DRAFT
ENVIRONMENTAL ASSESSMENT/
OVERSEAS ENVIRONMENTAL ASSESSMENT
FOR
RED HILL DEFUELING AND FUEL RELOCATION

JOINT BASE PEARL HARBOR-HICKAM,

OAHU, HAWAII

JUNE 2023

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ABSTRACT

Designation:	Environmental Assessment/Overseas Environmental Assessment
Title of Proposed Action:	Red Hill Defueling and Fuel Relocation
Location:	Joint Base Pearl Harbor-Hickam (JBPHH), Oahu, Hawaii
Affected Region:	City and County of Honolulu, Oahu, Hawaii
Lead Action Proponent:	Commander, Joint Task Force-Red Hill
Co-Action Proponent:	Defense Logistics Agency
Point of Contact:	Naval Facilities Engineering Systems Command (NAVFAC) Pacific Environmental Planning Division (EV2) Attn: Jill Sears 258 Makalapa Drive, Suite 100 Pearl Harbor, Hawaii 96860-3134
Date:	June 2023

The Joint Task Force Red Hill (JTF-RH) and Defense Logistics Agency (DLA) have prepared this Environmental Assessment/Overseas Environmental Assessment (EA/OEA) in accordance with the National Environmental Policy Act (NEPA), Executive Order (EO) 12114, and Council on Environmental Quality (CEQ) and Department of Navy regulations. The Proposed Action is the gravity-based defueling of the Red Hill Bulk Fuel Storage Facility (RHBFSF) and relocation of flowable fuel by tanker ship.

This EA/OEA evaluates the potential direct, indirect, and cumulative environmental impacts of the Proposed Action on the human environment, including to: public health and safety, water resources, marine biological resources, hazardous materials and waste, air quality and greenhouse gases. In accordance with EO 12114 and the Department of Defense's implementing regulations in 32 Code of Federal Regulations (CFR) Part 187, this EA/OEA evaluates the potential for significant environmental harm from the Proposed Action alternatives in ocean waters beyond the territorial limits of the United States (U.S.).

Reader's Note:

JTF-RH and DLA honor native Hawaiian culture and respect the importance of diacritical marks in clarifying pronunciation and meaning in the Hawaiian language. However, to ensure functionality of reading assistance technology, this document does not apply diacritical marks to text.

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EXECUTIVE SUMMARY

ES.1 Proposed Action

The Proposed Action is the gravity-based defueling of Red Hill Bulk Fuel Storage Facility (RHBFSF) underground storage tanks and associated pipelines, and relocation of the flowable fuel by tanker ship.

This Environmental Assessment/Overseas Environmental Assessment (EA/OEA) addresses gravity-based defueling of the RHBFSF at Joint Base Pearl Harbor-Hickam (JBPHH) and relocation of the flowable fuel to other United States Department of Defense (DoD) fuel supply locations in the Pacific region or sale of the fuel to commercial entities utilizing DoD contracting authorities. The Joint Task Force Red Hill (JTF-RH) and Defense Logistics Agency (DLA) prepared this EA/OEA pursuant to the National Environmental Policy Act (NEPA), as amended (42 United States Code [USC] section 4321 et seq.) and its implementing regulations issued by the Council on Environmental Quality (40 Code of Federal Regulations [CFR] Part 1500 - 1508) and Executive Order (EO) 12114.

ES.2 Purpose and Need for the Proposed Action

The purpose of the proposed gravity-based defueling action is to comply with State of Hawaii Department of Health (DOH) Emergency Orders (DOH, 2021a; DOH 2022a), the Environmental Protection Agency (EPA) 2023 Consent Order (EPA, 2023f), and U.S. Secretary of Defense (SECDEF) Lloyd J. Austin III's order on March 7, 2022 to defuel and permanently close the RHBFSF (DoD, 2022A).

Defueling RHBFSF is needed to protect local water supplies from further contamination. Additionally, the DoD needs to defuel the facility as a first step in the process of full closure and remediation of RHBFSF.

