out their responsibilities and authority pursuant to this AOC.

(v) The Facility is a controlled access area and subject to safety and security requirements. Other parts of the Site may be controlled or restricted. Navy and DLA shall provide an escort whenever the Regulatory Agencies require access to controlled or restricted areas for purposes consistent with the provisions of this AOC. The Regulatory Agencies shall provide reasonable notice to the Navy and DLA Project Coordinator, or his or her designee, to request any necessary escorts for such areas. Navy and DLA shall not require an escort to any area of the Site unless it is a restricted or controlled-access area. Upon request of the Regulatory Agencies, Navy and DLA shall promptly provide a written list of current restricted or controlled-access areas of the Site.

(vi) Upon a denial of any aspect of a request of access, Navy and DLA shall provide an immediate explanation of the reason for the denial, including reference to any applicable regulations, and upon request, a copy of such regulations. Within forty-eight (48) hours, Navy and DLA shall provide a written explanation for the denial. To the extent possible,

Navy and DLA shall expeditiously provide a recommendation for accommodating the requested access in an alternate manner.

(vii) Pursuant to this Section, any denial of access contrary to the terms of this AOC at reasonable times to any portion of the Site, where a request for access was made for the purposes of enforcing the requirements of federal or state law, or implementing or enforcing this AOC, shall be construed as a violation of the terms of this AOC subject to the penalty provisions outlined in Section 15 (Penalties) of this AOC.

(c) Access to Areas Not Controlled by Navy and/or DLA

Where action under this AOC is to be performed in areas owned by, or in possession of, someone other than Navy or DLA, Navy and DLA shall use their best efforts to obtain all necessary access agreements in a timely manner. Navy and DLA shall commence efforts to obtain such agreements within thirty (30) days of approval of any Work for which access is necessary. Any such access agreement shall provide for access by the Regulatory Agencies and their representatives to move freely in order to conduct actions that the Regulatory Agencies determine to be necessary. The access agreement shall specify that Navy and DLA are not the Regulatory Agencies' representative(s) with respect to any liabilities associated with activities to be performed. Navy and DLA shall provide DOH's Project Coordinator and EPA's Project Coordinator with copies of any access agreements. Navy and DLA shall immediately notify the Regulatory Agencies if after using Navy and DLA's best efforts, they are unable to obtain such agreements within the time required. Best efforts as used in this Paragraph shall include, at a minimum, a certified letter from Navy and DLA to the present owner of such property requesting access agreements to permit Navy and DLA, the Regulatory Agencies, and the Regulatory Agencies' authorized representatives to enter such property, and the offer of payment of reasonable sums of money in consideration of granting access. Navy and DLA shall, within ten (10) calendar days of receipt of a denial of access, submit in writing, a description of their efforts to obtain access. The Regulatory Agencies may, at their discretion, assist Navy and DLA in obtaining access. Where access on state owned property is needed, DOH will make best efforts to assist Navy and DLA with access.

(d) Document Availability

All data, information, and records created or maintained for purposes of implementation of this AOC, and all records relating to Facility operations and maintenance, or to site conditions, shall be made available to the Regulators upon request unless Navy or DLA assert a claim that such documents are legally privileged from disclosure and meets the burden of demonstrating to the Regulatory Agencies that such a privilege exists. Navy and DLA may assert a claim that certain documents or portions of documents are protected from public disclosure under federal or state law (e.g., documents exempt from disclosure under applicable laws such as FOIA, Procurement Integrity Act, Privacy Act, etc.). Navy and DLA shall clearly mark the material in which such a claim is asserted (e.g., documents shall be marked on each page and shall be reasonably segregated) and cite to the legal authority allowing withholding. If no such claim accompanies the information when it is submitted to the Regulatory Agencies, it may be made available to the public by EPA or DOH without further notice to Navy and DLA. Navy and DLA agree not to assert such claims with respect to any data related to Site conditions, including but not limited to, sampling, analytical, monitoring, hydrogeologic, scientific, chemical or engineering data or any other documents or information evidencing conditions at or around the Site.

(e) Nothing in this AOC shall be construed to limit the Regulatory Agencies' right of access, entry, inspection, and information gathering pursuant to applicable law.

11. COMPLIANCE WITH OTHER LAWS

Navy and DLA shall perform all actions required pursuant to this AOC in accordance with all applicable local, state, and federal laws and regulations. Navy and DLA shall use best efforts to obtain or cause their representatives to obtain all permits and approvals necessary under such laws and regulations in a timely manner so as not to delay the Work required by this AOC.

12. FUNDING OF THE WORK

(a) It is further agreed to and ordered that Navy and DLA shall timely seek sufficient funding through their budgetary processes to finance and perform all the Work. Navy and DLA recognize the requirements of this AOC as necessary actions subject to the provisions of Executive Order 12088 requiring request of sufficient funds in the agency budget. It is the

expectation of the Parties to this AOC that all obligations of Navy and DLA arising under this AOC will be fully funded.

(b) Any requirement for the payment or obligation of funds, including stipulated penalties, by Navy or DLA, established by the terms of this AOC may be subject to the availability of appropriated funds. No provision herein shall be interpreted to require obligation or payment of funds in violation of the Anti-Deficiency Act, 31 U.S.C. § 1341.

(c) If Navy and DLA determine that there are insufficient funds to carry out the Work in accordance with the AOC, Navy and DLA shall notify the Regulatory Agencies within thirty (30) days thereafter and request a meeting to work with the Regulatory Agencies to explore cost-savings or re-scoping measures to off-set the shortfall. The meeting shall be held within thirty (30) days of the request for the meeting, unless otherwise agreed to by the Parties. If re-scoping or cost savings measures are not sufficient to offset the shortfall such that schedules developed pursuant to this AOC should be modified, then Navy and DLA shall submit a modified schedule to the Regulatory Agencies for approval within the time frame agreed to in the meeting. The time frame agreed to in the meeting shall be in writing, signed by the Parties and be enforceable under this AOC. If funds are not available in any year to fulfill Navy and DLA's obligations under this AOC and the Parties are unable to agree on cost-savings or re-scoping measures to offset the shortfall or a modified schedule, DOH and EPA reserve their respective rights to initiate any action against any person(s) or to take any response action which would be appropriate absent this AOC.

13. REIMBURSEMENT OF DOH COSTS

(a) Subject to the provisions of this Paragraph, Navy and DLA agree to pay reasonable service charges incurred by DOH with respect to the Work. Reasonable service charges shall mean reasonable and necessary costs above and beyond normal regulatory responsibilities (i.e., required overtime or contracted effort) that DOH incurs in monitoring Navy's and DLA's performance under this AOC to determine whether such performance is consistent with the requirements of this AOC, including costs incurred in reviewing plans, reports and other documents submitted pursuant to this AOC. Reasonable service charges incurred by DOH shall be limited to no more than fifty thousand dollars ($50,000) per calendar year unless otherwise agreed in writing by Navy and DLA. DOH shall advise Navy and DLA

prior to accruing any costs for which it intends to seek reimbursement pursuant to this section and shall obtain concurrence that such costs are reasonable. Navy and DLA shall make good faith efforts to negotiate a separate cooperative agreement with DOH which will detail the modalities for payment of reasonable service charges incurred by DOH with respect to the Work. If Navy, DLA, and DOH cannot agree on the reasonableness of the proposed costs, they shall attempt to resolve any disputes under this Section amongst themselves. In the event that a separate cooperative agreement is developed, any dispute resolution related to this Paragraph shall be pursuant to that agreement and applicable regulation and shall not be subject to Section 14 (Dispute Resolution).

(b) DOH reserves the right to bring an action against Navy and DLA under any applicable law for recovery of all reasonable service charges incurred by DOH with respect to the Site that have not been reimbursed by Navy and DLA if Navy and DLA and DOH fail to enter into a separate cooperative agreement or make other arrangements for reimbursement of reasonable service charges incurred by DOH with respect to the Work.

14. DISPUTE RESOLUTION

(a) The Parties intend to work cooperatively to avoid disputes in the implementation of the AOC. The Parties shall make reasonable efforts to resolve disputes informally at the lowest level. The process for dispute resolution set forth in this Section shall be the exclusive remedy through which the Parties resolve any and all disputes arising from this AOC and the implementation and execution of the Work. At any point during the dispute resolution process, Navy and DLA may withdraw their dispute and commence or resume the previously disputed Work in accordance with direction from the Regulatory Agencies.

(b) A dispute resolution committee ("DRC") shall serve as the initial forum for resolution of disputes for which agreement has not been reached through informal dispute resolution among the Parties. Each Party shall designate one individual and an alternate to serve on the DRC, and may change those designations at will, with written notice to be provided to the other Parties, but shall at all times have persons so designated and available to participate in the dispute resolution process as needed. The persons designated to serve on the DRC shall be employed at the senior management level (e.g., Senior Executive Service (SES) or equivalent) or be delegated the authority in writing to participate on the DRC by an SES or equivalent level

official, or higher, for the purposes of dispute resolution under this agreement.

(i) Within thirty (30) days after any action which leads to or generates a dispute, the disputing Party shall submit to the DRC a written statement of dispute setting forth the nature of the dispute, the disputing Party's position with respect to the dispute and the technical, legal and factual information the disputing Party is relying upon to support its position.

(ii) Prior to any Party's issuance of a written statement of dispute, the disputing Party shall engage the other Parties in informal dispute resolution among the Project Coordinators and/or their immediate supervisors. During this informal dispute resolution period, the Parties shall meet and/or confer as many times as are necessary to discuss and attempt resolution of the dispute.

(iii) Within twenty (20) calendar days of receipt by the DRC of the disputing Party's written request for formal dispute resolution, unless additional time is provided by the DRC, the other Parties may submit their own statements of position with respect to the dispute to the DRC for its consideration.

(iv) The DRC shall have forty-five (45) calendar days from the date it receives a timely written request from the disputing Party for formal dispute resolution to unanimously resolve the dispute and issue a written decision signed by the designee of each Party then serving on the DRC, except that such designees may agree unanimously to extend the period of time to reach decision if necessary. This decision may include any necessary findings and instructions, as appropriate, to proceed with Work interrupted or delayed by the dispute.

(c) In the event the DRC is unable to unanimously resolve the dispute within the forty-five (45) day period, the written statement of dispute shall be forwarded to the Senior Executive Committee (SEC) for resolution, within ten (10) days after the close of the forty-five (45) day period. EPA's representative on the SEC is the Regional Administrator of EPA Region 9. DOH's representative on the SEC is the Director of Health. Navy's representative on the SEC is the Commander Navy Installations Command. DLA's representative on the SEC is the Chief of Staff of DLA. The SEC members shall, as appropriate, confer, meet, and exert their best efforts to resolve the dispute and issue a unanimous written decision signed by all Parties. If unanimous resolution of the dispute is not reached within thirty (30) days of elevation to the SEC, the Regional Administrator of EPA Region 9 shall issue a written position on the dispute

within forty (40) days of elevation to the SEC. The Assistant Secretary of the Navy for Energy, Installations & Environment, or the Director of DLA, within thirty (30) days of the EPA's Regional Administrator's issuance of the EPA's position, may issue a written notice elevating the dispute to EPA's Assistant Administrator of the Office of Enforcement and Compliance Assurance (EPA Assistant Administrator) for resolution. In the event that Navy, DLA or DOH elects not to elevate the dispute to the EPA Assistant Administrator within the designated thirty (30) day escalation period, the other Parties shall be deemed to have agreed with the EPA's Regional Administrator's written position with respect to the dispute.

(d) Upon elevation of the dispute to the EPA Assistant Administrator pursuant to Paragraph 14(c) above, the EPA Assistant Administrator will review and resolve the dispute. Upon request, and prior to resolving the dispute, the EPA Assistant Administrator will meet and confer with the Assistant Secretary of the Navy for Energy, Installations & Environment, the Director of DLA, and the Governor to discuss the issue(s) under dispute. The EPA Assistant Administrator will resolve the dispute within thirty (30) days of receipt of the dispute, unless the Assistant Secretary of the Navy for Energy, Installations & Environment, the Director of DLA, or the Governor request a meeting with the EPA Assistant Administrator prior to resolving the dispute, in which case the dispute will be resolved within thirty (30) days of such meeting. Upon resolution, the EPA Assistant Administrator will provide the other Parties with a written final decision setting forth resolution of the dispute.

(e) The existence of a dispute and the Regulatory Agencies' consideration of matters placed in dispute shall not excuse, toll, or suspend any compliance obligation or deadline required pursuant to this AOC during the pendency of the dispute resolution process except as agreed by the Regulatory Agencies in writing pursuant to Section 8 of this AOC or determined by the Administrator or his or her designee. In the event that a dispute is resolved in favor of Navy and DLA pursuant to this Section, stipulated penalties incurred with respect to the specific subject of that dispute will not be due and owing.

(f) Within thirty (30) calendar days of receipt of any final decision and instructions with respect to any dispute resolved pursuant to the procedures specified in this Section, unless otherwise specified in the decision, Navy and DLA shall incorporate the final decision and

instructions into the appropriate plan, schedule or procedures and implement this AOC in accordance with such plan, schedule or procedures.

(g) Resolution of a dispute pursuant to this Section constitutes a final resolution of any dispute arising under this AOC. All Parties shall abide by all terms and conditions of any final resolution of dispute obtained pursuant to this Section of the AOC.

15. PENALTIES

(a) In the event that Navy and/or DLA fails to comply with any term, condition or requirement of this AOC, EPA and/or DOH may assess and Navy and DLA shall be liable for stipulated penalties in the amounts set forth in this Section unless a Force Majeure event has occurred as defined in Section 17 (Force Majeure) and the Regulatory Agencies have approved the extension of a deadline as required by that Section. Compliance with this AOC by Navy and DLA shall include completion of any Work in accordance with this AOC and within the specified time schedules approved under this AOC. A stipulated penalty may be assessed in an amount not to exceed $5,000 for the first week (or part thereof) and $10,000 for each additional week (or part thereof) for which a failure set forth in this Subsection occurs.

(b) Stipulated penalties incurred pursuant to this Section shall begin to accrue on the day after complete performance is due or the day the violation occurs and shall continue to accrue until the violation is corrected to the satisfaction of the Regulatory Agencies.

(c) Upon determining that Navy and DLA have failed in a manner set forth in this Subsection, the EPA or the DOH will notify Navy and DLA. Any such notification shall be in writing. If the failure in question is not already subject to dispute resolution at the time such notice is received, Navy and DLA shall have thirty (30) days after receipt of the notice to invoke dispute resolution on the question of whether the failure did in fact occur and whether there is no mitigating reason for the failure. Where dispute resolution is invoked, no assessment of a stipulated penalty shall be final until the conclusion of dispute resolution procedures related to the assessment of the stipulated penalty. Notwithstanding any other provision of this Section, the Regulatory Agencies may, in their unreviewable discretion, waive any portion of stipulated penalties that have accrued pursuant to this AOC.

(d) No later than sixty (60) days after receipt of a written demand for payment from the Regulatory Agencies, unless the dispute resolution provisions of Section 14 (Dispute

Resolution) are invoked, Navy and DLA shall pay the penalty. If the stipulated penalties become payable by Navy and DLA, they shall pay one half (50%) of the total penalty amount by cashier's or certified check payable to the "State of Hawaii Director of Finance" for deposit into the Hawaii's Leaking Underground Storage Tank Fund [HRS § 342L-51] and delivered to the Director's Office, 1250 Punchbowl Street, Honolulu, Hawaii. They shall pay the other half (50%) of the total penalty amount by certified or cashier's check payable to the United States Treasury and delivered to the U.S. Environmental Protection Agency. Cincinnati Finance Center, Box 979077, St. Louis, MO, or other agreed-to method. All payments by Navy and DLA shall reference Navy and DLA's name and address, and the docket number for this action.

(e) This Section shall not affect Navy or DLA's ability to obtain an extension of a timetable, deadline, or schedule pursuant to Section 8 of this AOC.

(f) Nothing in this AOC shall be construed to render any officer or employee Navy or DLA personally liable for the payment of any stipulated penalty assessed pursuant to this Section.

16. ENFORCEABILITY

(a) The Parties agree to exhaust their rights under Section 14 (Dispute Resolution), prior to DOH exercising any rights to pursue a civil action and seek judicial review that it may have.

(b) Subject to the Dispute Resolution Provisions of Section 14 and the Regulatory Agencies' Covenants in Section 19, nothing in this AOC shall preclude the State of Hawaii from seeking to enforce the terms and conditions of this AOC as a final order of DOH against Navy and DLA in a civil action to collect penalties and/or enforce its provisions pursuant to HRS §§ 340E-4, 340E-8, 342D-9, 342D-10, 342D-11, 342L-8, 342L-9, 342L-12, and 342L-52, Section 7002 of RCRA, 42 U.S.C. § 6972, or in a civil action for breach of this AOC and from seeking any other relief as may be necessary to protect the public health, a source of drinking water and the environment. However, DOH will not seek to collect, in a judicial proceeding, civil penalties for a breach of this AOC if it or EPA has already collected such penalties under the penalty provisions of this AOC for the same matter, or if such penalties have been overturned through the dispute resolution process of Section 14.

(c) Failure to diligently conduct the Work may subject Navy and DLA to an action under Section 7002 of RCRA, 42 U.S.C. § 6972.

(d) Navy and DLA waive their opportunity to confer with the Administrator of EPA pursuant to 42 U.S.C. § 6961(b)(2) and any right to further review of the issuance of this AOC pursuant to any provisions of state and federal law.

(e) In any action to enforce the terms of this AOC, all Parties agree to be bound by the terms of the AOC and agree to not contest the validity of this AOC, its terms or conditions, or the procedures underlying or relating to them in any action brought by the Regulatory Agencies to enforce its terms.

17. FORCE MAJEURE

(a) Navy and DLA agree to perform all requirements under this AOC within the time limits established under this AOC, unless the performance is delayed by a force majeure. For purposes of this AOC, a force majeure is defined as any event arising from causes beyond the control of Navy and DLA, or Navy or DLA's contractors, that delays or prevents performance of any obligation under this AOC despite Navy and DLA's best efforts to fulfill the obligation. The requirement that Navy and DLA exercise "best efforts to fulfill the obligation" includes using best efforts to anticipate any potential force majeure event and best efforts to address the effects of any potential force majeure event: (1) as it is occurring, and (2) following the potential force majeure event, such that the delay is minimized to the greatest extent possible. Force majeure does not include financial inability to complete the Work, increased cost of performance, changes in Navy and DLA's business or economic circumstances, or inability to attain media cleanup standards.

(b) If any event occurs or has occurred that may delay the performance of any obligation under this AOC, whether or not caused by a force majeure event, Navy and DLA shall orally notify the Regulatory Agencies within forty-eight (48) hours of when Navy or DLA knew or should have known that the event might cause a delay. Such notice shall: (1) identify the event causing the delay, or anticipated to cause delay, and the anticipated duration of the delay; (2) provide Navy and DLA's rationale for attributing such delay to a force majeure event; (3) state the measures taken or to be taken to prevent or minimize the delay; (4) estimate the timetable for implementation of those measures; and (5) state whether, in the opinion of Navy and DLA, such

event may cause or contribute to an endangerment to public health or the environment. Navy and DLA shall undertake best efforts to avoid and minimize the delay. Failure to comply with the notice provision of this Paragraph and to undertake best efforts to avoid and minimize the delay shall waive any claim of force majeure by Navy and DLA. Navy and DLA shall be deemed to have notice of any circumstances of which their contractors had or should have had notice.

(c) If the Regulatory Agencies determine that a delay in performance or anticipated delay in fulfilling a requirement of this AOC is or was attributable to a force majeure, then the time period for performance of that requirement will be extended as deemed necessary by the Regulatory Agencies. If the Regulatory Agencies determine that the delay or anticipated delay has been or will be caused by a force majeure, then the Regulatory Agencies will notify Navy and DLA, in writing, of the length of the extension, if any, for performance of such obligations affected by the force majeure. Any such extensions shall not alter Navy and DLA's obligation to perform or complete other tasks required by this AOC which are not directly affected by the force majeure.

(d) If the Regulatory Agencies disagree with Navy and DLA's assertion of a force majeure, then Navy and DLA may elect to invoke the dispute resolution provision, and shall follow the procedures set forth in Section 14 (Dispute Resolution). In any such proceeding, Navy and DLA shall have the burden of demonstrating by a preponderance of the evidence that the delay or anticipated delay has been or will be caused by a force majeure, that the duration of the delay or the extension sought was or will be warranted under the circumstances, that Navy and DLA's best efforts were exercised to avoid and mitigate the effects of the delay, and that Navy and DLA complied with the requirements of this Section. If Navy and DLA satisfy this burden, then the Regulatory Agencies will extend the time for performance as the Regulatory Agencies determine is necessary.

18. RESERVATION OF RIGHTS

(a) Notwithstanding any other provisions of this AOC, the Regulatory Agencies retain their authority to take, direct, or order any and all actions necessary to protect public health, any source of drinking water or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants, or contaminants, or hazardous or solid waste or constituents of such wastes, on, at, or from the Facility, including but not limited

to the right to bring enforcement actions under RCRA, the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), the Clean Water Act ("CWA"), the Safe Drinking Water Act ("SDWA"); HRS chapters 340E, 342D and 342L; and any other applicable statutes or regulations. However, unless required on an emergency basis, no such action shall be taken in relation to any activity within the scope of this AOC unless a Party has first made good faith efforts to address the issue through a modification to this AOC and, if necessary, through the Dispute Resolution process set forth in Section 14.

(b) The Regulatory Agencies reserve all of their statutory and regulatory powers, authorities, rights, and remedies, both legal and equitable, which may pertain to Navy and DLA's failure to comply with any of the requirements of this AOC.

(c) Navy and DLA reserve all of their statutory and regulatory rights and defenses both legal and equitable, including but not limited to rights and defenses against third parties. Nothing in this AOC shall be taken as an admission of fact or law in any dispute with a third party or in any dispute outside the context of enforcement of this AOC.

(d) This AOC is not intended to be nor shall it be construed to be a permit. Navy and DLA acknowledge and agree that EPA or DOH's review and approval of the Work does not constitute a warranty or representation that the Work will achieve the required cleanup or performance standards. Compliance by Navy and DLA with the terms of this AOC shall not relieve Navy and DLA of their obligations to comply with applicable local, state, or federal laws and regulations.

19. REGULATORY AGENCIES' COVENANTS

(a) Except as provided in Section 18 (Reservation of Rights), EPA covenants not to take administrative action against Navy or DLA pursuant to Section 7003 of RCRA, 42 U.S.C. § 6973, for the Work. EPA's covenant shall take effect upon the Effective Date of this AOC. EPA's covenant is conditioned upon the satisfactory performance by Navy and DLA of their obligations under this AOC. EPA's covenant extends only to Navy and DLA and does not extend to any other person.

(b) Except as provided in Section 18 (Reservation of Rights), DOH covenants not to take administrative enforcement action against Navy or DLA with respect to any Work on the

condition that the Work is consistent with Navy's and DLA's obligations under this AOC and/or that the Work has been satisfactorily completed and approved by the DOH.

20. OTHER CLAIMS

By issuance of this AOC, the Regulatory Agencies assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Navy and DLA. The Regulatory Agencies shall not be deemed a party to any contract, agreement or other arrangement entered into by Navy and DLA or its officers, directors, employees, agents, successors, assigns, heirs, trustees, receivers, contractors, or consultants in carrying out actions pursuant to this AOC.

21. RECORD RETENTION

(a) Navy and DLA shall preserve all records related to the Facility in accordance with the appropriate federal records retention schedule. In addition, Navy and DLA shall preserve all documents shared with the Regulatory Agencies relating to the Work performed under this AOC, monitoring data, and other raw data generated pursuant to this AOC, for at least ten (10) years following the termination of the AOC. Navy and DLA shall make such records available to DOH or EPA at their request.

(b) All substantive documents exchanged between the Parties relating to the Work performed under this AOC and all monitoring data related to the Facility shall be stored by Navy and DLA in a centralized location at the Site, or an alternative location mutually approved by the Project Coordinators to promote easy access by the Regulatory Agencies or their representatives.

22. PRESIDENTIAL EXEMPTION

The Parties recognize that the President may exempt a solid waste management facility from requirements of RCRA pursuant to 42 U.S.C. § 6961(a) or a UST from the requirements of RCRA pursuant to 42 U.S.C. § 6991f for a period of time not to exceed one (1) year after the President grants the exemption. This exemption may be renewed. Navy and DLA shall obtain access to and perform all actions required by this AOC within all areas inside those portions of the Site, which are not the subject of or subject to any such exemption by the President.

23. PUBLIC COMMENT

(a) Upon signature by Navy and DLA, the Regulatory Agencies shall provide public notice, a public meeting and a reasonable opportunity for public comment on the proposed

settlement. After consideration of any comments submitted during a public comment period of not less than thirty (30) days (which the Regulatory Agencies may extend), the Regulatory Agencies may sign this AOC, or withhold consent, or seek to amend all or part of this AOC if the Regulatory Agencies determine that comments received disclose facts or considerations which indicate that this AOC is inappropriate, improper, or inadequate.

(b) If a modification is necessary, the Regulatory Agencies shall transmit a modified copy of the AOC to Navy and DLA for review and signature, or further negotiations, as appropriate. If the modification is determined by the Regulatory Agencies to be significant, the process for public comment, described in Section 23(a), will repeat.

24. SEVERABILITY

If any provision of this AOC or the application of this AOC to any party or circumstances is held by any judicial authority to be invalid, the remainder of the AOC shall remain in full force and effect.

25. EFFECTIVE DATE

After this AOC is signed by each of the Parties and after the public comment period and review as described in Section 23 (Public Comment), this AOC shall become effective. The undersigned representatives certify that they are fully authorized to enter into the terms and conditions of this AOC and to bind the party they represent to this document.

26. TERMINATION AND SATISFACTION

The provisions of this AOC shall be deemed fully satisfied upon the Regulatory Agencies' execution of a written acknowledgement ("Acknowledgement") specifying that Navy and DLA have demonstrated to the satisfaction of the Regulatory Agencies that the terms and conditions of this AOC have been fully and satisfactorily completed. Prior to termination of this AOC, the Parties shall discuss whether an agreement, or additional regulation, is necessary to ensure continued protection of health and the environment. Termination of this AOC shall not terminate Navy and DLA's obligation to comply with Sections 10 (Sampling and Access) and 21 (Record Retention) of this AOC or the Regulatory Agencies' reservation of rights in Section 18. IN WITNESS WHEREOF, the Parties have duly executed this presents as of the day and year subscribed below.

Agreed this 15 day of September, 2015.

By: _____

John V. Fuller, Rear Admiral
Commander Navy Region Hawaii, U.S. Navy

Agreed this 28 day of SEPTEMBER 2015.

By: _____
Renee L. Roman, Chief of Staff
Defense Logistics Agency

It is so ORDERED and Agreed this 28 day of Sept, 2015.

By: _____
Keith Kawaoka, Deputy Director
Department of Health

APPROVED:
AS TO
FORM

_____
Wade H. Hargrove III, Deputy Attorney General
Hawaii Department of Attorney General

It is so ORDERED and Agreed this 28 day of Sept, 2015.

By: _____

Jeff Scott, Director, Land Division
Region 9, U.S. Environmental Protection Agency

Administrative Order on Consent
In the Matter of Red Hill Bulk Fuel Storage Facility
EPA Docket No: RCRA 7003-R9-2015-01
DOH Docket No: 15-UST-EA-01

Attachment A
Statement of Work

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Introduction

This Statement of Work ("SOW") sets forth the tasks and requirements to be undertaken by the United States Department of Navy ("Navy") and the Defense Logistics Agency ("DLA"), in compliance with the Administrative Order on Consent ("AOC") in the Matter of Red Hill Bulk Fuel Storage Facility ("Facility"), located near Pearl Harbor, on the island of Oahu in the State of Hawaii. Unless otherwise specified, the underground storage tanks ("USTs") covered by the AOC and this SOW are the twenty (20) field-constructed steel underground bulk fuel storage tanks ("Tanks") at the Facility. The Tanks are constructed of steel, encased by an estimated minimum of 2.5 to 4 feet of concrete surrounded and supported by basalt bedrock. The primary objectives of the AOC and this SOW are to take steps to ensure that the groundwater resource in the vicinity of the Facility is protected and to ensure that the Facility is operated and maintained in an environmentally protective manner. Navy, DLA, the Hawaii Department of Health ("DOH") and the United States Environmental Protection Agency ("EPA"), collectively referred to as "the Parties" in the AOC and this SOW, agree that these objectives can best be accomplished by ensuring that the Tanks and other infrastructure at the Facility deploy the best available practicable technology ("BAPT") (as defined in Section 3) to prevent fuel releases, developing a better understanding of the hydrogeology of the area surrounding the Facility, and conducting an assessment of the risk to the groundwater resources that may be posed by the Facility.

The major components of the Work under this SOW are summarized below.

(1) Navy and DLA will improve upon their existing tank inspection and repair process to ensure that the tank infrastructure prevents releases of fuel to the maximum extent practicable.

(2) Navy and DLA will undertake a comprehensive study to investigate the feasibility of upgrading the tank structures including, but not limited to, installing secondary containment. This study will evaluate several technologies, building on similar efforts conducted by Navy in 1998 and 2008. After completing the study, a technology or technologies will be approved by DOH and EPA ("the Regulatory Agencies") and implemented by Navy and DLA. Implementation will occur in phases so that all Tanks in operation will deploy BAPT, as approved by the Regulatory Agencies, within twenty-two (22) years of the effective date of the AOC or as otherwise provided for in the AOC or this SOW.

(3) Navy and DLA will, as an interim measure, double the frequency of their tank tightness testing from biennial to annual and continue to continuously monitor the inventory of fuel in the Tanks. Navy and DLA shall conduct the next round of tank tightness testing no later than one year from the effective date of the AOC. As set forth below, Navy and DLA will also conduct a study to evaluate improvements to the tank tightness and release detection

technologies deployed at the Facility and, pending the outcome of the study and approval by the Regulatory Agencies, implement improvements.

(4) Navy and DLA will further develop models to better understand groundwater flow in the areas around the Facility and evaluate the fate and transport of contaminants in the subsurface around the Facility. As set forth below, based on the modeling effort, as approved by the Regulatory Agencies, Navy and DLA will develop and improve the existing groundwater monitoring network to the extent determined necessary.

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

Overall Project Management

1.1 Subject Matter Experts Involvement

It is the intent of the Parties to seek the technical advice of subject matter experts, such as the Honolulu Board of Water Supply and the Hawaii Department of Land and Natural Resources, as needed, for scoping and review of key deliverables. The Parties shall take actions that facilitate sharing of information with subject matter experts such as establishing confidentiality agreements and/or providing redacted versions of documents as necessary to address procurement integrity and security concerns.

1.2 Community Involvement

The Parties shall update the public jointly based on public interest and at the request of one of the Parties. Navy and DLA shall submit a synopsis of each final report developed under the AOC, and this SOW, to the Regulatory Agencies who may make that synopsis available to the public. The Regulatory Agencies will make the final deliverables available to the public to the extent such documents are not protected from public disclosure. The Parties shall also host public meetings at least annually to allow for the public to be provided progress updates by the Navy, DLA, and the Regulatory Agencies, and to ask questions about the Red Hill facility.

1.3 Meetings

Meetings may consist of in-person, telephone, or video-conferences, the form of which will be based on budget constraints, schedules, and other considerations. Within ten (10) business days of a meeting, Navy and DLA shall circulate a summary of the meeting to the Regulatory Agencies for concurrence. The Parties may request additional meetings beyond the meetings outlined in this SOW, as needed. During each meeting, the Parties will identify applicable guidance, policies and procedures for the future Work to be performed that follows from such meeting.

1.4 Regulatory Agencies Written Responses

The Regulatory Agencies shall provide joint, written responses for all responses to Navy and DLA under Section 7 of the AOC (Regulatory Agencies' Approval of Deliverables).

1.5 Communications Between Parties

All Parties shall make best efforts to maintain effective and timely communications with the other Parties to facilitate implementation of the AOC and this SOW.

1.6 Quality Assurance

Navy and DLA shall include a discussion of quality assurance and quality control ("QA/QC") procedures in each Scope of Work submitted to the Regulatory Agencies for approval. The QA/QC procedures shall be used to ensure that environmental or other data generated meets standards established by the Parties.

Navy and DLA shall use laboratories that have a documented quality system that complies with the "Uniform Federal Policy for Quality Assurance Project Plans" (Intergovernmental Data Quality Task Force, March 2005), and the "EPA Requirements for Quality Management Plans for Environmental Data Operations (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by EPA.

1.7 Definitions

Unless otherwise specified, the terms used in this document shall have the meaning defined in the Resource Conservation and Recovery Act (42 U.S.C. §6901 *et seq*.) and 40 Code of Federal Regulations Part 280 - *Technical Standards and Corrective Action Requirements for Owners and Operators of Underground Storage Tanks*.

1.8 Compliance with Underground Storage Tank Regulations

On June 22, 2015, EPA promulgated new regulations that apply to field-constructed underground storage tank systems. These new regulations will not become legally enforceable in states with federally-approved programs, such as the State of Hawaii, until the state's rules are updated, and the state successfully receives federal approval of their revised regulations. Notwithstanding this schedule, Navy and DLA shall begin coordinating with the Regulatory Agencies in order to comply with the new federal UST regulations (see 80 Fed. Reg. 41623-41683) applicable to the Facility as soon as possible.

2. Tank Inspection, Repair, and Maintenance

The purpose of the deliverables to be developed and the work to be performed under this Section is to identify and evaluate tank inspection, repair, and maintenance ("TIRM") procedures to ensure the continued integrity of the Tanks at the Facility and to develop and implement improvements to these procedures to prevent releases to the environment.

2.1 Scoping Meeting(s) for TIRM Procedures Report

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the TIRM Procedures Report. During the meeting, criteria for decision making will be discussed, and a decision will be made as to whether additional Scoping Meetings are needed.

2.2 TIRM Procedures Report

Within 120 days from the final Scoping Meeting, Navy and DLA shall submit a TIRM Procedures Report to the Regulatory Agencies. The TIRM Procedures Report shall describe the current procedures and evaluate options for improvements to the procedures.

At a minimum, the TIRM Procedures Report will identify and evaluate the following:

a. Current TIRM procedures, including
    1. Non-destructive testing
    2. Destructive testing
    3. Quality control
    4. Welding inspections
    5. Tank inspections
    6. Pipeline inspections
    7. Alarm operation and testing
    8. Recommissioning (after maintenance or repair of tanks taken temporarily out of service);
b. Lessons learned from Tank 5 and related modifications to current procedures;
c. Quality Control and Assurance of TIRM;
d. Options for improving the TIRM procedures,
e. Schedule/frequency of modified American Petroleum Institute ("API") 653 tank inspections, repairs, and maintenance; and
f. Actions that can be taken throughout the facility, as soon as practicable, to reduce risk of release that can be implemented independent of tank upgrades.

2.3 TIRM Procedures Decision Meeting

Within sixty (60) days from the receipt by the Regulatory Agencies of the TIRM Procedures Report, Navy and DLA shall schedule and hold a Decision Meeting to be attended by the Parties. The purpose of the Decision Meeting is to outline a plan for implementing improved TIRM procedures and propose a schedule for TIRM at the Facility. The Regulatory Agencies will not make final decisions on the TIRM procedures until the TIRM Procedures Decision Document is submitted under Section 2.4.

2.4 TIRM Procedures Decision Document and Implementation

Within sixty (60) days from the Decision Meeting, Navy and DLA shall submit a TIRM Procedures Decision Document to the Regulatory Agencies for approval. The TIRM Procedures Decision Document shall explain the procedures to be used, and set forth a schedule of

implementation for TIRM procedures. Once approved by the Regulatory Agencies, Navy and DLA shall implement the TIRM Procedures Decision Document in accordance with the schedule and shall adhere to it unless modified under Sections 3.5 and 3.7.

3. Tank Upgrade Alternatives

The purpose of the deliverables to be developed and work to be performed under this Section is to identify and evaluate the various tank upgrade alternatives ("TUA") and then select and implement the BAPT and TIRM procedures that can be applied to the in-service Tanks at the Facility to prevent releases into the environment.

As used in this SOW, BAPT shall mean the release prevention methods, equipment, repair, maintenance, new construction, and procedures, or any combination thereof, that offers the best available protection to the environment and that is feasible and cost-effective for the Tanks at the Facility. The selection and approval of BAPT shall be based on, but not be limited to, consideration of the following factors: (1) the risks and benefits of the particular technology; (2) the capabilities, feasibility, and requirements of the technology and facilities involved; (3) the anticipated operational life of the technology; and (4) the cost of implementing and maintaining the technology. Reliance on any one of these factors to the exclusion of other factors is inappropriate.

3.1 Scoping Meeting(s) for TUA Report

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting will be to detail the contents of the Scope of Work for the TUA Report. During the meeting, criteria for decision making will be discussed, and a decision will be made as to whether additional Scoping Meetings are needed.

3.2 TUA Scope of Work

Within ninety (90) days from the final Scoping Meeting, Navy and DLA shall submit the TUA Scope of Work to the Regulatory Agencies for approval.

3.3 TUA Report

Within twelve (12) months from the Regulatory Agencies' approval of the Scope of Work, Navy and DLA shall submit a TUA Report to the Regulatory Agencies for approval. The purpose of the TUA Report is to identify and evaluate the various tank upgrade alternatives that can be applied to the Tanks at the Facility.

The TUA Report shall evaluate the following:

a. Current tank upgrade procedures;
b. Secondary containment alternatives;
c. Coatings;
d. Liners/Bladders;

e. Associated release detection systems; and
f. Any other alternatives deemed promising.

3.4 TUA Decision Meeting

Within sixty (60) days from the Regulatory Agencies' approval of the TUA Report, Navy and DLA shall schedule and hold a Decision Meeting to be attended by the Parties. The purpose of the Decision Meeting is to discuss BAPT, the TIRM procedures, and subsequent actions for maintaining, repairing, and upgrading the Tanks at the Facility. Any proposed pilot program may also be discussed. The Regulatory Agencies will not make final decisions on the TUA until the TUA Decision Document is submitted under Section 3.5.

3.5 TUA Decision Document and Implementation

Within sixty (60) days from the Decision Meeting, Navy and DLA shall submit a TUA Decision Document to the Regulatory Agencies for approval that identifies the BAPT and the manner in which BAPT will be implemented in all in-service Tanks used to store fuel at the Facility. The TUA Decision Document shall define and specify the: (1) overall operational design of BAPT; (2) technology to be applied; (3) procedural aspects to be implemented; (4) plan and schedule for implementation of BAPT setting forth the order and schedule that Tanks shall receive BAPT, including a schedule for the start of each tank's budget planning cycle; and (5) performance criteria for successful application of BAPT. The TUA Decision Document shall either incorporate the TIRM Procedures Decision Document approved by the Regulatory Agencies in Section 2 above, or, consistent with the BAPT identified, incorporate a modified TIRM Procedures Decision Document.

Once approved by the Regulatory Agencies, Navy and DLA shall implement the TUA Decision Document for all in-service Tanks in accordance with the approved schedule. The TUA Decision Document shall be revised as necessary to incorporate changes to BAPT and its plan and schedule for implementation, as well as any modifications to the TIRM Procedures Decision Document that may occur under Section 3.7. Tanks that have already begun their budget planning cycle for a previously approved BAPT, but have not completed installation of that BAPT, shall continue with installation of the previously approved BAPT unless all parties agree to a revised schedule for installing the new BAPT on those Tanks.

Tanks to which BAPT has not been successfully applied in accordance with a TUA Decision Document shall be taken out of use, temporarily closed, and emptied of all regulated substances no later than twenty-two (22) years from the Effective Date of this AOC unless an extension of time to implement BAPT has been granted pursuant to this Section. Navy and DLA shall use their best efforts to install BAPT as soon as reasonably practicable while maintaining quality and performance requirements. The Regulatory Agencies may grant an extension, or series of extensions, of the twenty-two (22) year deadline, totaling no more than five (5) years, to allow additional time to apply BAPT during which time Navy and DLA may continue to store regulated substances in Tanks to which BAPT has not yet been applied. Upon the expiration of

the twenty-two (22) year deadline and any extension(s) granted pursuant to this section, all Tanks to which BAPT has not been successfully applied shall be taken out of use, temporarily closed, and emptied of all regulated substances or permanently closed pursuant to applicable regulations or as approved by the Regulatory Agencies. The provisions of the AOC shall not be deemed by the Regulatory Agencies to have been fully satisfied until Navy and DLA have successfully applied BAPT to all Tanks which have not been permanently closed pursuant to applicable regulation or as approved by the Regulatory Agencies.

3.6 Pilot Programs

At any time, Navy and DLA may propose pilot programs to evaluate technologies and use data and conclusions drawn from such pilot programs in the development and evaluation of TUA. A pilot program may only be deployed in a Tank with approval from the Regulatory Agencies.

Prior to the installation of a proposed pilot program, Navy and DLA shall submit a Pilot Program Decision Document to the Regulatory Agencies for approval. The Pilot Program Decision Document can be combined as part of the TUA Decision Document in Section 3.5, if appropriate. The Pilot Program Decision Document shall define and specify: (1) the overall operational design of the pilot program; (2) the technology to be applied; (3) the procedural aspects to be implemented; (4) the Tank(s) to which the pilot program will be introduced; (5) the performance criteria and method of evaluating the success of the pilot program; and (6) a plan for terminating the pilot program. Any proposed pilot program shall at least be designed to provide environmental protection substantially equivalent to that of the currently approved BAPT at the time of the pilot program approval.

A pilot program, once approved by the Regulatory Agencies, if successfully installed and performing as expected, may continue to be used in a tank in accordance with the Pilot Program Decision Document. At the conclusion of the pilot program, or sooner if the operational performance measures suggest that the pilot program is at least providing environmental protection substantially equivalent to the BAPT that was current at the time of the pilot program approval, Navy and DLA shall submit a TUA Re-Evaluation Report in accordance with Section 3.7 proposing either that the pilot program be approved by the Regulatory Agencies as BAPT for the piloted tank(s) only, or as BAPT for all in-service Tanks that have not received BAPT. If the Regulatory Agencies determine that the pilot program has met its performance measures as defined in the Pilot Program Decision Document, the Regulatory Agencies will approve the piloted tank(s) as having received BAPT.

3.7 TUA Re-evaluation

At least once every five (5) years from the approval of the initial TUA Decision Document, Navy and DLA shall complete a re-evaluation of new technologies to determine if either BAPT or the TIRM procedures, or both, should be modified. Navy and DLA shall propose a scope and process (i.e., TUA Re-evaluation Scope of Work) to the Regulatory Agencies for

approval for each re-evaluation period no later than one (1) year prior to the expiration of that five (5) year interval between re-evaluation periods.

Navy and DLA shall submit to the Regulatory Agencies a TUA Re-evaluation Report for approval prior to the expiration of that five (5) year interval between re-evaluation periods. The TUA Re-evaluation Report shall identify appropriate tank upgrade alternatives and recommendations, including modifications, if any, to BAPT or the TIRM procedures, or both. Within sixty (60) days of the approval of any TUA Re-evaluation Report by the Regulatory Agencies, Navy and DLA shall hold a TUA Re-evaluation Decision Meeting to be attended by the Parties to discuss the alternatives and recommendations contained in the TUA Re-evaluation Report. Within sixty (60) days of the TUA Re-evaluation Report Decision Meeting, the Navy and DLA shall submit to the Regulatory Agencies for approval, any modified TUA Decision Document or modified TIRM Procedures Decision Document, or both. After approval by the Regulatory Agencies, Navy and DLA shall implement the modified TUA Decision Document, or the modified TIRM Procedures Decision Document, or both, in accordance with the approved schedule.

Navy and DLA may determine that military construction ("MILCON") funding is required in order to implement the new BAPT identified in a modified TUA Decision Document. Such a determination shall be made consistent with federal law, policy, and regulation (see, e.g., 10 U.S.C. §§ 2801 – 2805; OPNAVINST 11010.20H), and if so made, Navy and DLA may upgrade up to four (4) Tanks using the most recent previously-approved BAPT under the following circumstances: (1) Navy and DLA have started the MILCON planning process, and are continuing to use best efforts to obtain funds for the new BAPT, but funds have not yet been authorized and appropriated by Congress; and (2) Navy and DLA have issued a solicitation ("Request for Proposals") for the most recent previously-approved BAPT no later than five (5) years after the approval of the most recent modified TUA Decision Document. Thereafter, if MILCON funding becomes available for the new BAPT prior to award of a contract for implementation of the most recent previously-approved BAPT under this paragraph, Navy and DLA shall, within ninety (90) days after the MILCON appropriation becomes law, submit to the Regulatory Agencies for approval a proposal to either: (1) continue with the implementation of the most recent previously-approved BAPT; or (2) implement the new BAPT, along with a request for an appropriate extension of time as provided in Section 3.5. Navy and DLA's efforts to start the MILCON planning process shall be demonstrated to the Regulatory Agencies by providing a copy of an appropriate two (2)-page draft Military Construction Project Data form ("DD Form 1391") or its equivalent no later than one (1) year after approval by the Regulatory Agencies of the modified TUA Decision Document. Navy and DLA shall use their best efforts to install the new BAPT in any Tanks that have not already received BAPT as soon as reasonably practicable.

4. Release Detection / Tank Tightness Testing

The purpose of the deliverables to be developed and work to be performed under this Section is to document the current release detection system and tank tightness testing procedures used at the Facility, evaluate these procedures, and implement any approved modifications.

4.1 Tank Tightness Testing Frequency

Until the approval of the New Release Detection Alternatives Decision Document as described in Sections 4.6 and 4.8 below, Navy and DLA shall increase their tank tightness testing from a biennial test to an annual test no later than one year from the effective date of the AOC, continue to use an inventory control monitoring system, and conduct vapor monitoring for all in-service Tanks as per the DOH-approved "Red Hill Bulk Fuel Storage Facility, Final Groundwater Protection Plan" (Dec 2009), or DOH-approved successor plan.

4.2 Outline of Current Fuel Release Monitoring Systems Report

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall submit a document outlining the contents of the pending Current Fuel Release Monitoring Systems Report ("Outline of Current Fuel Release Monitoring Systems Report") to the Regulatory Agencies for approval.

4.3 Current Fuel Release Monitoring Systems Report

Within sixty (60) days from the Regulatory Agencies' approval of the Outline of Current Fuel Release Monitoring Systems Report, Navy and DLA shall submit a Current Fuel Release Monitoring Systems Report to the Regulatory Agencies for approval.

At a minimum, the Report shall include:

a. Recordkeeping procedures;
b. Dynamic re-filling procedures for tank re-commissioning;
c. Dynamic filling procedures for daily operations;
d. Static and dynamic release detection systems;
e. Release detection sensitivity; and
f. The previously completed 2008 Market Survey of Leak Detection Systems for the Red Hill Fuel Storage Facility, Fleet Industrial Center, Pearl Harbor, and the 2014 Addendum I to the 2008 Market Survey.

4.4 Scoping Meeting(s) for New Release Detection Alternatives

Within sixty (60) days from the Regulatory Agencies' approval of the Current Fuel Release Monitoring Systems Report, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the Scope of Work for the study to evaluate possible new or improved release detection alternatives. During the meeting, criteria for decision making will be discussed, and a decision will be made as to whether additional Scoping Meetings are needed.

4.5 New Release Detection Alternatives Scope of Work

Within ninety (90) days from the Final Scoping Meeting, Navy and DLA shall submit the New Release Detection Alternatives Scope of Work to the Regulatory Agencies for approval.

4.6 New Release Detection Alternatives Report

Within twelve (12) months from approval of the New Release Detection Alternatives Scope of Work, Navy and DLA shall submit a New Release Detection Alternatives Report to the Regulatory Agencies for approval.

The New Release Detection Alternatives Report shall include:

a. A description of existing practices;
b. Static and dynamic release detection system alternatives;
c. Tank tightness alternatives;
d. Comparison of the effectiveness of existing and alternative technologies; and
e. A decision matrix.

4.7 New Release Detection Alternatives Decision Meeting

Within sixty (60) days from the Regulatory Agencies' approval of the New Release Detection Alternatives Report, Navy and DLA shall schedule and hold a Decision Meeting to be attended by the Parties. The purpose of the Decision Meeting is to determine subsequent actions for implementing the new release detection alternatives as appropriate. The Regulatory Agencies will not make final decisions on the New Release Detection Alternatives until the New Release Detection Alternatives Decision Document is submitted under Section 4.8.

4.8 New Release Detection Alternatives Decision Document and Implementation

Within sixty (60) days after the Decision Meeting, Navy and DLA shall submit a Release Detection Alternatives Decision Document, including an implementation plan and schedule, to the Regulatory Agencies for approval. Once approved by the Regulatory Agencies, Navy and DLA shall implement the Release Alternatives Decision Document in accordance with the approved schedule.

5. Corrosion and Metal Fatigue Practices

The purpose of the deliverables to be developed and work to be performed under this Section is to evaluate the possibility and extent of corrosion and metal fatigue as well as practices to control corrosion and metal fatigue at the Facility. Based on this evaluation, procedures under Sections 2 or 3 of this SOW may be modified to improve control of corrosion and metal fatigue.

Navy and DLA shall maintain records of and continue efforts to complete internal cleaning and inspection of the aboveground pipelines in the tunnels within the Facility.

5.1 Outline of Corrosion and Metal Fatigue Practices Report

Within thirty (30) days of the Effective Date of the AOC, Navy and DLA shall submit an outline detailing the contents of the pending Corrosion and Metal Fatigue Practices Report ("Outline of Corrosion and Metal Fatigue Practices Report") to the Regulatory Agencies for approval.

5.2 Corrosion and Metal Fatigue Practices Report

Within sixty (60) days from approval of the Outline of Corrosion and Metal Fatigue Practices Report, Navy and DLA shall submit a Corrosion and Metal Fatigue Practices Report to the Regulatory Agencies for approval. The Corrosion and Metal Fatigue Practices Report shall include, among other things, an explanation of the current practices for assessing the condition of the Tanks and associated fuel containment infrastructure, including details on the non-destructive testing procedures. Additionally, the report will describe any recordkeeping relating to corrosion and metal fatigue practices at the Facility.

5.3 Destructive Testing

The purpose of the deliverables to be developed and work to be performed under this Section is to verify the findings of the Corrosion and Metal Fatigue Practices Report through the use of destructive testing on at least one tank at the Facility.

5.3.1 Scoping Meeting(s) for Destructive Testing

Within ninety (90) days from the Regulatory Agencies' approval of the Corrosion and Metal Fatigue Practices Report, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the Destructive Testing Scope of Work, and a decision will be made as to whether additional Scoping Meetings are needed.

5.3.2 Destructive Testing Scope of Work

Within ninety (90) days from the final Destructive Testing Scoping Meeting, Navy and DLA shall submit a Destructive Testing Scope of Work, including a plan for implementation and a proposed schedule, to the Regulatory Agencies for approval. The Scope of Work shall detail planned destructive testing to be conducted on at least one (1) tank at the Facility. Once approved by the Regulatory Agencies, Navy and DLA shall implement the Scope of Work in accordance with the approved schedule.

5.3.3 Destructive Testing Results Report

Within twenty-four (24) months from the Regulatory Agencies' approval of the Destructive Testing Scope of Work, Navy and DLA shall submit the Destructive Testing Results Report to the Regulatory Agencies for approval.

5.4 Decision on Need for and Scope of Modified Corrosion and Metal Fatigue Practices

If the Parties determine that the results of the previous deliverables in this Section indicate the need for evaluation and implementation of potential changes in practices to control corrosion or metal fatigue, Navy and DLA shall, within sixty (60) days from the Regulatory Agencies' approval of the Destructive Testing Results Report, schedule and hold a Scoping Meeting to be attended by the Parties for the purpose of developing appropriate modifications to the scopes of work and timelines in Section 2 and/or Section 3. Additional scoping meetings shall be conducted, and deliverables shall be modified or added using appropriate procedures in Section 2 and/or Section 3, as determined necessary by the Parties, to address any needs for further evaluation, development, or implementation of practices to control corrosion or metal fatigue. Once approved by the Regulatory Agencies, Navy and DLA shall implement the approved modifications in accordance with the approved schedule.

6. Investigation and Remediation of Releases

The purpose of the deliverables to be developed and the work to be performed under this Section is to determine the feasibility of alternatives for investigating and remediating releases from the Facility.

The deliverables shall include:

a. The response to the January 2014 release from Tank #5; and
b. An evaluation and discussion of potential remediation methods for the January 2014 Tank #5 release and any future releases

6.1 Scoping Meeting(s) for Investigation and Remediation of Releases

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the Investigation and Remediation Releases Scope of Work. During the meeting, the criteria for decision making will be discussed, and a decision will be made as to whether additional Scoping Meetings are needed.

6.2 Investigation and Remediation of Releases Scope of Work

Within sixty (60) days of the final Scoping Meeting, Navy and DLA shall submit the Investigation and Remediation of Releases Scope of Work to the Regulatory Agencies for approval.

6.3 Investigation and Remediation of Releases Report

Within twenty-four (24) months from the Regulatory Agencies' approval of the Investigation and Remediation of Releases Scope of Work, Navy and DLA shall submit the Investigation and Remediation Releases Report to the Regulatory Agencies for approval.

6.4 Investigation and Remediation of Releases Decision Meeting

Within sixty (60) days from the Regulatory Agencies' approval of the Investigation and Remediation of Releases Report, Navy and DLA shall schedule and hold a Decision Meeting to be attended by the Parties. The purpose of the Decision Meeting is to evaluate the feasibility to investigate and remediate potential releases from the Facility to the maximum extent practicable. The Regulatory Agencies will not make final decisions on the Investigation and Remediation of Releases until the Investigation and Remediation Releases Decision Document is submitted under Section 6.5.

6.5 Investigation and Remediation of Releases Decision Document and Implementation

Within sixty (60) days from the Decision Meeting, Navy and DLA shall submit a Decision Document for the Investigation and Remediation of Releases, including a proposed plan and schedule for implementation, to the Regulatory Agencies. Once approved by the Regulatory Agencies, Navy shall implement the Investigation and Remediation of Releases Decision Document in accordance with the approved schedule.

7. Groundwater Protection and Evaluation

The purpose of the deliverables to be developed and work to be performed under this Section is to monitor and characterize the flow of groundwater around the Facility. Navy and DLA shall update the existing Groundwater Protection Plan to include response procedures and trigger points in the event that contamination from the Facility shows movement toward any drinking water well. The collective work done in this Section shall be used to inform subsequent changes to the Groundwater Protection Plan. The deliverables and work to be performed under this Section may include the installation of additional monitoring wells as needed.

7.1 Groundwater Flow Model Report

The purpose of this deliverable is to refine the existing groundwater flow model and improve the understanding of the direction and rate of groundwater flow within the aquifers around the Facility.

7.1.1 Scoping Meeting(s) for Groundwater Flow Model Report

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the draft Scope of Work for the Groundwater Flow Model Report, and a decision will be made as to whether additional Scoping Meetings are needed.

7.1.2 Groundwater Flow Model Report Scope of Work

Within ninety (90) days from the final Scoping Meeting, Navy and DLA shall submit the Groundwater Flow Model Scope of Work to the Regulatory Agencies for approval. The Groundwater Flow Model Scope of Work shall consider interim deliverables to refine the

groundwater flow modeling and related data requirements prior to completion of the Groundwater Flow Model Report. At a minimum, progress reports shall be provided to the Regulatory Agencies every four (4) months after approval of the Groundwater Flow Model Report Scope of Work.

7.1.3 Groundwater Flow Model Report

Within twenty-four (24) months from the approval of the Groundwater Flow Model Report Scope of Work, Navy and DLA shall submit a Groundwater Flow Model Report to the Regulatory Agencies for approval.

7.2 Contaminant Fate and Transport Model Report

The purpose of the Contaminant Fate and Transport Model Report is to utilize the Groundwater Flow Model to improve the understanding of the potential fate and transport, degradation, and transformation of contaminants that have been and could be released from the Facility.

7.2.1 Scoping Meeting(s) for Contaminant Fate and Transport Model Report

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the draft Scope of Work for the Contaminant Fate and Transport Model, and a decision will be made as to whether additional Scoping Meetings are needed.

7.2.2 Contaminant Fate and Transport Model Report Scope of Work

Within ninety (90) days from the final Scoping Meeting, Navy and DLA shall submit the Contaminant Fate and Transport Model Scope of Work to the Regulatory Agencies for approval.

7.2.3 Contaminant Fate and Transport Model Report

Within one-hundred and eighty (180) days from the Regulatory Agencies' approval of the Groundwater Flow Model Report, Navy and DLA shall submit a Contaminant Fate and Transport Model Report to the Regulatory Agencies for approval.

7.3 Groundwater Monitoring Well Network

The primary purpose of this deliverable is to evaluate the number and placement of groundwater monitoring wells required to adequately identify possible contaminant migration. The secondary purpose of this deliverable is to obtain additional data for the Groundwater Flow Model and Contaminant Fate and Transport Model Report.

7.3.1 Scoping Meeting for Groundwater Monitoring Well Network

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the

Scoping Meeting is to detail the contents of the draft Scope of Work for the Groundwater Monitoring Well Network. During the Scoping Meeting, the criteria for decision making will be discussed, and a decision will be made as to whether additional Scoping Meetings are needed.

7.3.2 Groundwater Monitoring Well Network Scope of Work

Within ninety (90) days from the final Scoping Meeting, Navy and DLA shall submit the Groundwater Monitoring Well Network Scope of Work to the Regulatory Agencies for approval. The Groundwater Monitoring Well Network Scope of Work shall consider whether interim deliverables for developing a groundwater monitoring well network are needed for the development of the groundwater flow modeling and related data requirements. If gaps in groundwater monitoring well data are identified and validated, Navy and DLA will begin installation of additional monitoring wells as soon as possible.

7.3.3 Groundwater Monitoring Well Network Report

Within twelve (12) months from the Regulatory Agencies' approval of the Groundwater Flow Model Report, Navy and DLA shall submit a Groundwater Monitoring Well Network Report. This report shall include a recommendation of the number and location of groundwater monitoring wells, including those already installed and potential new wells, to the Regulatory Agencies for approval.

7.3.4 Groundwater Monitoring Well Network Decision Meeting

Within sixty (60) days from the Regulatory Agencies' approval of the Groundwater Monitoring Well Network Report, Navy and DLA shall schedule and hold a Decision Meeting to be attended by the Parties. The purpose of the Decision Meeting is to evaluate subsequent actions for implementing the Groundwater Monitoring Well Network. The Regulatory Agencies will not make final decisions on the Groundwater Monitoring Well Network until the Groundwater Monitoring Well Network Decision Document is submitted under Section 7.3.5.

7.3.5 Groundwater Monitoring Well Network Decision Document and Implementation

Within sixty (60) days from the Decision Meeting, Navy and DLA shall submit a Decision Document for the Groundwater Modeling Well Network, including a proposed implementation plan and schedule, to the Regulatory Agencies for approval. Once approved by the Regulatory Agencies, Navy shall implement the Decision Document for the Groundwater Modeling Well Network in accordance with the approved schedule.

8. Risk/Vulnerability Assessment

The purpose of the deliverables to be developed and work to be performed under this Section is to assess the level of risk the Facility may pose to the groundwater and drinking water aquifers and to inform the Parties in subsequent development of BAPT decisions.

The Risk/Vulnerability Assessment Report may include:

a. A risk matrix;
b. Probability of catastrophic events (seismic events, leaks);
c. Completed hydrology studies;
d. Probability of mechanical and human errors;
e. Effectiveness of risk mitigation and protective measures; and
f. A comparison of risks and benefits between the current Facility and alternative fuel storage facilities.

8.1 Scoping Meeting(s) for Risk/Vulnerability Assessment

Within thirty (30) days from the Effective Date of the AOC, Navy and DLA shall schedule and hold an initial Scoping Meeting to be attended by the Parties. The purpose of the Scoping Meeting is to detail the contents of the draft Scope of Work for Risk/Vulnerability Assessment, and a decision will be made as to whether additional Scoping Meetings are needed.

8.2 Risk/Vulnerability Assessment Scope of Work

Within ninety (90) days from the final Scoping Meeting, Navy and DLA shall submit the Risk/Vulnerability Assessment Scope of Work to the Regulatory Agencies for approval.

8.3 Risk/Vulnerability Assessment Report

Within eighteen (18) months from the Regulatory Agencies' approval of the Risk/Vulnerability Assessment Scope of Work, Navy and DLA shall submit a Risk/Vulnerability Assessment Report to the Regulatory Agencies for approval. The Risk/Vulnerability Assessment Report may be revised as new information becomes available. All revisions to the Risk/Vulnerability Assessment Report shall be submitted to the Regulatory Agencies for approval.

9. Work Table

Subject	Work	Dates
Section 2 **Tank Inspection, Repair, and Maintenance** ("TIRM")		
	2.1 - Scoping Meeting	Within 30 days from effective date of AOC
	2.2 - TIRM Procedures Report	Within 120 days from final Scoping Meeting
	2.3 - Decision Meeting	Within 60 days from Report Receipt
	2.4 - Decision Document/Implementation	Within 60 days from Decision Meeting
Section 3 **Tank Upgrade Alternatives ("TUA")**		
	3.1 - Scoping Meeting	Within 30 days from effective date of AOC
	3.2 - Scope of Work	Within 90 days from final Scoping Meeting
	3.3 - TUA Report	Within 12 months from Scope of Work Approval
	3.4 - Decision Meeting	Within 60 days from TUA Report Approval
	3.5 - Decision Document/Implementation	Within 60 days from Decision Meeting
	3.7 - TUA Re-evaluation Report Scope of Work	No later than 1 year prior to expiration of 5-year re-evaluation period
	3.7 – TUA Re-evaluation Report	At least once every five (5) years from approval of initial TUA Decision Document
	3.7– TUA Re-evaluation Decision Meeting	Within 60 days from approval of TUA Re-evaluation Report
	3.7 – Modified TUA Decision Document (if required)	Within 60 days from TUA Re-evaluation Decision Meeting
	3.7 – Modified TIRM Decision Document (if required)	Within 60 days from TUA Re-evaluation Decision Meeting
	3.7 – Military Construction Project Date form (DD Form 1391) or equivalent (if required)	Within 1 year from modified TUA Decision Document approval
	3.7 – Proposal to continue with old BAPT or implement new BAPT (if required)	Within 90 days after military construction funds are appropriated
Section 4 **Release Detection / Tank Tightness Testing**		
	4.1 Tank Tightness Testing Frequency	Within 1 year from effective date of AOC
	4.2 - Outline of Current Fuel Release Monitoring Systems Report	Within 30 days from effective date of AOC
	4.3 - Current Fuel Release Monitoring Systems Report	Within 60 days from Outline of Current Fuel Release Monitoring Systems Report Approval
	4.4 - Scoping Meeting	Within 60 days from Current Fuel Release Monitoring Systems Report Approval
	4.5 - Scope of Work	Within 90 days from final Scoping Meeting
	4.6 - New Release Detection Alternatives Report	Within 12 months from Scope of Work Approval
	4.7 - Decision Meeting	Within 60 days from New Release Detection Alternatives Report Approval
	4.8 - Decision Document/Implementation	Within 60 days from Decision Meeting
Section 5 **Corrosion and Metal Fatigue Practices**		
	5.1 - Outline of Corrosion and Metal Fatigue Practices Report	Within 30 days from effective date of AOC
	5.2 - Corrosion and Metal Fatigue Practices Report	Within 60 days from Outline of Corrosion and Metal Fatigue Practices Report Approval
	5.3.1 - Scoping Meeting for Destructive Testing	Within 90 days from Report Approval
	5.3.2 - Scope of Work for Destructive Testing	Within 90 days from final Scoping Meeting
	5.3.3 - Destructive Testing Results Report	Within 24 months from Scope of Work Approval
	5.4 - Scoping Meeting for Modified Corrosion and Metal Fatigue Practices (if required)	Within 60 days from Destructive Testing Results Report Approval
Section 6 **Investigation and Remediation of Releases**		
	6.1 - Scoping Meeting	Within 30 days from effective date of AOC
	6.2 - Scope of Work	Within 60 days from final Scoping Meeting
	6.3 - Investigation and Remediation of Releases Report	Within 24 months from Scope of Work Approval
	6.4 - Decision Meeting	Within 60 days from - Investigation and Remediation of Releases Report Approval

	6.5 - Decision Document/Implementation	Within 60 days from Decision Meeting
Section 7 Groundwater Protection and Evaluation		
Section 7.1 Groundwater Flow Model Report	7.1.1 - Scoping Meeting	Within 30 days from effective date of AOC
	7.1.2 - Scope of Work	Within 90 days from final Scoping Meeting
	7.1.3 - Groundwater Flow Model Report	Within 24 months from Scope of Work Approval
Section 7.2 Contaminant Fate and Transport Model Report	7.2.1 - Scoping Meeting	Within 30 days from effective date of AOC
	7.2.2 - Scope of Work	Within 90 days from final Scoping Meeting
	7.2.3 - Contaminant Fate and Transport Model Report	Within 180 days from Groundwater Flow Model Report Approval
Section 7.3 Groundwater Monitoring Well Network	7.3.1 - Scoping Meeting	Within 30 days from effective date of AOC
	7.3.2 - Scope of Work	Within 90 days from final Scoping Meeting
	7.3.3 - Groundwater Monitoring Well Network Report	Within 12 months from Groundwater Flow Model Report Approval
	7.3.4 - Decision Meeting	Within 60 days from Groundwater Monitoring Well Network Report Approval
	7.3.5 - Decision Document/Implementation	Within 60 days from Decision Meeting
Section 8 Risk/Vulnerability Assessment		
	8.1 - Scoping Meeting	Within 30 days from effective date of AOC
	8.2 - Scope of Work	Within 90 days from final Scoping Meeting
	8.3 - Risk/Vulnerability Assessment Report	Within 18 months from Scope of Work Approval

10. Acronyms and Abbreviations

AOC	Administrative Order on Consent
API	American Petroleum Institute
BAPT	Best Available Practicable Technology
DLA	Defense Logistics Agency
DOH	Hawaii Department of Health
EPA	United States Environmental Protection Agency
Navy	United States Department of Navy
QA/QC	Quality Assurance and Quality Control
SOW	Statement of Work
TIRM	Tank Inspection, Repair, and Maintenance
TUA	Tank Upgrade Alternatives
USTs	Underground Storage Tanks

Contract N62742-14-D-1884, Delivery Order 0028

Section 8.2: Risk/Vulnerability Assessment Scope of Work

April 13, 2017

Red Hill Bulk Fuel Storage Facility
NAVSUP FLC Pearl Harbor, HI (PRL)
Joint Base Pearl Harbor-Hickam

Administrative Order on Consent
In the matter of Red Hill Bulk Fuel Storage Facility
EPA Docket No. RCRA 7003-R9-2015-01
DOH Docket No. 15-UST-EA-01

Contract Agency:

NAVFAC Pacific
258 Makalapa Drive, Suite 100
JBPHH Hawaii 96860-3134

Prepared by:
Mr. Mark Manfredi
Mr. John F. Montgomery II

QRVA Scope of Work Executive Summary

The Quantitative Risk and Vulnerability Assessment (QRVA) will assess the level of risk the Red Hill Bulk Fuel Storage Facility (RHBFSF) may pose to the surrounding groundwater to inform the Government in subsequent development of best available practicable technology (BAPT) decisions.

During the scoping discussions for Section 8 of the Administaravtive Order on Consent Statement of Work (AOC SOW) all Parties agreed that a qualitative risk vulnerability assessment had limited value to support prudent decision making. A Quantitative Risk and Vulnerability Assessment was selected for providing a more rigorus and repeatable approach to evaluating risk. A normal baseline QRVA for a large, complex facility requires 5 to 7 years to complete and is normally broken into phases. This specific baseline QRVA will be broken into four distinct phases: internal events (excluding internal fire and flooding), internal/external fire and flooding, seismic events, and other external events.

The first phase of the baseline QRVA, and this scope of work, is designed to focus on internal events (not including fire or flood). This includes, but is not limited to equipment or structural failures in both frontline and support systems, human errors, etc. The report from the first phase will be submitted 18 months from the approval of this scope of work, in compliance with the RHBFSF AOC SOW Section 8.3. The remaining three phases will be performed sequentially and overlapped where technically feasible to better support scheduling for the AOC.

As other sections of the AOC are completed and new information becomes available, future revised assessments could be done in comparison to the baseline. Sections 5 and 6 of this scope of work explain this in further detail.

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1 – Introduction

The purpose of this scope of work is to define the processes and methodology necessary to complete phase one of the baseline Quantitative Risk and Vulnerability Assessment (QRVA) for the Red Hill Bulk Fuel Storage Facility (RHBFSF) in compliance with the RHBFSF Administrative Order on Consent – Statement of Work (AOC-SOW) Section 8.2. The phase one QRVA baseline report will be due 18 months from the approval date of this scope of work. It will be designed to serve as a tool to help facilitate decision making that will mitigate risk and improve safety.

1.1 – Background

The RHBFSF site is located approximately 2.5 miles northeast of Pearl Harbor on the island of Oahu in Hawaii. The facility lies along the western edge of the Koolau Range and is situated on a topographic ridge that divides the Halawa Valley and the Moanalua Valley. The site is bordered to the south by the Salt Lake volcanic crater and occupies approximately 144 acres of land. The surface topography varies from approximately 200ft to 500ft above mean sea level.

The facility consists of twenty 12.5-million-gallon, field constructed, underground storage tanks (UST) constructed in the early 1940s. The tanks are 250ft tall and 100ft in diameter, with a domed top and base. The facility currently stores Jet Propulsion Fuel No. 5 (JP-5), Jet Propulsion Fuel No. 8 (JP-8), and marine diesel (F-76). Historic fuel storage has included diesel oil, Navy Special Fuel Oil, Navy distillate (ND), F-76, aviation gas, motor gas, JP-5, and JP-8.

In January 2014, up to 27,000 gallons of JP-8 was released from Tank 5, which was being returned to service after having undergone inspections, repair, and maintenance. As a result of the fuel release from Tank 5, the U.S. Environmental Protection Agency (EPA) and the Hawaii Department of Health (DOH) brought an enforcement action against the Navy and the Defense Logistics Agency (DLA) to address the fuel release and minimize the likelihood and impact of future releases. Regulatory experience has shown that a negotiated agreement, such as an administrative order on consent, is the appropriate enforcement tool to address such a unique facility and solve complex environmental problems since it allows for flexible, collaborative, and innovative solutions. The AOC-SOW is a proactive approach that goes beyond the normal scope of merely complying with current regulations.

2 – Risk Levels, Scope of Hazards, and Boundary Assessments

Prior to initiating technical work on a facility QRVA, it is necessary to clearly establish the desired risk level, scope phase, and boundary assessments.

2.1 – Risk Assessment Levels

“Levels” of risk assessment are frequently defined to focus the evaluations such that the associated results can efficiently and effectively support risk management. These levels of risk assessment can be defined, as desired, by the risk analyst, but the objective of

defining these levels is to support an understanding of risk, which ultimately can facilitate the development and implementation of effective risk management actions or options. The "level" of a QRVA is often best described by characterizing the key figure(s) of merit desired to be developed and quantified via the QRVA. For example, any or all of the following levels of QRVA could be pursued for a RHBFSF QRVA:

- Level 1 – Frequency (and Annual Probability) of Loss of Fuel Inventory Control (by Volume Range) within the RHBFSF Property Boundaries

- Level 2 – Frequency (and Annual Probability) of Uncontrolled Release of Fuel Inventory (by Volume Range) Outside the RHBFSF Property Boundaries that Could Impact Red Hill Groundwater Shaft Water Quality

- Level 3 – Frequency (and Annual Probability) of Exceeding Public Water Supply Quality Levels or Limits (e.g., within the Red Hill groundwater shaft) Directly Associated with Uncontrolled Release of Fuel Inventory outside the RHBFSF Property Boundaries

- Level 4 – Frequency (and Annual Probability) of Public Deaths (or Injuries or Illnesses) Directly Associated with Uncontrolled Release of Fuel Inventory outside the RHBFSF Property Boundaries

Experience has shown that Levels 1 and/or 2 above are often adequate to facilitate effective risk management decision-making for the facility owner/operator. The QRVA described in this SOW focuses on a Level 2 risk assessment, as defined above. The result of this risk assessment can provide evaluation information and metrics to support work being executed under the AOC-SOW Sections 6 and 7 which can support expansion of the risk assessment to a Level 3 assessment for the Red Hill groundwater shaft, as desired and directed by the Navy. Other QRVA levels can, of course, be defined through modification or supplementation of the risk metrics outlined above.

2.2 – Scope of Hazards

Next, the scope of hazards to be addressed within the QRVA must be specified. Industry experience, supplemented by industry standards for risk assessment, has established that a comprehensive QRVA should generally consider risks from the hazard sources below. They are grouped into phases, which are recommended to efficiently characterize the scope of hazards to be addressed in the RHBFSF QRVA:

- Phase 1 – Internal Events (not including fire or flood)
  - Equipment or structural failures in both frontline and support systems, human errors, etc.

- Phase 2 – Internal and External Fire and Flood Events
  - Internal flooding
  - Internal fires
  - Internal sabotage (not included within the scope of this analysis for security reasons)
  - External flooding, tsunami, and heavy precipitation
  - External fires

- Phase 3 – Seismic Events
  - Earthquakes

- Phase 4 – Additional External Events
  - High Winds
  - Storms (tornados, hurricanes, etc.)
  - Landslides (or mud slides)
  - Proximity Transportation Accidents
  - Aircraft Crashes
  - External Hazardous Material or Chemical Spills or Releases
  - Extreme Weather (e.g., high temperature, etc.)
  - Terrorist Acts (not included within the scope of this analysis for security reasons)
  - Other Facility-Specific Hazards (often location-dependent hazards that can be special cases of other general hazard sources)

As part of this scope of work, Phase 1 scope of hazards will be assessed in the QRVA SOW and delivered to the regulating agencies 18 months from the approval of this scope of work, in accordance with the AOC. The remaining phases will be assessed in the normal linear progression of a QRVA outside of this scope of work (see Section 4).

2.3 – Boundaries of Assessment

The scope of a QRVA is defined via clear and comprehensive characterization of assessment boundaries. First, the functional and physical boundaries of the facility to be assessed must be clearly defined. The functional boundaries are facility-specific, depending upon the processes performed by or at the facility. The physical boundaries are generally defined by specifying the target property lines, structures, systems, and components (SSC) considered to be within the facility functional boundaries. Functional and physical boundaries are generally those supported by existing as-built, as-operated design basis documentation (DBD). DBD includes currently-effective documentation and schematic drawing information associated with the as-built, as-operated facility. DBD includes all effective documentation associated with facility design, operation, maintenance, and testing; e.g., documentation associated with the initial information item request presented in Section 2.4.1 of this SOW.

Closely related to analysis boundaries is the issue of the physical and functional basis or starting point for the QRVA. An effective design freeze date must be established to ensure a stable design basis for the QRVA. Regarding determination of the RHBFSF design basis for the QRVA, the following design basis has been selected by the Navy:

> Freeze the facility design as of the date of approval of this scope of work. The design basis will be the as-built, as-operated facility as of the scope of work approval date, to include design, operation, maintenance, and testing changes that have been approved and funded as of that date, but with no additional modification options.

2.4 – Procedural Approach

The overall process flow for the RHBFSF baseline QRVA is summarized in Figure 2-1.

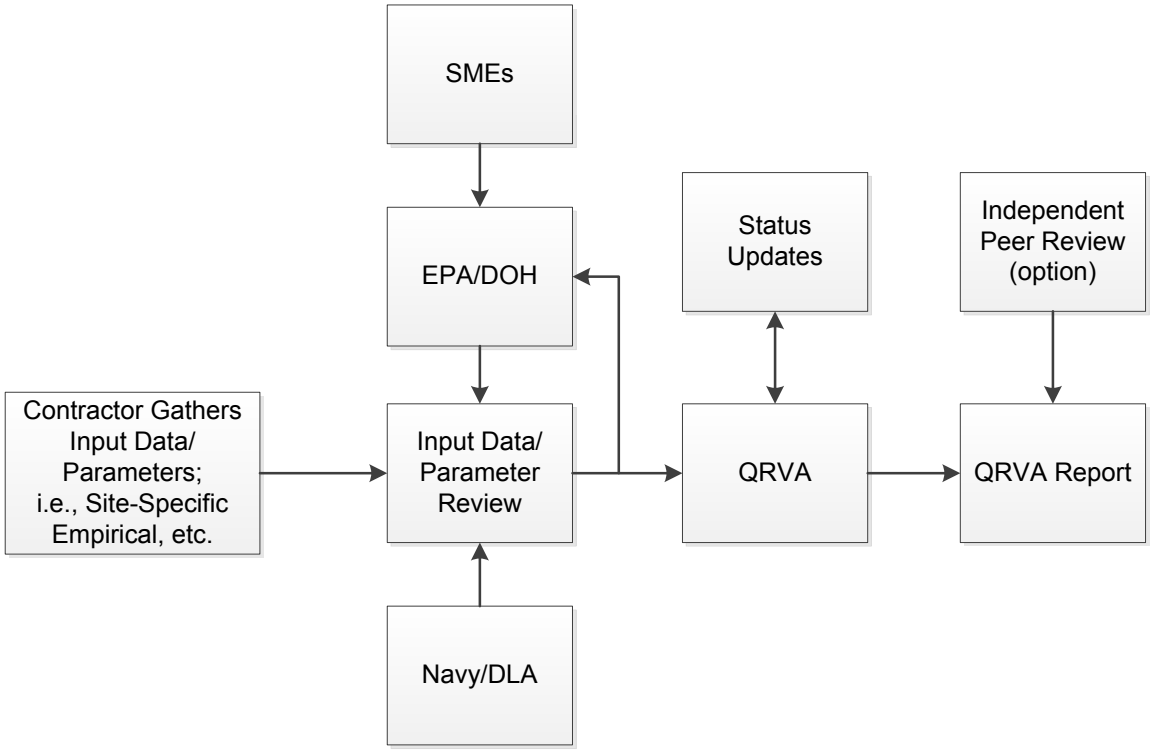


Figure 2-1. QRVA Process Overview

The lines of communication for the QRVA process is summarized in Figure 2-2.

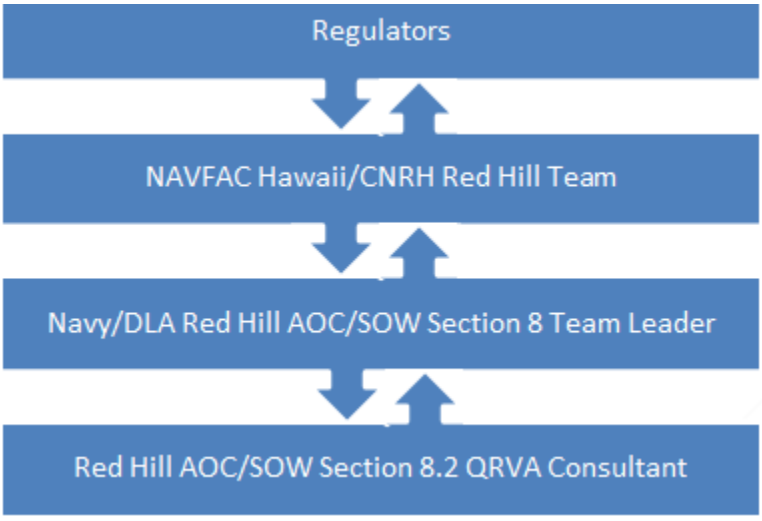


Figure 2-2. QRVA Lines of Communication

2.4.1 – Contractor Gathers Input Data/Parameters

An initial data request will include, but not be limited to:

1. RHBFSF general site and facility layout and arrangement drawings.

2. A comprehensive set of RHBFSF P&IDs or equivalent flow and/or logic diagrams.

3. Tank and piping isometric drawings or similar layout diagrams.

4. System description documentation.

5. A comprehensive electronic list of all SSCs included within the scope of the QRVA, including alpha-numeric component ID numbers, system designators, specific component service descriptions, component types, component locations, and reference(s) to SSC design documentation. This list should include all tanks, piping, pumps, valves, electric power, and associated instrumentation and controls equipment required to operate the facility.

6. SSC design documentation, preferably in electronic format, including design or building code information; e.g., American Petroleum Institute (API) and/or American Society of Mechanical Engineers (ASME) code information for tanks.

7. Structure and component seismic design criteria.

8. RHBFSF site location scheme; e.g., areas, zones, rooms, or compartments with associated location (e.g., 3D coordinate system) information. If fire zones have been designated for this facility based on fire area and barrier criteria, this information is preferred.

9. All facility operating and maintenance procedures, including normal and emergency (incident response) operating procedures and policies.

10. Facility operating logs, preferably for the entire history of the facility, but for at least the last 5 years (e.g., 2012 to present) of facility operation.

11. A list of all historical incidents involving hydrocarbon or other fuel or material release from facility tanks and systems, to include not only tank or piping rupture events, but also releases associated with human errors; e.g., during fuel or other fluid tank fill, tank emptying, or other transfer, maintenance, or testing operations. This includes all Unplanned Fuel Movement (UFM) reports and associated corrective action taken.

12. Loss of fuel inventory incident reports over the entire history of the facility.

13. Either the record of all fuel movements over the past 5 years or an expected realistic facility operating profile to be used in the QRVA; i.e., average demand loading for all RHBFSF equipment over the long term. This includes estimates for run time and demand cycle numbers for all RHBFSF equipment per year over the long term (e.g., pump on/off cycles and run time, valve open/closure cycles, tank fill/offload

cycles and timing, piping segment active flow time and standby/rest time, equipment sensor cycles and monitoring time, instrumentation and control equipment actuation cycles and monitoring time, and power source energize/de-energize cycles and power provision time over the long term).

14. The full text of any previous facility risk and vulnerability assessments and other risk assessment reports performed for the RHBFSF, along with all associated appendices, models, and databases.

15. Other documentation deemed pertinent to RHBFSF QRVA, as determined by DOD.

Information collection, review, and data management will be performed in accordance with standard quality assurance/quality control practices defined in Section 3.7 of this document.

Data applied in the QRVA are generally documented and applied within relational databases embedded within the QRVA software applied for event sequence quantification, RISKMAN™, in this project. Typical quantitative parameters required for a QRVA include:

- Initiating Event Frequency Values
- Scenario-Related Failure Exposure Parameters
  - Calendar Time Exposure
  - Mission Time or Operating Time Exposure
  - Mission Demand Exposure
    - Basic Event Probability Values Developed Using the Exposure Parameters above with:
  - Component Failure Rates (time-based and demand-based)
  - Human Failure Event Human Error Probability Values
    - Common Cause Failure Parameter Values Based on Common Cause Failure Group Size (e.g., α, β, γ, and δ values)
    - System or Component Alignment Fractions

The general process for developing and managing these data is as follows:

- Identify the data parameters necessary to support the QRVA.
- Obtain industry generic data for these parameters via industry data sources.
- Obtain data for SSCs similar to those in operation at the QRVA target facility (the RHBFSF in this case).
- Obtain facility-specific data, from the owner/operator of the target facility, the Navy in this case, primarily from the RHBFSF operator, the Joint Base Pearl Harbor Fuels Department.

- Combine these data mathematically to formulate appropriate parameter entries for QRVA event sequence quantification, primarily via application of Bayesian update techniques (see Appendix A for details).

Generic data applied in the QRVA will be taken from reputable documented references. Most current references for generic data, such as NUREG/CR-6928, apply Gamma functions to characterize time-based initiating event frequency values and equipment failure rates, and they apply Beta functions for demand-based failure rates. That practice will be followed for this QRVA. In general, Poisson distributions, sometimes used as examples in this SOW, will not be applied in the actual QRVA, and Beta function distributions will be applied instead, in accordance with current standard data analysis practices (see NUREG/CR-6928).

Any documented component-specific degradation model information provided by the Navy or AOC stakeholders via the communication channel presented in Figure 2-2 will be evaluated and considered for application in the QRVA. While the data parameters will reside in the applied QRVA software, RISKMAN, in this project, these parameters will be extracted into common tabular format; e.g., via Microsoft (MS) Excel or MS Access tables, for technical review and verification. Each data parameter applied in the RHBFSF QRVA will have a pedigree documented within the QRVA report, including the information sources applied in the development of the parameter. In some cases, engineering judgment may be applied to estimate some QRVA input parameters. When engineering judgment is so applied, the QRVA report will provide documentation of the bases and assumptions supporting development of each of these input data parameters.

All data applied in the QRVA will not only have a documented pedigree, but will also have a documented preparer, reviewer, and approver within the Contractor.

2.4.2 – Input Data/Parameter Review

Upon completion of the QRVA data analysis task, the QRVA data will be made available for review by the Navy, Regulators, and SMEs; e.g., the EPA, DOH, DLNR, USGS, BWS, etc. This review is scheduled to be conducted over a 2-week time period. The documented review comments on this data review will be evaluated and resolved by the Contractor via written response approximately 2 weeks after receipt of all review comments

2.4.3 – Technical Work

Technical work on the RHBFSF QRVA will be conducted applying the methodology, guidelines, and procedures outlined in the QRVA Methodology presented in Appendix A of this SOW. Primary guidance information sources include the following:

- American Nuclear Society (ANS) and Institute of Electrical and Electronic Engineers, “PRA Procedures Guide: A Guide to the Performance of Probabilistic Risk Assessments for Nuclear Power Plants,” sponsored by the U.S. Nuclear Regulatory Commission and the Electric Power Research Institute, NUREG/CR-2300, April 1983 (Reference 3).

- U.S. Nuclear Regulatory Commission, "PSA Procedures Guide," NUREG/CR-2815, 1985 (Reference 4).

- American Institute of Chemical Engineers Center for Chemical Process Safety, "Guidelines for Chemical Process Quantitative Risk Analysis," 2nd Edition, October 1999 (Reference 5).

Additional guidance for special QRVA topics and tasks is provided via the references cited in Section 7, Appendix A, and via the information sources included in the bibliography of this SOW.

3 – Quantitative Risk and Vulnerability Assessment

3.1 – Definitions of Key Terms

The definitions of some key terms applied in QRVA are presented in this section. A comprehensive list of QRVA terms and definitions is presented in Appendix E. Some definitions of fundamental QRVA terms are presented as follows:

Risk: The combined answer to three questions that consider (1) what can go wrong?, (2) how likely is it?, and (3) what are the potential consequences? More sophisticated definitions of risk include a fourth question: (4) what is our level of uncertainty (or confidence) associated with the answers to the first three questions?

Hazard: Anything that has the potential to initiate or cause an undesired sequence of events and/or conditions to occur that leads to an undesired consequence. Examples of QRVA hazards are facility equipment failures, human errors, fires, floods, earthquakes, adverse weather, etc.

Vulnerability: Weakness in the design or operation of a system, component, or structure that could increase the probability of disabling its function and, thus, contribute, in a potentially significant way, to overall facility risk.

Initiating Event: An event that perturbs the steady state operation of the facility and could lead to an undesired facility condition. This is an event that can start or precipitate a sequence of additional events or conditions that ultimately result in an undesired consequence.

Basic Event: An element of the QRVA model for which no further decomposition is performed because it is at the limit of resolution consistent with available data.

Probability: The likelihood that an event will occur as expressed by the ratio of the number of actual occurrences to the total number of possible occurrences.

Frequency: The actual (historical) or expected (future) number of occurrences of an event or accident condition expressed per unit of time.

Boolean Logic: A branch of algebra in which all operations are either true or false; i.e., yes or no, and all relationships between the operations can be expressed with

logical operators such as AND, OR, or NOT. Invented by English mathematician George Boole.

3.2 – Description of QRVA Methodology

The details of the QRVA methodology to be applied on this project are presented in Appendix A of this SOW. A conceptual overview of general QRVA activities is presented as follows:

- Facility Familiarization and QRVA Scope Determination
- Initiating Event Analysis
- Event Sequence (Event Tree) Analysis
- System (Failure Modes and Effects Analysis [FMEA] and Fault Tree) Analysis
- Data Analysis (including Dependent Events Analysis)
- Human Reliability Analysis
- Event Sequence Quantification (including Uncertainty Analysis)
- Risk Results Compilation (e.g., Detailed Risk Matrix)
- Risk Decomposition and Vulnerability Assessment
- QRVA Documentation and Communication (Presentation)

The Contractor must first review and evaluate facility information, such as that identified in the initial information request items presented in Section 2.4, to become thoroughly familiar with facility SSCs and the operational profile of the facility. This includes review of facility operating, maintenance, and testing procedures for both normal and emergency operating conditions.

The team then conducts an analysis of potential event sequence initiating events, specifically initiating event frequencies, which may be precipitated via the hazards considered within the scope of the QRVA. For this QRVA, these hazards are those identified in Section 2.2 of this SOW.

The team then develops qualitative event sequences that could lead to undesired consequences contributing to risk. For this QRVA, the primary undesired consequence is the uncontrolled release of fuel from the RHBFSF.

The event sequence analysis is conducted via event tree analysis. The team conducts facility system FMEA and fault tree analysis to characterize event tree top events and split fractions. To support quantification of QRVA event sequences, data analysis must be performed to support quantification of event tree split fractions. Quantification of event tree split fractions is supported primarily via fault tree quantification. The data analysis is performed to quantify initiating event frequencies and conditional probability of individual event tree split fractions for event sequence quantification. The event tree split fraction conditional probability values are derived primarily via fault tree quantification. The data analysis includes derivation of fault tree basic event probability values. In developing event sequences and fault trees for a facility QRVA, it is necessary to identify human actions (e.g., facility operator actions) that may contribute to facility event sequences. Human reliability analysis (HRA) is performed to identify and characterize these actions in terms of human failure events (HFE) for the fault trees and

event trees. HRA also includes evaluation of HFE human error probability (HEP) values for application within the event sequence quantification.

When the fault tree models are completed and quantified, and the split fraction data is entered into the event trees, the event sequences can then be quantified, and baseline risk can be determined. Fault tree analysis and quantification and event tree analysis and quantification are accomplished via state-of-the-art QRVA software packages, such as RISKMAN, to be applied on this project. The data for fault tree and event tree quantification are entered as probability distributions in the QRVA software. Uncertainty analysis is performed by propagating the input data probability distributions through the fault tree and event tree quantifications processes applying either a Monte Carlo or a Latin-Hypercube process in RISKMAN, resulting in a probability distribution for the baseline risk. Baseline risk results are compiled and expressed via a table of results sometimes called a risk matrix.

After the baseline risk results have been determined, the vulnerability assessment is performed by decomposing the risk into its component parts in a number of ways. We apply what are known as risk importance measures to decompose the total baseline risk into fractional risk contributors by event sequence, initiating event group, etc. We also calculate risk importance measures down to the basic component failure mode and human failure event levels of risk contributors to develop ranked lists of these risk model elements. These ranked lists of contributors by initiating event group, event sequence, and individual basic events or fundamental elements of risk contribution provide valuable insight into the vulnerability of the facility to risk. Finally, the baseline risk results and the vulnerability assessment are documented in a report in terms that can support prudent decision-making for the facility.