ES.3 Alternatives Considered

The JTF-RH and DLA developed alternatives for safe defueling and relocating the fuel for analysis based upon the following reasonable alternative screening factors:

1. Defueling must occur in a safe and expeditious manner in accordance with: DOH Emergency Order of 6 December 2021; SECDEF Memo of 7 March 2022, DOH Superseding Emergency Order of 6 May 2022; DoD Defueling Plan of 1 June 2022; DoD Defueling Plan Supplements 1A and 1B of 7 and 28 September 2022; DoD Defueling Plan Supplement 2 of 16 May 2023; and U.S. Indo-Pacific Command fragmentary order 05 of 23 January 2023.

2. Defueling operation must not unduly burden the Oahu commercial fuel supply chain.

3. Transfer of fuel from RHBFSF to the fuel loading pier must occur through DoD-owned, existing infrastructure.

4. Fueling transfer from RHBFSF must not utilize public roadways to minimize traffic impacts and reduce risk of accidents and spills.

5. Fuel tanker loading must occur at an operational pier that can accommodate a tanker ship, and has existing infrastructure to accommodate F-76, JP-5, or F-24 fuel types.

6. If fuel is relocated for DoD use, it must be directed to locations within the DoD fuel supply chain with infrastructure to safely offload and store fuel in the type and quantity needed by the DoD at the time of defueling.

7. Relocation and/or commercial sale of fuel must be both economical and a responsible use of the taxpayer's resources.

JTF-RH and DLA are considering two action alternatives that meet the purpose and need of the Proposed Action and a No Action Alternative. Both the No Action Alternative and the two action alternatives utilize existing infrastructure at RHBFSF and JBPHH to remove the fuel from RHBFSF and load it onto tanker ships. The No Action Alternative and the two action alternatives would include removal of flowable fuel from the associated pipelines (i.e., unpacking). Removal of residual amounts of fuel products that do not flow under the force of gravity, such as sludge (unrecoverable tank bottoms) and any fuel within low points of the facility and pipelines, would occur after the gravity-based defueling stage, and is not included in the scope of environmental analysis of this EA/OEA. RHBFSF will transition to DoD's closure phase after the gravity-based defueling stage.

Alternative 1, the No Action Alternative, is the distribution of flowable fuel from RHBFSF to JBPHH customers at regular demand rates for routine use. This alternative would ultimately remove all flowable fuel from RHBFSF because it would not receive any re-supply of fuel. Under the No Action Alternative, flowable fuel would remain in the tanks at RHBFSF for approximately ten to fourteen months after DOH approval of the gravity-based defueling operation.

Alternative 2 is the relocation of the approximately 106 million gallons of flowable fuel from RHBFSF to existing locations within the DoD fuel supply chain by ocean transit. The fuel removal operation involves gravity flow of the fuel from RHBFSF through existing DoD piping and associated infrastructure to a fuel loading pier at JBPHH. A maximum of eleven refined product tanker ship transits are required to receive and transport the flowable fuel from RHBFSF. After exiting Pearl Harbor, tanker ship transits one through ten would transit within existing commercial shipping lanes to one or more (up to nine) existing DoD fuel support points throughout the Pacific. The fuel deliveries to these locations would occur in lieu of routine or planned fuel supply deliveries.

Potential receiving locations (Figure ES-1) for the ten fuel deliveries include:

- West Oahu, Hawaii (Campbell Industrial Park)
- Point Loma, California
- Selby, California
- Vancouver, Washington
- Manchester, Washington
- Sasebo, Japan
- Subic Bay, Philippines
- Port of Singapore
- Darwin, Australia

The quantity of fuel and number of deliveries to each location depends on DoD fuel inventory needs at the time of defueling. For planning and analysis purposes, the EA/OEA evaluates an upper bound, or maximum number, of transits for each receiving location (see Section 2.3.2 in the EA/OEA).

Alternative 3 is the commercial sale of a portion of the approximately 106 million gallons of flowable fuel from RHBFSF combined with the relocation of the remaining portion of the fuel to existing locations within the DoD fuel supply chain by ocean transit. A maximum of eleven tanker ships would be required to receive and relocate the flowable fuel from RHBFSF.

With Alternative 3, up to ten tanker loads of fuel from RHBFSF may be commercially sold in accordance with Section 2922e of Title 10, United States Code, which authorizes the sale of certain fuel sources. Sale of fuel would need to coincide with defueling schedule. Therefore, the amount of fuel sold would be determined by commercial interest and purchasers' ability to receive the fuel at the time of gravity-based defueling. The portion of fuel that is not sold would be relocated from RHBFSF to existing locations within the DoD fuel supply chain by ocean transit. Relocation of fuel would be accomplished using the same process as Alternative 2. Potential DoD fuel supply chain receiving locations and maximum number of tanker transits to each location are the same as Alternative 2.