3.3 – Assumptions and Level of Uncertainty

The bases and assumptions associated with the QRVA will be clearly documented in the QRVA report. In QRVA, every effort is made to develop and apply realistic “best estimate” models and data. In some cases, simplifying assumptions may be applied to simplify overall risk modeling and quantification. In cases, where simplifying assumptions are made in the QRVA, these assumptions will be documented in the QRVA report.

Uncertainty is considered in rigorous high-quality QRVA. The RHBFSF Contractor will apply probability distributions for applicable input data in the risk quantification performed via the selected QRVA software, RISKMAN, for this QRVA. The source of input data probability distributions will be documented in the QRVA report. The uncertainty represented by these input data probability distributions will be propagated through the risk model quantifications of the QRVA via the RISKMAN software using either Monte Carlo simulation techniques or Latin-Hypercube simulation techniques. The more common of these two methods of uncertainty propagation is the Monte Carlo simulation technique. Propagation of input data uncertainty through the risk model enables the analysts to express overall baseline risk results in terms of probability distributions, which express our uncertainty in the baseline risk results.

By expressing our level of uncertainty in the QRVA, we greatly improve the ability of decision-makers to apply QRVA results in support of making prudent decisions. Guidelines for addressing uncertainty in QRVA are provided in Appendix A of this SOW

and in NUREG-1855, which will be applied as a guide supporting the uncertainty analysis performed for this QRVA.

3.4 – Evaluating and Prioritizing Events

In this QRVA, event sequences and individual events will be evaluated and prioritized based on their contribution to overall facility baseline risk, primarily via the vulnerability assessment portion of the QRVA. In some areas of the QRVA, simplifying assumptions may be applied, which may be slightly conservative "locally" at the individual event or event sequence level of indenture in the risk model, but which "globally" have no significant effect on the overall quantification of facility baseline risk. In cases where simplifying assumptions are applied, they will be documented in the QRVA report.

Screening analyses may also be applied in this QRVA to effectively simplify the risk quantification by eliminating insignificant contributors to risk. Any such screening analyses or evaluations applied in this QRVA will be based on criteria for acceptable threshold of risk provided by the regulator; e.g., the EPA in this case. If the regulator does not or cannot provide quantitative acceptable risk thresholds for this QRVA, these risk thresholds will be developed by the RHBFSF Contractor, and the bases behind these risk thresholds will be documented in the QRVA report for Navy and regulator review.

3.5 – Content and Format of Deliverables

The primary deliverable of the QRVA for this project will be the QRVA report, which clearly documents the bases, assumptions, methodology, databases, calculations, and results of the RHBFSF baseline risk assessment. This report content will be developed generally corresponding to the tasks identified in the project work breakdown structure (WBS) presented in Section 4 of this SOW. The report will be generated applying standard software tools, such as Microsoft Word, and will be communicated via Adobe Acrobat PDF file format. Supporting databases and computer calculation files will also be transmitted to the Navy to archive as part of the overall QRVA deliverable.

As of the writing of this SOW, the Navy anticipates that portions of the QRVA may be required to be treated as Department of Defense Classified information. The exact classification level has not yet been determined by the Navy, but may at a minimum be be at the Confidential or Secret level of security classification. This means that portions of the QRVA report will not be able to be released to the general public or those without the proper security clearance. A redacted version, in full compliance with the Freedom of Information Act will be made available.

3.6 – Coordination with Other AOC/SOW Sections

The Contractor will accomodate open communication and cooperation with work being performed under other sections of the RHBFSF AOC. Meetings and conference calls will be arranged, directed, and facilitated by the Navy to support work coordination, communication, and cooperation among AOC technical teams.

3.7 – Quality Control/Assurance Process

This section describes the recommended quality assurance (QA) and quality controls practices to be applied to the QRVA project.

3.7.1 – ISO 9001 Quality Assurance

Work on this project will be conducted following the standard ISO 9001 Quality Management System. Experience has shown that this approach provides sufficient quality controls and assurance of product quality for high-quality analyses and evaluations, while also providing a significant basis for cost savings.

The QRVA project will commit to operate consistent with applicable environmental legislation and regulations and to provide services consistent with international standards developed to avoid, reduce, or control pollution to the environment.

The QRVA project will monitor performance as an ongoing activity, to strive for continual improvement, and to provide a framework for establishing and reviewing quality and environmental objectives and targets.

3.7.2 – ASME/ANS Standard RA-S-2008 (with current addenda) Capability Categories

It is recommended that the QRVA project be designed to achieve and clearly document general compliance with Capability Category II high level and supporting level requirements stipulated in ASME/ANS Standard RA-S-2008 with updated addenda through RA-Sb-2013, appropriately adapted for application to a fuel storage facility like the RHBFSF.

4 – Project Milestones, In-Progress Reviews, and Schedule

A preliminary work breakdown structure for the project is presented in Table 4-1. The overall QRVA project will be divided into four phases, the first of which is being executed by this scope of work in compliance with Section 8.3 of the AOC-SOW. The four phases are as follows:

- Phase 1 – Levels 1 and 2 QRVA for Internal Events (not including fire or flood)
- Phase 2 – Levels 1 and 2 QRVA for Internal and External Flooding and Fire
- Phase 3 – Levels 1 and 2 QRVA for Seismic Events
- Phase 4 – Levels 1 and 2 QRVA for Other External Events (see Section 2.2)

Table 4-1. Preliminary WBS

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
1	1	Internal Events	Not Applicable	Information Collection
1	2	Internal Events	Not Applicable	Facility Familiarization and Information Review
1	3	Internal Events	Not Applicable	Definition of Safety and Fuel Release Protective Functions
1	4	Internal Events	Not Applicable	Development and Documentation of QRVA Bases and Assumptions
1	5	Internal Events	Not Applicable	Initiating Events Analysis
1	6	Internal Events	Not Applicable	Event Sequence Analysis
1	7	Internal Events	Not Applicable	Systems Analysis
1	8	Internal Events	Not Applicable	Human Reliability Analysis
1	9	Internal Events	Not Applicable	Data Analysis
1	10	Internal Events	Not Applicable	Event Sequence Quantification
1	11	Internal Events	Not Applicable	Unplanned Fuel Movement Report Data Analysis
1	12	Internal Events	Not Applicable	Acute Release from Accident Sequences Analysis
1	13	Internal Events	Not Applicable	Risk Results Presentation and Interpretation
1	14	Internal Events	Not Applicable	Risk Vulnerability Assessment
1	15	Internal Events	Not Applicable	QRVA Documentation
1	16	All Stage 1	Not Applicable	QRVA Peer Review Support
1	17	All Stage 1	Not Applicable	QRVA Peer Review Finding and Observation Resolution Support

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
1	18	All Stage 1	Not Applicable	Project Management, Overview, and Quality Control
2	19	Internal Flood	Not Applicable	Events Scope Determination
2	20	Internal Flood	Not Applicable	Facility Partitioning
2	21	Internal Flood	Not Applicable	Flood Source Identification and Characterization
2	22	Internal Flood	Not Applicable	Flood-Induced Initiating Event Analysis
2	23	Internal Flood	Not Applicable	Scenario Development
2	24	Internal Flood	Not Applicable	Human Reliability Analysis
2	25	Internal Flood	Not Applicable	Accident Sequence Analysis
2	26	Internal Flood	Not Applicable	Data Analysis
2	27	Internal Flood	Not Applicable	Risk Quantification
2	28	Internal Flood	Not Applicable	Risk Uncertainty Analysis
2	29	Internal Flood	Not Applicable	Risk Results Presentation and Interpretation
2	30	Internal Flood	Not Applicable	Risk Vulnerability Assessment
2	31	Internal Flood	Not Applicable	QRVA Documentation
2	32	External Flood	Not Applicable	Events Scope Determination
2	33	External Flood	Not Applicable	Facility Partitioning
2	34	External Flood	Not Applicable	Flood Source Identification and Characterization
2	35	External Flood	Not Applicable	Flood-Induced Initiating Event Analysis
2	36	External Flood	Not Applicable	Scenario Development

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
2	37	External Flood	Not Applicable	Human Reliability Analysis
2	38	External Flood	Not Applicable	Accident Sequence Analysis
2	39	External Flood	Not Applicable	Data Analysis
2	40	External Flood	Not Applicable	Risk Quantification
2	41	External Flood	Not Applicable	Risk Uncertainty Analysis
2	42	External Flood	Not Applicable	Risk Results Presentation and Interpretation
2	43	External Flood	Not Applicable	Risk Vulnerability Assessment
2	44	External Flood	Not Applicable	QRVA Documentation
2	45	Internal Fire	Not Applicable	Facility Walkdowns
2	46	Internal Fire	Not Applicable	QRVA Database Development
2	47	Internal Fire	Not Applicable	Facility Boundary and Partitioning Definition
2	48	Internal Fire	Not Applicable	QRVA Component Selection
2	49	Internal Fire	Not Applicable	QRVA Cable Selection
2	50	Internal Fire	Not Applicable	Qualitative Screening
2	51	Internal Fire	Not Applicable	Fire-Induced Risk Model Development
2	52	Internal Fire	Not Applicable	Fire Ignition Frequencies Development
2	53	Internal Fire	Not Applicable	Post-Fire HRA Screening Assessment
2	54	Internal Fire	Not Applicable	Quantitative Screening Phase 1
2	55	Internal Fire	Not Applicable	Scoping Fire Modeling

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
2	56	Internal Fire	Not Applicable	Quantitative Screening Phase 2
2	57	Internal Fire	Not Applicable	Detailed Circuit Failure Analysis
2	58	Internal Fire	Not Applicable	Circuit Failure Mode and Likelihood Analysis
2	59	Internal Fire	Not Applicable	Detailed Fire Modeling
2	60	Internal Fire	Not Applicable	Post-Fire HRA Detailed and Recovery Assessment
2	61	Internal Fire	Not Applicable	Seismic-Fire Interactions Assessment
2	62	Internal Fire	Not Applicable	Fire Risk Quantification
2	63	Internal Fire	Not Applicable	Uncertainty and Sensitivity Analyses
2	64	Internal Fire	Not Applicable	QRVA Documentation
2	65	External Fire	Not Applicable	Facility Walkdowns
2	66	External Fire	Not Applicable	QRVA Database Development
2	67	External Fire	Not Applicable	Facility Boundary and Partitioning Definition
2	68	External Fire	Not Applicable	QRVA Component Selection
2	69	External Fire	Not Applicable	QRVA Cable Selection
2	70	External Fire	Not Applicable	Qualitative Screening
2	71	External Fire	Not Applicable	Fire-Induced Risk Model Development
2	72	External Fire	Not Applicable	Fire Ignition Frequencies Development
2	73	External Fire	Not Applicable	Post-Fire HRA Screening Assessment
2	74	External Fire	Not Applicable	Quantitative Screening Phase 1

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
2	75	External Fire	Not Applicable	Scoping Fire Modeling
2	76	External Fire	Not Applicable	Quantitative Screening Phase 2
2	77	External Fire	Not Applicable	Detailed Circuit Failure Analysis
2	78	External Fire	Not Applicable	Circuit Failure Mode and Likelihood Analysis
2	79	External Fire	Not Applicable	Detailed Fire Modeling
2	80	External Fire	Not Applicable	Post-Fire HRA Detailed and Recovery Assessment
2	81	External Fire	Not Applicable	Seismic-Fire Interactions Assessment
2	82	External Fire	Not Applicable	Fire Risk Quantification
2	83	External Fire	Not Applicable	Uncertainty and Sensitivity Analyses
2	84	External Fire	Not Applicable	QRVA Documentation
2	85	All Stage 2	Not Applicable	QRVA Peer Review Support
2	86	All Stage 2	Not Applicable	QRVA Peer Review Finding and Observation Resolution Support
2	87	All Stage 2	Not Applicable	Project Management, Overview, and Quality Control
3	88	Seismic Events	Not Applicable	Develop Facility-Specific Risk Hazard Curves
3	89	Seismic Events	Not Applicable	Perform Initial Modification to Internal Events Systems Models
3	90	Seismic Events	Not Applicable	Develop Seismic Equipment List (SEL)
3	91	Seismic Events	Not Applicable	Conduct Soil Failures Evaluation
3	92	Seismic Events	Not Applicable	Perform Seismic Response Analysis
3	93	Seismic Events	Not Applicable	Perform Facility Walkdowns

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
3	94	Seismic Events	Not Applicable	Screen Components from SEL
3	95	Seismic Events	Not Applicable	Perform Relay Chatter Evaluation
3	96	Seismic Events	Not Applicable	Develop Seismic Fragility Parameters
3	97	Seismic Events	Not Applicable	Modify Internal Events QRVA Boolean Logic Models
3	98	Seismic Events	Not Applicable	Human Reliability Analysis
3	99	Seismic Events	Not Applicable	Accident Sequence Analysis
3	100	Seismic Events	Not Applicable	Data Analysis
3	101	Seismic Events	Not Applicable	Risk Quantification
3	102	Seismic Events	Not Applicable	Risk Uncertainty Analysis
3	103	Seismic Events	Not Applicable	Risk Results Presentation and Interpretation
3	104	Seismic Events	Not Applicable	Risk Vulnerability Assessment
3	105	Seismic Events	Not Applicable	QRVA Documentation
3	106	All Stage 3	Not Applicable	QRVA Peer Review Support
3	107	All Stage 3	Not Applicable	QRVA Peer Review Finding and Observation Resolution Support
3	108	All Stage 3	Not Applicable	Project Management, Overview, and Quality Control
4	109	Other External Events	High Winds and Storms	Initiating Events Analysis
4	110	Other External Events	High Winds and Storms	Event Sequence Analysis

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
4	111	Other External Events	High Winds and Storms	Systems Analysis
4	112	Other External Events	High Winds and Storms	Human Reliability Analysis
4	113	Other External Events	High Winds and Storms	Data Analysis
4	114	Other External Events	High Winds and Storms	Event Sequence Quantification
4	115	Other External Events	High Winds and Storms	Acute Release from Accident Sequences Analysis
4	116	Other External Events	High Winds and Storms	Risk Results Presentation and Interpretation
4	117	Other External Events	High Winds and Storms	Risk Vulnerability Assessment
4	118	Other External Events	High Winds and Storms	QRVA Documentation
4	119	Other External Events	Landslides	Initiating Events Analysis
4	120	Other External Events	Landslides	Event Sequence Analysis
4	121	Other External Events	Landslides	Systems Analysis
4	122	Other External Events	Landslides	Human Reliability Analysis

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
4	123	Other External Events	Landslides	Data Analysis
4	124	Other External Events	Landslides	Event Sequence Quantification
4	125	Other External Events	Landslides	Acute Release from Accident Sequences Analysis
4	126	Other External Events	Landslides	Risk Results Presentation and Interpretation
4	127	Other External Events	Landslides	Risk Vulnerability Assessment
4	128	Other External Events	Landslides	QRVA Documentation
4	129	Other External Events	Proximity Transportation Accidents	Initiating Events Analysis
4	130	Other External Events	Proximity Transportation Accidents	Event Sequence Analysis
4	131	Other External Events	Proximity Transportation Accidents	Systems Analysis
4	132	Other External Events	Proximity Transportation Accidents	Human Reliability Analysis

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
4	133	Other External Events	Proximity Transportation Accidents	Data Analysis
4	134	Other External Events	Proximity Transportation Accidents	Event Sequence Quantification
4	135	Other External Events	Proximity Transportation Accidents	Acute Release from Accident Sequences Analysis
4	136	Other External Events	Proximity Transportation Accidents	Risk Results Presentation and Interpretation
4	137	Other External Events	Proximity Transportation Accidents	Risk Vulnerability Assessment
4	138	Other External Events	Proximity Transportation Accidents	QRVA Documentation
4	139	Other External Events	Extreme Weather	Initiating Events Analysis
4	140	Other External Events	Extreme Weather	Event Sequence Analysis
4	141	Other External Events	Extreme Weather	Systems Analysis

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
4	142	Other External Events	Extreme Weather	Human Reliability Analysis
4	143	Other External Events	Extreme Weather	Data Analysis
4	144	Other External Events	Extreme Weather	Event Sequence Quantification
4	145	Other External Events	Extreme Weather	Acute Release from Accident Sequences Analysis
4	146	Other External Events	Extreme Weather	Risk Results Presentation and Interpretation
4	147	Other External Events	Extreme Weather	Risk Vulnerability Assessment
4	148	Other External Events	Extreme Weather	QRVA Documentation
4	149	Other External Events	Other Facility-Specific Hazards	Initiating Events Analysis
4	150	Other External Events	Other Facility-Specific Hazards	Event Sequence Analysis
4	151	Other External Events	Other Facility-Specific Hazards	Systems Analysis
4	152	Other External Events	Other Facility-Specific Hazards	Human Reliability Analysis
4	153	Other External Events	Other Facility-Specific Hazards	Data Analysis

Table 4-1. Preliminary WBS (Continued)

Phase Number	Task Number	QRVA Hazard Category	QRVA Hazard Sub-Category	Task Title
4	154	Other External Events	Other Facility-Specific Hazards	Event Sequence Quantification
4	155	Other External Events	Other Facility-Specific Hazards	Acute Release from Accident Sequences Analysis
4	156	Other External Events	Other Facility-Specific Hazards	Risk Results Presentation and Interpretation
4	157	Other External Events	Other Facility-Specific Hazards	Risk Vulnerability Assessment
4	158	Other External Events	Other Facility-Specific Hazards	QRVA Documentation
4	159	All	Not Applicable	Total Aggregate Risk Consolidation
4	160	All	Not Applicable	Risk Results Presentation and Interpretation
4	161	All	Not Applicable	Risk Vulnerability Assessment
4	162	All	Not Applicable	QRVA Documentation
4	163	All Stage 4	Not Applicable	QRVA Peer Review Support
4	164	All Stage 4	Not Applicable	QRVA Peer Review Finding and Observation Resolution Support
4	165	All Stage 4	Not Applicable	Project Management, Overview, and Quality Control

A Gantt chart of the project schedule will be generated by the contractor and capture all of the Tasks listed in Table 4-1. Phase 1 of the baseline QRVA report will be completed within 18 months of approval of this scope of work. Normally, from the perspective of best technical approach, the four Phases of the QRVA are performed sequentially; however, as schedule is important in this project, the four stages of the QRVA can be overlapped to compress the overall schedule to approximately 4 years total. This timeline is achievable, while maintaining acceptably high standards for the full-scope assessment.

While frequent review of interim work products will be performed by the Navy, only one formal in-progress review (IPR) is scheduled for Phase 1 of the project. The IPR, upon Navy approval, will include review by Regulators and external SMEs. This IPR will be performed immediately following completion of the data analysis task. The focus of this IPR is limited to QRVA data analysis. The IPR will be conducted over a 2-week period and culminate with submittal of written review comments to the Contractor. It is the intent of the team to resolve these IPR review comments in writing within 2 weeks from receipt of the complete set of all consolidated review comments, depending upon the volume and complexity of the comments.

5 – Interpretation of Results and Consideration of QRVA in Decision Making

As the RHBFSF QRVA is a Level 2 QRVA, the overall baseline risk results will be presented in terms of frequency and annual probability of uncontrolled release of fuel from the facility. As shown in Appendix A, the risk of releases will be broken down by fuel type and by volume range. It is conceivable that, via careful review of baseline risk values and probability distributions, the Navy and other stakeholders could determine that the risk of fuel release from the RHBFSF is acceptably low for the current design and operation of the facility, to include currently-authorized and funded facility modifications. In such cases, the QRVA is applied over the remaining life cycle of the facility to help optimize safety management through the end of the facility life. In cases where the baseline risk is determined to be unacceptably high, the QRVA vulnerability assessment can be applied to support development, evaluation, and prioritization of risk-reducing improvements to the facility.

In the vulnerability assessment, the consolidated baseline risk is decomposed into elements contributing to risk in a number of ways to help facilitate prudent decision-making concerning potential risk reduction alternatives for the facility. Key elements of the QRVA Vulnerability Assessment are presentations of the risk element risk importance measures and associated sensitivity case studies in the form of tabular results and via presentation of risk element “tornado charts”. In effect, tornado charts are bar charts of risk element importance measure or sensitivity case study results rotated by 90 degrees and rank ordering the bars from high to low moving downward on the chart, creating, in effect, a tornado-shaped chart of results with the most important elements at the top and the least important elements at the bottom. Experience has shown that there can be significant pitfalls in attempting to interpret risk importance measure and sensitivity case study results directly from tables and charts.

By reviewing all the ranked lists of importance measure results along with the sensitivity case study tornado charts, we can obtain an understanding of facility-specific

risk-dominating vulnerabilities. Examples of facility risk importance measures are fractional importance, risk achievement worth, risk reduction worth, Fussell-Vesely importance, and Birnbaum importance. Please refer to Appendix A for additional details on risk importance measures.

It is also instructive to compare facility-specific component failure rates (i.e., the Bayesian-updated failure rates) and HFE HEP values with their associated generic data values. Those facility-specific values that are significantly greater than (e.g., more than 50% relative difference) their associated generic values can point to potential facility-specific risk vulnerabilities.

These results will be presented in the QRVA report with an accompanying discussion developed by analysts experienced with the RHBFSF risk model designed to facilitate meaningful interpretation of vulnerability assessment results.

Using QRVA results to support decision-making is relatively straightforward. For example, as stated above, the baseline QRVA results can be applied to determine whether or not we have adequate confidence that the facility presents acceptable or unacceptable risk. If we determine that predicted risk is too high for the facility, we can use the results of the vulnerability assessment to help identify potential facility improvement options that can effectively reduce risk. For example, if the QRVA results show that risk is being dominated by seismic events (earthquakes), and the scenarios dominating that risk are associated with failure of a certain section of piping in the facility, then a potential improvement option may be to replace that piping with piping having a higher resistance to seismic damage (lower fragility to seismic damage), or it may be that replacing or strengthening the support brackets for the identified piping segment(s) could be effective in reducing risk from that particular facility vulnerability.

The QRVA can be applied to investigate and evaluate the potential cost-benefit-risk impacts associated with proposed improvement options at the facility. This is generally accomplished via development and evaluation of risk improvement option case studies. This is also know as “alternatives analysis” in many technical circles. In general, the QRVA can be applied to predict the potential benefit (risk reduction) associated with a proposed improvement option and, by linking that to the implementation cost associated with the improvement option, evaluate improvement option cost-benefit. In that way, proposed improvement options can be prioritized based on the quantitative value of the ratio of risk reduction per dollar invested.

6 – Future Case Studies Consideration

As described in Section 5, the QRVA can be applied to investigate and evaluate the potential cost-benefit-risk impacts associated with proposed improvement options at the facility. This is generally accomplished via development and evaluation of risk improvement option, or more aptly named risk reduction option, case studies. In general, the QRVA can be applied to predict the potential benefit (risk reduction) associated with a proposed improvement option and linking that to the implementation cost associated with the improvement option. In that way, proposed improvement options can be prioritized based on the quantitative value of the ratio of risk reduction per dollar invested. For example, the QRVA could be applied to evaluate potential risk reduction associated with AOC-SOW Section 3 tank upgrade alternatives and, using the

case study results and the ratio of risk reduction to alternative cost, prioritize the tank upgrade alternatives by predicted risk reduction per dollar invested, by alternative case.

While no such case studies are included in the baseline QRVA included within this SOW, the application of a mature QRVA could be applied to support case study evaluation of risk reduction alternatives in the future, and throughout the remaining life of the facility.

7. References

1. United States Navy Contract N62742-14-D-1884, Task Order 0028, February 8, 2017.
2. Administrative Order on Consent for the Red Hill Bulk Fuel Storage Facility, U.S. Environmental Protection Agency, 2015 (https://www.epa.gov/red-hill/red-hill-administrative-order-consent).
3. American Nuclear Society (ANS) and Institute of Electrical and Electronic Engineers, "PRA Procedures Guide: A Guide to the Performance of Probabilistic Risk Assessments for Nuclear Power Plants," sponsored by the U.S. Nuclear Regulatory Commission and the Electric Power Research Institute, NUREG/CR-2300, April 1983.
4. U.S. Nuclear Regulatory Commission, "PSA Procedures Guide," NUREG/CR-2815, 1985.
5. American Institute of Chemical Engineers Center for Chemical Process Safety, "Guidelines for Chemical Process Quantitative Risk Analysis," 2nd Edition, October 1999.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

STATE OF HAWAII
DEPARTMENT OF HEALTH
P. O. BOX 3378
HONOLULU, HI 96801-3378

SEP 23 2019

Captain Marc Delao
Regional Engineer
Navy Region Hawaii
850 Ticonderoga St. STE 110
Joint Base Pearl Harbor Hickam, Hawaii 96860

Subject: **Section 8 of the Red Hill Administrative Order on Consent ("AOC") Statement of Work ("SOW") Approval of Section 8.3 and Requirement to Complete Additional Work**

Dear Captain Delao:

The U.S. Environmental Protection Agency ("EPA") and Hawaii Department of Health ("DOH"), collectively the "Regulatory Agencies", have received the U.S. Department of Navy's ("Navy's") letter dated May 29, 2019 ("Transmittal Letter"), the *Quantitative Risk and Vulnerability Assessment Phase 1 (Internal Events without Fire and Flooding)*[1] ("Risk Assessment"), and the *Red Hill Alternative Location Study*[2]. As required by Section 8 of the Red Hill AOC SOW, the Risk Assessment has provided information to the Regulatory Agencies, Navy and Defense Logistics Agency ("DLA") that will assist in subsequent decisions related to Section 3 of Red Hill AOC SOW and evaluate the level of risk the Red Hill Bulk Fuel Storage Facility ("Facility") may pose to groundwater and drinking water aquifers. Therefore, the Regulatory Agencies are approving the Risk Assessment as satisfying, in part, the requirement under Section 8.3- Risk/Vulnerability Assessment Report. As noted in the Navy's Transmittal Letter and the Regulatory Agencies' conditional approval of Section 8.2, Navy and DLA are required to perform additional work to update the Risk/Vulnerability Assessment Report.

Additional Work Requirements

To more comprehensively assess the risk the Facility may pose to groundwater and drinking water aquifers, the Regulatory Agencies require the Navy and DLA to complete the work outlined below.

[1] Quantitative Risk and Vulnerability Assessment Phase 1 (Internal Events without Fire and Flooding), by ABS Consulting, Irvine, California, November 12, 2018
[2] Red Hill Alternative Location Study, by Austin Brockenbrough Engineering and Consulting, Richmond, Virginia, February 5, 2018

1) The Navy and DLA will assess the risks and vulnerabilities of the Facility to seismic, fire, flood, and other external events as detailed in the Transmittal Letter. The Regulatory Agencies concur that additional work is needed with respect to these risks and vulnerabilities and that an approach utilizing both qualitative and quantitative evaluations developed by qualified subject matter experts[3] should efficiently identify key vulnerabilities and prioritize areas for potential risk mitigation. We understand that the Navy plans to prepare expert qualitative evaluations to help assess whether these hazards pose a material risk to the Facility or determine if they can be eliminated through a screening analysis. Following these qualitative evaluations, expert quantitative analyses will help to assess the level of risk posed by specific vulnerabilities or initiating events of concern. As noted on page 3 of the Transmittal Letter, the Navy and DLA will submit a Scope of Work to the Regulatory Agencies for approval.

   Although the Regulatory Agencies and the Navy and DLA previously expressed interest to follow a similar quantitative process to that used for the Phase 1 assessment, the Regulatory Agencies are open to an approach that screens some events through a qualitative evaluation and utilizes a quantitative analysis for key areas of concern. Given the proposed change in approach, we recommend that the Navy and DLA discuss the proposed approach with all stakeholders, and not just with the Regulatory Agencies. We look forward to receiving the revised Scope of Work addressing the Phases 2, 3, and 4 of the original approved Risk/Vulnerability Assessment Scope of Work of April 13, 2017.

2) Condition 1 in the Regulatory Agencies' conditional approval[4] of the Section 8.2 Scope of Work states that the Navy and DLA will produce a risk and vulnerability assessment that simulates consequences of potential uncontrolled releases to the groundwater and drinking water aquifers, and that the groundwater model required in Section 7 of the Red Hill AOC SOW should be utilized to conduct this simulation. Based on the results of the Risk Assessment, most acute small releases will result from initiating events related to the steel tank liner, whereas most acute large releases will result from initiating events related to the nozzle. Therefore, the contaminant fate and transport model and associated vadose zone models should, at a minimum, simulate the fate and transport of acute large releases that are initiated at the tank nozzle and smaller acute releases that are initiated at the tank liner. Moreover, Navy and DLA should provide a rationale for the types of releases that will eventually be simulated in the contaminant fate and transport modeling effort.

Quantitative Risk and Vulnerability Assessment Phase 1 ("Risk Assessment")

The Risk Assessment dated November 12, 2018 and prepared by ABS Consulting does not estimate the projected health risk to receptors, such as people or organisms potentially exposed to contaminated groundwater or drinking water. Rather, this Risk Assessment, is

[3] Credentials of subject matter experts retained by Navy and DLA for this task will be reviewed, not validated, by the Regulatory Agencies.

[4] U.S. EPA Region 9 and State of Hawaii Department of Health, "Conditional Approval of Red Hill Administrative Order on Sent Statement of Work ("AOC-SOW") Section 8.2 Scope of Work- Risk/Vulnerability Assessment", May16 2017

designed to assess the level of risk from the Facility where the consequences of interest are uncontrolled volumes of fuel released. The Risk Assessment, mostly due to time and resource constraints, only assesses the risks from hazards caused by internal events, which include equipment or structural failures, human operator errors and other factors, but not seismic, fire or flood events. As discussed above in this letter, additional work is required to address risks associated with other hazards of interest stemming from other external events. Furthermore, information from this assessment and the additional work will need to be combined with efforts underway as part of section 7 of the Red Hill AOC SOW to estimate potential health risk consequences.

Through an analysis of both Facility specific data and data from other industrial facilities, the Risk Assessment estimates the risk of releases from the Facility. It also incorporates a human reliability analysis along with an inventory of the Facility's infrastructure to estimate the eventual risk of an uncontrolled release. A detailed list of the Facility specific information reviewed by ABS Consulting is available in Appendix B of the Risk Assessment. The Risk Assessment's review of historical records, particularly the examination of information related to prior releases that may have occurred before 1988 reporting requirements, and the inclusion of the Facility's response plans and components, is informative.

The Risk Assessment was designed to be a baseline assessment of the Facility's current configuration and operation as of July 27, 2017. Key quantitative results are summarized as follows: 0.00417 events per year for uncontrolled releases larger than 120,000 gallons of fuel, 0.276 events per year for uncontrolled releases between 1,000 and 30,000 gallons of fuel, and a chronic risk of uncontrolled release of 5,803 gallons of fuel per year. The Regulatory Agencies understand that Navy and DLA dispute the Risk Assessment's quantitative results for the reasons stated in the Transmittal Letter and the *Navy's Risk and Vulnerability Assessment Summary* dated May 29, 2019. The Regulatory Agencies also recognize that numerous assumptions regarding the Facility were made, such as the Facility remaining a bulk fuel storage facility and not a throughput facility, and that the Tank Inspection, Repair, and Maintenance program will address maintenance, including corrosion, concerns. Variations in any of the assumptions made in the assessment could affect risk estimates.

Although the Risk Assessment may not reflect the concerns listed in *Navy's Risk and Vulnerability Assessment Summary*, it provides valuable information regarding the relative factors contributing to risk. By identifying the various factors contributing to risk, the Navy and DLA may be able to prioritize areas of improvement to reduce the potential for uncontrolled releases. For example, the Risk Assessment states that the availability of tank ullage, emergency response procedures, and tank fuel inventory instrumentation are important to risk. In addition, the Risk Assessment states that operator actions are generally more important than equipment failures to overall risk. A summary of the Risk Assessment's results also shows that most acute large releases result from initiating events related to the tank nozzle and not the tank liner. Although section 8 of the Red Hill AOC SOW does not specify an implementation plan in accordance with the risk and vulnerability assessment, the Risk Assessment provides important information to incorporate and develop best available practicable technology for the tank systems at the Facility. Therefore, we expect that the

findings and recommendations will be incorporated into the Tank Upgrade Alternatives and Release Detection Alternatives Decision Document, as appropriate; and that the findings and recommendations that are not directly associated with these upgrades be addressed as described in the *Navy's Risk and Vulnerability Assessment Summary*.

The Regulatory Agencies are enclosing a letter from the Honolulu Board of Water (BWS) dated September 5, 2019. The letter provides their comments and concerns regarding the Risk Assessment. The BWS requests an unredacted Risk Assessment report as referenced on page 8 under section 5 Individual Fuel Release Scenarios.

According to page 3 of the Transmittal Letter, the Navy will submit a scope of work for the additional risk and vulnerability assessment work to Regulatory Agencies for approval. The Regulatory Agencies are requiring this scope of work to be submitted no later than 120 days from the date of this letter. Please let us know if you have any comments or concerns with the information in this letter.

Sincerely,

Omer Shalev
Project Coordinator
EPA Region 9 Land Division

Roxanne Kwan
Interim Project Coordinator
DOH Solid and Hazardous Waste Branch

Enclosure

cc: Commander Darrel Frame, Navy (via email)
Mr. Steven Chow, Navy (via email)

BOARD OF WATER SUPPLY

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

September 5, 2019

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

and

Ms. Roxanne Kwan
Solid and Hazardous Waste Branch
State of Hawaii
Department of Health
2827 Waimano Home Road
Pearl City, Hawaii 96782

Dear Mr. Shalev and Ms. Kwan:

Subject: Honolulu Board of Water Supply (BWS) Comments on ABS Consulting (ABS) Report "Quantitative Risk and Vulnerability Assessment Phase 1 (Internal Events without Fire and Flooding) dated November 12, 2018" and "Navy's Risk and Vulnerability Assessment Summary" and Cover Letter dated May 29, 2019 as per Red Hill Bulk Fuel Storage Facility (RHBFSF) Administrative Order on Consent (AOC) Statement of Work (SOW) Section 8

The Honolulu Board of Water Supply (BWS) is pleased to offer comments to the latest two documents submitted by the Navy under RHBFSF AOC Section 8. The first document is the ABS report "Quantitative Risk and Vulnerability Assessment Phase 1 (Internal Events without Fire and Flooding) dated November 12, 2018" (ABS, 2018). The second is the Navy's cover letter to the ABS report entitled "Navy's Risk and Vulnerability Assessment Summary" dated May 29, 2019 (Navy, 2019). In this letter you will find our general remarks followed by detailed comments addressing each document.

Please note that BWS has sent letters to the Regulatory Agencies in the past that commented on various Quantitative Risk and Vulnerability Assessment (QRVA) documents submitted previously by the Navy under RHBFSF AOC Section 8 (Lau,

2016; Lau, 2017a; Lau, 2017b; Lau, 2017c; Lau, 2017e; and Lau, 2018c). We are referencing these past letters as they provide context and historical perspective to our comments contained herein.

General Comments on Phase 1 QVRA Report

The ABS Phase 1 QVRA report substantiates the BWS' concerns with the chronic and potentially catastrophic risks associated with operating enormous fuel tanks a mere 100 feet above a one of a kind state-designated drinking water aquifer that cannot be replaced. According to ABS, the Navy's own consultant, we can expect:

- Greater than 27% probability of a sudden release of between 1,000 and 30,000 gallons of fuel from the RHBFSF each year;
- Greater than 34% chance of a sudden release of more than 120,000 gallons from the RHBFSF in the next 100 years;
- Greater than 5% chance of a sudden release of more than 1 million gallons from the RHBFSF in the next 100 years; and,
- 5,803 gallons per year of chronic, undetected fuel releases from the RHBFSF.

These risks to our irreplaceable drinking water resources are simply too high, and inconsistent with the mandate of Hawaii Revised Statutes Section 342L-32(b) that all USTs and UST systems must "be designed, constructed, installed, upgraded, maintained, repaired, and operated to prevent releases of the stored regulated substances for the operational life of the tank or tank system". Moreover, the risk estimates provided by ABS do not even consider other hazards such as seismic, fire, flood, landslides, etc. and thus can only underestimate the overall risks reported. Given the threat to our water supply these risks represent, the BWS maintains that the RHBFSF tanks should be upgraded with secondary containment or relocated away from our sole source groundwater aquifer.

The Phase 1 QRVA report details a comprehensive *quantitative* engineering evaluation of the internal event hazards at the RHBFSF. BWS strongly feels that a thorough, quantitative approach is necessary to properly address the considerable risks posed by the RHBFSF to our irreplaceable sole source groundwater aquifer. ABS' Phase 1 QVRA is designed to provide a baseline assessment of the level of risk the RHBFSF poses to nearby groundwater resources and to inform tank upgrade alternative (TUA) selection process decisions. The Phase 1 QVRA report is quite extensive, over 800 pages long, and details a rigorous, quantitative evaluation of the risks of uncontrolled releases from the RHBFSF. The scope and rigor of ABS' quantitative engineering evaluation of the risks of uncontrolled fuel releases from the RHBFSF is consistent with those typically used for nuclear power plants and large petrochemical facilities. To our

knowledge, this report represents the only *quantitative* analysis to date for the RHBFSF that estimates actual amounts of fuel that could be expected to be released in the future based on past releases and operations at the facility. The Phase 1 QVRA report confirms that the risk of a sudden, large or undetected, slow fuel release from the RHBFSF to the environment is unacceptably high.

Finally, the BWS notes that the Phase 1 QVRA report documents only the first phase of a planned, multi-phase quantitative risk assessment. Phases 2 through 4 can only increase the expected probabilities of fuel releases from the RHBFSF because they consider additional risks not accounted for in Phase 1. Phase 1 considers only certain internal events and does not include risks of release from fire, flood, earthquakes, high winds and hurricanes, landslides or mudslides, proximity transportation accidents (aircraft crashes, hazardous material or chemical spills), etc. Consequently, even the unacceptably high risk of future fuel releases reported by ABS likely understates the actual threat to our drinking water posed by the RHBFSF.

Specific Comments on Phase 1 QVRA Report

1. Navy's "Risk Thresholds of Concern"

The Phase 1 QVRA report compares their calculated release probabilities and volumes to "thresholds of concern" that were prescribed by the Navy as 120,000 gallons or greater per incident for acute releases and 41,400 gallons or greater per year for chronic releases (ABS, 2018). ABS appear to equate these thresholds of concern as a threshold "of fuel release potentially threatening water table safety". The BWS does not, and ABS should not, accept the Navy's risk thresholds. Oahu's sole source aquifer is the only one of its kind and cannot be replaced. Allowing any amount of fuel to be released from the RHBFSF tanks into this resource is unacceptable and contrary to Hawaii law.

Notwithstanding the basis of the Navy's thresholds of concern, the Phase 1 QVRA report clearly demonstrates that those thresholds are in jeopardy of being exceeded. ABS calculated that there would be a greater than 34% chance of a sudden release of more than 120,000 gallons in the next 100 years. While ABS opines that its mean chronic fuel release estimates fall "below the threshold of concern", ABS calculations recognize that as much as 52,596 gallons per year might be released from the RHBFSF under certain conditions. Both these event scenarios would exceed even the Navy's own stated thresholds of concern. Ultimately, the risks of acute and chronic fuel releases calculated by ABS demonstrate that the amount of fuel that could be expected to be released in the future from the RHBFSF is inconsistent with the standard required under Hawaii law and in excess of any reasonable risk threshold.

2. Constant Failure Rates

The BWS disagrees with the ABS' use of a constant future failure rate when steel liner corrosion damage is accumulating over time. While ABS do acknowledge that corrosion is a contributing factor to failure events, it appears that ABS ignores the cumulative effects of corrosion in its calculated release risks in part because it expects the Navy's inspection and repair processes to perform without fail. For instance, Section 5.4.9 of the Phase 1 QVRA report states:

> "We feel that a strong reason for why we do not see evidence of corrosion rate acceleration at the RHBFSF is that there is an effective continuous 'renewal' process in place for the tanks and supporting flow path components. This renewal process occurs via the regular tank inspection and repair processes in practice at the facility, specifically the commitment that all tanks will be inspected with 100% area coverage at least once every 20 years, and that as a result of these inspections there is a process in place for replacement of tank liner sections or plates where actual breeches in continuity are discovered or where impending breeches are predicted to cause through-wall leakage prior to the next inspection."

We believe ABS' use of the phrase "corrosion rate acceleration" is in error, because the rate at which the general or pitting corrosion is consuming steel liner is not expected to accelerate. The phrase "corrosion rate acceleration" used in the Phase 1 QVRA report likely refers to an increasing frequency of fuel releases due to corrosion damage accumulation as the tank liner continues to be thinned by general and pitting corrosion.

The Phase 1 QVRA report goes on to state:

> "[W]e might expect there to actually be a failure rate deceleration factor at play over the remainder of facility life. This could be supported by our reasonable expectations that, in the future over time, tank inspection processes designed to discover problematic corrosion and other failure mechanisms will improve (we have certainly seen that over the current history of the facility). Therefore, our ability to find actual and impending failures will improve. Also, we might even expect that tank repair and liner section replacement processes could be enhanced in the future. These aspects of tank inspection and repair processes bolster the argument for the renewal effect that would counteract any hypothetical corrosion rate acceleration."

In stark contrast to ABS, the BWS believes that the accumulated damage from liner corrosion, which progresses from the exterior of the tanks and cannot be mitigated, could have a major impact on future release rates. While the excerpts listed above from the Phase 1 QVRA report indicate that ABS implicitly acknowledges that corrosion

damage will contribute to future releases, it ignores the accumulation of corrosion damage, and thus underestimates associated risk, because ABS apparently believes that the Navy's nondestructive evaluation (NDE) inspection and repair process is likely to improve in the future such that it "would counteract any hypothetical corrosion rate acceleration." The BWS finds two major flaws with the ABS assumptions and conclusions:

(i) ABS fail to recognize the high probability that the Navy's current tank wall inspection and repair process will miss areas so corroded that they represent a significant probability of through-wall pitting prior to the next inspection in 20 years. The unreliability of the Navy's NDE techniques has been documented in the Navy's NDE report (Navy, 2018a), the initial destructive testing laboratory report (IMR Test Labs, 2018), the Navy's destructive testing results report (NAVFAC, 2019a), and the BWS' comments on these reports (Lau, 2019a; Lau, 2019b). As a result, ABS' risk calculations almost certainly underestimate the risk of future fuel releases from the RHBFSF, particularly as over time corrosion continues to eat away at the aging single-walled tanks from the outside.

(ii) The ABS assumption that NDE techniques will improve as corrosion damage accumulates, somehow balancing the increasing risk of through-wall corrosion, is speculative at best. No such NDE improvements have yet been postulated, much less demonstrated. Moreover, reliance on such speculation is not consistent with the ABS statement that its report is based on the "assumption that the facility will effectively be operated in the current configuration with the same operating profile ... hypothetically for hundreds of years with no intervening risk-mitigating improvements."

3. Capacity of the Concrete Tank Shell to Contain Leaks through the Liner

ABS also state in its "QRVA Bases and Assumptions – Overview" that the structural integrity of the concrete tanks and grouting is assumed robust for purposes of supporting the tank inner shell for this Phase 1 QRVA. However, ABS go on to note that there has effectively been no inspection, testing, or maintenance performed on the concrete tanks and grouting since construction and, therefore, no credit can be given in this assessment for fuel containment and that:

> "All fuel that passes through the tank inner shell is assumed to ultimately pass into the rock and soil surrounding the tank and, thus, have a capability of potentially propagating, over time, to the water table."

This is still the case as even the recently-completed destructive testing has not evaluated the quality of the concrete or condition of the rebar (NAVFAC, 2019a). In addition, the evidence of non-fuel tight concrete tanks is supported by the

release of fuel from Tank 5 in 2014 and prior fuel and fuel staining found underneath the RHBFSF tanks in 2002 (AMEC, 2002).

4. Navy Conceptual Site Model (CSM) Identifies Both Corrosion and Cracked Concrete as Fuel Release Points

The Navy acknowledges in its most recent CSM that migration pathways for fuel include corrosion pitting and cracks in the concrete surrounding the RHBFSF tanks (NAVFAC, 2019b). Specifically, the Navy CSM recognizes that there have been "historical observations of space between the back side of the steel shell plates and the inner side of the reinforced concrete" as one of three lines of evidence for fuel release points (NAVFAC, 2019b).

The Navy also states: "Areas of [Tank 5's] internal steel liner appears to have separated from the concrete encasement surrounding the tank. This condition can allow water, fuel, liquid or vapor, to be trapped in a localized area between the two surfaces ... [and] hydrocarbons have been found in contact with the back-wall surfaces in the past" (NAVFAC, 2019b). In addition, the Navy CSM confirms that the AOC identifies typical historical structural and integrity issues with the RHBFSF tanks relevant to repairing them for a future use, including "corrosion and pitting," "holes in the steel liner," and "defective welds in the barrel and upper and lower domes" (NAVFAC, 2019b). Accordingly, the Navy's assessment of potential leak scenarios included "documented leaks in and around the Red Hill tank farm" (NAVFAC, 2019b).

The fuel release point and fuel migration pathways, as outlined in the Navy CSM, are outlined by the Navy in the following excerpt (NAVFAC, 2019b):

Release Point LOEs:

- Results of forensic analysis of the release as detailed in NAVFAC EXWC (2016)
- Historical observations of space between the back side of the steel shell plates and the inner side of the reinforced concrete (NAVFAC EXWC 2016)
- Areas of weakness or corrosion potential such as the bottom drain pipe and tell-tale pipe penetrations (NAVFAC EXWC 2016)

Migration Pathways:

- LNAPL migrates down along the space between the back side of the steel shell plates and the inner side of the reinforced concrete to lower tank bottom.
- Some LNAPL may potentially exit into cracks in the concrete shell into higher-permeability rock types surrounding the concrete or to space between the inner side of the reinforced concrete and outer gunite-covered rock formations.
- Contraction of the gunite after curing could create space between the gunite and rock formations around the tunnel exterior.
- Potential damage to concrete and gunite associated with tank metal plate reinforcement.
- Sumps, vent lines, grates, and drains.

Migration Pathway LOEs:

- Construction design supports potential development of LNAPL migration pathways due to cold joints, contraction, and cracking in the concrete and gunite.
- Historical observations of space between the back side of the steel shell plates and the inner side of the reinforced concrete (NAVFAC EXWC 2016).
- Appearance of a fuel hydrocarbon seep observed below Tank 5 on the evening of January 12, 2014 in the lower cross tunnel wall near the exterior of the material encasing the lower part of Tank 5.
- Monitored results of increasing soil vapor levels directly below and adjacent to Tank 5.

Source: NAVFAC. 2019b. "Conceptual Site Model, Investigation and Remediation of Releases and Groundwater Protection and Evaluation, Red Hill Bulk Fuel Storage Facility." June 30.

5. Individual Fuel Release Scenarios

The BWS comments herein are based on the summaries of results and descriptions of general risk assessment methodology included in the Phase 1 QVRA report, which provide sufficient data and analyses to evaluate the bases for the high level of risk for future fuel releases from the RHBFSF calculated by ABS. At this time, however, the BWS is unable to comment more specifically on ABS' quantification of *individual fuel release scenarios* because certain text in the main report and appendices (e.g., fault

and event tree construction) has been redacted. The BWS requests that the United State Environmental Protection Agency (EPA) and Hawaii Department of Health (DOH) (collectively, "Regulatory Agencies") provide the BWS with the complete unredacted QRVA Phase 1 report, including all appendices, so that we can provide further comment on ABS' risk assessment methodology pertaining to the individual fuel release scenarios outlined in the QRVA Phase 1 report.

General Comments to the Navy's Risk and Vulnerability Assessment Summary

The Navy's Risk and Vulnerability Assessment Summary letter expresses rejection of its own consultant's work and further quantitative risk assessment of the RHBFSF. The Navy's assessment is, at best, based on qualitative arguments. The Navy attached a long transmittal letter to the Phase 1 QVRA report, as well as its own eight-page summary document titled "Navy's Risk and Vulnerability Assessment Summary" that outline the Navy's concerns with and interpretation of the Phase 1 QVRA report (Navy, 2019). The Navy's Risk and Vulnerability Assessment Summary repeatedly calls into question the accuracy of ABS' baseline risk assessment and proposes to modify the AOC in order to abandon any further quantitative assessment of the risk of future fuel releases from the RHBFSF. In its place, the Navy is proposing a screening level, qualitative approach based on expert opinion rather than engineering analysis. The BWS could find no credible technical basis in the Navy's summary letter to justify the Navy's stated rejection of ABS' risk calculations, nor does the BWS agree with any proposal to substitute qualitative for quantitative risk assessment. The BWS does not support the Navy's proposal to walk back from rigorously calculated quantitative risk to subjective portrayals of qualitative risk. All phases of the planned quantitative risk assessment should be completed, and the significant risk the RHBFSF poses to our critical drinking water resources should be considered when making a TUA decision.

The significant risk to Oahu's sole source groundwater aquifer, as rigorously calculated and presented in the Phase 1 QVRA report, supports the BWS ongoing concerns with the RHBFSF. A proper response to such findings would be in to increase efforts to better understand and mitigate the threat to our water supply, not to walk away from the results and halt the engineering analysis. We request that the Regulatory Agencies reject the Navy's attempt to obscure the results of the Phase 1 QVRA report, and to direct the Navy to complete Phases 2 through 4 of the quantitative risk assessments. Otherwise, the final risk assessment will be neither quantitative nor representative of the risk the RHBFSF poses to our critical drinking water resources.

Specific Comments to the Navy's Risk and Vulnerability Assessment Summary

1. Quantitative vs. Qualitative Risk Assessment

In its cover letter to the Phase 1 QVRA report, the Navy recommends not performing Phases 2 through 4 of the quantitative risk assessments as originally proposed. The

Navy indicates that it may abandon the rigorous QRVA (Phases 2, 3 and 4) of the AOC Section 8 work and instead proposes "a more screening level, qualitative approach" using Navy and regulator subject matter experts (SMEs) for the completion of Phase 2, 3 and 4 risk evaluations (Navy, 2019). This stands in stark contrast to the approach documented in the Phase 1 QVRA report, which notes that "[d]uring the scoping discussions for Section 8 of the AOC Statement of Work (SOW) (Reference ES-2), all Parties agreed that a qualitative risk vulnerability assessment had limited value to support prudent decision-making. A QRVA was selected for providing a more rigorous and repeatable approach to evaluating risk." (ABS, 2018).

The BWS concurs with ABS that the Navy's newly-proposed use of qualitative approaches for risk assessment Phases 2 through 4 will have limited value and will not allow the explicit demonstration of the overall quantitative risk levels at the RHBFSF. Qualitative Phase 2, 3 and 4 evaluations cannot be added or combined "to the current calculated quantitative baseline QRVA Phase 1 Risks results" in order to support prudent decision making. The goal of the AOC Section 8 risk work is to be able to make a TUA selection that is conservative and protective of the environment. Changing to a qualitative approach at this point in the process will do little to help justify the eventual TUA decision.

2. Regulatory Involvement

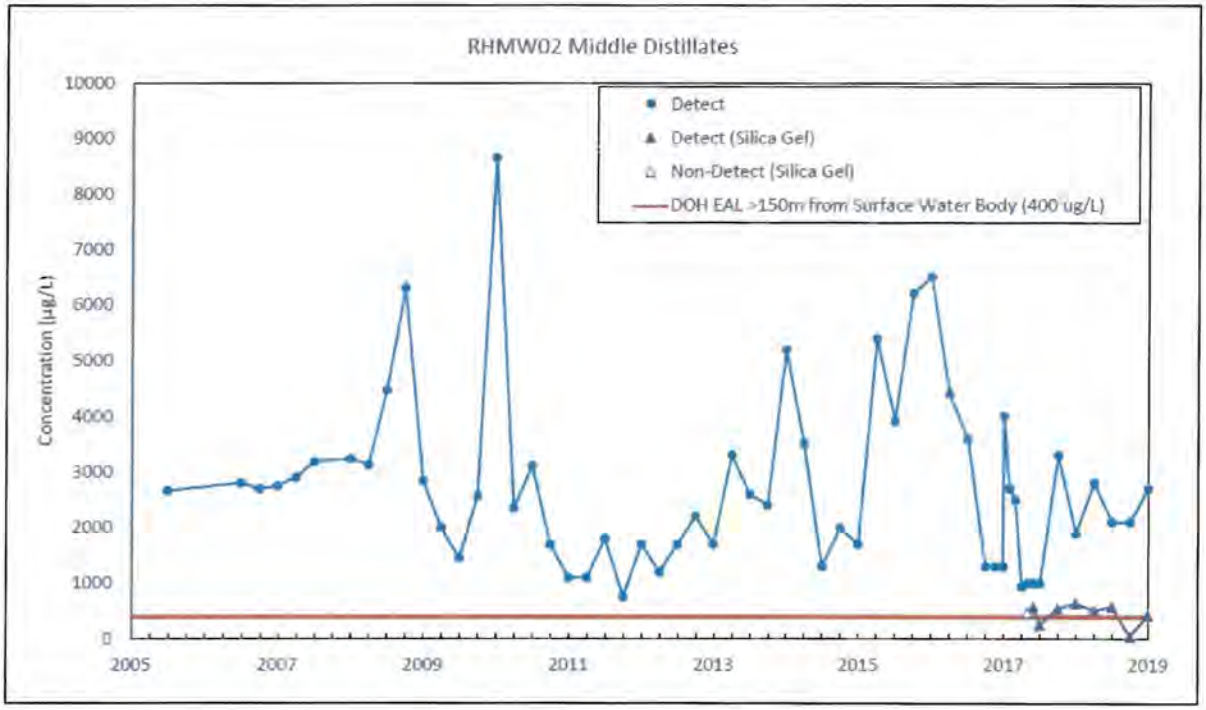
The Navy states that "[t]he Regulatory Agencies and their SMEs concur that additional effort to refine this initial baseline Phase 1 QRVA with additional sensitivity case studies would not significantly benefit the effort on the AOC as it relates to informing a [TUA] decision, and therefore may not be cost effective or timely, given estimates for time to completion" and that "[o]ne of the Regulatory Agencies' SMEs suggested a more qualitative, 'workshop' approach to the risk and vulnerability assessment" work under the AOC. The BWS is unaware of any such determination by the Regulatory Agencies or their SMEs. To the extent the Regulatory Agencies have made an independent determination concerning any changes to the agreed-upon quantitative risk assessment approach, the BWS requests that the Regulatory Agencies share the basis for such a decision.

3. Leak Record

The Navy states that the Phase 1 QVRA report "does not reflect the historical record, which shows that, since 1983, the Navy has not identified a release other than the 27,000 gallons from Tank 5 that was reported in 2014, which is 1 event in 35 years." The Navy continues to make this claim despite the fact that it is inconsistent with available records of the leak history at the RHBFSF. The BWS, by simply reviewing reports issued by the Navy, found that a release from Tank 6 was reported by the Navy in 2002 (Navy, 2002; Lau,2018a). Further, inspection reports provided by the Navy in its recent Tank Inspection Repair and Maintenance (TIRM) report indicate that Tank 15,

Tank 16, Tank 19, Tank 10, Tank 5, Tank 17, and Tank 20 underwent inspections after 1983 that identified through-wall corrosion and, by extension, leaks occurred (Lau, 2018c). The groundwater data from monitoring wells RHMW01 and RHMW02 are likewise indicative of multiple leaks as evidenced by TPH-d detections in groundwater samples (Lau, 2018b). Quite simply, the release from Tank 5 in 2014 is not the only release from the RHBFSF since 1983 (Lau, 2018a).

Groundwater data indicates that fuel continues to migrate to groundwater. As shown in the graph below, fuel constituents have been identified in groundwater samples collected from monitoring well RHMW02 since 2005. RHMW02 is the monitoring well located in the approximate center of the lower access tunnel and midpoint of the RHBFSF tank farm.



Source: NAVFAC, 2019c – First Quarter 2019 – Quarterly Groundwater Monitoring Report, Red Hill Bulk Fuel Storage Facility, Joint Base Pearl Harbor-Hickam, Oahu, Hawaii. May.

4. Leak Detection

The BWS has previously expressed its concern that the Navy's risk assessment was going to assume a maximum flow rate of 0.5 gallons per hour (gph) for chronic, undetectable leaks. This value, as we previously noted, derives from leak detection technology and associated information provided by Mass Technology Corporation (MTC). ABS has commented: "We see evidence in [unpublished] inspection reports

dated in 2015 that the [MTC] technology is currently in place at the RHBFSF." The BWS noted that periodic (e.g., biannual) deployment of the technology in offline tests of tank tightness is insufficient to justify use in the QRVA of a 0.5 gph maximum undetectable leak rate during normal operations. The BWS reiterates that the validity of that value depends critically on continuous, successful implementation of the MTC technology at the RHBFSF. The BWS acknowledges and appreciates that ABS has indicated it would revise the QRVA, and thus address the possibility of undetectable leaks with substantially higher flow rates than 0.5 gph, if its initial conclusion cannot be confirmed as correct by the Navy (Lau, 2018a).

The Phase 1 QVRA report (ABS, 2018) page 5-152 states that ABS estimated the "probabilities as to the likely actual level of accuracy" for these now annual RHBFSF tank leak tightness tests as follows:

0.7 gph, 30%

0.5 gph, 60%

0.2 gph, 10%

This indicates that the minimum leak that the Navy can detect during their annual leak detection has some uncertainty. Further, it confirms that low leak rates on the enormously large tanks at the RHBFSF are difficult to detect and that this level of detection is only done on an annual basis. Therefore, leaks of this magnitude, or even slightly greater may be occurring at rates above 0.7 gph between leak testing periods.

The Phase 1 QVRA report also indicates the probability of a through hole developing during the time since the last annual tank leak tightness test. It describes this probability as being "low" without any basis. The BWS notes that chronic, undetectable fuel releases to the environment from the RHBFSF, which ABS calculates could be as high as 52,596 gallons per year, are a consequence of the current tank design and the only TUA selections that would mitigate such releases would be secondary containment or removal of the tanks to a location that is not over the aquifer.

5. Navy's Proposed Actions to Mitigate Risk

The Navy presents ten approaches that it intends to take to mitigate certain vulnerabilities identified by the Phase 1 QVRA report as contributors to risk. The BWS notes that the vast majority of these actions are responses to leaks once they are discovered. The Navy proposes relatively little change to its current TIRM practices. Meaningful action must seek to prevent the leaks from occurring, and the best way to do that is to upgrade the RHBFSF tanks with secondary containment or relocate them away from our sole source groundwater aquifer.

6. Improvements to the Phase 1 Risk Assessment

The Navy states in its cover letter that "[t]he Navy has begun reconciling data used by the consultant and was looking towards additional effort to provide necessary updates to increase the absolute accuracy of the reported frequencies and/or potential release volumes." (Navy, 2019). However, the Navy goes on to declare that it "will not expend further resources to improve the accuracy of the baseline Phase I assessment" because "[t]here is little benefit in attempting to improve the reported frequencies or consequences." (Navy, 2019). The BWS cannot reconcile these statements. In any event, the BWS believes that the most prudent course of action in light of ABS' findings is to increase efforts to better understand and mitigate the threat to our water supply, not to walk away from the results and halt the engineering analysis. The Regulatory Agencies should direct the Navy to complete all phases of the quantitative risk assessments.

7. Missing Tank 5 and Tank 17 Tank Tightness Test Results

Among the Navy's concerns with the Phase 1 QVRA report is that apparently the tank tightness test results for Tank 5 and Tank 17 were not provided to ABS or incorporated into its calculations (Navy, 2019). The BWS does not understand why the Navy did not provide these test results to its own contractor. Although it is unclear to what extent this information might have impacted the overall risk assessment, the BWS agrees that the Navy should have provided it and it should have been used in the completion of the Phase 1 QRVA report.

8. Tank Nozzles

The Navy emphasizes that according to the ABS baseline risk model, nozzle leaks contribute to approximately twice the potential releases per year than small steel liner leaks (Navy, 2019). The Navy further discusses that in order to mitigate risk, it will remove the two smaller nozzles via the TIRM process, which will only leave the large nozzle for each tank. The Navy states that the Regulatory Agencies approved this approach with the understanding that the large nozzle remaining in each tank is fully inspectable, repairable, and can be coated. In addition, as shown by the recent destructive testing report the Navy has difficulty with its current NDE practices to accurately locate areas that need to be repaired on the inner tank wall which should be significantly easier than in the cramped space inside these nozzles. Furthermore, if the nozzles are indeed a significant risk driver, it is unclear to the BWS why the tank nozzles would not be considered for retrofitting with secondary containment. We understand that there has been some discussion of retrofitting one large nozzle in one of the tanks as a "pilot test." The BWS recommends strongly considering performing this tank nozzle retrofit for all RHBFSF tanks in use.

9. Risk Contributor List

The Navy lists 10 risk contributors in their summary document. The risk contributors are listed by the Navy in order of importance (Navy, 2019). The first listed item as a risk contributor is "availability of tank ullage to accommodate emergency movement of fuel from a leaking tank to a safe storage location." The Navy identifies this contributor as having the most influence on risk. Essentially, the Navy recognizes that it should have the ability to transfer fuel from a tank that is leaking into a tank that is determined to be safe and structurally uncompromised. But the Navy claims that federal regulations prohibit maintaining an asset that is not operationally used, i.e. an empty tank, and that an empty tank is very difficult to maintain. The BWS considers situational awareness insufficient to adequately mitigate risk and that an engineering solution (storage capacity for fuel from a leaking tank) should be in place and instituted immediately. The BWS believes that an empty tank, or another type of containment system, could be designated as "operational" and therefore not subject to the federal requirement that the Navy states is the barrier to implementing such a safety measure.

Summary of Comments

After reviewing the subject documents, the BWS continues to have serious concerns that the RHBFSF poses a considerable risk to the high-quality sole source groundwater aquifer that nourishes Oahu's drinking water. Numerous leaks from the RHBFSF tanks have been documented and sampling from under and around the RHBFSF has demonstrated the existence of petroleum contamination in the very aquifer that sustains Honolulu's water supply. To date, the Navy has not demonstrated to our satisfaction that the risks associated with storing enormous amounts of fuel directly above our drinking water can be sufficiently mitigated by simply continuing the status quo of cleaning, inspecting, and repairing its aging single-walled tanks.

The BWS concurs with the decision to utilize a quantitative approach for Phase 1 of the risk assessment at the RHBFSF. We believe that a quantitative approach should also be followed for Phases 2 through 4 of the remainder of the risk assessment. The BWS believes the risks calculated by ABS and presented in the Phase 1 QVRA report are unacceptably high and will only increase once seismic, fire, flood, landslide, and other hazards (associated with QVRA Phases 2 through 4) are considered.

The Navy's unusual and unconvincing efforts to separate itself from its own consultant's rigorous, quantitative evaluation of the risks of uncontrolled releases from the RHBFSF should be rejected by the Regulatory Agencies. To truly mitigate this considerable risk will require that the RHBFSF tanks be relocated to a facility not over our sole-source groundwater aquifer or be upgraded with engineered secondary containment.

Thank you for the opportunity to comment. If you have any questions, please contact Mr. Erwin Kawata, Program Administrator of the Water Quality Division, at 808-748-5080.

Very truly yours,

ERNEST Y.W. LAU, P.E.
Manager and Chief Engineer

CC: Mr. Steve Linder
United States Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

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(14) Section 154.550 Emergency shutdown.
(15) Section 154.560 Communications.
(16) Section 154.570 Lighting. Paragraphs (c) and (d).
(17) Section 154.700 General.
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[CGD 86–034, 55 FR 36252, Sept. 4, 1990, as amended by CGD 91–036, 58 FR 7352, Feb. 5, 1993; CGD 93–056, 61 FR 41457, Aug. 8, 1996]

§ 154.105 Definitions.

As used in this part:

Barrel means a quantity of liquid equal to 42 U.S. gallons.

Boundary Line means any of the lines described in 46 CFR part 7.

Captain of the Port (COTP) means the U.S. Coast Guard officer commanding a Captain of the Port Zone described in part 3 of this chapter, or that person's authorized representative.

Caretaker status denotes a facility where all piping, hoses, loading arms, storage tanks, and related equipment in the marine transfer area are completely free of oil or hazardous materials, where these components have been certified as being gas free, where piping, hoses, and loading arms terminating near any body of water have been blanked, and where the facility operator has notified the COTP that the facility will be in caretaker status.

Commandant means the Commandant of the Coast Guard or an authorized representative.

Contiguous Zone means the entire zone established by the United States under Article 24 of the Convention on the Territorial Sea and the Contiguous Zone, but not extending beyond 12 miles from the baseline from which the breadth of the territorial sea is measured.

District Commander means the officer of the Coast Guard designated by the Commandant to command a Coast Guard District, as described in part 3 of this chapter or an authorized representative.

Facility means either an onshore or offshore facility, except for an offshore facility operating under the jurisdiction of the Secretary of the Department of Interior, and includes, but is not limited to, structure, equipment, and appurtenances thereto, used or capable of being used to transfer oil or hazardous materials to or from a vessel or public vessel. Also included are facilities that tank clean or strip and any floating structure that is used to support an integral part of the facility's operation. A facility includes federal, state, municipal, and private facilities.

Facility operator means the person who owns, operates, or is responsible for the operation of the facility.

Hazardous material means a liquid material or substance, other than oil or liquefied gases, listed under 46 CFR 153.40 (a), (b), (c), or (e).

Marine transfer area means that part of a waterfront facility handling oil or hazardous materials in bulk between the vessel, or where the vessel moors, and the first manifold or shutoff valve on the pipeline encountered after the pipeline enters the secondary containment required under 40 CFR 112.7 or 49 CFR 195.264 inland of the terminal manifold or loading arm, or, in the absence of secondary containment, to the valve or manifold adjacent to the bulk storage tank, including the entire pier or wharf to which a vessel transferring oil or hazardous materials is moored.

MARPOL 73/78 means the International Convention for the Prevention

of Pollution from Ships, 1973 (done at London, November 2, 1973) as modified by the Protocol of 1978 relating to the International Convention for the Prevention of Pollution from Ships, 1973 (done at London, February 17, 1978).

Mobile facility means any facility that can readily change location, such as a tank truck or tank car, other than a vessel or public vessel.

Monitoring device means any fixed or portable sensing device used to monitor for a discharge of oil or hazardous material onto the water, within or around a facility, and designed to notify operating personnel of a discharge of oil or hazardous material.

Officer in Charge, Marine Inspection (OCMI) means the U.S. Coast Guard officer commanding a Marine Inspection Zone described in part 3 of this chapter, or an authorized representative.

Offshore facility means any facility of any kind located in, on, or under, any of the navigable waters of the United States, and any facility of any kind which is subject to the jurisdiction of the United States and is located in, on, or under any other waters, other than a vessel or a public vessel.

Oil means oil of any kind or in any form, including but not limited to, petroleum, fuel oil, sludge, oil refuse, and oil mixed with wastes other than dredged spoil.

Onshore facility means any facility (including, but not limited to, motor vehicles and rolling stock) of any kind located in, on, or under any land within the United States other than submerged land.

Person in charge means an individual designated as a person in charge of transfer operations under § 154.710 (for facilities) or § 155.700 (for vessels) of this chapter.

STCW means the International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, 1978.

Self-propelled tank vessel means a self-propelled tank vessel other than a tankship.

Tank barge means a non-self-propelled tank vessel.

Tankship means a self-propelled tank vessel constructed or adapted primarily to carry oil or hazardous material in bulk in the cargo spaces.

Tank vessel means a vessel that is constructed or adapted to carry, or that carries, oil or hazardous material in bulk as cargo or cargo residue, and that—

(a) Is a vessel of the United States;

(b) Operates on the navigable waters of the United States; or

(c) Transfers oil or hazardous material in a port or place subject to the jurisdiction of the United States.

Transfer means any movement of oil or hazardous material to, from, or within a vessel by means of pumping, gravitation, or displacement. A transfer is considered to begin when the person in charge on the transferring vessel or facility and the person in charge on the receiving facility or vessel first meet to begin completing the declaration of inspection as required by § 156.150 of this chapter. A transfer is considered to be complete when all the connections for the transfer have been uncoupled and secured with blanks or other closure devices and both of the persons in charge have completed the declaration of inspection to include the date and time the transfer was complete.

Vessel operator means a person who owns, operates, or is responsible for the operation of a vessel.

[CGD 75–124, 45 FR 7169, Jan. 31, 1980, as amended by CGD 86–034, 55 FR 36252, Sept. 4, 1990; CGD 79–116, 60 FR 17141, Apr. 4, 1995; CGD 93–056, 61 FR 41458, Aug. 8, 1996; 62 FR 3610, Jan. 24, 1997; CGD 79–116, 62 FR 25125, May 8, 1997]

§ 154.106 Incorporation by reference: Where can I get a copy of the publications incorporated by reference in this part?

(a) Certain material is incorporated by reference (IBR) into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the Coast Guard must publish notice of change in the FEDERAL REGISTER and the material must be available to the public. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or go to *http://www.archives.gov/federal‖register/*

U.S. Department of Homeland Security

United States Coast Guard

Coast Guard Regulated Facility Compliance Program

COMDTINST M16600.10
March 2020

U.S. Department of Homeland Security
United States Coast Guard

Commandant
United States Coast Guard

US Coast Guard Stop 7501
2703 Martin Luther King Jr Ave SE
Washington, DC 20593-7501
Staff Symbol: CG-FAC
Phone: (202) 372-1130
Fax: (202) 372-8428

COMDTINST M16600.10
09 MAR 2020

COMMANDANT INSTRUCTION M16600.10

Subj: COAST GUARD REGULATED FACILITY COMPLIANCE PROGRAM

Ref:
(a) Marine Safety Manual, Volume II, COMDTINST M16000.7 (series)
(b) Marine Safety Manual, Volume VII, COMDTINST M16000.12 (series)
(c) National Container Inspection Program Manual, COMDTINST M16616.11 (series)
(d) Regulated Mobile Facilities, COMDTINST M16600.9 (series)
(e) U.S. Coast Guard Marine Environmental Response and Preparedness Manual, COMDTINST M16000.14 (series)
(f) Marine Safety Manual, Volume I, Administration and Management, COMDTINST M16000.6 (series)
(g) Safety and Environmental Health Manual, COMDTINST M5100.47 (series)
(h) Coast Guard Occupational Medicine Manual, COMDTINST M6260.32 (series)
(i) Coast Guard Medical Manual, COMDTINST M6000.1 (series)
(j) Regulated Bulk Liquid Transfer Monitors, COMDTINST M16455.11 (series)
(k) Captain of the Port Orders Tactics, Techniques, and Procedures (TTP), CGTTP 3-71.3
(l) Navigation and Vessel Inspection Circular No. 01-2011 – Guidance Related to Waterfront Liquefied Natural Gas (LNG) Facilities, COMDTPUB P16700.4
(m) Navigation and Vessel Inspection Circular No. 06-17 – Pipeline and Hose Testing Guidance for Maritime Transportation Related Facilities Handling Oil or Hazardous Material in Bulk, COMDTPUB P16700.4

1. PURPOSE. This Manual provides Policy and Doctrine used by Coast Guard personnel in the administration and execution of the regulated facility compliance program. This Manual is intended to provide overarching guidance for the Coast Guard regulated facility compliance program, with Chapters 1 through 3 applying to all facility inspection activities. Chapters 4 through 6 are specific to facility safety regulations, and other documents containing facility compliance information are referenced throughout this Manual.

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N00543

Exhibit N-5F

2. ACTION. All Coast Guard unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chiefs of headquarters staff elements must comply with the provisions of this Manual. Internet release is authorized.

3. DIRECTIVES AFFECTED.

   a. Facilities Receiving Vehicles From Roll-On/Roll-Off (RO/RO) Vessels Being Regulated Under 33 CFR Part 126, CG-FAC Policy Letter No. 14-01, is hereby cancelled.

   b. Facilities Receiving Cargoes Classified as Potentially Dangerous Material (PDM) Under 46 CFR Part 148, CG-FAC Policy Letter No. 14-02, is hereby cancelled.

   c. MISLE Casework Completion, Review, and Closure for Facility and Container Related Activities, CG-FAC Policy Letter No. 19-02, is hereby cancelled.

4. DISCLAIMER. This Manual is not a substitute for applicable legal requirements, nor is it itself a rule. It is intended to provide operational guidance for Coast Guard personnel and is not intended to nor does it impose legally-binding requirements on any party outside the Coast Guard.

5. MAJOR CHANGES.

   a. Updates and combines facility compliance program information previously located in Reference (a) and various policy letters outlined in Paragraph 3 into a single document.

   b. Formalizes existing best practices and provides amplifying information to Coast Guard personnel on oversight and management of facility compliance programs and activities conducted as part of those programs.

6. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.

   a. The development of this Manual and the general policies contained within it have been thoroughly reviewed by the originating office in conjunction with the Office of Environmental Management, Commandant (CG-47). This Manual is categorically excluded under current Department of Homeland Security (DHS) categorical exclusion (CATEX) A3 from further environmental analysis in accordance with the U.S. Coast Guard Environmental Planning Policy, COMDTINST 5090.1 and the Environmental Planning (EP) Implementing Procedures (IP).

   b. This Manual will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment. All future specific actions resulting from the general policy in this Manual must be individually evaluated for compliance with the NEPA and Environmental Effects Abroad of Major Federal Actions, Executive Order 12114, Department of Homeland Security (DHS) NEPA policy, Coast Guard Environmental Planning, and compliance with all other applicable environmental mandates.

7. DISTRIBUTION. No paper distribution will be made of this Manual. An electronic version will be located on the following Commandant (CG-612) web sites. Internet: http://www.dcms.uscg.mil/directives/, and CGPortal: https://cgportal.uscg.mil/library/directives/SitePages/Home.aspx.

8. RECORDS MANAGEMENT CONSIDERATIONS. This Manual has been evaluated for potential records management impacts. The development of this Manual has been thoroughly reviewed during the Directives clearance process, and it has been determined there are no further records scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. 3101 et seq., National Archive and Records Administration (NARA) requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This policy does not have any significant or substantial change to existing records management requirements.

9. FORMS/REPORTS.

   a. The Facility Inspection Requirements, Form CG-835F, must be used during all facility compliance activities. All previous editions are obsolete. Per Chapter II-16-35, Item No. 3 of the Information and Life Cycle Management Manual, COMDTINST M5212.12 (series), units must retain copies of the Form CG-835F for three years after which they may be destroyed (NCI-26-76-2 items 453 and NC-26-80-4, and 221) unless they are related to a case under litigation or are part of an incomplete investigation. Documents entered into the Marine Information for Safety and Law Enforcement (MISLE) database meet these retention requirements. Copies of the forms are available through the CG Forms website at https://www.dcms.uscg.mil/Our-Organization/Assistant-Commandant-for-C4IT-CG-6/The-Office-of-Information-Management-CG-61/Forms-Management/CG-Forms/, or via Military Standard Requisitioning and Issue Procedures (MILSTRIP) from the Surface Forces Logistics Center.

   b. Units will document Facility Compliance activities in MISLE per applicable MISLE user guides, available on the Commandant (CG-FAC-2) CGPortal page.

10. REQUESTS FOR CHANGES. Units and individuals may recommend changes by writing via the chain of command to: Commandant (CG-FAC); U.S. Coast Guard Stop 7501; 2703 Martin Luther King Jr Ave., SE; Washington, DC 20593-7501.

R. V. TIMME /s/
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Prevention Policy

CHAPTER 1 General

A. Background.

1. Missions. Three of the eleven statutory missions of the Coast Guard are Marine Safety, Marine Environmental Protection, and Port and Waterways Security. Within the context of these three missions, the Coast Guard inspects waterfront facilities for safety and security requirements to prevent accidents or intentional acts that could cause death and injury, the spill or release of oil or hazardous material into the environment, or a disruption to the Marine Transportation System. In some instances, facility compliance activities also have a nexus to a fourth statutory mission, Defense Readiness.

2. Waterfront facilities. The definition of what constitutes a waterfront facility varies depending upon the authorizing legislation and regulations. In general, a waterfront facility is a pier, wharf, dock or similar structure to which a vessel may be secured. Any equipment on the structure, any buildings on or contiguous to the structure, and any equipment or materials on the structure or in those buildings are also considered part of the facility. When determining the Coast Guard's jurisdiction of a waterfront facility, the specific regulations and statutes that apply to the facility must be considered. For facilities regulated under 33 CFR Part 126, the nexus to the waterside operations must be considered. For facilities regulated under 33 CFR Part 127 and 33 CFR Part 154, portions of the facility that fall within the definition of the Marine Transfer Area (MTA) for the specific facility are regulated by the Coast Guard for safety purposes. The footprint of the Maritime Transportation Security Act (MTSA) regulated portion often does not mirror the Coast Guard's jurisdictional areas outlined in this Paragraph, but rather may include a portion of the facility or the entire footprint of the facility.

B. History.

1. The Revenue Cutter Service's involvement with marine environmental protection began in earnest with the Refuse Act in 1899, which outlawed the "dumping of refuse" into the navigable waters of the United States and gave the Revenue Cutter Service and later the Coast Guard enforcement authority. Growing environmental awareness in the later part of the 20th century pushed the Coast Guard even deeper into the pollution prevention realm with the passing of the Clean Water Act of 1972, the Oil Pollution Act of 1990, and other subsequent laws. The oceans and waterways of the world have long been used by the maritime community, shoreside industries, and municipalities as catchalls for domestic and industrial wastes. Pollution results from acts of commission and omission. In either case, the technology to measure and combat the detrimental effects of pollution is available or is being developed.

2. A series of maritime incidents led to the laws and regulations in place today that form the backbone of the Coast Guard's regulated facility compliance program. These incidents include, but are not limited to:

   a. The Black Tom Explosion of 1916 led to the Espionage Act.

e. Jurisdiction on LNG facilities is generally limited by regulation to the MTA. The MTA on LNG facilities extends from the vessel or where the vessel moors to the last manifold or valve before the receiving tank.

f. Jurisdiction on LHG facilities is generally limited to the MTA. The MTA on LHG facilities extends from the vessel or where the vessel moors to the first shutoff valve on the pipeline immediately inland of the terminal manifold, including the entire part of a pier or wharf used to serve LHG vessels. As discussed in 60 FR 39789, the area encompasses the pier or wharf in its entirety, including the cargo manifold, as well as the part of piping cargo and vapor inland from the pier to the first shutoff valve. Here, ''inland'' refers to the direction along the piping away from the vessel.

g. Other applicable regulations. The MTSA regulations in 33 CFR Parts 101 and 105 and MARPOL PRF regulations in 33 CFR Part 158 may also apply to a LNG or LHG facility.

6. 33 CFR Parts 154. These regulations apply to all onshore and offshore facilities capable of transferring oil or liquid hazardous material, in bulk, to or from any vessel with a capacity of 250 barrels or more on the navigable waters or contiguous zone of the United States.

   a. These regulations are issued under PWS and the FWPCA and apply to the navigable waters of the United States, adjoining shorelines, and the contiguous zone. Even though the FWPCA applies out to 200 miles, these regulations apply out to 12 miles from the baseline because of PWS jurisdiction, with the following exceptions:

      (1) Under 33 CFR § 154.100, this Part applies to "each facility", and 33 CFR § 154.105 defines "facility" to include "either an onshore or offshore facility, except for an offshore facility operating under the jurisdiction of the Secretary of the Department of Interior".

         (a) As discussed in 45 FR 7157, 33 CFR Part 154 does not apply to Outer Continental Shelf (OCS) Facilities. OCS Facility is defined at 33 CFR § 140.10.

         (b) Structures similar to an OCS Facility but located within state waters, as defined in the SLA, are applicable to 33 CFR Part 154 if they are capable of transferring oil or liquid hazardous material, in bulk, to or from any vessel with a capacity of 250 barrels or more.

      (2) Oil import/export facilities located beyond the state waters, as defined in the SLA, may also be subject to the DPA. In such instances, contact Commandant (CG-OES-2) and Commandant (CG-FAC-2).

   b. A tank truck or tank car that transfers oil or liquid hazardous material, in bulk, to or from any vessel with a capacity of 250 barrels or more are considered a mobile facility under 33 CFR Part 154. This Part allows modified requirements for mobile facilities. Coast Guard policy on oversight of mobile facilities can be found in Reference (d).

c. Jurisdiction on facilities regulated under this Part are generally limited by regulation to the MTA. The MTA extends from the part of a waterfront facility handling oil or hazardous materials in bulk between the vessel, or where the vessel moors, and the first manifold or shutoff valve on the pipeline encountered after the pipeline enters the secondary containment required under 40 CFR § 112.7 or 49 CFR § 195.264 inland of the terminal manifold or loading arm, or, in the absence of secondary containment, to the valve or manifold adjacent to the bulk storage tank, including the entire pier or wharf to which a vessel transferring oil or hazardous materials is moored.

d. Federal facilities, regardless of the type of the vessels they service, come under the purview of 33 CFR Parts 154 and 156 (this includes DoD and Coast Guard facilities). Primary responsibility for enforcing the requirements of 33 CFR Parts 154 and 156 at facilities that are both federally owned and operated resides with the Federal agency that owns and operates the facility, not with the Coast Guard. When a facility is owned or operated by a commercial entity but operating on a Federal facility, the Coast Guard maintains regulatory oversight. Consistent with our general enforcement responsibility and in the public interest, on facilities that are both owned and operated by a Federal agency, the Coast Guard does the following:

(1) Supports and assists the efforts of the Federal agency involved to comply with the pollution prevention regulations.

(2) Conducts facility compliance activities at such facilities upon request, and enters such facilities to gain access to commercial vessels berthed there.

(3) Advises other agencies of violations, when observed or reported, and of requirements that must be met to achieve compliance.

(4) When a violation of these parts is observed at a Federally owned and operated facility, the COTP-

(a) Formally advises the responsible official of the violation(s);

(b) Explores all possible means of resolving the matter and achieving compliance; and

(c) Submits relevant documentation to the District Commander for disposition if compliance is not forthcoming.

(5) Upon receipt of documentation from the COTP indicating violations at such facilities, the District Commander must explore all possible means of reaching a mutual agreement for achieving compliance. Such efforts must be undertaken with the District Commander's counterpart in the cognizant agency, e.g., the Regional Administrator, District Commandant, or District Engineer and be fully documented. If this fails to achieve a resolution of the situation, provide Commandant (CG-FAC) all relevant information for resolution with the parent agency.

(1) A PMC may serve as a component of a facility regulated under 33 CFR Part 154. These may be as a floating structure that looks like a tank barge, a floating structure that looks like a deck barge with oil or hazardous material storage tanks on the deck, or a floating structure that looks like another vessel type (e.g. fish processing vessel) now used as a PMC.

(2) In such instances, the jurisdictional boundaries of 33 CFR Part 154 apply; the Coast Guard jurisdiction goes to the first manifold or shutoff valve on the pipeline encountered after the pipeline enters the secondary containment required by EPA or PHMSA inland of the terminal manifold or loading arm, or, in the absence of secondary containment, to the valve or manifold adjacent to the bulk storage tank

(a) In the event of a PMC, the jurisdictional boundary will typically be the last valve before the bulk storage tank.

(b) Based on past history, EPA, or state agencies acting on their behalf, might not apply the requirements of 40 CFR § 112.7 to PMCs. In such instances, secondary containment will not be required, leaving the Coast Guard as the sole jurisdictional agency.

(c) Under the definition of MTA in 33 CFR § 154.105, the Coast Guard cannot regulate the storage tanks on a PMC under 33 CFR Part 154. As such, the requirements of 33 CFR Part 154 must only be applied to portions of the facility within the MTA. The COTP retains authority to issue COTP Orders or Administrative Orders due to conditions on any portion of the facility that pose a threat to the environment or safety of the facility or waterway, whether the item(s) of concern are in the MTA or not.

[1] When the COTP determines a facility poses a threat to the marine environment and a COTP Order or Administrative Order is warranted, the PMC may be required to be removed from the water for an examination by a marine surveyor or Coast Guard Marine Inspector to determine necessary measures or repairs to ensure the safety of personnel and/or the environment.

[2] When the primary concern from a PMC is the safety of personnel, issues can sometimes be resolved by the Coast Guard Facility Inspectors contacting OSHA or the state agency working on their behalf.

3. Definitions. 33 CFR § 154.105 lists definitions of terms used throughout 33 CFR Part 154. In addition to specific terms outlined below, discussion of additional terms listed in this section are discussed throughout this Chapter in appropriate locations.

a. Hazardous material – this definition points to numerous other regulations to identify what is considered a regulated hazardous material under this Part. When referencing these regulations, the applicability of those regulations must not be considered, but rather just the commodities covered under specific regulations referenced. For example, an inland tank barge is not applicable to MARPOL Annex II, but if an inland tank barge is carrying a cargo

that is a Noxious Liquid Substance (NLS) under MARPOL Annex II, the facility the inland tank barge conducts transfer operations with meets the applicability of 33 CFR Part 154.

(1) One regulation the definition of Hazardous Material in 33 CFR § 154.105 points to is 46 CFR § 153.40(c), which is "Materials listed in Table 1" of 46 CFR § 153.40. Referencing this Table does not automatically bring Table 2 of 46 CFR § 153.40 to exclude cargos from being regulated when carried on inland tank barges. As such, a facility that only receives inland tank barges carrying commodities listed on Table 2 of 46 CFR § 153.40 is still applicable to 33 CFR Part 154.

(2) When a bulk liquid commodity has not been classified, under MARPOL Annex II regulation 6.3, it is the administrations responsibility to categorize that commodity. In the United States, Commandant (CG-ENG-5) is responsible for this. If Commandant (CG-ENG-5) determines a bulk liquid commodity is a MARPOL Annex II cargo (NLS), a facility that conducts bulk transfer with a vessel of a capacity of 250 barrels or more, that facility meets the applicability of 33 CFR Part 154.

b. MTA – the MTA is the Coast Guard regulated portion of a facility regulated under 33 CFR Part 154. The MTA extends from the vessel or where the vessel moors to the first valve inside secondary containment required by the EPA or PHMSA, which is sometimes miles from the vessel or where the vessel moors. Jurisdictional concerns should be discussed directly with EPA and/or PHMSA to determine the jurisdictional boundary, noting the facility may have secondary containment along the transfer pipeline not required by EPA or PHMSA.

4. Incorporated by Reference. 33 CFR § 154.106 lists industry consensus standards incorporated by reference. While newer versions of the standards Incorporated by Reference may exist, only the version listed in this section are enforceable. A facility owner or operator can request to comply with a newer version of the listed industry consensus standards, in which case those approved versions become enforceable. In such instances, the request should be reviewed as an alternative under 33 CFR § 154.107. COTPs may contact their District Prevention staff for assistance in reviewing such requests. If necessary, District Prevention staffs will contact Area staffs, Commandant (CG-FAC-2), and Commandant (CG-OES-2) for higher level review. Additional information on alternatives is discussed in Chapter 6.A.5 of this Manual.

5. Alternatives. Under 33 CFR § 154.107, the COTP may approve alternative procedures, methods, or equipment standards in lieu of any requirements in this Part if the stipulations of the section are met.

a. There are three requirements listed within this section for alternatives, and all three of these requirements must be met in order for the COTP to approve an alternative.

(1) Review and approval must be based on material submitted by the facility owner or operator.

U.S. Department
of Transportation

Research &
Special Programs
Administration

400 Seventh Street S.W.
Washington, D.C. 20590

U.S. Environmental
Protection Agency

Office Solid Waste &
Emergency Response

401 M Street, SW, 5201G
Washington, DC 20460

FEB - 4 2000

From: Richard B. Felder, Associate Administrator, Office of Pipeline Safety, United States Department of Transportation

Stephen D. Luftig, Director, Office of Emergency and Remedial Response, United States Environmental Protection Agency

To: Department of Transportation, Office of Pipeline Safety Regional Directors

Director, Office of Site Remediation and Restoration EPA Region I
Director, Emergency and Remedial Response Division EPA Region II
Directors, Hazardous Waste Management Division EPA Regions III and IX
Director, Waste Management Division EPA Regions IV, VIII
Directors, Superfund Division EPA Regions V, VI, VII
Director, Environmental Cleanup Office EPA Region X

Subject: Jurisdiction over Breakout Tanks/Bulk Oil Storage Tanks (Containers) at Transportation-Related and Non-Transportation-Related Facilities

I. Purpose

The purpose of this agreement is to clarify jurisdictional issues and establish mutual goals for the Office of Emergency and Remedial Response, Environmental Protection Agency (EPA) and the Office of Pipeline Safety, Department of Transportation (DOT). This letter does not amend the 1971 MOU between the EPA and DOT or redelegate any responsibilities agreed to under that MOU or previously assigned to DOT or EPA under Executive Order 12777 or any previous Executive Order.

II. Authority and History

Section 311 of the Clean Water Act (CWA) (33 U.S.C. 1321) gives the President authority to issue regulations regarding prevention, preparedness, and response planning for facilities. Executive Order 12777, signed on October 18, 1991, delegates responsibilities under CWA Section 311 to EPA to issue regulations regarding prevention, preparedness, and response planning for non-transportation-related onshore facilities. EPA was also delegated responsibility

to establish procedures, methods, and equipment and other requirements to prevent and contain discharges of oil and hazardous substances from non-transportation-related onshore facilities. Those regulations are found at 40 CFR 112. DOT was delegated authority to issue regulations regarding prevention, preparedness, and response planning at transportation-related onshore facilities. DOT was also delegated responsibility to establish procedures, methods, and equipment and other requirements to prevent and contain discharges of oil and hazardous substances from transportation-related onshore facilities. DOT issued response planning regulations for transportation-related onshore oil pipelines, found at 49 CFR 194.

DOT also issued safety standards found at 49 CFR 195 for pipeline facilities under the Pipeline Safety Act of 1992 (49 U.S.C. 60101). DOT considers environmental factors when issuing pipeline safety standards.

III. Current Status at Complex Facilities

A 1971 Memorandum of Understanding (MOU) between the EPA and DOT defines transportation and non-transportation-related activities. A facility with both transportation-related and non-transportation-related activities is a "complex facility" and is subject to the dual jurisdiction of EPA and DOT. Both EPA and DOT have determined that the definition of a complex facility, as currently interpreted under both agencies programs, can include an entire facility or a single tank. Owners or operators of a complex facility must comply with all the regulatory requirements of both agencies when both agencies have jurisdiction. An example of dual jurisdiction is a bulk storage container serving as a tank storing oil while also serving as a breakout tank for a pipeline or other transportation purposes. Attachments 1-10 provide practical examples of complex facilities showing jurisdictional delineation to minimize potential confusion over regulatory responsibility.