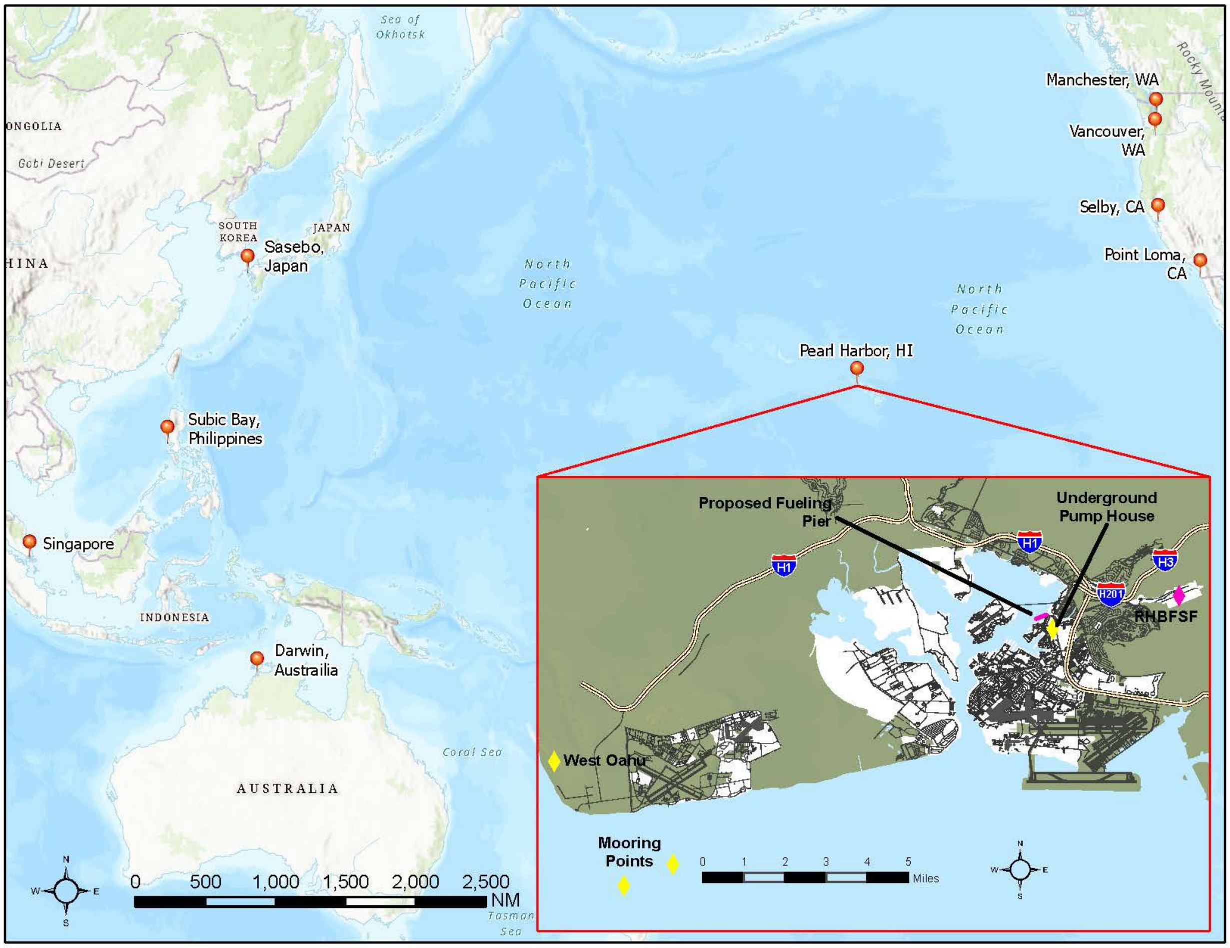

Figure ES-1. Location of Potential Fuel Receiving Sites

Under both Alternatives 2 and 3, an eleventh tanker or barge would be staged at the JBPHH fueling pier for approximately two to five weeks to receive flowable tank bottoms and fuel from the underground surge tanks and pipeline unpacking process (estimated to be 2 million gallons of fuel or a portion thereof). Fleet Logistic Center, Pearl Harbor (FLC) would sample and test this fuel to determine whether it meets specifications for DoD requirements and it would then be sold or relocated.