IV. Next Steps

To improve communications, both DOT and EPA have initiated talks at the Headquarters level. These talks will be expanded to include regional representatives. Better communications entails; (1) improving information sharing on pipeline and tank incidents resulting in discharges to navigable water, material failures, human errors and other activities resulting in a discharge; (2) improving information sharing relating to pollution prevention, preparedness, and response; (3) sharing critiques of response efforts by EPA On-Scene Coordinators (OSCs) with DOT to enhance response planning of the pipeline operator (DOT may also consider these critiques in revisions to its regulations); (4) including an EPA participant on the Technical Hazardous Liquid Pipeline Safety Standards Committee (THLPSSC); (5) including a DOT Office of Pipeline Safety Regional member on each Inland Area Committee who may advise the EPA OSC on issues related to pipelines and breakout tanks; (6) continuing the DOT practice of offering EPA OSCs the opportunity to review submitted response plans before DOT approval; and (7) continuing discussions to resolve the jurisdictional issues surrounding oil gathering lines and their associated tanks.

Cross training is also important. EPA will make space available for DOT representatives to attend Spill Prevention, Control, and Countermeasure and Facility Response Planning training courses. DOT will make space available for EPA representatives and OSCs to attend courses in pipeline safety and inspection. DOT and EPA personnel will establish the appropriate level of participation in these training opportunities over the next three years. The agencies will also explore other opportunities for cross training including the Freshwater Spill Symposium, Preparedness for Response Exercise Program (PREP), etc.

DOT and EPA will establish procedures for the joint inspection of facilities subject to dual jurisdiction. A joint inspection will be considered the equivalent of a separate inspection by each agency. DOT and EPA will identify risk factors to consider when identifying high-priority/high-risk facilities subject to joint inspections. These risk factors include, but are not limited to; proximity to densely populated areas, proximity to navigable waters or environmentally sensitive areas as defined in Area Contingency Plans or other appropriate documents, areas likely to be subject to natural disasters, facility spill history, and compliance history. DOT and EPA regional representatives will use the procedures to identify those facilities that will be jointly inspected by both agencies. Facilities should be offered the opportunity to elect to participate in joint inspections. A joint inspection does not abridge the ability of each agency to implement enforcement activities arising from those inspections, nor limit the right to conduct separate inspections of any facility subject to dual jurisdiction. DOT and EPA will endeavor to conduct six to ten joint inspections nationwide within one year of this memorandum. The agencies will assess the effectiveness of the joint inspection program at the completion of all of the joint inspections.

V. Immediate Considerations and Long Term Goals

While DOT and EPA have different historical emphases, our respective goals are complementary. The mutual long term goals of EPA and DOT are:

1. To ensure that all breakout tanks/bulk storage containers are appropriately regulated under all applicable statutes,
2. That the rules and enforcement practices of both agencies are substantially equivalent to the extent possible and,
3. That as many facilities as possible are subject to single jurisdiction in the interest of regulatory efficiency.

DOT and EPA want to encourage the use of tank management programs which exemplify best engineering and operational practices in the industry. Our efforts to recognize excellence in performance will enable both agencies to funnel lessons back into our tank programs to ensure that they are dynamic and able to keep pace with developments in the filed. Both agencies share the goal of improving the effectiveness of our tank inspection programs while focusing our limited resources on those facilities that pose the greatest risk to the environment

Over a five-year period, DOT and EPA shall undertake joint efforts to measure the effectiveness of DOT and EPA regulatory programs in protecting the environment and contributing to the safety of the regulated industry. The agencies will determine and agree upon factors including, but not limited to regulations, implementation, enforcement, and additional exemplary protective measures. DOT and EPA may invite the Coast Guard to participate in or review these efforts.

EPA and DOT are committed to working diligently towards achieving these goals. Until these long term goals are achieved, EPA and DOT shall respect the jurisdiction of its sister agency and encourage regulated facilities to fully comply with each agency's regulations.

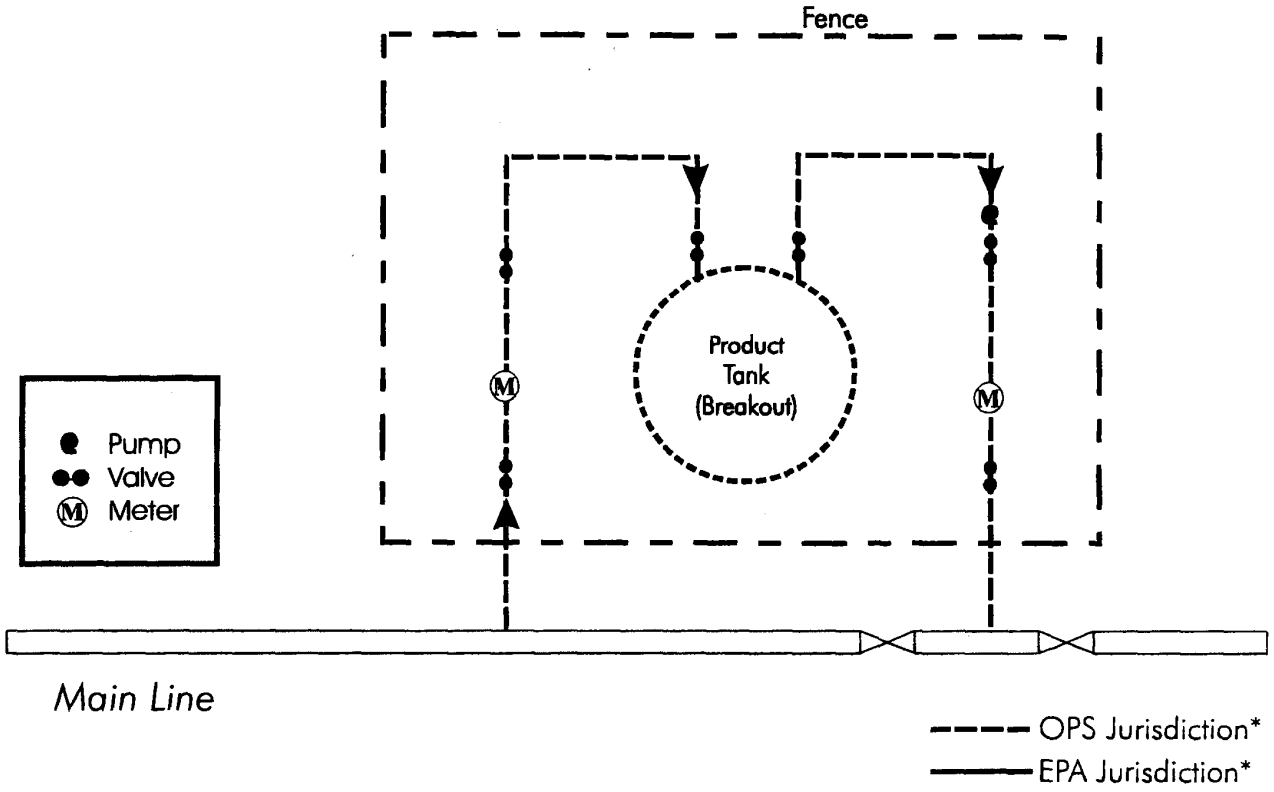
For more information contact David Lopez, Director, Office of Emergency and Remedial Response Oil Program Center at (703) 603-8707 and Stacey Gerard, Director, Office of Policy, Regulations, and Training (202) 366-4595.

Attachments

cc: Timothy Fields Jr, Assistant Administrator, OSWER
Mike Shapiro, Deputy Assistant Administrator, OSWER
Jim Makris, Director, CEPPO, OSWER
Steve Herman, Assistant Administrator, OECA
Eric Schaeffer, Director, Office of Regulatory Enforcement, OECA
Earl Salo, Assistant General Counsel for Superfund, OGC
Bob Cianciarulo, Superfund/Oil Program Lead Region Coordinator
EPA Regional Removal Managers
Elaine Joost, Acting Chief Counsel, RSPA
Commandant, U.S. Coast Guard (G-MS, G-MO, G-MSO, G-MOC, G-MOR)

N00555

BREAKOUT TANKAGE



SOURCE: US EPA REV: 11/03/99

ATTACHMENT 1

Exhibit N-5G

N00556

STORAGE TANKAGE

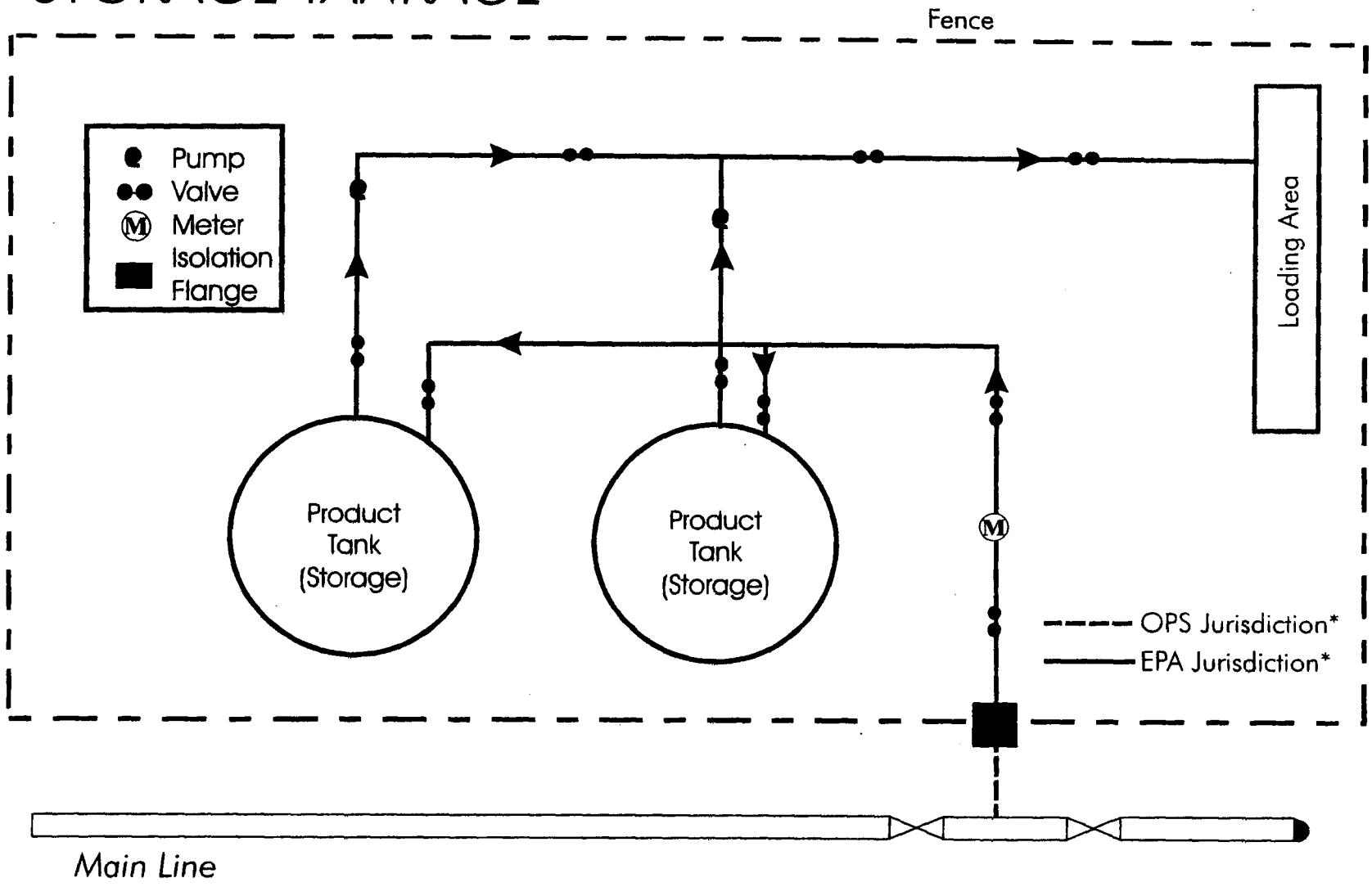
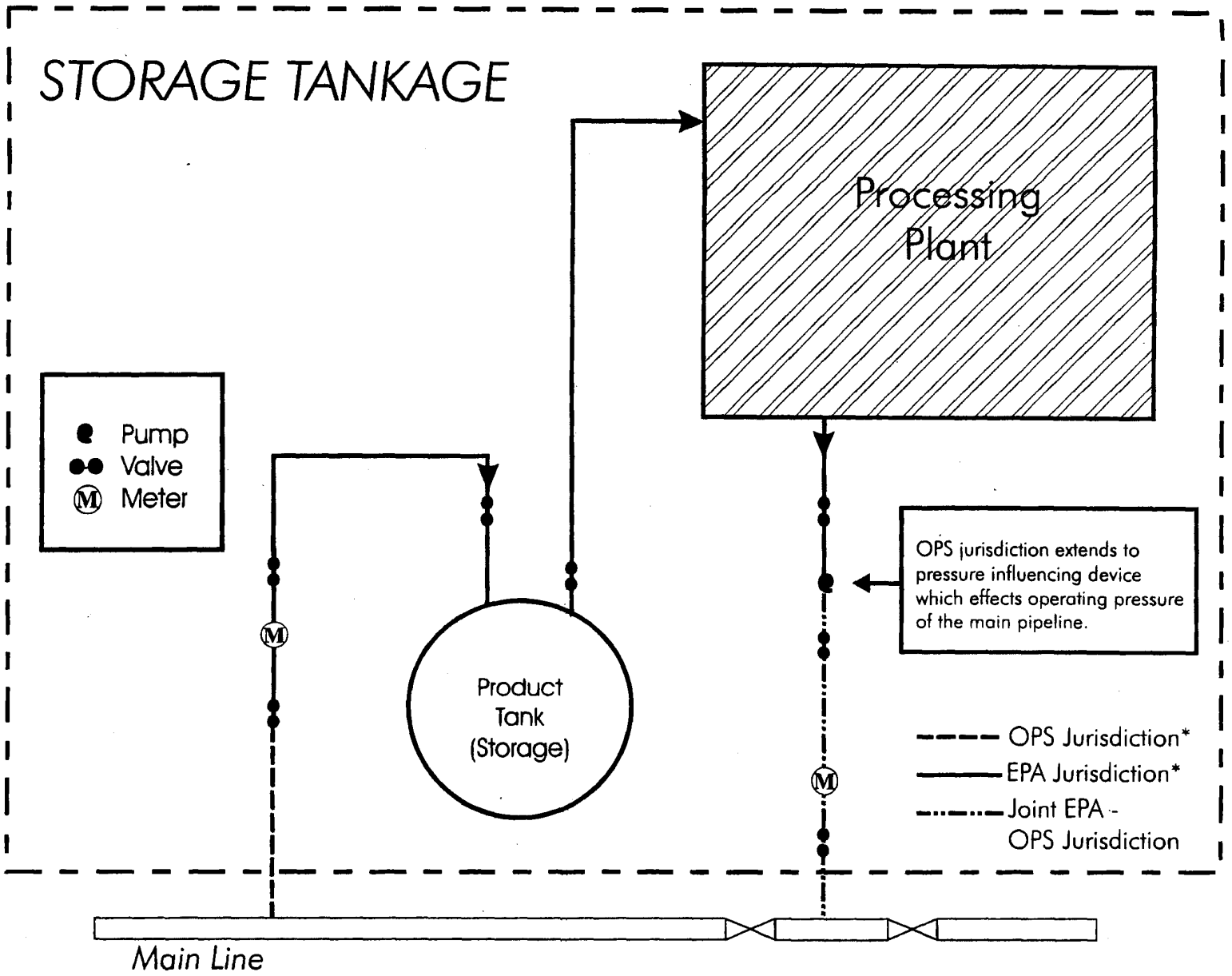


Exhibit N-5G

* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first meter, valve, or isolation flange at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first meter, valve, or isolation flange at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

N00557



* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first and last pressure influencing device, meter, valve, or isolation flange, at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first and last pressure influencing device, valve, or isolation flange, at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

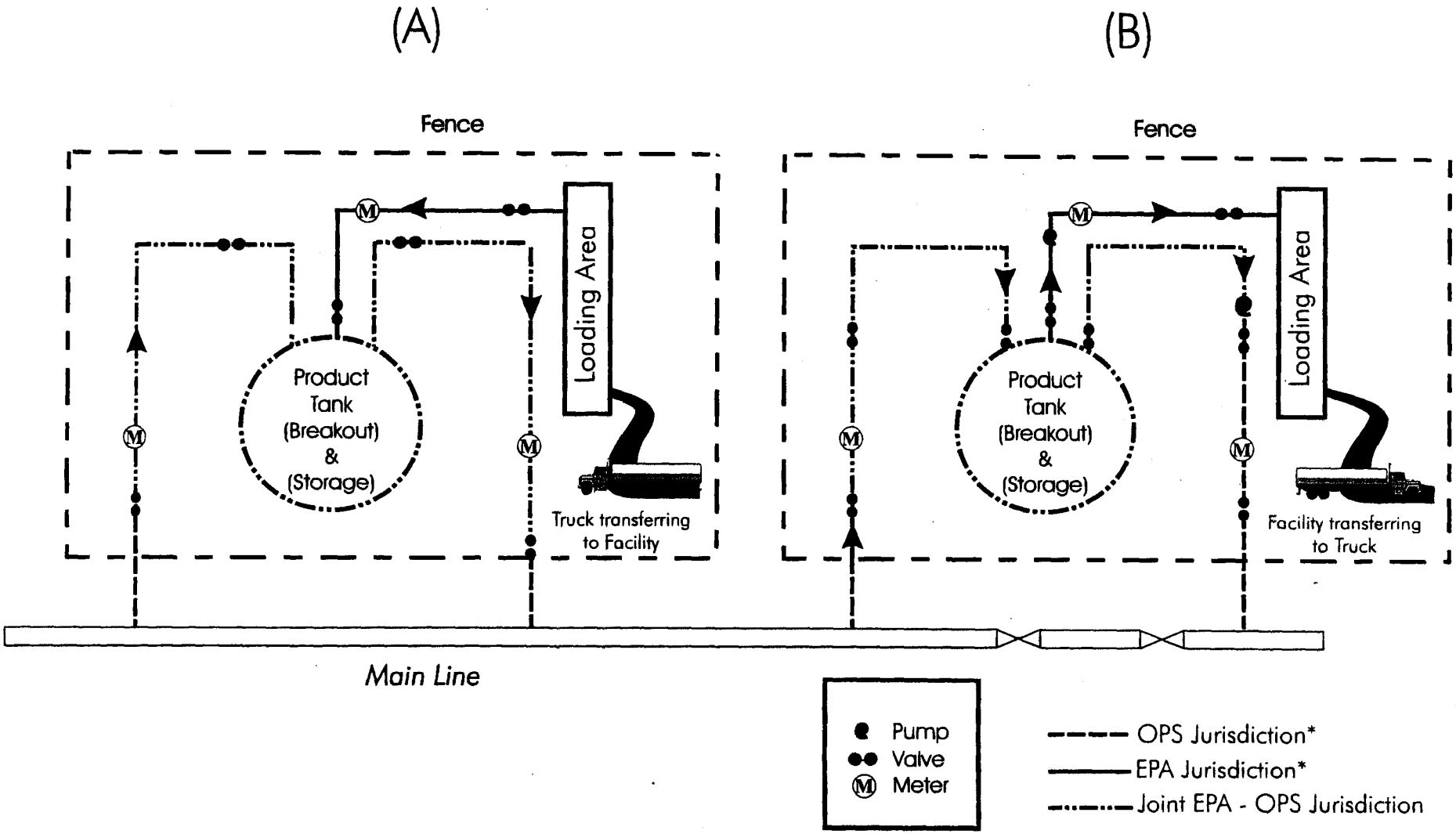
SOURCE: US EPA REV: 11/03/99

ATTACHMENT 3

Exhibit N-5G

N00558

BREAKOUT AND STORAGE TANKAGE - JOINT EPA - OPS JURISDICTION



* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first and last pressure influencing device, meter, valve, or isolation flange, at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first and last pressure influencing device, valve, or isolation flange, at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

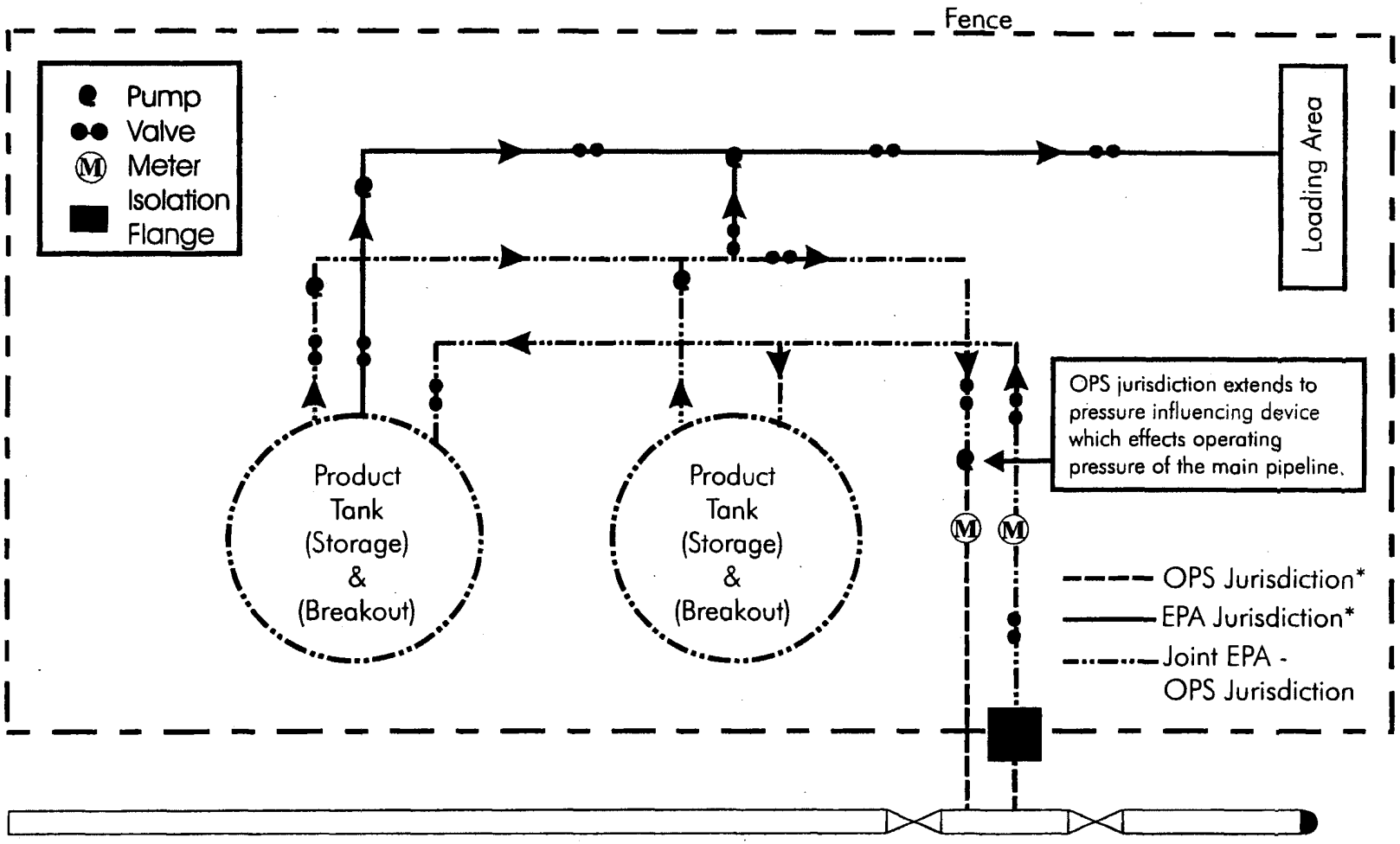
SOURCE: US EPA REV: 11/04/99

ATTACHMENT 4

Exhibit N-5G

N00559

STORAGE AND BREAKOUT TANKAGE - JOINT EPA - OPS JURISDICTION



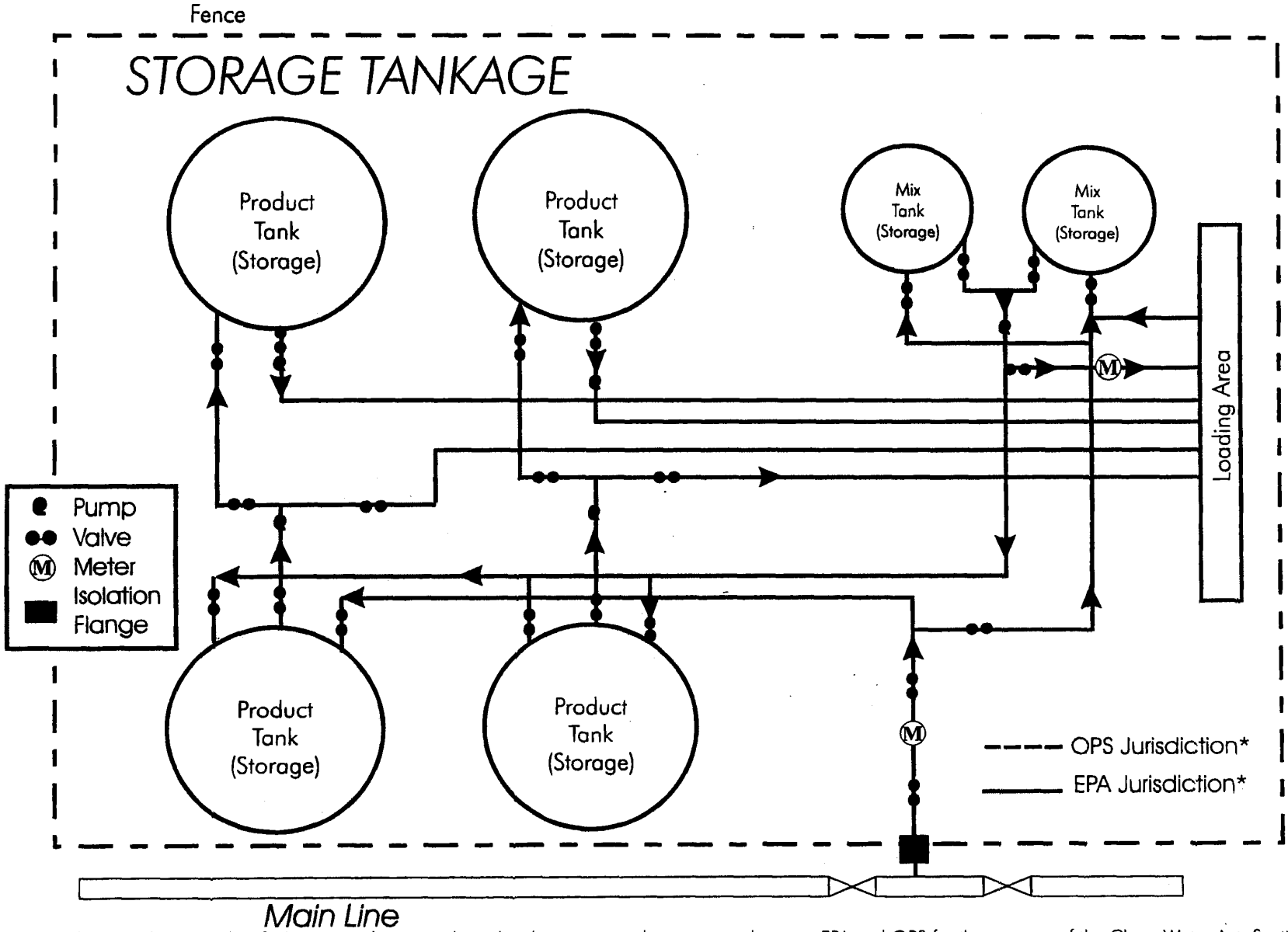
* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first and last pressure influencing device, meter, valve, or isolation flange, at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first and last pressure influencing device, valve, or isolation flange, at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

SOURCE: US EPA REV: 11/03/99

ATTACHMENT 5

Exhibit N-5G

N00560



* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first meter, valve, or isolation flange at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first meter, valve, or isolation flange at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

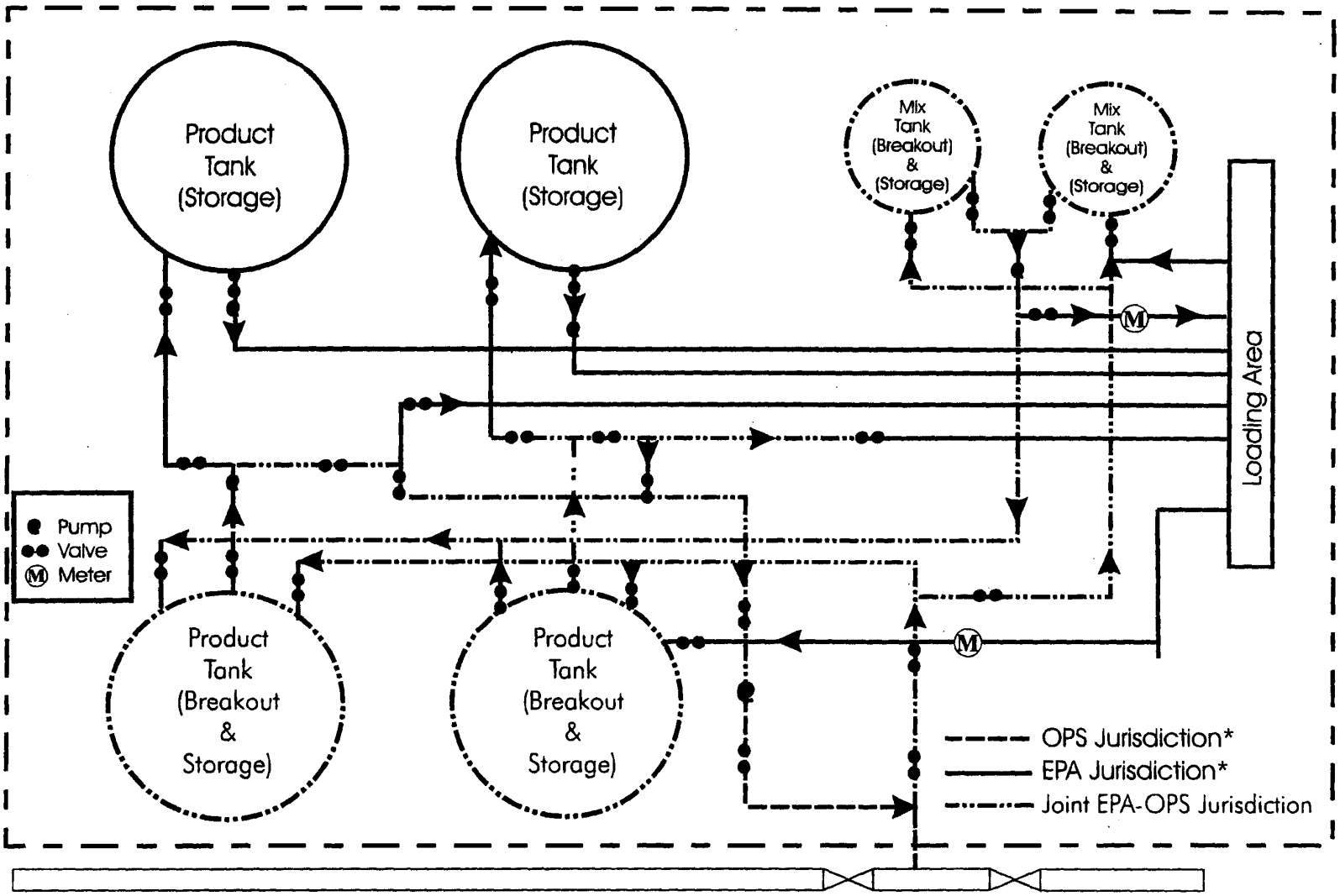
SOURCE: US EPA REV: 11/03/99

ATTACHMENT 6

Exhibit N-5G

N00561

STORAGE & BREAKOUT TANKAGE - JOINT EPA - OPS JURISDICTION



* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first meter, valve, or isolation flange at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first meter, valve, or isolation flange at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

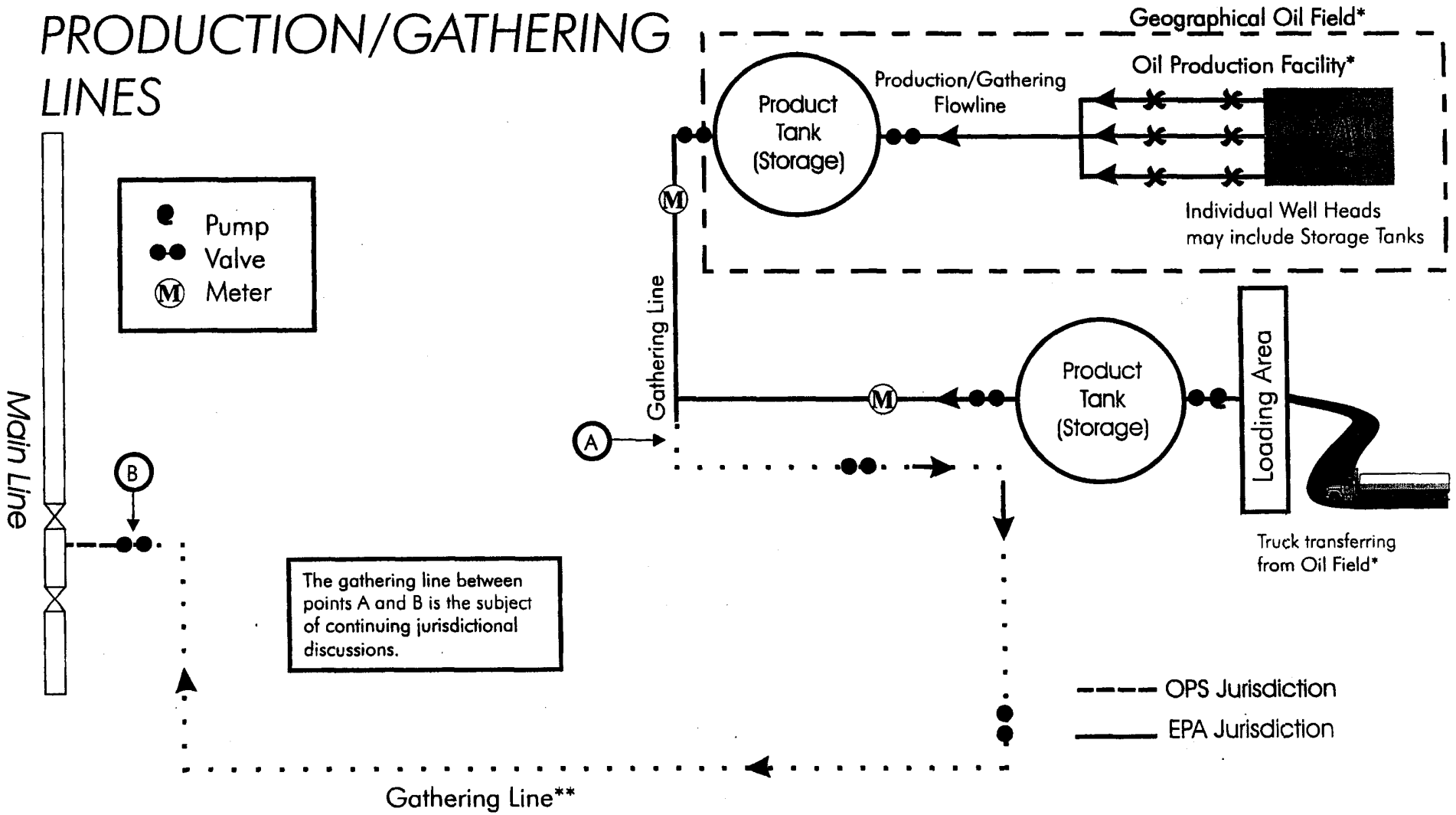
ATTACHMENT 7

SOURCE: US EPA REV: 11/04/99

Exhibit N-5G

N00562

STORAGE TANKAGE ASSOCIATED WITH PRODUCTION/GATHERING LINES



*In 40 CFR 112.1 and 112.7 EPA regulates onshore oil production facilities including wells, flowlines, separation equipment, storage facilities, gathering lines and auxiliary non-transportation-related equipment and facilities in a single geographical oil or gas field operated by a single operator.

**In 49 CFR 195 OPS does not regulate gathering lines (8 5/8 inch or less nominal outside diameter) that transports petroleum from a production facility in rural areas. See 49 CFR 195.1 and 195.2. The gathering line is subject to OPS response planning requirements in 49 CFR 194.

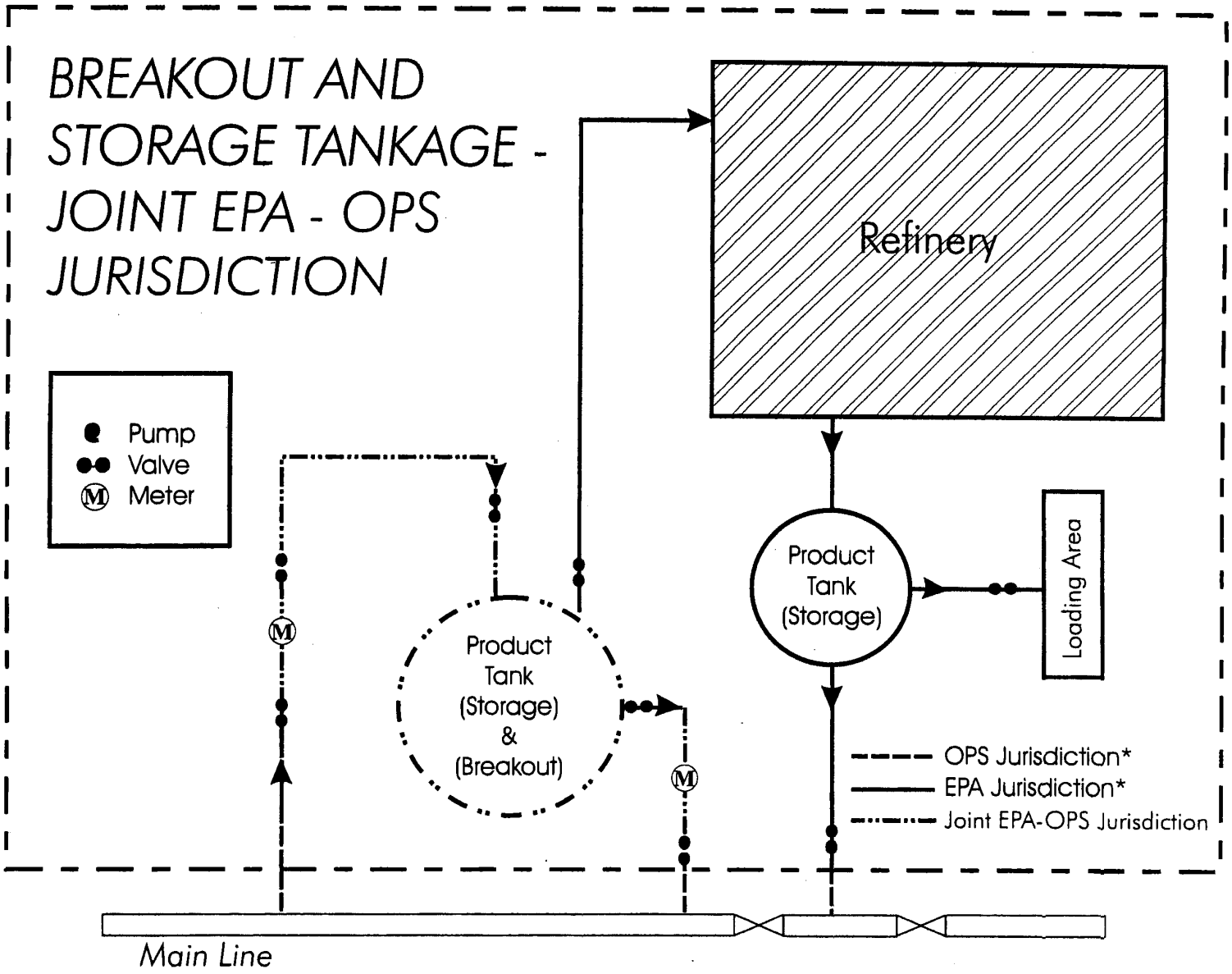
SOURCE: US EPA REV: 12/06/99

ATTACHMENT 8

Exhibit N-5G

N00563

BREAKOUT AND STORAGE TANKAGE - JOINT EPA - OPS JURISDICTION



* This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first and last pressure influencing device, meter, valve, or isolation flange, at or inside the facility property. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first and last pressure influencing device, valve, or isolation flange, at or inside the facility property. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

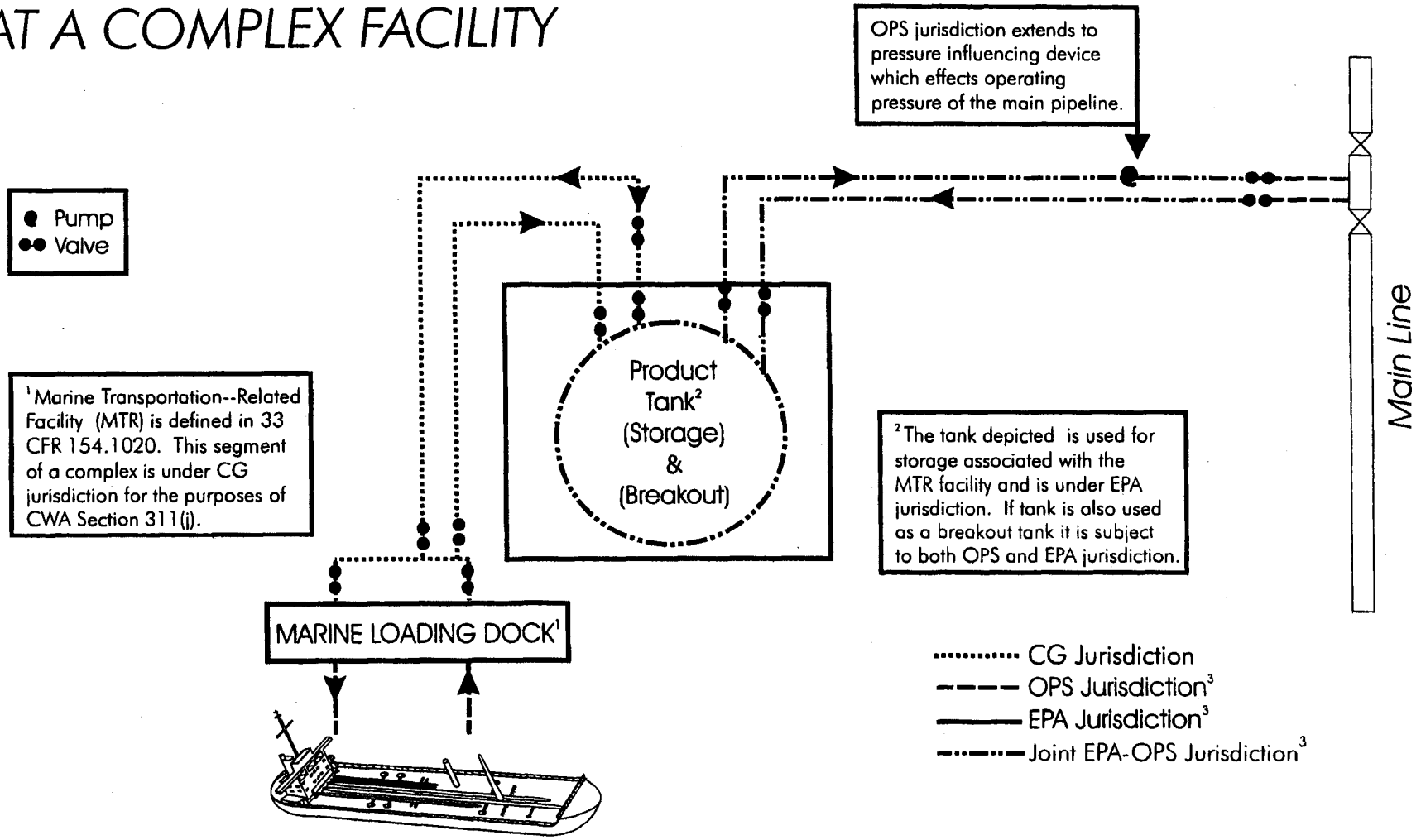
SOURCE: US EPA REV: 11/03/99

ATTACHMENT 9

Exhibit N-5G

N00564

EPA, OPS, AND COAST GUARD JURISDICTION AT A COMPLEX FACILITY



[3] This diagram does not identify the precise location where the change in jurisdiction occurs between EPA and OPS for the purpose of the Clean Water Act, Section 311(j) (33 USC 1321(j)). When the pipeline operator and the storage or breakout tank operator remain the same, the change in jurisdiction occurs at the first and last pressure influencing device, meter, valve, or isolation flange, at or inside the facility property line. When the pipeline operator and the storage or breakout tank operator are not the same, the change in jurisdiction occurs at the change in operational responsibility or at the first and last pressure influencing device, valve, or isolation flange, at or inside the facility property line. In either of the above situations, the location of the property line should not solely be used to determine jurisdiction when operational activities (loading/offloading) extend beyond the property line.

SOURCE: US EPA REV: 12/13/99

ATTACHMENT 10

Exhibit N-5G

FINAL 2016 REGULATION APPLICABILITY STUDY OF 22 FUELING SYSTEMS

JOINT BASE PEARL HARBOR-HICKAM, HAWAII

Prepared for:
Defense Logistics Agency Energy
Fort Belvoir, Virginia

Prepared under:
Air Force Civil Engineer Center
Contract FA8903-08-D-8791-0053

Submitted by:
Michael Baker International
Virginia Beach, Virginia
And

[redacted] (b) (4)

Date:
13 March 2018

Michael Baker INTERNATIONAL

Project: 149137
Task: 15.02.198

N00565

Exhibit N-5H

FINAL 2016 REGULATION APPLICABILITY STUDY OF 22 FUELING SYSTEMS

JOINT BASE PEARL HARBOR-HICKAM, HAWAII

Prepared for:

Defense Logistics Agency Energy
Fort Belvoir, Virginia

Prepared under:

Air Force Civil Engineer Center
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Prepared by:

Michael Baker International
Virginia Beach, Virginia
and
[redacted] (b) (4)
[redacted]

13 March 2018

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Appendix A 2015 Revised Federal UST Regulations (Federal Register / Volume 80, Number 135, dated 15 July 2015, excerpts 41585, 41587 - 41589)
Appendix B Evaluation of Volumes

LIST OF ABBREVIATIONS AND ACRONYMS

40 CFR 280	Title 40 Code of Federal Regulation Part 280
AFCEC	Air Force Civil Engineer Center
AHS	Airport Hydrant System
AMC	Air Mobility Command
AST	Aboveground storage tank
DLA	Defense Logistics Agency
DoD	Department of Defense
DOT	Department of Transportation
E-85	85 Percent Ethanol Fuel Blend
F-24	Jet A Commercial Aviation Fuel with Military Additives
F-76	Diesel Fuel Marine
FOR	Fuel Oil Reclaim
HSV	Hydrant service vehicle
JB	Joint Base
JP-5	Jet Propellant 5
JPTS	Jet Propellant Thermally Stable
Michael Baker	Michael Baker International
Mogas	Motor Gasoline
MP	Multi-Product
NCTAMS	Naval Computer and Telecommunications Area Master Station
POC	Point(s) of contact
POL	Petroleum, Oil, Lubricants
PRT	Product recovery tank
SPCC	Spill Prevention, Control, and Countermeasure
TFS	Truck fill stand
TOL	Truck offload
USCG	United States Coast Guard
US EPA	United States Environmental Protection Agency
UST	Underground storage tank

PROFESSIONAL ENGINEER CERTIFICATION

FINAL 2016 REGULATION APPLICABILITY STUDY
OF 22 FUELING SYSTEMS

JOINT BASE PEARL HARBOR-HICKAM, HAWAII

This report has been reviewed by a professional engineer and has been prepared in accordance with good engineering practices. Laboratory results, field notes, and supporting data have been reviewed and referenced correctly.

I hereby certify that I have examined this report and attest that it has been prepared in accordance with good engineering practices.

Engineer: Christopher D. Caputi, P.E.
Registration Number: 032382
State: Virginia
Date: 13 March 2018

EXECUTIVE SUMMARY

The scope of this project is to perform an analysis of fueling systems that utilize capitalized fuels at Joint Base (JB) Pearl Harbor-Hickam, Hawaii to determine their regulatory definition relative to the revised Federal Underground Storage Tank (UST) regulations (Title 40 Code of Federal Regulation Part 280 [40 CFR 280]). In July 2015, the United States Environmental Protection Agency's (US EPA's) UST regulations were revised to remove the previous deferrals of certain UST systems described as Airport Hydrant Systems (AHSs) and field-constructed USTs. The revised UST regulation, among other items, requires owners and operators of regulated AHSs and field-constructed USTs to make a one-time notification to the US EPA identifying any currently installed UST systems, with newly changed regulatory status, no later than 13 October 2018. The focus of this project is to determine if the capitalized fueling systems at this base are newly regulated UST systems, by revised definition, and require notification to the US EPA. If applicable, it is the responsibility of the base to register newly regulated UST systems with their implementing agency. Owners and operators of UST systems with unchanged regulatory status shall verify the notification to the US EPA, however, confirmation of the registration is out of the scope of this report.

Fueling operations associated with JB Pearl Harbor-Hickam include 11 bulk systems (one Jet A Commercial Aviation Fuel with Military Additives [F-24], one Jet Propellant 5 [JP-5], one Diesel Fuel Marine [F-76], one Multi-Product [MP], two Fuel Oil Reclaim [FOR], two Lube Oil, one Diesel, and two Jet Propellant Thermally Stable [JPTS]) and 11 non-bulk systems (five Motor Gasoline [Mogas], five Diesel, and one 85 Percent Ethanol Fuel Blend [E-85]). The analysis of the 22 fuel systems at JB Pearl Harbor-Hickam was completed on 2 February 2016; the volumes of the 22 individual fuel systems were evaluated.

The summary of the calculations to determine applicability are shown in the following table.

Fuel System	Percent of Underground Volume
Pearl Harbor, Upper Tank Farm, Hickam Bulk Storage, and Red Hill Bulk Storage Facilities	
Bulk F-24 System	76.74 %
Bulk JP-5 System	95.67 %
Bulk F-76 System	57.95 %
Bulk MP System	2.01 %
Bulk FOR System 1	0.45 %
Bulk FOR System 2	0.07 %
Bulk Lube Oil System 1	0 %
Bulk Lube Oil System 2	0 %
Facility [redacted]	
Bulk Diesel System	0 %
Facility [redacted]	
Bulk JPTS System 3	0 %
Bulk JPTS System 4	0 %
Facility [redacted] (b)	
Non-Bulk Mogas System	100 %
Non-Bulk Diesel System	100 %
Facility [redacted] (b) (3)	
Non-Bulk Mogas System 1	0 %
Non-Bulk Mogas System 2	0 %
Non-Bulk Diesel System 3	0 %
Non-Bulk Diesel System 4	0 %
Non-Bulk E-85 System	0 %
Facility [redacted] (b)	
Non-Bulk Mogas System	0 %
Non-Bulk Diesel System	0 %
Facility [redacted] (b)	
Non-Bulk Mogas System	0 %
Non-Bulk Diesel System	0 %

The analysis of the 22 fueling systems that utilize capitalized fuels at JB Pearl Harbor-Hickam determined that two of the 22 fuel systems, identified as the Bulk F-24 and JP-5 Systems, were confirmed to have more than 10 percent of system volume underground, and are thereby defined as newly regulated UST AHS systems per 40 CFR 280. One of the 22 fuel systems, identified as Bulk F-76 System, was confirmed to have more than 10 percent of system volume underground, and is thereby defined as a newly regulated UST system per 40 CFR 280. Two of the 22 fuel systems, identified as the Non-Bulk Mogas and Diesel Systems located at Facility [redacted] (b), were confirmed to have more than 10 percent of their volumes underground. The regulatory status of these two fuel systems remains unchanged; therefore, these two fuel systems continue to be classified as UST systems regulated per 40 CFR 280. The 17 remaining fuel systems were found to be aboveground storage tank (AST) systems, which have less than 10 percent of their volume underground; therefore, they are not UST systems per 40 CFR 280.

For the two fuel systems confirmed as newly regulated UST AHS systems and the one system confirmed as a newly regulated UST system, per 40 CFR 280, the recommended action for operators is to provide a one-time notification, to the US EPA, identifying the Bulk F-24, JP-5, and F-76 Systems as UST systems no later than 13 October 2018. It is the responsibility of the base to register the newly regulated UST systems with the applicable implementing agencies; however, the notification and verification are out of the scope of this report. For the two fuel systems confirmed as UST systems, identified as the Non-Bulk Mogas and Diesel Systems located at Facility (b), the recommended action for operators is to verify that these two UST systems have been registered with the implementing agency; confirmation of this registration is out of scope for this report. For the 17 remaining fuel systems found to be AST systems, no further actions are required, at this time, to comply with the revised regulations of 40 CFR 280.

1.0 INTRODUCTION

1.1 Purpose of Project

The Defense Logistics Agency (DLA) Energy contracted Michael Baker International (Michael Baker) through Air Force Civil Engineer Center (AFCEC) Contract FA8903-08-D-8791-0053 to perform an analysis of fueling systems that utilize capitalized fuels at Joint Base (JB) Pearl Harbor-Hickam, Hawaii to determine their regulatory definition relative to the revised Federal Underground Storage Tank (UST) regulations. In July 2015, the United States Environmental Protection Agency's (US EPA's) UST regulations were revised to remove the previous deferrals of certain UST systems described as Airport Hydrant Systems (AHSs) and field-constructed USTs. The revised UST regulation, among other items, requires owners and operators of regulated AHSs and field-constructed USTs to make a one-time notification to the US EPA identifying any currently installed UST systems, with newly changed regulatory status, no later than 13 October 2018. The focus of this project is to determine if the capitalized fueling systems at this base are newly regulated UST systems, by revised definition, and require notification to the US EPA. If applicable, it is the responsibility of the base to register newly regulated UST systems with their implementing agency. Owners and operators of UST systems with unchanged regulatory status shall verify the notification to the US EPA, however, confirmation of the registration is out of the scope of this report.

1.2 Applicable Regulation

In the 15 July 2015 Federal Register, the US EPA published the revised UST regulations (Appendix A). This is the first major revision to the federal UST regulations since 1988. The 2015 UST regulation changed certain portions of the 1988 UST regulation in Title 40 Code of Federal Regulation Part 280 (40 CFR 280).

Specifically of interest to DLA Energy, this revised regulation now addresses certain UST systems which had been previously deferred in the 1988 regulation. By removing the deferral, many Department of Defense (DoD) AHSs and field-constructed UST systems now may meet the definition of a fully regulated UST system.

To determine whether a fuel storage system is regulated under the revised UST regulations, the total system volume (aboveground storage plus the underground storage and system piping) is compared to the total

volume of underground storage and its associated underground piping. If the volume of the underground system (storage and system piping) is more than 10 percent of the total system volume, then the total system is considered a regulated UST system.

Note that aboveground storage tanks (ASTs) associated with a regulated UST AHS or regulated field-constructed USTs are partially excluded in the revised UST regulation. Partially excluded ASTs which are part of the UST system may be subject to Spill Prevention, Control, and Countermeasure (SPCC) requirements in Title 40 Code of Federal Regulation Part 112.

1.3 Data Acquisition

On 2 February 2016, Mr. Chris Caputi, of Michael Baker, met with Mr. John Floyd, Mr. Tom Williams, and Mr. Alphonso Parks, of JB Pearl Harbor-Hickam, to discuss the assets at the facilities and to gather additional documentation of the fueling systems necessary to determine regulatory applicability. Specifically, the capacities of all ASTs, USTs, and piping, were confirmed in order to support the required calculations.

A summary of the points of contact (POC) for this project can be found in Table 1-1.

Table 1-1: Points of Contact

Name / Position	Organization	Email / Phone
Mr. John Floyd / Deputy Director	JB Pearl Harbor-Hickam, Hawaii	john.floyd@navy.mil / (808) 473-7801
Mr. Tom Williams / Fuels Operations Manager	JB Pearl Harbor-Hickam, Hawaii	thomas.m.williams@navy.mil / (808) 448-3358
Mr. Alphonso Parks / Hickam POL Primary	JB Pearl Harbor-Hickam, Hawaii	alphonso.parks@hickam.af.mil / (808) 448-3358

POL = Petroleum, oil, lubricants

1.4 Future Construction Applicability

The 10 percent evaluation and assessment completed for this report is based on the current status of the fuel systems as of the site visit date of 2 February 2016. Potential construction projects that change or modify the configuration of the fuel systems could impact the 10 percent calculation and subsequent notification. Accordingly, the base will need to review and reassess the status of a fuel system upon completion of a construction project to determine if a notification is required.

2.0 SITE INFORMATION

JB Pearl Harbor-Hickam is located on the island of Oahu, approximately 8 miles northwest of Honolulu, Hawaii. Fueling operations at JB Pearl Harbor-Hickam include 11 bulk systems (one Jet A Commercial Aviation Fuel with Military Additives [F-24], one Jet Propellant 5 [JP-5], one Diesel Fuel Marine [F-76], one Multi-Product [MP], two Fuel Oil Reclaim [FOR], two Lube Oil, one Diesel, and two Jet Propellant Thermally Stable [JPTS]) and 11 non-bulk systems (five Motor Gasoline [Mogas], five Diesel, and one 85 Percent Ethanol Fuel Blend [E-85]). Figure 2-1 provides an overview of fueling systems included in this report.

2.1 Summary of Bulk F-24 System Operation

F-24 is received via barge at the Hotel and Kilo Piers at Pearl Harbor and by an off-base commercial pipeline at the Upper Tank Farm. The Kilo Pier and the off-base commercial pipeline are designated as MP. The Department of Transportation (DOT) and United States Coast Guard (USCG) jurisdictional valves are located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valves is included in this calculation. Fuel can also be received via truck offload (TOL) at Hickam Bulk Storage Facility. Fuel is stored in (b) field-constructed vertical ASTs; (b) ASTs (ASTs (b) and (b)) at the Upper Tank Farm and (b) ASTs (ASTs (b) through (b) at Hickam Bulk Storage Facility. Fuel is also stored in (b) bulk field-constructed underground storage tanks (BFCUSTs) (BFCUSTS (b) through (b) and (b) (3)) at Red Hill Bulk Storage Facility. There is one aboveground product recovery tank (PRT) (Filter Pad PRT) and two underground PRTs (AMC PRT and Type III PRT) located at Hickam Bulk Storage Facility. Fuel is transferred from the Upper Tank Farm to Hickam Bulk Storage Facility, via a primarily underground transfer pipeline, and to Red Hill Bulk Storage Facility, via an aboveground transfer pipeline located in a tunnel. Fuel is issued to the Hotel and Kilo Piers at Pearl Harbor, the truck fill stands (TFSs) at the Upper Tank Farm and Hickam Bulk Storage Facility, the hydrant service vehicle (HSV) at Hickam Bulk Storage Facility, and the Air Mobility Command (AMC) Hydrant Loop and the Type III Hydrant Loop at Hickam Bulk Storage Facility. The fuel system piping is aboveground and underground. Refer to Figures 2-2 through 2-6 for the Bulk F-24 System layout and see Appendix B, page 1, for fuel system capacities.

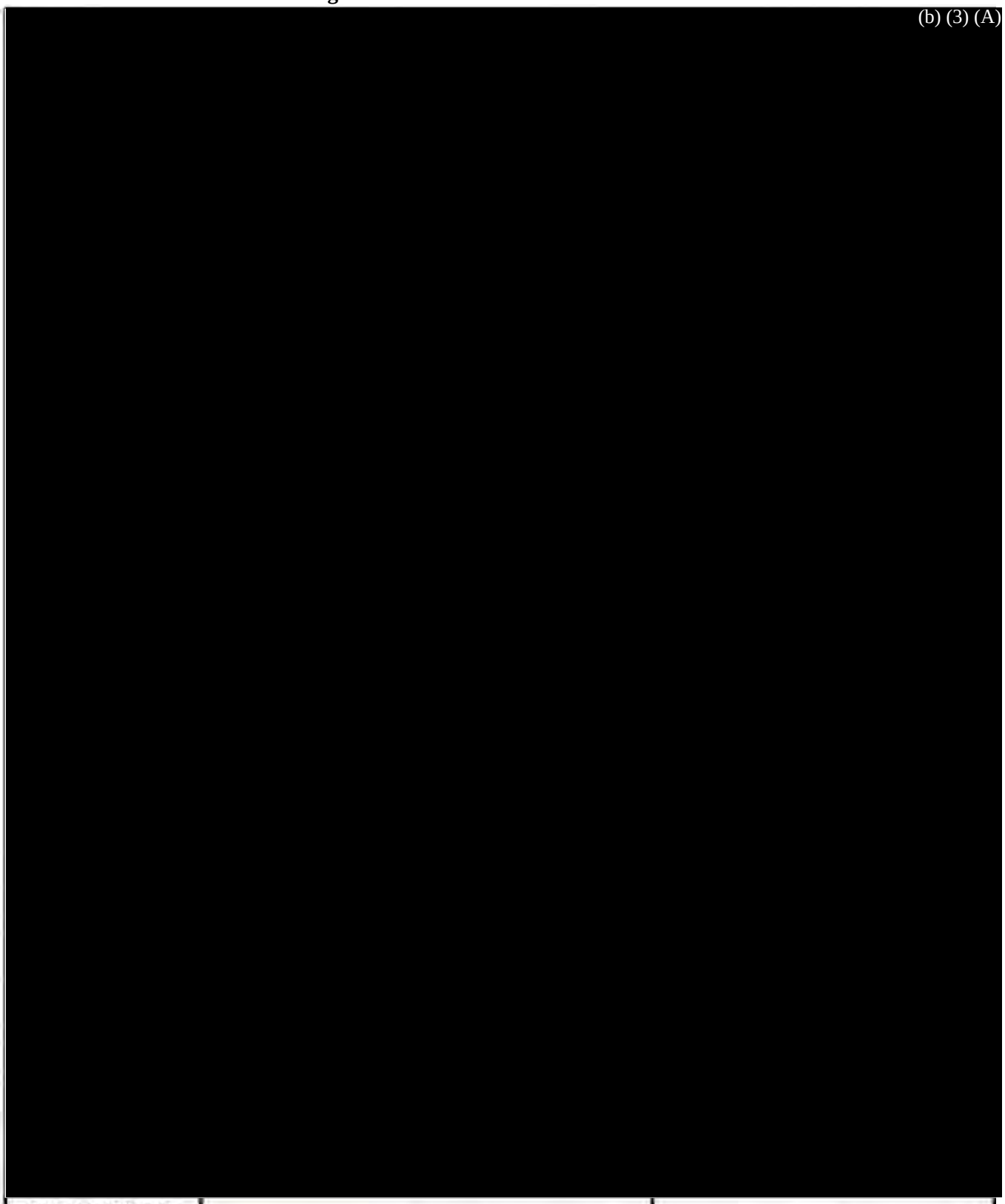
Figure 2-1: JB Pearl Harbor-Hickam Overview

Figure 2-2: Transfer Pipelines and Hydrant Loops Overview

(b) (3) (A)

DATE: DECEMBER 2017 SCALE: NTS DGN / DWN / CHK BY: CC / JES / LB JOB: 149137 TASK: 15.02.198	Michael Baker INTERNATIONAL Michael Baker International Virginia Beach, Virginia	FIGURE 2-2 TRANSFER PIPELINES AND HYDRANT LOOPS OVERVIEW 2016 REGULATION APPLICABILITY STUDY JB PEARL HARBOR-HICKAM, HAWAII

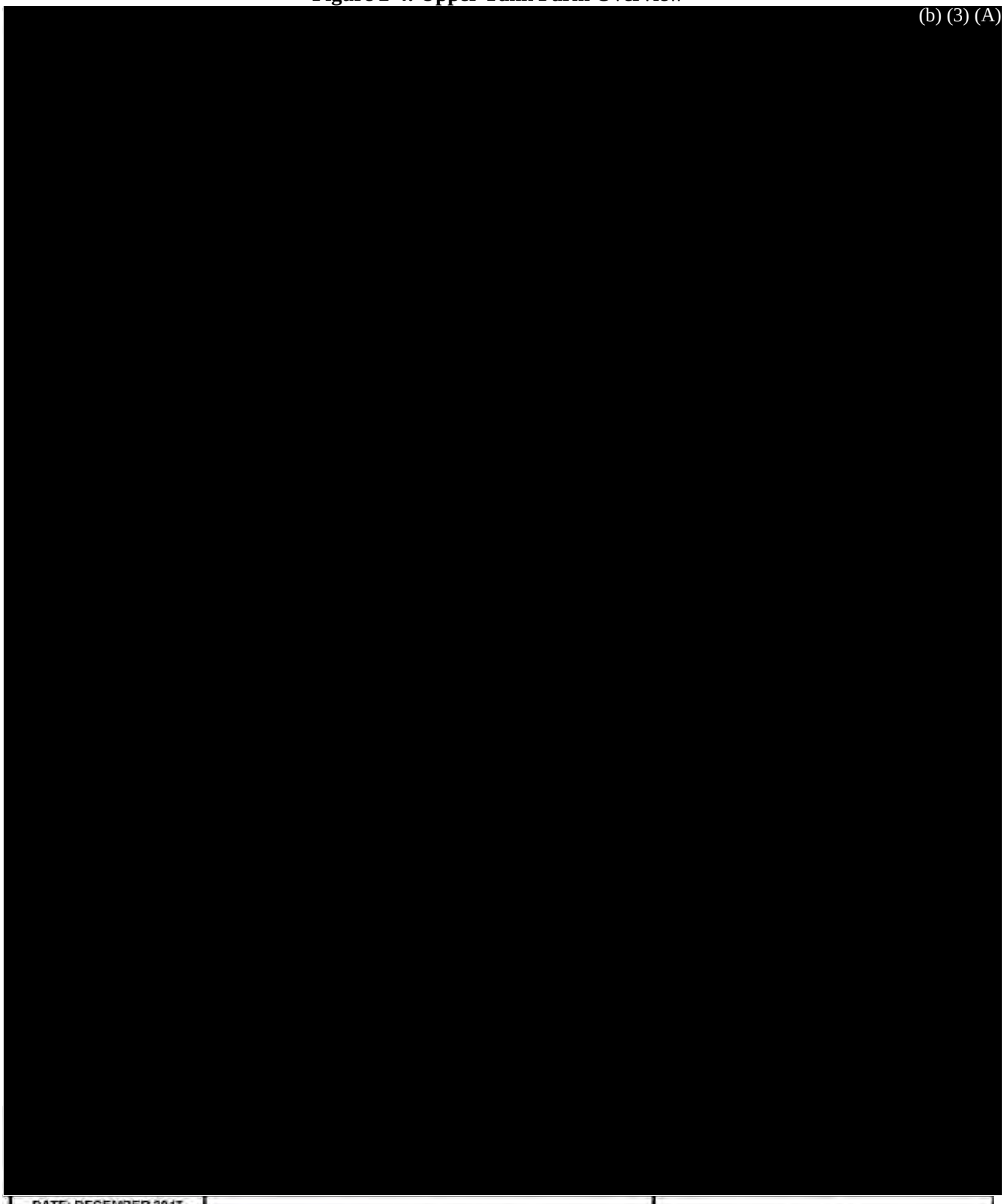
Figure 2-3: Pearl Harbor Piers Overview



DATE: DECEMBER 2017 SCALE: NTS DGN / DWN / CHK BY: CC / JES / LB JOB: 149137 TASK: 15.02.198	Michael Baker INTERNATIONAL Michael Baker International Virginia Beach, Virginia	FIGURE 2-3 PEARL HARBOR PIERS OVERVIEW 2016 REGULATION APPLICABILITY STUDY JB PEARL HARBOR-HICKAM, HAWAII

Figure 2-4: Upper Tank Farm Overview

(b) (3) (A)



DATE: DECEMBER 2017 SCALE: NTS DGN / DWN / CHK BY: CC / JES / LB JOB: 149137 TASK: 15.02.198	Michael Baker INTERNATIONAL	Michael Baker International Virginia Beach, Virginia	FIGURE 2-4 UPPER TANK FARM OVERVIEW 2018 REGULATION APPLICABILITY STUDY JB PEARL HARBOR-HICKAM, HAWAII

Figure 2-5: Hickam Bulk Storage Facility Overview

Figure 2-6: Red Hill Bulk Storage Facility Overview

2.2 Summary of Bulk JP-5 System Operation

JP-5 is received via barge at the Hotel and Kilo Piers at Pearl Harbor and by an off-base commercial pipeline at the Upper Tank Farm. The Kilo Pier and the off-base commercial pipeline are designated as MP. The DOT and USCG jurisdictional valves are located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valves is included in this calculation. Fuel is stored in (b) field-constructed vertical AST (AST (b)) at the Upper Tank Farm and (b BFCUSTs (BFCUSTS (through (b) (3) (A), and (b) (3)) at Red Hill Bulk Storage Facility. Fuel is transferred from the Upper Tank Farm to Red Hill Bulk Storage Facility via an aboveground transfer pipeline located in a tunnel. Fuel is issued to the Hotel and Kilo Piers at Pearl Harbor and TFSs at the Upper Tank Farm. The fuel system piping is aboveground and underground. Refer to Figures 2-2, 2-3, 2-4, and 2-6 for the Bulk JP-5 System layout and see Appendix B, page 2, for fuel system capacities.

2.3 Summary of Bulk F-76 System Operation

F-76 is received via barge at the Hotel, Kilo, and Sierra Piers at Pearl Harbor and by an off-base commercial pipeline at the Upper Tank Farm. The Kilo Pier and the off-base commercial pipeline are designated as MP. The DOT and USCG jurisdictional valves are located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valves is included in this calculation. Fuel is stored in (b) field-constructed vertical ASTs (AST (b) (3), and (b)) at the Upper Tank Farm and (b) BFCUSTs (BFCUSTS (b) (3) (A), and (b) (3)) at Red Hill Bulk Storage Facility. Fuel is transferred from the Upper Tank Farm to Red Hill Bulk Storage Facility via an aboveground transfer pipeline located in a tunnel. Fuel is issued to the Hotel, Kilo, Mike, and Bravo Piers at Pearl Harbor and TFSs at the Upper Tank Farm. The fuel system piping is aboveground and underground. Refer to Figures 2-2, 2-3, 2-4, and 2-6 for the Bulk F-76 System layout and see Appendix B, page 3, for fuel system capacities.

2.4 Summary of Bulk MP System Operation

MP is received via barge at the Kilo Pier at Pearl Harbor and by an off-base commercial pipeline at the Upper Tank Farm. Fuel is stored in (b) field-constructed, vertical AST (AST (b)) at the Upper Tank Farm. The DOT and USCG jurisdictional valves are located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valves is included in this calculation. Fuel is issued to the Kilo Pier at Pearl Harbor and one TFS at the Upper Tank Farm. Fuel system piping is aboveground and underground. Refer to Figures 2-2 through 2-4 for the Bulk MP System layout and see Appendix B, page 4, for fuel system capacities.

2.5 Summary of Bulk FOR System 1 Operation

FOR is received via barge at the Hotel Pier at Pearl Harbor and from the reclaim system from BFCUSTs (b) (3) through (b) (3). The USCG jurisdictional valve is located near the Upper Tank Farm. Only underground receipt piping after the jurisdictional valve is included in this calculation. FOR is stored in (b) field-constructed, vertical ASTs (ASTs (b) and (b)) at the Upper Tank Farm. Fuel is issued via one TFS at the Upper Tank Farm. Fuel system piping is primarily aboveground. Refer to Figures 2-3 and 2-4 for the Bulk FOR System 1 layout and see Appendix B, page 5, for fuel system capacities.

2.6 Summary of Bulk FOR System 2 Operation

FOR is received from the reclaim system from BFCUSTs (through (b and (b at Red Hill Bulk Storage Facility and stored in (b) shop-fabricated, vertical AST (AST (b)) at (b) (3) Fuel is issued to one TFS at (b) (3) Fuel system piping is primarily aboveground. Refer to Figure 2-7 for the Bulk FOR System 2 layout and see Appendix B, page 6, for fuel system capacities.

Figure 2-7: FOR System 2 Overview

2.7 Summary of Bulk Lube Oil System 1 Operation

Lube Oil is received by over-the-road transport at one TOL and stored in (b) shop-fabricated AST (AST (b)) at (b) (3) Fuel is issued to one TFS. Fuel system piping is aboveground. Refer to Figure 2-8 for the Bulk Lube Oil System 1 layout at (b) (3) and see Appendix B, page 7, for fuel system capacities.

2.8 Summary of Bulk Lube Oil System 2 Operation

Lube Oil is received by over-the-road transport at one TOL and stored in (b) shop-fabricated AST (AST (b) at (b) (3) Fuel is issued to one TFS. Fuel system piping is aboveground. Refer to Figure 2-8 for the Bulk Lube Oil System 2 layout at (b) (3) and see Appendix B, page 8, for fuel system capacities.

Figure 2-8: Bulk Lube Oil Systems Overview

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FIGURE 2-8 BULK LUBE OIL SYSTEMS OVERVIEW 2016 REGULATION APPLICABILITY STUDY JB PEARL HARBOR-HICKAM, HAWAII		

2.9 Summary of Bulk Diesel System at Facility [redacted] Operation

Diesel is received by over-the-road transport at two combination TOL/TFSs and stored in [redacted] shop-fabricated, horizontal ASTs (ASTs [redacted] and [redacted]) at Facility [redacted]. Fuel is issued to two combination TOL/TFSs. Fuel system piping is aboveground. Refer to Figure 2-9 for the Bulk Diesel System layout at Facility [redacted] and see Appendix B, page 9, for fuel system capacities.

Figure 2-9: Facility (b) (3) (A) Overview

(b) (3) (A)

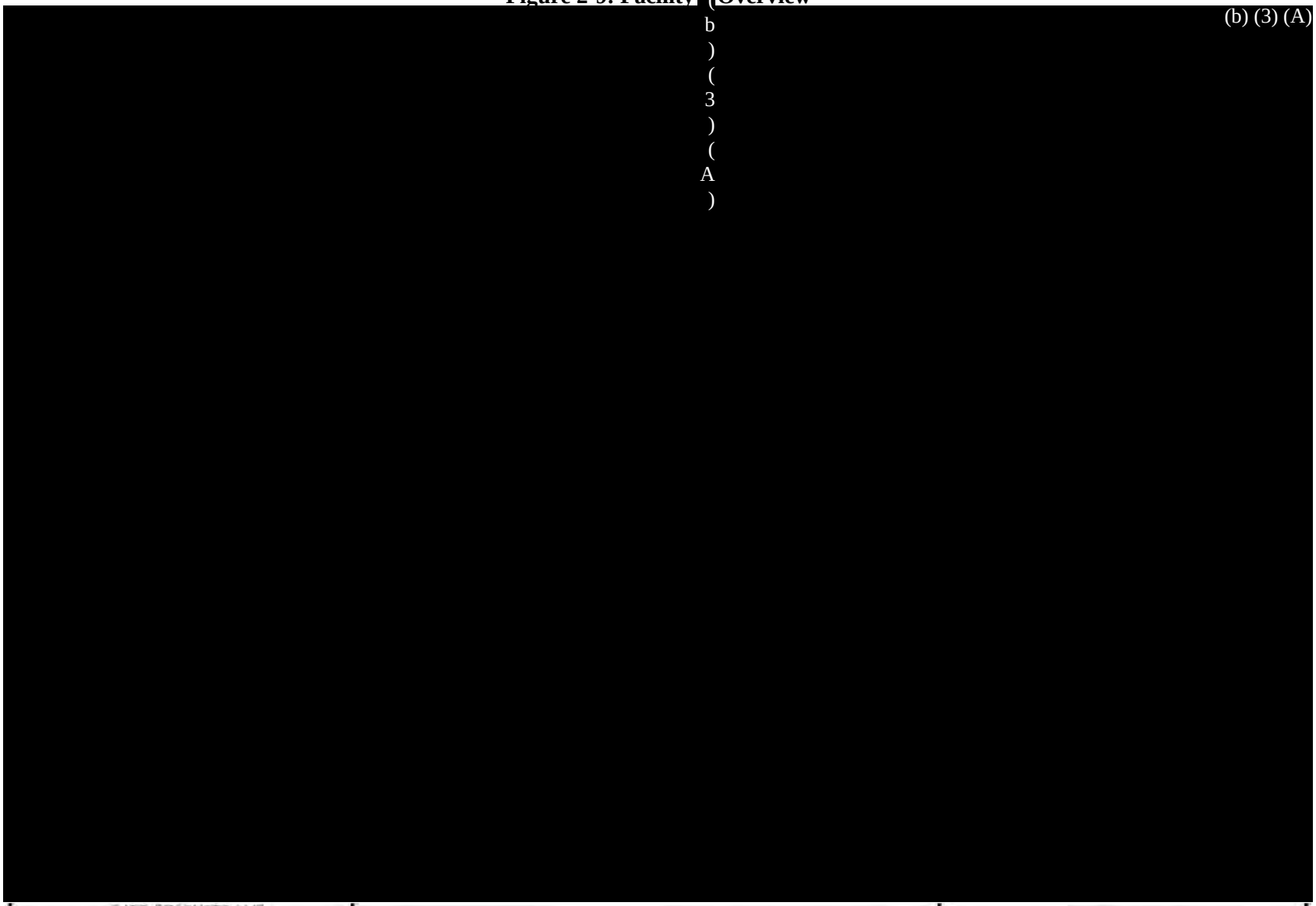

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FIGURE 2-9
FACILITY (b) OVERVIEW
2016 REGULATION APPLICABILITY STUDY
JB PEARL HARBOR-HICKAM, HAWAII

2.10 Summary of Bulk JPTS System 3 at Facility (b) Operation

JPTS is received by over-the-road transport at one TOL and stored in (b) shop-fabricated AST (AST (b)) at Facility (b). Fuel is issued to one TFS. Fuel system piping is aboveground. Refer to Figure 2-10 for the Bulk JPTS System 3 layout at Facility (b) and see Appendix B, page 10, for fuel system capacities.

2.11 Summary of Bulk JPTS System 4 at Facility (b) Operation

JPTS is received by over-the-road transport at one TOL and stored in (b) shop-fabricated AST (AST (b)) at Facility (b). Fuel is issued to one TFS. Fuel system piping is aboveground. Refer to Figure 2-10 for the Bulk JPTS System 4 layout at Facility (b) and see Appendix B, page 11, for fuel system capacities.

Figure 2-10: Facility (Overview

(b) (3) (A)

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DATE: DECEMBER 2017 SCALE: NTS DGN / DWN / CHK BY: CC / JES / LB JOB: 149137 TASK: 15.02.198	Michael Baker INTERNATIONAL	Michael Baker International Virginia Beach, Virginia	FIGURE 2-10 FACILITY (b) OVERVIEW 2016 REGULATION APPLICABILITY STUDY JB PEARL HARBOR-HICKAM, HAWAII

2.12 Summary of Non-Bulk Mogas System at Facility (b) Operation

Mogas is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated USTs (USTs (b) (3) and (b) (3)) at Facility (b). Fuel is issued to one retail-style dispenser. Fuel system piping is underground. Refer to Figure 2-11 for the Non-Bulk Mogas System layout at Facility (b) (3) and see Appendix B, page 12, for fuel system capacities.

2.13 Summary of Non-Bulk Diesel System at Facility (b) Operation

Diesel is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated USTs (USTs (b) (3) and (b) (3)) at Facility (b). Fuel is issued to two retail-style dispensers. Fuel system piping is underground. Refer to Figure 2-11 for the Non-Bulk Diesel System layout at Facility (b) and see Appendix B, page 13, for fuel system capacities.

Figure 2-11: Facility (b) Overview

(b) (3) (A)

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2.14 Summary of Non-Bulk Mogas System 1 at Facility (b) (3) Operation

Mogas is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated dual-compartment horizontal AST (AST (b) (3)) at Facility (b) (3). Fuel is issued to (b) retail-style dispensers. Fuel system piping is aboveground. Refer to Figure 2-12 for the Non-Bulk Mogas System 1 layout at Facility (b) (3) and see Appendix B, page 14, for fuel system capacities.

2.15 Summary of Non-Bulk Mogas System 2 at Facility (b) (3) Operation

Mogas is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated dual-compartment horizontal AST (AST (b) (3) at Facility (b) (3). Fuel is issued to (b) retail-style dispensers. Fuel system piping is aboveground. Refer to Figure 2-12 for the Non-Bulk Mogas System 2 layout at Facility (b) (3) and see Appendix B, page 15, for fuel system capacities.

2.16 Summary of Non-Bulk Diesel System 3 at Facility (b) (3) Operation

Diesel is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated dual-compartment horizontal AST (AST (b) (3)) at Facility (b) (3). Fuel is issued to (b) retail-style dispensers. Fuel system piping is aboveground. Refer to Figure 2-12 for the Non-Bulk Diesel System 3 layout at Facility (b) (3) and see Appendix B, page 16, for fuel system capacities.

2.17 Summary of Non-Bulk Diesel System 4 at Facility (b) (3) Operation

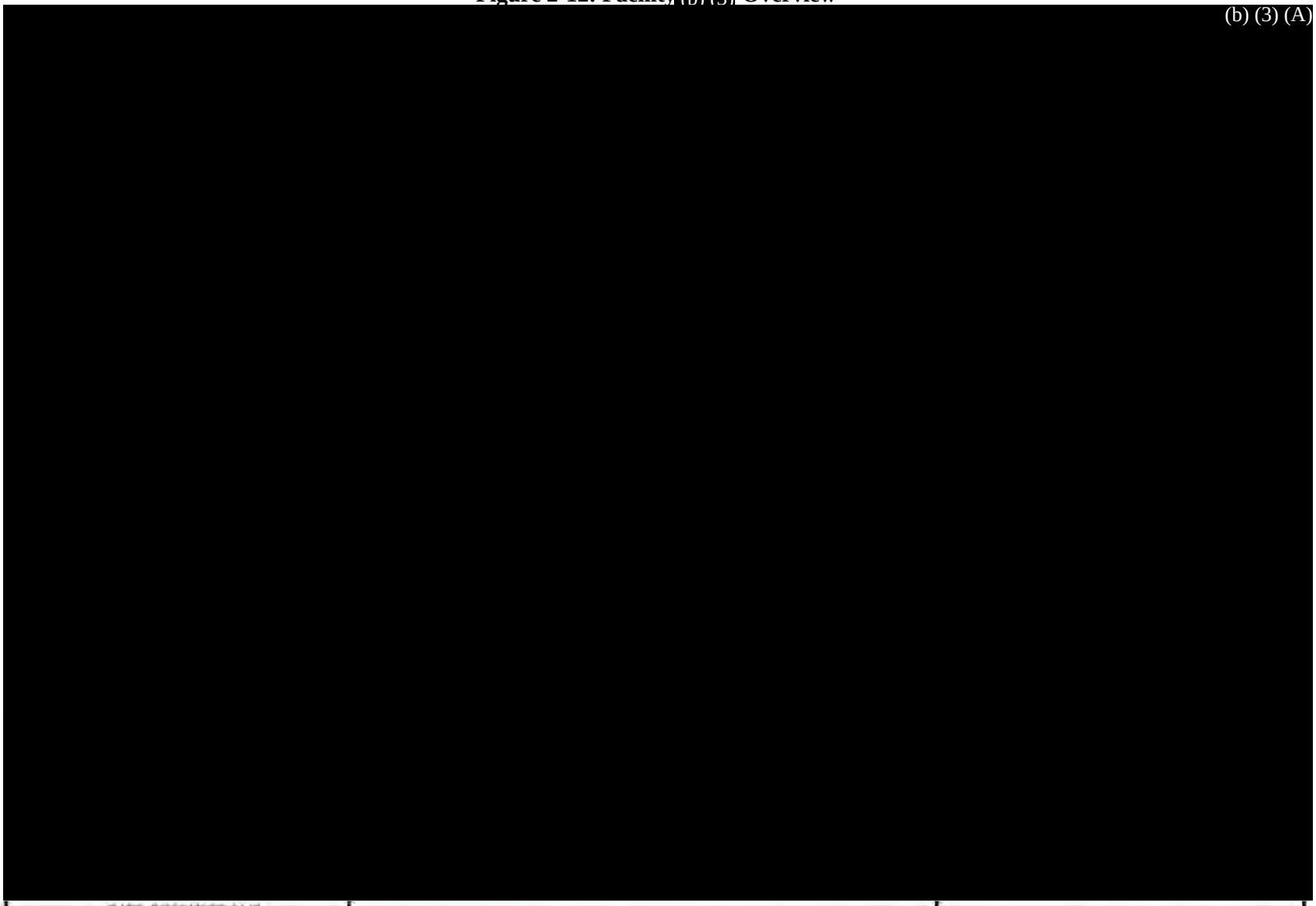
Diesel is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated dual-compartment horizontal AST (AST (b) (3)) at Facility (b) (3) Fuel is issued to (b) retail-style dispensers. Fuel system piping is aboveground. Refer to Figure 2-12 for the Non-Bulk Diesel System 4 layout at Facility (b) (3) and see Appendix B, page 17, for fuel system capacities.

2.18 Summary of Non-Bulk E-85 System at Facility (b) (3) Operation

E-85 is received by over-the-road transport via direct fill port and stored in (b) shop-fabricated horizontal AST (AST (b) (3)) at Facility (b) (3). Fuel is issued to (b) retail-style dispensers. Fuel system piping is aboveground. Refer to Figure 2-12 for the Non-Bulk E-85 System layout at Facility (b) (3) and see Appendix B, page 18, for fuel system capacities.

Figure 2-12: Facility (b) (3) Overview

(b) (3) (A)



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Virginia Beach, Virginia

FIGURE 2-12
FACILITY (b) OVERVIEW
2016 REGULATION APPLICABILITY STUDY
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2.19 Summary of Non-Bulk Mogas System at Facility (b) Operation

Mogas is received by over-the-road transport via remote fill port and stored in (b) shop-fabricated horizontal AST (AST (b)) at the West Loch Annex Facility (b). Fuel is issued to (b) retail-style dispenser. Fuel system piping is aboveground. Refer to Figure 2-13 for the Non-Bulk Mogas System layout at Facility (b) and see Appendix B, page 19, for fuel system capacities.

2.20 Summary of Non-Bulk Diesel System at Facility (b) Operation

Diesel is received by over-the-road transport via remote fill port and stored in one shop-fabricated horizontal AST (AST (b)) at the West Loch Annex Facility (b). Fuel is issued to one retail-style dispenser. Fuel system piping is aboveground. Refer to Figure 2-13 for the Non-Bulk Diesel System layout at Facility (b) and see Appendix B, page 20, for fuel system capacities.

Figure 2-13: Facility (b) Overview

(b) (3) (A)

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2.21 Summary of Non-Bulk Mogas System at Facility (b) Operation

Mogas is received by over-the-road transport via remote fill port and stored in (b) shop-fabricated horizontal AST (AST (b)) at Naval Computer and Telecommunications Area Master Station (NCTAMS) Wahiawa Annex Facility (b). Fuel is issued to (b) retail-style dispenser. Fuel system piping is aboveground. Refer to Figure 2-14 for the Non-Bulk Mogas System layout at Facility (b) and see Appendix B, page 21, for fuel system capacities.

2.22 Summary of Non-Bulk Diesel System at Facility (b) Operation

Diesel is received by over-the-road transport via remote fill port and stored in (b) shop-fabricated horizontal AST (AST (b)) at NCTAMS Wahiawa Annex Facility (b). Fuel is issued to (b) retail-style dispenser. Fuel system piping is aboveground. Refer to Figure 2-14 for the Non-Bulk Diesel System layout at Facility (b) and see Appendix B, page 22, for fuel system capacities.

Figure 2-14: Facility (b) Overview

(b) (3) (A)

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3.0 REGULATORY ANALYSIS AND RESULTS

3.1 Assumptions and Excluded Components

As indicated in the preamble of 40 CFR 280 (Appendix A) the start of the regulated AHS "begins where fuel enters one or more tanks from an external source such as a pipeline, barge, rail car, or other motor fuel carrier." For the purpose of this analysis, the calculation to determine if a fuel system is regulated as a UST fuel system, will begin at the point of change in ownership, or change in regulatory jurisdiction (as applicable), and will include the receipt piping that connects to the one, or more, fuel system tanks under analysis.

The underground piping volume calculations may include some small portions of incidental aboveground piping as part of the total. This small amount of volume, does not significantly impact the calculation results.

Spill collection (emergency containment) ASTs and USTs, if present, are not part of the calculation as these types of tanks are not for storing fuels.

3.2 Data Sources

Several sources of data were utilized to evaluate the bulk and non-bulk fuel systems, such as the base SPCC plans (References 5.1 and 5.2), previous leak detection testing and evaluation reports (References 5.3 through 5.7), and field data collections.

3.3 Calculation of Applicability

The calculation of applicability included determining:

Equation 1:

$$V_{Total} = V_{ASTs} + V_{USTs} + V_P$$

Where V_{ASTs} = volume of ASTs
V_{USTs} = volume of USTs
V_P = volume of underground piping

Equation 2:

$$V_{UG} = V_{USTs} + V_P$$

Where V_{UG} = total volume of USTs and underground piping

Equation 3:

$$Percent\ of\ Underground\ Volume = \frac{V_{UG}}{V_{Total}}$$

3.4 Results

The evaluation of volumes is located in Appendix B. The evaluation of 22 fuel systems at JB Pearl Harbor-Hickam was completed on 2 February 2016. The evaluation results are listed in Table 3-1.

Table 3-1: Evaluation Results

Fuel System	Percent of Underground Volume	Date of Evaluation	Evaluation Data
Pearl Harbor, Upper Tank Farm, Hickam Bulk Storage, and Red Hill Bulk Storage Facilities			
Bulk F-24 System	76.74 %	2 February 2016	Appendix B, Page 1
Bulk JP-5 System	95.67 %	2 February 2016	Appendix B, Page 2
Bulk F-76 System	57.95 %	2 February 2016	Appendix B, Page 3
Bulk MP System	2.01 %	2 February 2016	Appendix B, Page 4
Bulk FOR System 1	0.45 %	2 February 2016	Appendix B, Page 5
Bulk FOR System 2	0.07 %	2 February 2016	Appendix B, Page 6
Bulk Lube Oil System 1	0 %	2 February 2016	Appendix B, Page 7
Bulk Lube Oil System 2	0 %	2 February 2016	Appendix B, Page 8
Facility 5			
Bulk Diesel System	0 %	2 February 2016	Appendix B, Page 9
Facility 9			
Bulk JPTS System 3	0 %	2 February 2016	Appendix B, Page 10
Bulk JPTS System 4	0 %	2 February 2016	Appendix B, Page 11
Facility 1037			
Non-Bulk Mogas System	100 %	2 February 2016	Appendix B, Page 12
Non-Bulk Diesel System	100 %	2 February 2016	Appendix B, Page 13
Facility S-169			
Non-Bulk Mogas System 1	0 %	2 February 2016	Appendix B, Page 14
Non-Bulk Mogas System 2	0 %	2 February 2016	Appendix B, Page 15
Non-Bulk Diesel System 3	0 %	2 February 2016	Appendix B, Page 16
Non-Bulk Diesel System 4	0 %	2 February 2016	Appendix B, Page 17
Non-Bulk E-85 System	0 %	2 February 2016	Appendix B, Page 18
Facility S-60			
Non-Bulk Mogas System	0 %	2 February 2016	Appendix B, Page 19
Non-Bulk Diesel System	0 %	2 February 2016	Appendix B, Page 20
Facility 238			
Non-Bulk Mogas System	0 %	2 February 2016	Appendix B, Page 21
Non-Bulk Diesel System	0 %	2 February 2016	Appendix B, Page 22

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

The analysis of the 22 fueling systems that utilize capitalized fuels at JB Pearl Harbor-Hickam determined that two of the 22 fuel systems, identified as the Bulk F-24 and JP-5 Systems, were confirmed to have more than 10 percent of system volume underground, and are thereby defined as newly regulated UST AHS systems per 40 CFR 280. One of the 22 fuel systems, identified as Bulk F-76 System, was confirmed to have more than 10 percent of system volume underground, and is thereby defined as a newly regulated UST system per 40 CFR 280. Two of the 22 fuel systems, identified as the Non-Bulk Mogas and Diesel Systems located at Facility 1037, were confirmed to have more than 10 percent of their volumes underground. The regulatory status of these two fuel systems remains unchanged; therefore, these two fuel systems continue to be classified as UST systems regulated per 40 CFR 280. The 17 remaining fuel systems were found to be AST systems, which have less than 10 percent of their volume underground; therefore, they are not UST systems per 40 CFR 280.