All three alternatives incorporate Best Management Practices (BMPs) for the safe transfer and relocation of fuel from RHBFSF that reduce potential environmental impacts by avoiding, minimizing or eliminating impacts. These BMPs are described in Section 2.5 of the EA/OEA.

ES.4 Summary of Environmental Resources Evaluated in the EA/OEA

The process for identifying resources analyzed in this EA/OEA is summarized in Section 3, Introduction, of the EA/OEA. Resources relevant to the Proposed Action and analyzed in detail include:

- Public Health and Safety
- Water Resources
- Marine Biological Resources
- Hazardous Materials and Waste
- Air Quality and Greenhouse Gases

Resources that were not analyzed in detail are also described and explained in the introduction to Section 3 of the EA/OEA.

ES.5 Summary of Potential Environmental Impacts of the Action Alternatives and Major Mitigating Actions

Public Health and Safety. A minimal increase of demand for emergency services may result from the addition of approximately ten workers per shift during the defueling and tanker ship loading operations with Alternatives 2 and 3. Demand would be extremely small and not likely to have measurable impacts to existing service capacity. Tanker loading would be accomplished by a team of trained military and civilian workers from FLC and Port Operations. Common workplace hazards associated with this type of maritime work include slips, trips, and falls, machinery and equipment hazards (e.g., hoist), exposure to hazardous chemicals, and fire hazards (OSHA, 2023). The use of BMPs, training, and adherence to occupational safety and health regulations, standards, and instructions would reduce the likelihood and severity of a potential workplace accident.

Alternatives 2 and 3 would add up to four vessel movements per week (i.e., two round-trip transits) in Pearl Harbor. The additional vessels would account for an approximate ten percent increase in vessel traffic during the defueling operation. BMPs (including notifying the Harbormaster in advance of tanker arrival/departure, maintaining communications with the Harbormaster, and use of tugboats to assist tankers) would reduce the risk of vessel accidents. Overall, with the use of BMPs and adherence to procedures, Alternatives 2 and 3 would have less than significant effects to public health and safety.

Water Resources. The potential for spills within the RHBFSF, pipelines, and Underground Pump House (UGPH) would be reduced through the repairs and training described in Section 3.2.1.3 of the EA/OEA. While there is no evidence of ongoing releases of fuel from the RHBFSF to the environment, the potential exists for possible releases to occur for a longer period of time (ten to fourteen months) with the No Action Alternative than with Alternatives 2 or 3, which would defuel the tanks in approximately three to four months from the time DOH authorizes defueling. Essentially, the No Action Alternative would extend the period of time where fuel resides in the tanks, where it could pose additional threat to the groundwater and drinking water quality. Under Alternatives 2 and 3, use of tanker ships may marginally increase potential for spills to affect marine waters around Oahu, in international waters, and at receiving locations. Vessel fueling at the JBPHH pier would follow standard operating procedures and BMPs (including spill response procedures and training) to reduce the risk of spills. Statistically, the historic spill rate worldwide for tanker ship spills is 0.0005 percent. Although rare, a tanker ship spill has the potential to be a high-volume, extended duration (i.e., catastrophic) release into to the marine environment. Tanker ships would be double-hulled in accordance with the International Convention for the Prevention of Pollution from Ships (MARPOL) which reduces the potential for spills from accidental grounding and allision/collision. Tanker operators are required to follow applicable environmental and safety regulations which further reduces the likelihood of catastrophic spills. Fuel deliveries to receiving locations would be in lieu of regular deliveries, resulting in no overall risk increase from fuel unloading. Overall, with the use of BMPs for tanker fuel transfer/loading and adherence to provisions of the DOH order, Alternatives 2 and 3 would have less than significant effects to water resources.