4.2 Recommendations

For the two fuel systems confirmed as newly regulated UST AHS systems and the one system confirmed as a newly regulated UST system, per 40 CFR 280, the recommended action for operators is to provide a one-time notification, to the US EPA, identifying the Bulk F-24, JP-5, and F-76 Systems as UST systems no later than 13 October 2018. It is the responsibility of the base to register the newly regulated UST systems with the applicable implementing agencies; however, the notification and verification are out of the scope of this report. For the two fuel systems confirmed as UST systems, identified as the Non-Bulk Mogas and Diesel Systems located at Facility (b) the recommended action for operators is to verify that these two UST systems have been registered with the implementing agency; confirmation of this registration is out of scope for this report. For the 17 remaining fuel systems found to be AST systems, no further actions are required, at this time, to comply with the revised regulations of 40 CFR 280.

5.0 REFERENCES

5.1 2013 Spill Prevention, Control, and Countermeasure Plan for CNRH, Naval Supply Systems Command, Fleet Logistics Center Pearl Harbor, Oahu, Hawaii; Prepared for: Department of the Navy, Commanding Officer, Naval Facilities Engineering Command, Hawaii; Prepared by: Element Environmental, LLC; Prepared under: Environmental Technical Services Contract Number N62472-12-D-1820, CTO 0006; Date: March 2014.

5.2 2013 Spill Prevention, Control, and Countermeasure Plan for CNRH, Joint Base Pearl Harbor-Hickam, Hickam Air Force Base, Oahu, Hawaii; Prepared for: Department of the Navy, Commanding Officer, Naval Facilities Engineering Command, Hawaii; Prepared by: Element Environmental, LLC; Prepared under: Environmental Technical Services Contract Number N62472-12-D-1820, CTO 0006; Date: March 2014.

5.3 "Final 2016 Annual Leak Detection Report of 18 Bulk Field-Constructed Underground Storage Tank at RedHill Fuel Storage Complex, Joint Base Pearl Harbor-Hickam, Hawaii", Prepared for: Defense Logistics Agency Energy, Fort Belvoir, Virginia; Prepared under: Naval Facilities Engineering Command Atlantic Contract N62470-16-D-9007-0004; Submitted by: Michael Baker International, Virginia Beach, Virginia; Date: 31 March 2017.

5.4 "Final 2017 Annual Static Liquid Pressure Testing Report of Seven Sections (36,364 Feet) of Petroleum Pier Pipelines, Joint Base Pearl Harbor-Hickam, Hawaii", Prepared for: Defense Logistics Agency Energy, Fort Belvoir, Virginia; Prepared under: NAVFAC Atlantic Contract N62470-16-D-9007-0004; Submitted by: Michael Baker International, Virginia Beach, Virginia; Date: 15 May 2017.

5.5 "Final 2017 Biennial Leak Detection Testing Report of 36 Sections (59,084 Feet) of Petroleum Pipelines, Joint Base Pearl Harbor-Hickam, Hawaii", Prepared for: Defense Logistics Agency Energy, Fort Belvoir, Virginia; Prepared under: NAVFAC Atlantic Contract N62470-16-D-9007-0004; Submitted by: Michael Baker International, Virginia Beach, Virginia; Date: 4 May 2017.

5.6 "Final 2017 Annual Certification and Testing Report of the Monitoring Systems, Leak Detectors, Spill Buckets, and Overfill Protection Valves Associated with the Four Underground Storage Tanks at Military Service Station 1037, Joint Base Pearl Harbor-Hickam, Hawaii", Prepared for: Defense Logistics Agency Energy, Fort Belvoir, Virginia; Prepared under: NAVFAC Atlantic Contract N62470-16-D-9007-0004; Submitted by: Michael Baker International, Virginia Beach, Virginia; Date: 23 June 2017.

5.7 "Leak Detection Evaluation, Capitalized Military Service Stations and Underground Storage Tank Systems, Naval Supply System Command, Fleet Logistics Center Pearl Harbor Facilities (NAVSUP-FLCPH) - Hawaii", Prepared for: Defense Logistics Agency Energy, Fort Belvoir, Virginia; Prepared under: NAVFAC Atlantic Contract N62470-10-D-3000-0018; Submitted by: Michael Baker Jr., Inc., a Michael Baker International Company, Virginia Beach, VA; Date: 24 June 2015.

APPENDIX A –

2015 REVISED FEDERAL UST REGULATIONS
(FEDERAL REGISTER / VOLUME 80, NUMBER 135, DATED 15 JULY 2015,
EXCERPTS 41585, 41587 - 41589)

power generators notify implementing agencies that their systems exist. Commenters stated that this requirement is unnecessary because the 1988 UST regulation excluded emergency generator tanks from only the release detection requirement. EPA agrees with commenters. This final UST regulation does not include this one-time notification requirement for emergency generator tanks.

2. Airport Hydrant Fuel Distribution Systems and UST Systems With Field-Constructed Tanks

This final UST regulation removes the 1988 deferral and requires owners and operators of airport hydrant fuel distribution systems (referred to as airport hydrant systems) comply with applicable requirements. However, EPA is tailoring the requirements to the unique nature of airport hydrant systems. Airport hydrant systems function and are designed differently than conventional USTs. Unlike conventional USTs, airport hydrant systems consist of networks of large diameter underground piping operating at high pressures to deliver fuel to aircraft. In addition, operation and maintenance requirements for airport hydrant systems may differ from those for conventional UST systems.

This final UST regulation removes the 1988 deferral and requires owners and operators of UST systems with field-constructed tanks comply with applicable requirements. Similar to airport hydrant systems, EPA is tailoring the requirements to the unique nature of field-constructed tanks. UST systems with field-constructed tanks (referred to as field-constructed tanks) range from conventional sizes to very large capacities greater than 2 million gallons.

A few commenters suggested EPA write regulations specifically for airport hydrant systems and field-constructed tanks, since they are distinctly different from conventional USTs. EPA agrees that airport hydrant systems and field-constructed tanks are different from conventional USTs. Additionally, EPA thinks it would help owners and operators if the requirements for airport hydrant systems and field-constructed tanks are in a separate subpart of the final UST regulation. In order to help owners and operators of these systems comply, this final UST regulation adds subpart K (*UST Systems with Field-Constructed Tanks and Airport Hydrant Fuel Distribution Systems*) and places most regulatory requirements for both airport hydrant systems and field-constructed tanks in one location. Since 1988, owners and operators of these systems have been required to comply with the requirements for subparts A (*Program Scope and Interim Prohibition*) and F (*Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances*).

This final UST regulation requires airport hydrant systems and field-constructed tanks installed on or before the effective date of the final UST regulation begin meeting the requirements of subpart K according to the schedule below. Airport hydrant systems and field-constructed tanks installed after the effective date of this final UST regulation must meet the requirements at the time of installation.

Requirement	Effective date
Upgrading UST systems, general operating requirements, and operator training.	Three years after the effective date of this final UST regulation.
Release detection	Three years after the effective date of this final UST regulation.
Release reporting, response, and investigation; closure; financial responsibility and notification, except as provided in § 280.251(2)(b).	On the effective date of this final UST regulation.

This final UST regulation modifies the 2011 proposed UST regulation by revising the definition of airport hydrant fuel distribution system and defining a field-constructed tank.

An airport hydrant fuel distribution system (also called airport hydrant system) is defined as an UST system which fuels aircraft and operates under high pressure with large diameter piping that typically terminates into one or more hydrants (fill stands). The airport hydrant system begins where fuel enters one or more tanks from an external source, such as a pipeline, barge, rail car, or other motor fuel carrier.

A field-constructed tank is defined as a tank constructed in the field. For example, a tank constructed of concrete that is poured in the field, or a steel or fiberglass tank primarily fabricated in the field is considered field-constructed.

Overview of Actions

Release Detection—Tanks

This final UST regulation requires airport hydrant system tanks and field-constructed tanks meet these requirements:

- These tanks must be monitored using release detection methods specified in subpart D:
  - Shop fabricated tanks and
  - Field-constructed tanks with a capacity less than or equal to 50,000 gallons
- Field-constructed tanks with a capacity greater than 50,000 gallons must either be monitored using release detection methods specified in subpart D (except tanks using groundwater and vapor monitoring must combine that method with inventory control as described in the alternatives below) or use one of the alternatives below
  - Conduct an annual tank tightness test that can detect a 0.5 gallon per hour (gph) leak rate
  - At least once every 30 days, use an automatic tank gauging system to perform release detection, which can detect a leak rate of 1 gallon per hour or less; and at least once every three years, use a tank tightness test that can detect a 0.2 gallon per hour leak rate
  - At least once every 30 days, use an automatic tank gauging system to perform release detection, which can detect a leak rate of 2 gallons per hour or less; and at least every two years, use a tank tightness test that can detect a 0.2 gallon per hour leak rate
  - At least every two years, perform vapor monitoring (conducted according to § 280.43(e) for a tracer compound placed in the tank system) capable of detecting a 0.1 gallon per hour leak rate
  - At least every 30 days, perform inventory control, conducted according to Department of Defense (DoD) Directive 4140.25; Air Transport Association (ATA) Airport Fuel Facility Operations and Maintenance Guidance Manual; or equivalent procedures that can detect a leak equal to or less than 0.5 percent of flow through and either
    - At least every two years, perform a tank tightness test that can detect a 0.5 gallon per hour leak rate or
    - At least every 30 days, perform vapor monitoring or groundwater monitoring (conducted according to § 280.43(e) or (f), respectively, for the stored regulated substance)

periodic spill testing and overfill inspection requirements of § 280.35. Owners and operators must install the equipment and conduct the first spill test and overfill inspection no later than three years after the effective date of this final UST regulation and every three years thereafter. For airport hydrant systems brought into use after the effective date of this final UST regulation, spill and overfill prevention equipment requirements must be met at installation.

Owners and operators must conduct walkthrough inspections that meet the requirements of § 280.252(c). Owners and operators must conduct the first inspection within three years after the effective date of the final UST regulation. In addition to the items inspected as part of the walkthrough inspection for other regulated UST systems, owners and operators of airport hydrant systems must inspect hydrant pits and hydrant piping vaults every 30 days for areas that do not require confined space entry according to the Occupational Safety and Health Administration (OSHA) and annually for areas that do require confined space entry. Owners and operators must keep documentation of the inspection according to § 280.36(b).

Notification

This final UST regulation requires owners and operators of regulated airport hydrant systems and field-constructed tanks meet these notification requirements:

- For airport hydrant systems and field-constructed tanks currently installed, owners and operators must submit no later than 3 years after the effective date of this final UST regulation a one-time notification to their implementing agency that their systems exist
- For airport hydrant systems and field-constructed tanks installed after the effective date of the final UST regulation, owners and operators must provide their implementing agency a notification of each newly installed system within 30 days of bringing each system into use
- Owners must provide their implementing agency a notification of ownership change for each newly acquired airport hydrant system or field-constructed tank within 30 days of the date on which the new owner assumes ownership

Financial Responsibility

This final UST regulation requires owners and operators of airport hydrant systems and field-constructed tanks that have not been permanently closed meet the financial responsibility requirements in subpart H at the time the one-time notification of existence is submitted to the implementing agency. Owners and operators who install these systems after the effective date of this final UST regulation must meet the financial responsibility requirements at installation. This requirement does not apply to state or federal owners of airport hydrant systems and field-constructed tanks.

Partially Excluded Components

This final UST regulation excludes aboveground storage tanks associated with airport hydrant systems and field-constructed tanks from the requirements of subparts B, C, D, E, G, J, and K. Owners and operators are still required to comply with subparts A (*Program Scope and Installation Requirements for Partially Excluded UST Systems*); and F (*Release Response and Corrective Action for UST Systems Containing Petroleum or Hazardous Substances*) for these tanks.

Operator Training

This final UST regulation requires owners and operators of airport hydrant systems and field-constructed tanks meet the operator training requirements in subpart J.

Closure Requirements for Previously Closed Tanks

When directed by the implementing agency, owners and operators of airport hydrant systems and field-constructed tanks permanently closed before the effective date of this final UST regulation must assess the excavation zone and close the UST system according to subpart G if releases from the UST may, in the judgment of the implementing agency, pose a current or potential threat to human health and the environment.

Background

Tanks and piping associated with airport hydrant systems and field-constructed tanks can store millions of gallons of fuel and handle large volumes of regulated substances on a daily basis. Leaks from these systems can contaminate subsurface soil beneath the airport apron and runways, groundwater, and nearby surface water systems, posing a significant risk to human health and the environment. As a result, EPA is removing the deferral.

Some commenters indicated EPA needed to justify that airport hydrant systems and field-constructed tanks are leaking in order to regulate them. The 1988 UST regulation required owners and operators report only confirmed releases from these tanks to implementing agencies. Owners and operators were not required to report suspected releases to implementing agencies, which sometimes resulted in gaps for ensuring proper site investigations or transmission of sufficient release information. As a result, implementing agencies have little to no available historical records regarding releases of regulated substances from airport hydrant systems and field-constructed tanks.

In the 2011 proposed UST regulation, EPA provided details on several releases that previously occurred at airport hydrant systems. Since that time, EPA identified additional information on releases from both DoD and commercial airport hydrant systems. For example, at Hartsfield Jackson International Airport in Georgia, active remediation and free product recovery is ongoing (as of 2014) due to a 1988 release of an estimated 14,000 gallons of jet fuel.[44] In 2003, an estimated 100,000 gallons of jet fuel leaked from the valves and flanges of an airport hydrant system at Minneapolis-St. Paul International Airport in Minnesota. Some of the jet fuel was released into the sanitary sewer and nearby waterway. During the investigation of the jet fuel release, personnel discovered a second jet fuel leak at a different concourse; this leak impacted the stormwater system and produced oily sheens in the Minnesota River. Responsible parties agreed to pay civil penalties and complete environmental projects, including continued site remediation and fuel recovery.[45] In 1983 at Camp Lejeune, North Carolina, investigators discovered multiple feet of free product while using a hand auger to investigate the cause of a fuel inventory discrepancy.[46] In addition, from the 1960s to the 1980s, thousands of gallons of jet fuel leaked from a former airport hydrant system at Pope Air Force Base, North Carolina. At one time, it was noted that as much as 75,000 gallons of free product was floating on top of the groundwater because of these releases. As of 2014, the site is undergoing remediation.[47] In addition, at Marine Corps Air Station Cherry Point, North Carolina there have been multiple releases from the airport

[44] Corrective Action Plan—Part B: Hartsfield-Jackson International Airport, Concourse Pit. Number 19 Fuel Spill.

[45] *http://www.pca.state.mn.us/index.php/about-mpca/mpca-news/current-news-releases/news-release-archive-2005/airport-agrees-to-pay-$540000-for-environmental-violations.html?nav=0.*

[46] *http://www.tftptf.com/New_ATSDR3/RR_DRAFT_RAO.pdf.*

[47] Federal Remediation Technologies Roundtable Abstracts of Remediation Case Studies, Volume 3 *http://epa.gov/tio/download/frtr/abstractsvol3.pdf.*

hydrant system underground piping. The station was cited twice in the 1990s for contaminating soil and groundwater under this fuel facility due to leaking tanks or fuel spills. An extensive environmental remediation effort is underway in 2014 to clean this site. Contamination from many of the releases combined and migrated to form a single plume.

In the 2011 proposed UST regulation, EPA also provided details on several previous releases that occurred from field-constructed tanks. Since that time, EPA identified additional anecdotal information on releases from field-constructed tanks. At Adak Island, Alaska's Tank Farm A, records show fuel was released at various times from 21,000 to 420,000 gallon field-constructed tanks and piping. As of 2014, all tanks have been removed, but the former fuel farm is still undergoing remediation through long term monitoring and monitored natural attenuation.[48] Also at Adak Island, an overfill during a fuel transfer caused 142,800 gallons of diesel fuel to leak from a 4.8 million gallon underground field-constructed tank into the immediate and surrounding environment, causing harm to native wildlife.[49]

Releases can have a major impact on human health and the environment. Release prevention equipment, regular release detection tests, operator training, periodic walkthrough inspections, and proper operation and maintenance are keys to preventing and quickly identifying releases before they contaminate the surrounding environment. This final UST regulation adds these requirements for airport hydrant systems and field-constructed tanks in order to help prevent and quickly detect leaks from these systems into the environment.

Definition of an Airport Hydrant System

The 1988 UST regulation did not provide a definition for airport hydrant system. In the 2011 proposed UST regulation, EPA provided a definition of an airport hydrant system to clarify what components would be regulated. However, that definition was based on an airport hydrant system that received fuel at a single delivery point, designed with all components operating in tandem, and included only the immediate piping and tank directly feeding the airport hydrant piping. To clarify for owners and operators, EPA presented scenarios of typical airport hydrant systems in a guidance document provided during the public comment period.

After publishing the 2011 proposed UST regulation, EPA met with stakeholders to gather more information on airport hydrant system design and operation.[50] [51] EPA also provided another iteration of the schematics that contained better defined airport hydrant system scenarios. However, some commenters still were confused about which specific components of an airport hydrant system would be regulated.[52]

Many commenters requested that EPA provide guidance on how to perform the calculations to determine whether the airport hydrant system meets the definition of an underground storage tank and requested clarification of system components. In response to these comments, EPA is providing guidance below.

In order for an airport hydrant system to be subject to the final UST regulation, it must first meet the definition of an underground storage tank. Airport hydrant systems are not regulated UST systems under 40 CFR part 280, unless 10 percent or more of the total capacity of the system is beneath the surface of the ground. When performing the calculation, include all tanks and underground piping that are part of the airport hydrant system. An airport hydrant system may have one or more of the following connected together: Aboveground tanks, underground tanks, field-constructed tanks, or factory constructed tanks. Below are two examples. Note that aboveground piping is not included when calculating the total volume.

Example 1: A 1 million gallon aboveground storage tank (AST) connected to underground piping with a capacity of 100,000 gallons does not meet the definition of an UST, as explained below:

1 million gallons (AST) + 100,000 gallons (underground pipe) = 1.1 million gallons total volume

1.1 million gallons × 10% = 110,000 gallons

The volume of the underground piping (100,000 gallons) is less than 10 percent of the total volume of the tanks and underground piping (110,000 gallons).

Example 2: A 2 million gallon AST feeds two 100,000 gallon field-constructed underground storage tanks and two 50,000 gallon underground tanks constructed in the factory which feed 100,000 gallons of underground hydrant piping. Calculating these values yields a total system capacity of 2,400,000 gallons with 400,000 gallons underground. More than 16% of this airport hydrant system is underground making it an UST.

In response to comments on the proposed definition, EPA is clarifying the definition of an airport hydrant system in this final UST regulation. EPA determined that multiple tanks grouped or interconnected together can function as one system to fuel an airport hydrant system. EPA agrees with commenters that it would not be feasible to separate these tanks to define an airport hydrant system. EPA also found that other tanks not directly connected to the underground airport hydrant piping also could feed the airport hydrant system. The Agency is concluding that an airport hydrant system may consist of interconnected aboveground and underground storage tanks (that could be constructed in the factory or field-constructed) and piping that function as integral and interchangeable components of the fueling system. Field-constructed tanks that are part of the airport hydrant system are treated as part of the airport hydrant system and not independent UST systems that are field-constructed. The airport hydrant system begins when regulated substance enters from an external source such as a pipeline, barge, rail car, or other motor vehicle carrier, but does not include the external source. Airport hydrant systems use large diameter piping and operate at pressures higher than those of a conventional UST. This final definition alleviates stakeholder uncertainty on which components of an airport hydrant system must meet the UST regulation by including all integral components that form an airport hydrant system and deliver fuel to the aircraft. These systems include underground piping and ASTs or USTs that hold aircraft fuel (for example, settling tanks or product recovery tanks). They do not include tanks or underground piping not storing aircraft fuel (for example, additive tanks) or tanks and underground piping not connected to the airport hydrant system (for example, a system that fuels an emergency power generator for a pump house). In addition, EPA is aware there may be instances where an airport hydrant system might include permanently installed dispensing

[48] Tank Farm A *http://dec.alaska.gov/Applications/SPAR/CCReports/Site_Report.aspx?Hazard_ID=686.*

[49] *http://www.darrp.noaa.gov/northwest/adak/pdf/ADAK_DARPEA_FINAL_Draft%20PDF.pdf.*

[50] January 28, 2012, March 29, 2012, and October 19, 2012 meetings with representatives from Airlines for America.

[51] February 28, 2013 and March 18, 2013 meetings with DoD's Defense Logistics Agency Energy.

[52] *Airport Hydrant Systems Scenarios Revised,* dated February 28, 2012.

equipment at the end of the hydrant piping instead of a fill stand. However, since these systems still operate under high pressure and contain large diameter piping, we consider them to be airport hydrant systems.

Definition of a Field-Constructed Tank

The preamble to the 1988 UST regulation described a field-constructed tank as a tank usually constructed of steel or concrete and shaped like flat vertical cylinders, with a capacity of greater than 50,000 gallons. Tanks that are primarily factory built, but assembled in the field, are considered factory built tanks. For example, welding two halves of a factory constructed tank together in the field does not qualify the tank as a field-constructed tank. Several commenters requested EPA define field-constructed tank in the final UST regulation in order for implementing agencies and owners and operators to know which tanks are applicable. While EPA thinks this term is self-evident, this final UST regulation defines field-constructed tank as a tank constructed in the field. For example, a tank constructed of concrete that is poured in the field, or a steel or fiberglass tank primarily fabricated in the field is considered field-constructed. Please note this definition excludes those tanks with components primarily manufactured in a factory with minimal assembly in the field. EPA considers those tanks are factory built tanks. Field-constructed tanks vary from sizes smaller than 50,000 gallons to sizes very large in capacity. Large capacity tanks may exceed size or shape limitations that prohibit transportation of the tank in whole to the UST site. Field-constructed tanks present an engineering, design, or transportation concern that cannot be addressed by fabrication in a factory or are more ideally addressed through in-field construction. This definition includes tanks that are mounded or partially buried, such as those defined in 40 CFR part 112, if 10 percent or more of the volume of the system is beneath the ground's surface or otherwise covered with earthen material. EPA considers a field-constructed tank that is part of a wastewater treatment system to be partially excluded from the final UST regulation according to § 280.10(c). See section C–3 for additional information on the partial exclusion for wastewater treatment tank systems.

Universe of Field-Constructed Tanks and Airport Hydrant Systems Affected

UST systems with field-constructed tanks are generally very large and, in the event of a release, pose a substantial threat to human health and the environment. Typical tank sizes range from 20,000 gallons to greater than 2 million gallons. EPA is aware of approximately 330 UST systems with field-constructed tanks owned by the Department of Defense and 12 field-constructed tanks owned by the Department of Energy (DOE).

One commenter objected to EPA regulating airport hydrant systems because the 2011 proposed UST regulation addressed airport hydrant systems at military facilities and did not include systems at commercial airports. When issuing the 2011 proposed UST regulation, EPA thought the universe of these systems was mainly owned by DoD, based on information from DoD and commercial airport representatives. The 2011 proposed UST regulation also assumed the universe included two commercial airports with airport hydrant systems. Airlines for America (A4A, formerly known as Air Transport Association of America, Inc.) provided additional information during the public comment period that suggested nine commercial airports would be affected by the final UST regulation. As a result of the comments received, EPA did extensive research to confirm which commercial airports might be affected by the final UST regulation. EPA met with personnel from DoD and from eight of the nine suggested commercial airport facilities to gather additional information and determine the universe of airport hydrant systems that would have to comply with the final UST regulation.[53] [54] [55] [56] Additionally, EPA listened to concerns and answered questions about the 2011 proposed UST regulation. EPA also met with release detection vendors to determine whether commercial airports and DoD facilities could achieve release detection compliance within the specified time frames.[57] [58] [59] EPA concluded that of the nine airports A4A named, eight would possibly be affected by the final UST regulation. Based on these meetings, EPA found that most of the commercial airport hydrant systems have release prevention and detection equipment currently installed on them and airport personnel are already performing various activities that can be modified to meet the final UST regulation.

Process for Obtaining Public Comment

One commenter suggested that EPA:

- Did not follow all requirements to allow stakeholder input prior to issuing the 2011 proposed UST regulation
- Did not allow stakeholders adequate time to provide comments
- Failed to follow the correct public notice procedures
- Failed to inform stakeholders of two commercial airports that might be affected by the final UST regulation
- May have led commercial airport stakeholders to doubt that any commercial airport hydrant systems would be affected by the final UST regulation

The commenter also suggested EPA should withdraw the 2011 proposed UST regulation because the administrative record and resulting proposal conflicted with Executive Order 13563 (*Improving Regulation and Regulatory Review*).[60]

EPA disagrees with these comments. We performed extensive stakeholder outreach both prior to developing the 2011 proposed UST regulation and during the public comment period. In addition, EPA followed procedures required by the Administrative Procedure Act for providing public notice and requesting public comment through the **Federal Register**. In order to allow additional time for airport authorities to perform a preliminary assessment and respond to the 2011 proposed UST regulation, EPA extended the public comment period by two months as requested by commenters.[61] EPA met with all interested stakeholders who requested meetings, including representatives of commercial airports. EPA carefully researched information provided during the public comment period; this included verifying methods of release detection currently

[53] Discussions With Commercial Airports That May Be Affected By The Final UST Regulation dated February 6, 2013.

[54] Note that EPA did not meet with personnel from Indianapolis International Airport however, A4A and vendors stated that the airport hydrant system is equipped with the necessary equipment to meet requirements in the final UST regulation.

[55] January 28, 2013 and March 29, 2012 meetings with A4A.

[56] February 28, 2013 and March 18, 2013 meetings with DoD's Defense Logistics Agency Energy.

[57] June 20, 2012 and May 19, 2013 meeting with Hansa Consult of North America, LLC.

[58] June 20, 2012 meeting with VISTA Precision Solutions.

[59] August 15, 2012 meeting with Ken Wilcox and Associates.

[60] On January 18, 2011, President Obama issued Executive Order 13563, which directed federal agencies to develop a preliminary plan which outlined the agency's approach for periodically reviewing regulations to determine whether any rules ''should be modified, streamlined, expanded, or repealed so as to make the agency's regulatory program more effective or less burdensome in achieving the regulatory objectives.''

[61] January 5, 2012 request from A4A for a 60-day extension for more time to review and query its membership and potentially affected airports for a more complete understanding of the 2011 proposed UST regulation and potential costs.

APPENDIX B –

EVALUATION OF VOLUMES

Site:	Bulk F-24 System
Date of Evaluation:	2-Feb-2016
System Description:	F-24 is received by barge at the Hotel and Kilo piers at Pearl Harbor, an off-base commercial pipeline, and by over-the-road transport at the TOL at Hickam. Only underground receipt piping after the jurisdicational valves is included in this calculation. Fuel is stored in six BFCUSTs at Red Hill and six field-constructed vertical ASTs; two ASTs at the Upper Tank Farm and four ASTs at Hickam. There is one aboveground PRT and two underground PRTs at Hickam. Fuel is issued at the Hotel and Kilo piers at Pearl Harbor, TFSs at the Upper Tank Farm and Hickam, and two hydrant loops at Hickam. Fuel system piping is aboveground and underground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk JP-5 System
Date of Evaluation:	2-Feb-2016
System Description:	JP-5 is received by barge at the Hotel and Kilo piers at Pearl Harbor and by an off-base commercial pipeline. Only underground receipt piping after the jurisdicational valves is included in this calculation. Fuel is stored in 12 BFCUSTs at Red Hill and one field-constructed vertical AST at the Upper Tank Farm. Fuel is issued at the Hotel and Kilo piers at Pearl Harbor and the TFS at the Upper Tank Farm. Fuel system piping is aboveground and underground.

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Bulk F-76 System
Date of Evaluation: 2-Feb-2016
System Description: F-76 is received by barge at the Hotel, Kilo, and Sierra piers at Pearl Harbor and by an off-base commercial pipeline. Only underground receipt piping after the jurisdicational valves is included in this calculation. Fuel is stored in four BFCUSTs at Red Hill and three field-constructed vertical AST at the Upper Tank Farm. Fuel is issued at the Hotel, Kilo, Mike, and Bravo piers at Pearl Harbor and the TFS at the Upper Tank Farm. Fuel system piping is aboveground and underground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk MP System
Date of Evaluation:	2-Feb-2016
System Description:	MP is received by barge at the Kilo Pier at Pearl Harbor and by an off-base commercial pipeline. Only underground receipt piping after the jurisdicational valves is included in this calculation. Fuel is stored in one field-constructed vertical AST at the Upper Tank Farm. Fuel is issued at the Kilo Pier at Pearl Harbor and the TFS at the Upper Tank Farm. Fuel system piping is aboveground and underground.

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk FOR System 1
Date of Evaluation:	2-Feb-2016
System Description:	FOR is received by barge at the Hotel Pier and and from the reclaim system from BFCUSTs S1224 through S1227. Only underground receipt piping after the jurisdicational valve is included in this calculation. FOR is stored in two shop-fabricated vertical ASTs at the Upper Tank Farm. Fuel is issued via TFS. Fuel system piping is primarily aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk FOR System 2 at Adit 3
Date of Evaluation:	2-Feb-2016
System Description:	FOR is received from the reclaim system from BFCUSTs 2 through 18 and 20 and stored in one shop-fabricated vertical AST at Adit 3. Fuel is issued via TFS. Fuel system piping is primarily aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk Lube Oil System 1
Date of Evaluation:	2-Feb-2016
System Description:	Lube Oil is received by over-the-road transport via TOL and stored in one shop-fabricated horizontal AST. Fuel is issued via TFS. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk Lube Oil System 2
Date of Evaluation:	2-Feb-2016
System Description:	Lube Oil is received by over-the-road transport via TOL and stored in one shop-fabricated horizontal AST. Fuel is issued via TFS. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

(b) (3) (A)

Site: Bulk Diesel System at Facility 5
Date of Evaluation: 2-Feb-2016
System Description: Diesel is received by over-the-road transport at combination TOL/TFSs and stored in two shop-fabricated horizontal ASTs. Fuel is issued via combination TOL/TFSs. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk JPTS System 3 at Facility 9
Date of Evaluation:	2-Feb-2016
System Description:	JPTS is received by over-the-road transport via TOL and stored in one shop-fabricated horizontal AST. Fuel is issued via TFS. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Bulk JPTS System 4 at Facility 9
Date of Evaluation:	2-Feb-2016
System Description:	JPTS is received by over-the-road transport via TOL and stored in one shop-fabricated horizontal AST. Fuel is issued via TFS. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Non-Bulk Mogas System at Facility 1037
Date of Evaluation:	2-Feb-2016
System Description:	Mogas is received by over-the-road transport via direct fill port and stored in two shop-fabricated USTs. Fuel is issued via retail-style dispenser. Fuel system piping is underground.

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Non-Bulk Diesel System at Facility 1037
Date of Evaluation:	2-Feb-2016
System Description:	Diesel is received by over-the-road transport via direct fill port and stored in two shop-fabricated USTs. Fuel is issued via retail-style dispensers. Fuel system piping is underground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Non-Bulk Mogas System 1 at Facility S-169
Date of Evaluation:	2-Feb-2016
System Description:	Mogas is received by over-the-road transport via direct fill port and stored in one shop-fabricated dual-compartment horizontal AST. Fuel is issued via retail-style dispensers. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Non-Bulk Mogas System 2 at Facility S-169
Date of Evaluation: 2-Feb-2016
System Description: Mogas is received by over-the-road transport via direct fill port and stored in one shop-fabricated dual-compartment horizontal AST. Fuel is issued via retail-style dispensers. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Non-Bulk Diesel System 3 at Facility S-169
Date of Evaluation:	2-Feb-2016
System Description:	Diesel is received by over-the-road transport via direct fill port and stored in one shop-fabricated dual-compartment horizontal AST. Fuel is issued via retail-style dispensers. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Non-Bulk Diesel System 4 at Facility S-169
Date of Evaluation: 2-Feb-2016
System Description: Diesel is received by over-the-road transport via direct fill port and stored in one shop-fabricated dual-compartment horizontal AST. Fuel is issued via retail-style dispensers. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Non-Bulk E-85 System at Facility S-169
Date of Evaluation: 2-Feb-2016
System Description: E-85 is received by over-the-road transport via direct fill port and stored in one shop-fabricated horizontal AST. Fuel is issued via retail-style dispensers. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Non-Bulk Mogas System at Facility S-60
Date of Evaluation: 2-Feb-2016
System Description: Mogas is received by over-the-road transport via remote fill port and stored in one shop-fabricated horizontal AST. Fuel is issued via retail-style dispenser. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site:	Non-Bulk Diesel System at Facility S-60
Date of Evaluation:	2-Feb-2016
System Description:	Diesel is received by over-the-road transport via remote fill port and stored in one shop-fabricated horizontal AST. Fuel is issued via retail-style dispenser. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

(b) (3) (A)

Site: Non-Bulk Mogas System at Facility 238
Date of Evaluation: 2-Feb-2016
System Description: Mogas is received by over-the-road transport via remote fill port and stored in one shop-fabricated horizontal AST. Fuel is issued via retail-style dispenser. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

Site: Non-Bulk Diesel System at Facility 238
Date of Evaluation: 2-Feb-2016
System Description: Diesel is received by over-the-road transport via remote fill port and stored in one shop-fabricated horizontal AST. Fuel is issued via retail-style dispenser. Fuel system piping is aboveground.

Fueling System Details

(b) (3) (A)

Evaluation

(b) (3) (A)

From: Myers, Hugh [redacted]
Sent: Monday, March 15, 2021 3:05 PM
To: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA) [redacted]
Cc: [redacted]
Subject: [Non-DoD Source] Fw: DOH NOI File Request

John,

Thank you for a copy of the unredacted pressure test results from the January-February 2021 testing of the lines associated with Hotel Pier. I look forward to the redacted version of the report as well as the Navy's redaction justification statement as well from Sarah. Please provide the redaction statement to include the previously submitted redacted version of the reports as well.

Per our morning conversation,

Thank you for clarifying that the [redacted] de-fuel line that failed pressure test above hasn't been in use for over twenty years and routinely doesn't contain fuel product. The normal routing of the [redacted] de-fuel line when it is used goes from Hotel pier, to VS-3, to VS-1 then to Tank [redacted] which is an above ground storage tank. My understanding is Jan/Feb 2021 line test is the first pressure testing for the [redacted] defuel line, the line does not routinely contain fuel, and that this line was not part of your permit application.

My understanding is that when tankers deliver product at hotel pier, the fuel uses the normal JP-5, JP-24, and F-76 pipelines that are on the Pier.

Per my review of the attached, the current pipelines between VS-1C/Hotel Pier, and Kilo Pier complies with HAR pipeline MLDR. Based on the testing, our understanding is that F-24 line(formerly JP-8) initially failed, excess air removed from the line, and passed retesting the following day. Other than the pressure failure of the [redacted] de-fueling line, the F-24, JP-5, and F-76 has pass the MDLR for HAR compliance.

DOH is requesting a copy of the third-party certification of the Hansa pressure test version 2.2, 2.1, and 2.0 for MDLR calculation that was used in the attached pressure line test results for our review.

I will also look to the formal annual 2021 Static Liquid Pressure Test results submission on all your pipelines around the beginning of April 2021 timeframe as it becomes available.

DOH is hopeful that the current excavation efforts around VS-3 will illuminated the source of the current release in the area.

Mahalo,
Hugh

Hugh Myers
Red Hill Project Engineer
State of Hawaii, Solid Hazardous Waste Branch
[redacted]

From: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA) [redacted]
Sent: Monday, March 15, 2021 9:54 AM
To: [redacted]
Cc: [redacted]
Subject: [EXTERNAL] RE: DOH NOI File Request

Hugh,

Attached is the report for the one-time precision LD testing of the piping at VS-3. The test recorded a failure of the multi-product [redacted]line referred to as a defuel line. Although, the line failed the LD test, confirmation of a leak is still in progress.

I walked Ramone and Adam through the operation of the defuel line last week and will do the same for you if you come out on Thursday.

Sarah will provide you with a redacted copy of this report SEPCOR. Sarah is also consulting with our Office of General Counsel on a redaction justification statement.

We're still awaiting a final copy of the Static Liquid Pressure Test Report.

v/r-John

John Floyd

Deputy Director, Fuel and Facilities Management
NAVSUP Fleet Logistics Center Pearl Harbor
DSN: [redacted]
Comm: [redacted]
iPhone: [redacted]
Email: [redacted]

From: Myers, Hugh [redacted]
Sent: Thursday, March 11, 2021 5:55 PM
To: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA) [redacted]
Cc: [redacted]
Subject: [Non-DoD Source] RE: DOH NOI File Request

Good Afternoon John,

Please thank Sarah, I was able to download today all five redacted version of the requested pipeline test reports. These redacted reports provide DOH with public releasable version of the unredacted reports that DOH received on 2/23/2021 that covered items 5, 7, 8, and 9 of DOH December Letter of Interest.

Can you provide DOH, Navy redaction justification statement to cover these five reports.

DOH is awaiting the recent January/February 2021 pipeline test results report when it becomes available. Please provide DOH unredacted and redacted versions of this report as well. DOH request redaction justification statement to cover this report too.

Thank you,
Hugh Myers

Hugh Myers
Red Hill Project Engineer
Solid and Hazardous Waste Branch
State of Hawaii| Department of Health|2827 Waimano Rd.,#100|Pearl City, HI 96782
Phone: [redacted]

From: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA) [redacted]
Sent: Thursday, March 11, 2021 12:06 PM
To: Myers, Hugh [redacted]
Cc: [redacted]
Subject: [EXTERNAL] RE: DOH NOI File Request

Hello Hugh,

Sarah Stirling, our Records Manager, will be sending you redacted versions of the NOI Files via DOD SAFE shortly.

v/r-John

John Floyd
Deputy Director, Fuel and Facilities Management
NAVSUP Fleet Logistics Center Pearl Harbor
DSN: [redacted]
Comm: [redacted]
iPhone: [redacted]
Email: [redacted]

From: Myers, Hugh <[redacted]
Sent: Wednesday, February 24, 2021 8:50 AM
To: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA) <[redacted]
Subject: [Non-DoD Source] Re: DOH NOI File Request

John,

Thank you for the reports.
Today is my telework day so I will attempt the download tomorrow when I'm in the office.
Sorry to create more work for you, but do you need to send us a redacted version of any of these reports with justification for redactions. Please advise.
Just want to make sure, in case in the future we get a request for public information.
DOH looks forward to copies of the Coast Guard reports and a copy of the most recent pipeline testing that was just completed in January- February 2021 timeframe.
Thank you for the continued support and look forward to our next meeting,

Vr,
Hugh

Hugh Myers
Red Hill Project Engineer
State of Hawaii, Solid Hazardous Waste Branch
[redacted]

From: Floyd, John L CIV USN NAVSUPFLC PEARL HI (USA)

Sent: Tuesday, February 23, 2021 6:32 PM
To: Myers, Hugh
Subject: [EXTERNAL] DOH NOI File Request

Hugh,

I have forwarded to you via DoD SAFE the files below:

JB Pearl Harbor-Hickam HI - 2019 Annual LD Testing of 35 Sections (57136 Feet) of Petroleum Pipelines - MAR 2019
JB Pearl Harbor-Hickam HI - 2019 One-time SLPT of Four Sections (15513 Feet) of Pier Pipelines - AUG 2019
JB Pearl Harbor-Hickam HI - 2020 Annual LD Testing of Pipelines - Mar 2020
JB Pearl Harbor-Hickam HI - 2020 Annual SLPT Report - August 2020
JB Pearl Harbor-Hickam HI - 2020 One-time SLPT Report - November 2020

I will send the USCG Report tomorrow.

v/r-John

John Floyd
Deputy Director, Fuel and Facilities Management
NAVSUP Fleet Logistics Center Pearl Harbor
DSN: [redacted]
Comm: [redacted]
iPhone: [redacted]
Email: [redacted]

Drinking Water Distribution System Recovery Plan

JBPHH, O'ahu, Hawai'i

December 2021

Sherri R. Eng, N45
Commander, Navy Region Hawaii
By Direction of the Commander

Kathleen S. Ho
Deputy Director of Environmental Health
Hawaii Department of Health

Ben Castellana
On-Scene Coordinator
U.S. EPA Region 9

David K. Brixius
Chief of Environmental Division
U.S. Army Garrison Hawaii

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Drinking Water Distribution System Recovery Plan

JBPHH, O'ahu, Hawai'i

December 2021

This Drinking Water Distribution System Recovery Plan was prepared by the Navy, Army, State of Hawaii Department of Health, and the United States Environmental Protection Agency.

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Subj: DRINKING WATER DISTRIBUTION SYSTEM RECOVERY PLAN

This Drinking Water Distribution System Recovery Plan is provided to support the unidirectional flushing (UDF) of the Joint Base Pearl Harbor-Hickam (JBPHH) drinking water system. Testing indicates that residual volume of distributed fuel is too dilute for targeted capture and treatment within our approximately 25M gallon system. This plan details the allowable method and procedures for flushing the JBPHH potable water transmission system with clean drinking water from the Waiawa Shaft, our sole remaining production facility. Multiple efforts (e.g., the hydrologic capture zone analysis, sampling) are currently underway and this flushing effort is one of multiple lines of evidence that will be used to determine when it is appropriate for residents to return home.

This plan was developed in conjunction with the Navy, Army, State of Hawaii (HI) Department of Health (DOH), and United States Environmental Protection Agency (i.e., Interagency Drinking Water System Team) and reflects the consensus approach (that was developed during Face-to-Face meetings between all parties) for unidirectional flushing in a hydraulically-informed operation in response to the release at the Red Hill Shaft with the overarching goal of returning residents to their homes and/or workplaces SAFELY and as quickly as possible.

It should be noted that this distribution system recovery plan is evergreen – Meaning that it may/will be updated/revised as analytical data (and/or) other information are obtained that indicate that it should be adjusted to ensure protection of human health.

References:

(a) State of Hawaii Department of Health, Directive One– Flushing Requirements Navy Water System Incident, Case No.: 20211128-1848 (HI Directive One, dated December 8, 2021)
(b) Joint Drinking Water Sampling Plan, signed December 14, 2021

Enclosures:

(1) UDF Plan (Subject to change under advisement of the Interagency Drinking Water System Team)
(2) Daily Flushing Report
(3) National Pollutant Discharge Elimination System (NPDES), Notice of General Permit Coverage, authoring the discharge of treated effluent from drinking water distribution system recovery activities

1. BACKGROUND

1.1. EVENT: Portions of the Navy water distribution system serving JBPHH and surrounding areas were exposed to low levels of fuel contamination with initial indications in the form of smell reports occurring on or about 28 November 2021. Late in the evening of 28 November, the Navy's Red Hill Shaft was isolated from the water distribution system based on the clustering of reports in areas served primarily from the Red Hill Shaft. Since that time, sampling has identified and confirmed low level petroleum contamination in the distribution system, with the Red Hill Shaft as the source.

The Red Hill Shaft has remained isolated and the Navy water distribution system is currently being served solely from the Waiawa Shaft, which continues to be free of contamination. The Navy's Aiea Halawa shaft was also secured over migration concerns of the contaminant plume.

1.2. CRITICAL URGENCY: Protecting public health, safety and the environment is paramount. Flushing the JBPHH water distribution system is a critical step in ensuring access to safe drinking water. Firm resolve and a sense of urgency is necessary to provide support to impacted residents and to ensure our people have access to a safe water supply.

1.3. CONSTRAINTS: The DOH, Directive One– Flushing Requirements Navy Water System Incident, Case No.: 20211128-1848 (HI Directive One) outlined constraints on flushing activities. The details below reflect edits made to HI Directive One in coordination with the DOH.

1.3.1. Discharges to State waters conducted to recover the Navy and Army drinking water distribution systems in non-compliance with this plan are prohibited.

1.3.2. Treatment, such as using diffusers & granulated activated carbon, shall be conducted prior to discharge to land-based application or storm drains, consistent with the applicable NPDES (Enclosure 3) permit. Discharges to a sanitary sewer system shall be conducted consistent with permits issued by the respective sewer system operator/owner. Once area is flushed, tested and approved by the DOH, previously authorized normal system operation and maintenance activities may resume.