Marine Biological Resources. Potential stressors to marine biological resources from the Proposed Action include elevated underwater noise from vessels and vessel collisions with marine species. Although not considered reasonably likely to occur, the risk of an oil spill was also considered. The temporary, low-frequency and lower intensity sound levels of the tanker ships that would be used for Alternatives 2 and 3 would not result in an increased likelihood of acoustic injury to marine mammals, sea turtles, or fishes. Sound levels would not significantly disrupt breeding, feeding, or sheltering for any Endangered Species Act (ESA) listed species encountered. The likelihood of a vessel collision with a protected marine species is extremely remote because of the low probability that individual animals would overlap in space and time with the eleven one-way tanker transits. Additionally, the relatively slow speed of the vessels further reduces the chance of ship strike with marine mammals, sea turtles, and fishes. Vessels would employ measures to avoid and reduce the potential for vessel collisions and interactions with protected species (Table 2.5-1, BMP-11). A tanker spill during transit has a low probability of occurrence, and the response teams and

BMPs available at all ports (e.g., equipment maintenance protocols, contingency plans, fueling restrictions) further reduce the potential for a spill during fuel loading and unloading. Overall, with the use of BMPs, Alternatives 2 and 3 would have less than significant effects to marine biological resources.

Hazardous Materials and Waste. In the event of a fuel release, workers could be exposed to the fuel during incident response and spill cleanup activities. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan. Propeller wash from tanker ships and tugboats could temporarily resuspend contaminated sediments in Pearl Harbor. BMPs limiting the disturbance of sediments, including low ship speed and use of tugboats to assist tanker ships through Pearl Harbor, would minimize environmental exposure to the extent that no significant adverse effects related to contaminated sediments are expected to occur. With the use of BMPs, Alternatives 2 and 3 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.

Air Quality and Greenhouse Gases. Emissions from tanker ship transits would be temporary and would not significantly affect air quality at JBPHH or any of the receiving locations. Ports in California (Point Loma and Selby) are non-attainment for some air pollutants. However, emissions at those sites would fall below de minimis levels and Records of Non-Applicability for Clean Air Act General Conformity are provided in Appendix E of the EA/OEA. Tanker ship operators would follow the MARPOL regulations for low sulfur fuels and the lower sulfur content fuels required within 200 nautical miles of the U.S. pursuant to the North American Environmental Control Area. Under the minimum transit case, the action would emit 13,994 tons of greenhouse gases (GHGs). Under the maximum case, the action would emit 55,633 tons, equivalent to the annual operation of 6,365 U.S. homes.

Table ES-1 provides a tabular summary of the potential impacts to resources associated with each of the alternative actions analyzed.

Table ES-1. Summary of Impacts

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
Public Health and Safety	There may be a small increase in vessel traffic in Pearl Harbor if JP-5 stock rotation was required due to low demand for JP-5 fuel at JBPHH. This would result in a negligible increase in vessel traffic. The No Action Alternative would have no significant adverse effects on public health and safety.	A minimal increase of demand for emergency services may result from the addition of approximately ten workers per shift during the defueling and tanker ship loading operations. The additional tanker ships entering Pearl Harbor would account for an approximate ten percent increase in vessel traffic during the defueling operation. Overall, with the use of BMPs and adherence to procedures, Alternative 2 would have less than significant adverse effects to public health and safety.	Effects would be the same as Alternative 2.

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
Water Resources	Defueling would occur over a longer period of time than Alternative 2, which could pose additional threat to groundwater and drinking water sources should releases from RHBFSF occur. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 1 would have less than significant effects to water resources.	Defueling RHBFSF expeditiously would reduce potential for system releases that could further adversely affect local groundwater and drinking water supplies. Relocation of fuel via tanker may marginally increase potential for spills affecting marine waters on Oahu, international waters, and receiving location water bodies. Statistically, occurrences of catastrophic spills from oil tankers are low (0.0005 percent spill rate). Propeller wash from vessels at ports could cause short-term suspension of sediments, causing localized turbidity that would settle within days. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 3 would have less than significant effects to water resources.	Effects would be similar to those under Alternative 2. Defueling RHBFSF via commercial sale would occur over a similar expeditious timeframe as Alternative 2, reducing potential for releases that could adversely affect local groundwater and drinking water supplies. Commercially-operated tanker ships would adhere to international maritime safety and environmental regulations that reduce potential for catastrophic spills at ports and at sea. Propeller wash from vessels at ports could cause short-term suspension of sediments, causing localized turbidity that would settle within days. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 3 would have less than significant effects to water resources.
Marine Biological Resources	The amount of fuel transferred to tanker ships for overseas deliveries would likely be substantially less than under Alternatives 2 and 3. Tanker ships would use low speeds and BMPs to reduce the potential for vessel collisions with marine species and oil spills. Alternative 1 would have less than significant effects to marine biological resources.	The likelihood of a vessel collision with a protected marine species is extremely remote because of the low probability that individual animals of an ESA-listed species would overlap in space and time with the eleven one-way tanker transits. Additionally, the relatively slow speed of the vessels further reduces the chance of ship strike with marine mammals, sea turtles, and fishes. A tanker spill during transit has a low probability of occurrence, and the response teams and BMPs available at all ports. Overall, with the use of BMPs, Alternative 2 would have less than significant effects to marine biological resources.	Under Alternative 3, impacts to marine biological resources would be similar to those described for Alternative 2. The transit route and destination of sold fuel is at the discretion of the non-federal entity purchaser and not a federal action. Similar to Alternative 2, the temporary and slow-moving presence of the maximum of eleven tanker ships would reduce the risk of impacts to marine biological species from vessel noise or collision. With the use of BMPs, Alternative 3 would result in a less than significant effects to marine biological resources.