1.3.3. Discharges may only be made onto soil – not to asphalt, concrete or roadways, unless discharged in compliance with applicable NPDES or sanitary sewer system discharge permits. No discharges may leave the soil and enter any storm drains not in compliance with NPDES or sewer system discharge permits. All discharges must be conducted in a manner to prevent human contact and minimize exposure to wildlife.

1.3.4. Prior to the flushing activity, initial discharges must be arranged with a Wastewater Treatment Plant that will accept as much of the flushed water as the Navy expects to discharge.

1.3.5. The Navy must maintain personnel at each flushing location to ensure the discharge does not contact persons, pets, wildlife, etc.

1.3.6. The Navy personnel at each flushing location must also ensure that no discharge enters the storm drain or State waters (e.g. streams, ocean, etc.) unless in compliance with applicable NPDES permits and discharge requirements.

1.3.7. The Navy must immediately stop the flushing activity at the flushing location if the discharge results in adverse effects at the discharge point (impacts include, but are not limited to, fuel smells, flooding, injury to wildlife, presence of endangered species in area, erosion, etc.)

2. DRINKING WATER DISTRIBUTION SYSTEM RECOVERY PLAN:

2.1. OBJECTIVE: Recover full functionality of the JBPHH drinking water distribution system as expeditiously as legally permissible through flushing of the system with clean drinking water from the Waiawa shaft. The water transmission system includes pressurized pipes and transmission system appurtenances.

2.2. DISTRIBUTION SYSTEM RECOVERY PLAN INTENT: For the purpose of potable water distribution lines and tank flushing, the US Navy shall strategically open fire hydrants at locations detailed in Enclosure 1. Flushing shall commence under the oversight of the State of Hawaii DOH, Interagency Drinking Water System Team, and under the direction of the US Navy leadership. All personnel associated with the flushing activities will be briefed regarding this plan and flushing shall only commence following the standard operating procedures detailed in this plan. A Flushing Report (Enclosure 2) shall be submitted for each flushing activity completed and compiled in a report submitted to the DOH daily.

2.2.1. EXECUTION: We will execute recovery of the system in four stages:

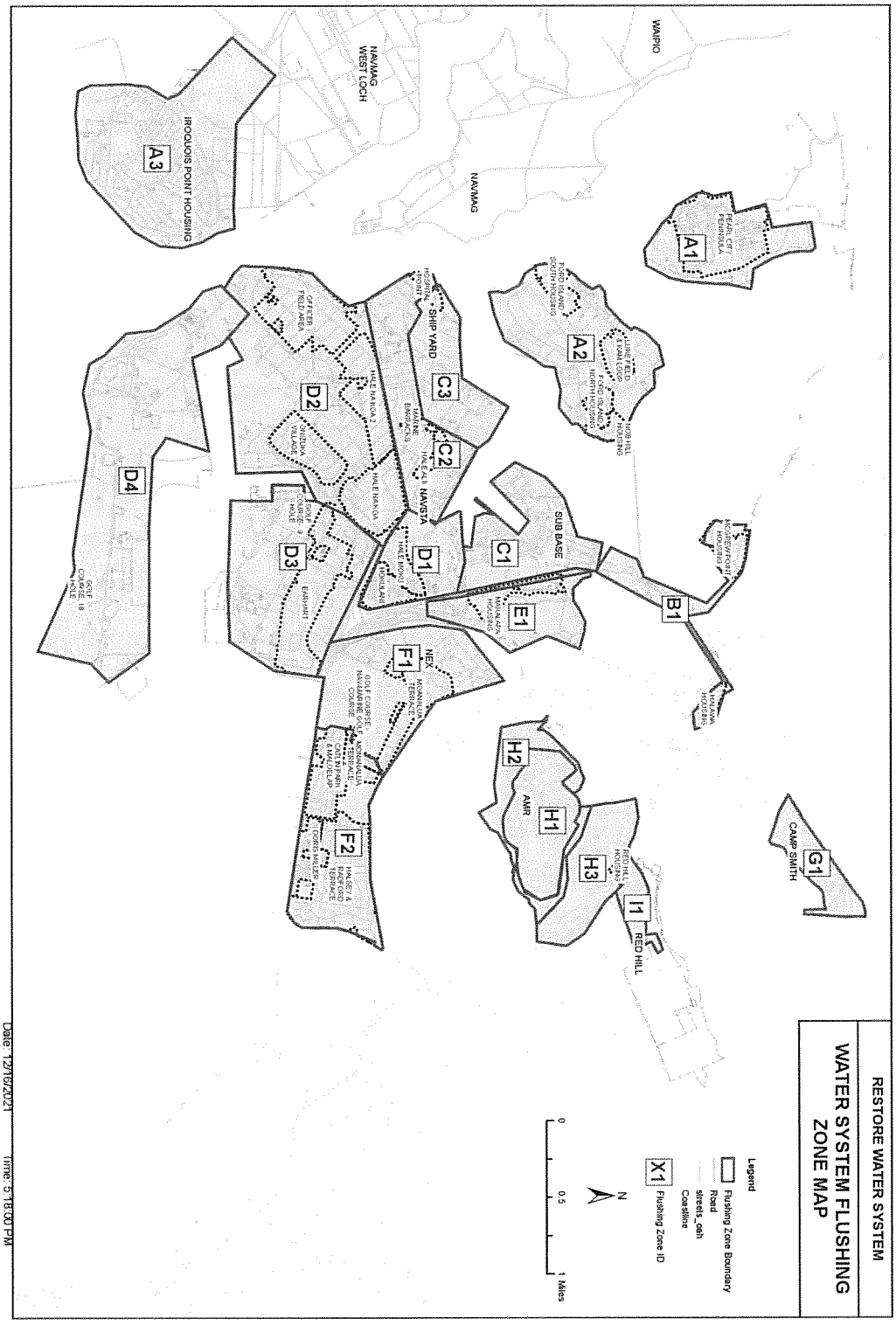
2.2.1.1. STAGE 1: Recover Distribution System and Tanks

2.2.1.2. STAGE 2: Flush Points of Service

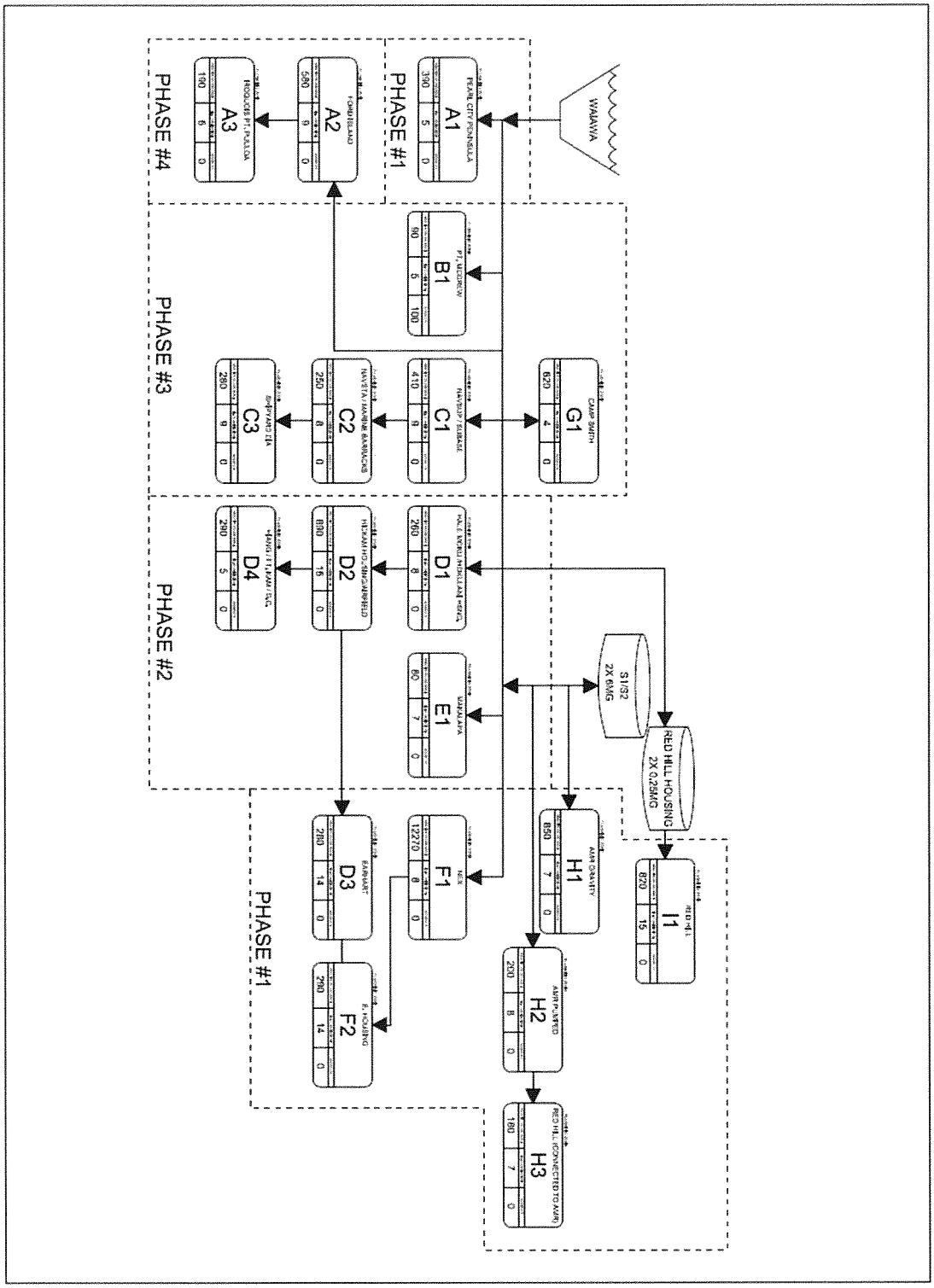
2.2.1.3. STAGE 3: Certify to Potable Standards

2.2.1.4. STAGE 4: Monitor

2.3. DISTRIBUTION SYSTEM RECOVERY PLAN MAP:



2.4. DISTRIBUTION SYSTEM RECOVERY PLAN DIAGRAM:



2.5. FLUSHING PLAN PHASING: Areas where contamination has shown to be present by both testing and reporting are phased as follows:

2.5.1. PHASE 1: Mobile Granular Activated Carbon (GAC) units will be deployed to Flush Areas A1, H1, H2, H3, I1, D3, F1, and F2. For planning assumptions, the US Navy intends to flush each area with five volumetric turnovers minimum. Water will be tested to confirm that the flushed zone is indistinguishable from the source.

2.5.1.1. Flush Area A1
Area Pipe Volume (KGAL): 390
Total Minimum Turnover Volume (KGAL): 1,950

2.5.1.2. Flush Area H1 (includes Mid tank)
Area Pipe Volume (KGAL): 850
Total Minimum Turnover Volume (KGAL): 4,250

2.5.1.3. Flush Area H2 (includes South tank)
Area Pipe Volume (KGAL): 200
Total Minimum Turnover Volume (KGAL): 1,000

2.5.1.4. Flush Area H3 (includes North tank)
Area Pipe Volume (KGAL): 180
Total Minimum Turnover Volume (KGAL): 900

2.5.1.5. Flush Area I1 (includes Red Hill tanks)
Area Pipe Volume (KGAL): 820
Total Minimum Turnover Volume (KGAL): 4,100

2.5.1.6. Flush Area D3
Area Pipe Volume (KGAL): 280
Total Minimum Turnover Volume (KGAL): 1,400

2.5.1.7. Flush Area F1 (includes S1/S2 tanks)
Area Pipe Volume (KGAL): 12,270
Total Minimum Turnover Volume (KGAL): 61,350

2.5.1.8. Flush Area F2
Area Pipe Volume (KGAL): 290
Total Minimum Turnover Volume (KGAL): 1,450

2.5.1.9. Total Phase 1 Min. Turnover Volume (KGAL): 76,400

2.5.2. PHASE 2: Mobile GAC units will be deployed to Flush Areas D1, D2, D4, and E1. For planning assumptions the US Navy intends to flush each area with three volumetric turnovers minimum. Water will be tested to confirm that the flushed zone is indistinguishable from the source.

2.5.2.1. Flush Area D1

Area Pipe Volume (KGAL): 260
Total Minimum Turnover Volume (KGAL): 780

2.5.2.2. Flush Area D2
Area Pipe Volume (KGAL): 890
Total Minimum Turnover Volume (KGAL): 2,670

2.5.2.3. Flush Area D4
Area Pipe Volume (KGAL): 290
Total Minimum Turnover Volume (KGAL): 870

2.5.2.4. Flush Area E1
Area Pipe Volume (KGAL): 80
Total Minimum Turnover Volume (KGAL): 240

2.5.2.5. Total Phase 2 Min. Turnover Volume (KGAL): 4,560

2.5.3. PHASE 3: Mobile GAC units will be deployed to Flush Areas B1, C1, C2, C3, and G1. For planning assumptions, the US Navy intends to flush each area with two volumetric turnovers minimum. Water will be tested to confirm that the flushed zone is indistinguishable from the source.

2.5.3.1. Flush Area C1
Area Pipe Volume (KGAL): 410
Total Minimum Turnover Volume (KGAL): 820

2.5.3.2. Flush Area C2
Area Pipe Volume (KGAL): 250
Total Minimum Turnover Volume (KGAL): 500

2.5.3.3. Flush Area C3
Area Pipe Volume (KGAL): 280
Total Minimum Turnover Volume (KGAL): 560

2.5.3.4. Flush Area G1 (includes Camp Smith tanks)
Area Pipe Volume (KGAL): 620
Total Minimum Turnover Volume (KGAL): 1,240

2.5.3.5. Flush Area B1
Area Pipe Volume (KGAL): 90
Total Minimum Turnover Volume (KGAL): 180

2.5.3.6. Total Phase 3 Min. Turnover Volume (KGAL): 3,300

2.5.4. PHASE 4: Mobile GAC units will be deployed to Flush Areas A2 and A3. For planning assumptions, the US Navy intends to flush each area with one volumetric turnover minimum. Water will be tested to confirm that the flushed zone is indistinguishable from the source.

2.5.4.1. Flush Area A2
Area Pipe Volume (KGAL): 580
Total Minimum Turnover Volume (KGAL): 580

2.5.4.2. Flush Area A3
Area Pipe Volume (KGAL): 190
Total Minimum Turnover Volume (KGAL): 190

2.5.4.3. Total Phase 4 Min. Turnover Volume (KCAL): 770

2.6. DISCHARGE WASTE SITE PRIORITIZATION: Flushing locations were strategically located to optimize flow through all main line pipes within the flushing zone. The feasible discharge methods at each flush site were located and evaluated with the following prioritization:

2.6.1. SANITARY SEWER (Where WWTP permits): Discharge to sanitary sewer at locations indicated in this plan. Discharges will comply with permits issued by the respective wastewater treatment authority (i.e. City and County of Honolulu, Department of Environmental Services) and not be initiated until express authorization by the applicable wastewater treatment system owner or operator. The US Navy shall coordinate flushing into the sanitary sewer system with system owners and operators to prevent sanitary sewer overflows due to the drinking water distribution system flushing activities.

2.6.1.1. The US Navy will utilize, where feasible, the option to discharge hydrant effluent to the wastewater system if authorized by permit. If used, the same notification procedures outlined below will be used.

2.6.1.2. The US Army will utilize, where authorized, the option to discharge hydrant effluent to the City and County of Honolulu's wastewater system in accordance with applicable Industrial Wastewater Discharge Permit. The permit includes constraints for discharge connections, flows, and effluent limitations, to ensure that wastewater spills will not occur. Daily notification to the DOH Clean Water Branch when flushing to sanitary sewer will be provided along with gate access for their staff should inspection be warranted.

2.6.2. DIRECT LAND APPLICATION AFTER GAC TREATMENT: Discharge to flat, pervious areas where laminar flow is achievable in areas identified in this plan.

2.6.3. STORM DRAIN UNDER NPDES PERMIT AUTHORIZATION: Discharge to storm drains as identified in this plan.

2.7. FLUSHING STANDARD OPERATING PROCEDURES:

2.7.1. DAILY DIRECTION

2.7.1.1. Flushing operations are expected to run 24 hours, weather-permitting. The operation will be split into three shifts.

2.7.1.2. Prior to the start of each shift, crews will be provided with any critical updates then directed to specific geographic locations where fire hydrants will be opened as part of the flushing activities. Each crew will have one person designated as the crew chief which is responsible for supervising the crew and completing the Flushing Reports required. The maps included in this plan shall direct which geographic location will be flushed on the given day and be included in respective Flushing Reports. Navy personnel responsible for recording Field Observations shall be appraised of scheduled discharge locations and timing.

2.7.1.3. Deployed in phases upon availability and in phase order, the Navy has confirmed flight information for three of the twenty-one mobile GAC units. The daily production plan may therefore advance or slow based on the arrival of mobile GAC units. All flushing operations will be presented to the DOH 24 hours prior.

2.7.2. HYDRANT FLUSHING

2.7.2.1. Upon arrival to the designated location, the crew chief will confirm site conditions allow for flushing in compliance with this plan.

2.7.2.2. The crew chief shall fill out all parameters on the Flushing Report, including recording the time the hydrants are opened. Crew chiefs and all crew are responsible to ensure all requirements of this plan and Reference (c) are met, incorporating the modifications requested within this plan.

2.7.2.3. The crew chief will complete all notifications per the notification section of this plan (below) and complete preliminary site preparations per the site preparation section of this plan (below) before directing crews to open the designated hydrants.

2.7.2.4. At the direction of the crew chief, crews will commence with opening the designated hydrants and crew chief shall initiate the Flushing Report.

2.7.2.5. In the event of an unforeseen condition such as hose break/leakage, crews will cease all operations by closing the designated hydrant. Onsite team will notify crew chief who will report findings to officer in charge. Existing protocols (SOPs) to be used to address issue. Details of incident to be included in Flushing report.

2.7.2.6. Upon completion of the flushing, the report will go to the crew chief. The crew chief shall review the Flushing reports for completeness and submit the reports to the officer in charge.

2.7.2.7. The officer in charge shall review the Flushing Reports and submit to the DOH, Interagency Drinking Water System Team via email at cleanwaterbranch@doh.hawaii.gov.

2.7.3. NOTIFICATIONS. Prior to initiating flushing, the following notifications will be made:

2.7.3.1. NLT 24 hours prior: US Navy communication team to notify our Public-Private Venture (PPV) housing partner. PPV notifies affected community that flushing operations are to begin the following day. US Navy to ensure multiple communication methods are used to notify residents.

2.7.3.2. NLT 24 hours prior: Notification to State of Hawaii, DOH, Interagency Drinking Water System Team, State of Hawaii, Department of Health, Clean Water Branch, and applicable wastewater treatment system owners and operators (i.e. City and County of Honolulu, Aqua Engineers).

2.7.3.3. NLT noon the following day: Navy's designated Officer in Charge of flushing operations provides a consolidated report of the previous day's flushing operations IAW enclosure (2).

2.7.4. SITE PREPARATION. Sites where flushing will occur must be able to accommodate the volume of the water flushed onto it. The area must be free of wildlife, and the excess water must be dispersed in a manner that does not cause flooding or damage. Warning signs to avoid contact with the water must be placed. Navy personnel will be present during the entire duration of the flushing to prevent unintended contact.

3. COMPLIANCE SAMPLING: Discharge samples will be conducted in compliance with applicable NPDES or WWTP discharge permits. Sampling conducted shall be consistent with the overall sampling and analysis plan set forth in Reference (b) and approved of by Interagency Drinking Water System Team. US Navy and its representatives shall cooperate and coordinate any desired quality assurance practices such as split or replicate sampling requested by the State of Hawaii, Department of Health, in good faith. Specifically, for compliance with this plan, sampling shall be conducted as follows:

3.1. Samples shall be taken post-GAC treatment with a periodicity of one sample per flush area for Tier I analytes as described in Reference (b).

3.2. Treated effluent from the mobile GACs will meet the following quality standards in addition to NPDES effluent limits. Values are in the tables below are taken from HIDOH standards and guidance and intended to address both impacts to aquatic habitats and potential odor and sheen issues. If there are any overlapping limits, the stricter of the limits shall apply.

CHEMICAL PARAMETER	Lowest Action Level (µg/L)
BENZENE	7.1E+01
ETHYLBENZENE	7.3E+00
METHYLNAPHTHALENE, 1-	2.1E+00
METHYLNAPHTHALENE, 2-	4.7E+00
NAPHTHALENE	1.2E+01
TOLUENE	9.8E+00
TPH (gasolines)	5.0E+02
TPH (middle distillates)	5.0E+02
TPH (residual fuels)	5.0E+02
Total TPH (sum of TPH values above)	5.0E+02
XYLENES	1.3E+01

Values in table from: HIDOH, 2017, *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater – Hawaii Edition* (Fall 2017): Hawai'i Department of Health, Office of Hazard Evaluation and Emergency Response. https://health.hawaii.gov/heer/guidance/ehe-and-eals/

FIELD SAMPLING	Discharge Limit
DISSOLVED OXYGEN (mg/l)	Report
TEMPERATURE (degrees C)	Report
CONDUCTIVITY (us/cm)	Report
TURBIDITY (ntu)	Report

3.3. FIELD OBSERVATIONS: US Navy shall provide personnel to conduct visual observations of receiving water discharge locations. Visual observations under this section shall be conducted to ensure the discharges do not have easily recognizable adverse impacts as prohibited by section 1.3.7 of this plan. Person(s) directed to meet this requirement shall use field datasheets provided by the State of Hawaii, Department of Health, to record field observations and shall include photographs of site conditions at discharge locations during flushing. Field observation data sheets shall be submitted daily with the daily flush report.

3.4. OVERSIGHT BY OUTSIDE AGENCIES: US Navy and the US Department of Defense shall provide escorted access for oversight by State of Hawaii agencies charged with the protection of human and environmental health, natural resources, or related purpose. This includes, but is not limited to, providing access to discharge locations, flushing activities, or areas potentially impacted by flushing activities.

4. STANDARD FOR COMPLETION: Flushing activities are to cease sixty (60) days from the date the US Navy is authorized to commence with this plan or at the written direction of the State of Hawaii, Department of Health unless written extension is provided by the State of Hawaii, Department of Health. At the time of plan development, the US Navy is directed to conduct

water quality monitoring for Total Petroleum Hydrocarbons (TPH) at both the drinking water source (Waiawa Well) and at flushing end points to determine when: 1) the composition of the source water and flushing water are indistinguishable; or 2) when flushing of the JBPHH water transmission system is no longer reducing the level of TPH within the system.

ENCLOSURE 1

UNIDIRECTIONAL FLUSHING (UDF) PLAN

ENCLOSURE 2

DAILY FLUSH REPORT

ENCLOSURE 3

National Pollutant Discharge Elimination System

Notice of General Permit Coverage

Discharges of Treated Effluent Associated with Drinking Water Distribution System Recovery

Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater

Volume 1: User's Guide

Hawai‘i Edition

Prepared by:
Hawai‘i Department of Health
Environmental Management Division
919 Ala Moana Blvd, Room 206
Honolulu, Hawai‘i 96814

Fall 2017

Contacts:
Roger Brewer
Hawai‘i Department of Health
Environmental Management Division
Hazard Evaluation and Emergency Response
Telephone: 1-808-586-4249
E-mail: roger.brewer@doh.hawaii.gov
http://hawaii.gov/health/environmental/hazard/index.html

OR
Roxanne Kwan
Hawai‘i Department of Health
Environmental Management Division
Solid and Hazard Waste Branch
Telephone: 1-808-586-4226
E-mail: roxanne.kwan@doh.hawaii.gov

DISCLAIMER

This document, *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater* (Fall 2017), is a technical report prepared by staff of the Hawai'i Department of Health (HDOH), Environmental Management Division. The document updates and replaces the Summer 2016 edition of the same document. A summary of 2017 updates is provided in Appendix 9.

The document provides guidance for identification and evaluation of environmental hazards associated with contaminated soil and groundwater. The Environmental Action Levels (EALs) presented in this document and the accompanying text are specifically *not* intended to serve as: 1) a stand-alone decision making tool, 2) guidance for the preparation of a baseline environmental risk assessment, 3) a rule to determine if a waste is hazardous under the state or federal regulations, or 4) a rule to determine when the release of hazardous substances must be reported to the HDOH.

The information presented in this document is not final action. HDOH reserves the right to change this information at any time without public notice. This document is not intended, nor can it be relied upon, to create any rights enforceable by any party in litigation in areas associated with HDOH. HDOH may elect to follow the information provided herein or act at a variance with the information, based on an analysis of site-specific circumstances.

This document will be periodically updated. Please send comments, edits, etc. in writing to the above contacts. This document is not copyrighted. Copies may be freely made and distributed. It is cautioned, however, that reference to the action levels presented in this document without adequate review of the accompanying narrative could result in misinterpretation and misuse of the information.

Executive Summary

This document presents guidance for the expedited identification of environmental hazards associated with contaminated soil and groundwater and the preparation of *Environmental Hazard Evaluation* (EHE) reports. This guidance should be used in conjunction with the Hawai‘i Department of Health (HDOH) HEER Office *Technical Guidance Manual* (HDOH 2016 and updates). The use of *Decision Unit* (DU) and *Multiple-Increment Sample* (MIS) investigation approaches is required for comparison of site data to *Environmental Action Levels* (EALs) and final decision making presented in this guidance. A companion,“Tropical Pacific” edition of this guidance has been prepared for use in the Commonwealth of the Northern Mariana Islands and Guam (TPEHE 2017 and updates; check with the local, overseeing regulatory agency for concurrence to use the guidance).

Refer to the HDOH *Technical Guidance Manual* (TGM) for guidance on the collection and analysis of samples for comparison to EALs (HDOH 2016). The EALs apply to the *mean* concentration of the contaminant for the targeted “Decision Unit (DU)” area and volume of media investigated, in the same manner as if the entire DU could be submitted to the laboratory and tested as a single sample. The EALs are not intended for direct comparison to individual, “discrete” sample data collected within a subarea or volume of a targeted DU beyond simple screening purposes. This is a fundamental principal of sampling theory. This approach is well developed for soil, as discussed in Sections 3, 4 and 5 of the TGM, with final decisions to be based on Multi Increment sample rather than discrete sample data. Development of methods to better apply the concept of DUs to soil vapor are currently underway. The concept is already well developed for testing of indoor air (refer to Section 7 of the HDOH TGM).

An EHE should be carried out at all sites where contaminated soil or groundwater is identified. A brief but properly prepared EHE will in most cases replace what is traditionally referred to as an environmental “risk assessment.” An important part of the EHE is the use of pre-approved EALs included in the lookup tables and *EAL Surfer* included with the EHE guidance (referred to as *Environmental Screening Levels* or *ESLs* in the Tropical Pacific edition of the guidance). The EALs are used to rapidly screen soil, soil vapor, and groundwater data collected for a site and identify potential environmental hazards. Under most circumstances, and within the limitations described, the presence of a chemical in soil, soil vapor, or groundwater at concentrations below the corresponding Tier 1 EAL can be assumed to not pose a significant threat to human health and the environment. This allows sites or portions of sites with minimal or no contamination to be quickly cleared for potential environmental concerns, a task which could easily take months or even years using a traditional, environmental risk assessment approach.

Site-specific risk assessments for contaminants in soil were reasonable in the 1980s when only a small number of cases were being investigated. The caseload exploded in the late 1980s and early 1990s, however, and agencies were overwhelmed with case work. This was highly detrimental to the regulated community from a legal and financial perspective, with the average time required to prepare, review and accept a risk assessment exceeding a year. This spurred the publication of conservative, but usually optional, soil action (screening) levels in the early 1990s by the U.S. Environmental Protection Agency (USEPA) and a progressively increasing number of states, with HDOH publishing the first edition of action levels in 1995.

The EALs incorporate an enormous amount of technical expertise across fields as diverse as toxicology, geology, chemistry, physics, ecology, engineering and even economics. Much like driving a car, however, it is not necessarily to understand the technical intricacies of the EALs in order to use them. As potential environmental hazards are identified, additional expertise can be brought in as deemed necessary and cost-beneficial for remediation of the contamination.

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. A detailed review of specific hazards and preparation of alternative action levels can be carried out at the discretion of the responsible party if time- and cost-beneficial (or as otherwise required by the HEER Office). This can include the preparation of a detailed, human health or ecological risk assessment, although this level of effort will rarely be required for typical sites.

An EHE serves as the link between site investigation activities and the selection of final response actions. The site investigation can be modified to ensure that adequate types and amounts of data are collected as potential environmental hazards are identified. For example, soil vapor should be collected if a comparison of initial soil or groundwater data to action levels indicates a potential vapor intrusion hazard. Once the site investigation and EHE are completed, *Environmental Hazard Maps* can be prepared to summarize the findings of the investigations and serve as a tool to help guide and design subsequent remedial efforts. The type of remedial actions required at the site will vary, depending on the nature of the environmental hazards identified (e.g., soil removal or capping to address direct exposure or leaching hazards versus soil vapor extraction to address vapor intrusion hazards).

The following information should be included in an EHE (or included in a report that contains the EHE):

1. **Site History:** Brief summary of the site history and operations that lead to the release of hazardous chemicals.
2. **Past Investigations and Remedial Actions:** Overview of past investigations and remedial actions.
3. **Extent and Magnitude of Contamination:** Summary of the extent and magnitude of contamination in soil, soil vapor and/or groundwater above Tier 1 EALs, clearly depicted on to-scale maps of the site.
4. **Identification of Potential Environmental Hazards:** Identification of potential environmental hazards by comparison of site soil, soil vapor and/or groundwater data to Tier 1 EALs as well as action levels for specific hazards (latter especially important at sites where full cleanup to the Tier 1 EALs will not take place or alternative action levels will be considered).
5. **Detailed Evaluation of Specific Environmental Hazards (optional):** Detailed evaluation of specific environmental hazards using approaches described in this document or alternative approaches approved by HDOH.
6. **Conclusions and Recommendations:** Provides a summary of EHE findings and recommendations for follow-up actions.

The level of detail needed in the EHE will vary depending on the nature of the contamination and anticipated cleanup actions. A basic EHE should be used to screen for potential environmental hazards, identify data gaps and complete the site investigation. The completed EHE should conclude with recommendations for follow-up actions, such as no further action, collection of additional data to better evaluate a specific environmental hazard, or evaluation of remedial alternatives. At sites where full cleanup is not possible, an “as-built” EHE should be used to document the extent and magnitude of remaining contamination as well as potential environmental hazards posed by the contamination in the absence of institutional or engineered controls. This “as built” EHE serves as the basis for an *Environmental Hazard Management Plan* (EHMP) that describes ongoing measures to be taken to ensure that the contamination is properly managed in the future.

The Tier 1 EALs presented in the lookup tables are NOT regulatory "cleanup standards". Site-specific action levels and cleanup levels are, however, subject to the approval of HDOH. EALs presented for chemicals that are known to be highly biodegradable in the environment may be excessively conservative

for use as final cleanup levels (e.g., many petroleum-related compounds). Stand-alone use of the Tier 1 EALs may be inadequate in some cases. Examples include sites with a high public profile that cannot be fully cleaned up and require a detailed discussion of potential risks to human health. Other examples include sites where physical conditions differ drastically from those assumed in development of the EALs (e.g., mine sites, landfills, etc., with excessively high or low pH) and sites where impacts pose heightened threats to sensitive ecological habitats. Use of the EALs as stand-alone screening criteria or final cleanup levels should be evaluated in terms of overall site conditions and potential environmental hazards, the cost/benefit of developing site-specific cleanup levels as well as the pros and cons of full site cleanup versus long-term management.

The EHE approach described in this guidance is applicable to any site where contaminated soil and groundwater are identified, including sites that fall under the purview of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The guidance will be of particular benefit to small-business owners and property owners with limited financial resources, for whom the preparation of traditional, Superfund-type risk assessments is generally not feasible or even necessary. The guidance is particularly useful as a rapid and cost-effective tool for the evaluation of brownfield or potential brownfield properties. This guidance will be updated as needed, in order to incorporate changes in the referenced sources as well as lessons gained from site investigation and response actions. Comments and suggestions are welcome at any time and should be submitted to the contacts noted at the beginning of this document.

1

Introduction

1.1 Environmental Hazard Evaluation

Environmental Hazard Evaluation (EHE) is the link between the discovery of contaminated soil or groundwater during the *site investigation* and *response actions* taken to address this contamination (Figure 1-1). During this step of the overall environmental response process, the significance of potential environmental hazards associated with the contamination is determined. This is carried out initially by comparison of soil, groundwater and/or soil vapor data to pre-approved, Environmental Action Levels (EALs) presented in Tables A through E at the end of this volume. If potential concerns are confirmed, then the specific hazards posed by the contamination are identified, the need for additional data to complete the site investigation is determined and the preparation of appropriate remedial actions is recommended.

Once the site has been adequately characterized, the most appropriate remedial action is determined. For sites where the extent of contamination is minimal or time is of the essence, the most cost-beneficial response may be the immediate removal of the contaminated media. In other cases, the potential cost of remediation or difficulty in accessing the contamination could preclude a complete cleanup. An advanced evaluation of specific environmental hazards is usually warranted at such sites. This may involve the development of site-specific cleanup levels and remedial actions to address the most pressing hazards (e.g., discharges of free product into storm sewers or vapor intrusion into overlying buildings). The extent and magnitude of the remaining contamination and the specific environmental hazards posed by the contamination is then documented in final site investigation and environmental hazard evaluation report. This is then used to prepare an *Environmental Hazard Management Plan* (EHMP) that presents guidelines for long-term management of the contamination and associated institutional and engineered controls.

Environmental Hazard Evaluations are therefore an integral part of site investigations and remedial actions. Site investigations and remedial actions

carried out in the absence of a basic understanding of the environmental hazards posed by contaminated soil or groundwater run the risk of being incomplete. This can result in later, unanticipated requirements for additional actions and unnecessary delays and costs needed to bring the property back into productive use. The guidance presented in this document is intended to help avoid such surprises and make the investigation, evaluation and remedial action process as effective and efficient as possible.

1.2 Targeted Environmental Hazards

A basic understanding of environmental hazards associated with contaminated soil and groundwater is critical in the overall environmental response process (see Figure 1-1). Common environmental hazards that should be initially screened for at all contaminated sites include:

Soil:
- Direct-exposure threats to human health
- Intrusion of subsurface vapors into buildings
- Leaching and subsequent threats to groundwater resources
- Threats to terrestrial habitats
- Gross contamination and general resource degradation concerns

Groundwater:
- Threats to drinking water resources
- Threats to aquatic habitats
- Intrusion of subsurface vapors into buildings
- Gross contamination and general resource degradation concerns

For use in this document, the term "soil" refers to any unconsolidated material found in the subsurface, including actual soil, saprolite, sediment, fill material, etc. Soil data should be reported on dry-weight basis (see Appendix 1, Section 7.3). Tier 1 Environmental Action Levels (EALs for soil presented in this guidance are *not* directly applicable to soil that is situated within the capillary fringe zone or below the water table. This is because the leaching models assume that the soil is not in direct contact with groundwater and the direct-exposure models assume the soils are or could be exposed at the ground surface and are relatively dry (latter increases assumed vapor emissions; refer to following section and Section 2.4).

The soil screening levels are also not applicable to samples of rock or other solid media. If little to no soil is present within a targeted area then no further action

with regards to soil contamination is required (e.g., contaminated soil removed down to bedrock to the extent practicable, with less than a few cubic yards/meters of soil left in place in isolated low areas or fractures).

For comparison, the minimum Decision Unit volume of soil recommended for characterization is 20 cubic yards (HDOH 2016). Although proper management might still be required, for example disposal of grossly contaminated soil disturbed during construction projects, smaller volumes of contaminated soil are not anticipated to pose a significant, long-term risk to human health and the environment under typical site scenarios and no further action under direct, HDOH oversight is warranted. Potential exceptions include the use of contaminated soil in small play areas used by young children. This does not necessarily imply that small volumes of heavily impacted soil do not pose a potential environmental concern, since the presence of isolated "hot areas" within a larger DU can cause the DU as a whole to fail EALs.

A brief description of each hazard is provided in Figure 1-2a. A schematic of common, potential environmental hazards associated with contaminated soil and groundwater is depicted in Figure 1-2b. Detailed discussions of each hazard are provided in Chapters 4 and 5 and in Appendix 1. Additional site-specific environmental hazards that may need to be reviewed on a site-specific basis include the uptake of contaminants in garden produce and the erosion and runoff of contaminated soil into nearby surface water bodies.

Note that several of the environmental hazards listed above are not necessarily "risk-based," at least in the traditional regulatory use of this term. For example, soil that is grossly contaminated with petroleum may not pose a toxicological risk to future residents, but it could pose significant odor and nuisance concerns and in some cases even result in explosive levels of vapors in soil vapor. Although it may seem counterintuitive, it is quite possible (and unfortunately common) for traditional, human health risk assessments to conclude that soil is "nontoxic," even though the soil would ignite if a match was dropped on it. Nevertheless, the fact that the soil is flammable is clearly important to identify and discuss in the Environmental Hazard Evaluation. Gross contamination can also complicate future construction or subsurface utility activities that require disturbance of heavily contaminated soil or groundwater. Leaching of contaminants from soil into groundwater is also important to consider, even though this is often neglected in traditional risk assessments. Discharges of contaminated groundwater or free product into surface water bodies, either naturally or via seepage into storm

sewers or via discharge during construction-related dewatering activities, can likewise pose significant environmental hazards to aquatic habitats.

The environmental hazard that drives the potential need for remedial action at a contaminated site depends on the toxicity and mobility of the targeted contaminants (refer to Appendix 1). Soil contaminated with chemicals that are that are highly toxic to humans and relatively immobile (e.g., arsenic, lead, polychlorinated biphenyls [PCBs], etc.) will usually be flagged for potential direct exposure hazards. Soil contaminated with chlorinated, volatile chemicals that are potential carcinogens (e.g., tetrachloroethylene [PCE] or TCE) or soil contaminated with gasoline or diesel fuel is typically flagged for potential vapor intrusion hazards. Soil contaminated with petroleum, solvents or highly mobile pesticides (e.g., total petroleum hydrocarbon [TPH] gasoline or diesel, benzene, toluene, ethylbenzene and xylenes [BTEX], PCE, atrazine, etc.) will often be flagged for potential leaching hazards. Soil contaminated with pesticides or metals that are relatively non-toxic to humans (e.g., barium, copper, nickel, etc.) can pose significant toxicity hazards to terrestrial flora and fauna and an ecological risk assessment might be require is sensitive habitat have been impacted.

Drinking water toxicity hazards are almost always identified for aquifers contaminated with hazardous chemicals. As is the case for soil, vapor intrusion hazards will often be identified for groundwater contaminated with carcinogenic, volatile chemicals. A number of chemicals pose potential aquatic toxicity hazards at relatively low concentrations, if the groundwater were to discharge into a sensitive aquatic habitat. Free product on groundwater poses gross contamination hazards that could lead to sheens or odor in surface water if allowed to migrate offsite (as well as vapor hazards). Gross contamination hazards could also be identified for drinking water contaminated with chemicals that have a low taste and odor threshold (e.g., TPH, ethylbenzene, toluene, xylenes, methyl tertiary butyl ether [MTBE]).

1.3 Tier 1 Environmental Action levels

Tier 1 *Environmental Action levels* (Tier 1 EALs are concentrations of contaminants in soil, soil vapor and groundwater above which the contaminants could pose a potential adverse threat to human health and the environmental. Figure 1-3 summarizes the use of the Tier 1 EALs. Exceeding the Tier 1 EAL does not necessarily indicate that contamination at the site poses environmental hazards. It does, however, indicate that additional evaluation is warranted. This can include additional site investigation and a more detailed evaluation of the

specific, tentatively identified hazards. The action levels, or approved alternatives, can be used to delineate specific areas of the site that require remedial actions. These actions can vary, depending on the hazard present and site conditions. An overview of the development of the Tier 1 EALs is provided in Chapter 2. A detailed discussion of the compilation and development of the EALs is provided in Appendix 1.

1.3.1 EAL Surfer

The EAL Surfer, an Excel-based version of the lookup up tables, makes use of the EALs and the identification of potential environmental hazards at contaminated sites especially easy. The EALs should be rounded to two significant digits for comparison to site data. The EAL Surfer is available for download from the HDOH web page (refer to contact information at beginning of guidance). Use of the EAL Surfer in EHE reports is recommended. Guidance on use of the Surfer and example printouts are provided in Chapter 3.

1.3.2 Use of EALs in Site Investigations

One of the most basic uses of the EALs is to identify potential contaminant of concern (COPCs) and guide completion of the site investigation. The initial list of COPCs established during a review of past site operations can be quickly narrowed down by direct comparison of soil and groundwater data to the Tier 1 EALs. Further consideration of contaminants that do not exceed Tier 1 EALs is not necessary. This assumes of course that existing data are representative of overall site conditions.

The EALs presented in Tables A and B reflect unrestricted land use (e.g., residential allowed) under four scenario where underlying groundwater is or is not a potential source of drinking water and the site is situated >150m or <150m from a surface water body (originally developed for petroleum plumes; Shih et al. 2004). These scenarios are discussed in Section 2.4. The EAL Surfer allows for modification of land use from unrestricted to commercial/industrial only. The resulting EALs are no longer considered Tier 1, however, since a restriction on use of the property might then be required. This can include a restriction on the excavation and offsite reuse of soil impacted the most stringent, Tier 1 EALs (i.e., unrestricted landuse, situated over groundwater that is a source of drinking water and <150 meter from surface water). Refer to the HDOH document *Guidance for Soil Stockpile Characterization and Evaluation of Imported and Exported Fill Materia*l (HDOH 2017) for additional information.

The lateral and vertical extent of contamination should be determined for COPCs that exceed the Tier 1 EALs (or approved, alternative action levels). Delineation of the extent of contamination to laboratory reporting or detection limits is often impracticable and, from a hazard evaluation standpoint, unnecessary. The investigation can be considered complete once the extent of contamination in excess of Tier 1 EALs (or approved alternatives) is accomplished. The use of field screening methods, mobile labs and quick turnarounds in laboratory analyses will help expedite the completion of site investigation activities.

The identification of potential environmental hazards should begin as soon as the first data are received. This will help identify the need for alternative types of data that will be required for more detailed evaluations of specific hazards and completion of the site investigation. For example, if arsenic is reported in soil at concentrations above 24 mg/kg then laboratory bioaccessibility tests should be run on the same sample (refer to Chapter 4). If the reported concentrations of volatile contaminants exceed action levels for vapor intrusion concerns then soil vapor data should be collected. Incorporating these decision rules in the sampling and analysis plan will help expedite completion of the site investigation as well identify potentially significant environmental hazards at the site that could require immediate action.

1.3.3 Use of EALs in Environmental Hazard Evaluations

The most important use of the Tier 1 EALs is the rapid identification of potential environmental hazards associated with contaminated soil and groundwater (refer to Section 2.1). With the exception of gross contamination, most of the environmental hazards noted earlier are not obvious in the field. An initial comparison of site data to the Tier 1 EALs provided in Tables A through E will only indicate if a potential hazard is present (i.e., “yes” or “no”). If the Tier 1 EAL is exceeded, site data should be compared to the detailed action levels used to develop the Tier 1 EAL. The specific, potential environmental hazard(s) associated with the contaminant can then be identified. This process is described in more detail in Chapter 3. As discussed above, use of the EAL Surfer will significantly expedite this process.

Potential environmental hazards identified in a Tier 1, action level EHE can be evaluated on a more site-specific basis as needed (refer to Chapters 3 and 4). The information gained can be used to better define the need for additional site investigation as well as to help develop appropriate remedial options. The level of effort required for advanced evaluations can vary greatly. For example, only a minimal level of effort may be needed to rule out potential hazards to terrestrial

ecological habitats at a highly developed commercial or industrial site that does not contain significant natural habitat. Vapor intrusion is typically a potential hazard at volatile organic chemicals (VOCs) contaminated sites where occupied structures are present (or proposed). The collection of soil vapor data at these sites can be highly useful and in some cases required. A detailed review of groundwater data can replace soil action levels for leaching hazards at sites that have remained uncapped for a sufficiently long period of time for worst-case groundwater impacts to take place.

1.3.4 Use of EALs in Remedial Actions

In cases where contamination is limited, easily accessible and time is of the essence, it can be more cost-effective to aggressively remediate the impacted soil or groundwater to the Tier 1 EALs. The Tier 1 EALs are not strict cleanup standards, however, and should not be used as such. In cases where cleanup costs could be significant or complete cleanup is not practicable, the choice is not so clear and a more advanced evaluation of specific environmental hazards is usually warranted (refer to Chapters 3 and 4). Use of the detailed EALs presented in Appendix 1 of this guidance and, in particular, use of the accompanying *EAL Surfer*, makes the identification of specific, potential environmental hazards relatively quick and easy. The information gained can then be used to evaluate specific environmental hazards in more detail and develop more efficient remedial actions.

Long-term management will be required for sites where contaminated soil and groundwater cannot be remediated in a relatively short time frame. In such cases, the detailed action levels presented in this guidance (or acceptable alternatives) should be used to delineate areas of contaminated soil and groundwater that will require long-term management as well as identify the specific environmental hazards posed by the contamination under uncontrolled site conditions. Specific actions required to address these hazards should then be described in an *Environmental Hazard Management Plan* (EHMP). An overview of EHMPs is presented in Chapter 5 and in the HEER office *Technical Guidance Manual* (HDOH 2016).

1.4 Decision Unit and Multi Increment Investigation Strategies

The use of *Decision Unit (DU)* and *Multi Increment (MI) sampling* methods is strongly recommended for the investigation of contaminated sites. Refer to the Sections 3-5 of the HEER Office *Technical Guidance Manual* for a detailed