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
Hazardous Materials and Waste	Inadvertent fuel releases that could be associated with Alternative 1 would mostly consist of small spills at points of consumption where fuel is transferred or dispensed. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan. With the use of BMPs, Alternative 1 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.	Inadvertent fuel releases during fuel loading and unloading processes would mostly consist of small amounts of fuel escaping from the flexible hose and flexible hose connection points on the fueling pier and tanker ship. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan. With the use of BMPs, Alternative 2 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.	Effects would be the same as Alternative 2.
Air Quality and Greenhouse Gases	Emissions from fuel storage and transfers would reflect the status quo and baseline levels, as deliveries would occur through existing processes on JBPHH. Effects on air quality would be less than significant.	Relocation of fuel via tanker ships would emit criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases from the combustion of fuel by tanker ships and tugboats. Anticipated air quality impacts from Alternative 2 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area's progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected. Records of Non-Applicability for the General Conformity Rule for nonattainment areas in California (Point Loma and Selby) found pollutants would be well below de minimis levels. Emission of greenhouse gases would be short-term and a small fraction of those generated by international shipping activities.	While the ultimate destinations under commercial sales is not known, from an economic standpoint, the purchaser would likely transport fuel the shortest distance practicable. Under this assumption, the transport emissions would likely be less than the maximum case under Alternative 2. Anticipated air quality impacts from Alternative 3 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area's progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected.

The analysis provided in Section 3 of the EA/OEA describes how, in accordance with NEPA, the Proposed Action would not result in significant impacts to the human environment. In accordance with E.O. 12114, the Proposed Action would not cause significant harm to the human or biological environment in ocean waters beyond the territorial limits of the U.S.

ES.6 Public and Agency Participation and Intergovernmental Coordination

JTF-RH and DLA are soliciting public and agency input regarding the Proposed Action through publication of the Draft EA/OEA (DEA/DOEA). The DEA/DOEA is available on the JTF-RH website: https://www.pacom.mil/JTF-Red-Hill/NEPA-Comment/.

The public comment period will begin June 9, 2023 and end June 30, 2023. A public meeting will be held on June 15, 2023 between 4 p.m. and 8 p.m. at the Keehi Lagoon Memorial, Harry and Jeannette Weinberg Memorial Hall, 2685 N. Nimitz Hwy, Honolulu, HI 96819. The public meeting will provide an opportunity for attendees to record verbal comments, otherwise all comments must be in writing and postmarked or submitted online on or before June 30, 2023.

Please address written comments to Joint Task Force Red Hill; 1025 Quincy Avenue, Suite 900; Joint Base Pearl Harbor-Hickam, HI 96860. Comments can also be submitted online at https://www.pacom.mil/JTF-Red-Hill/NEPA-Comment/. All official comments received during the public comment period will be fully considered by JTF-RH and DLA prior to rendering a decision on the Proposed Action.

JTF-RH and DLA are consulting with the National Marine Fisheries Service (NMFS) for Endangered Species Act under Section 7.

JTF-RH and DLA will notify the State of Hawaii Office of Planning and Sustainable Development that the Proposed Action would be consistent with the de minimis Activities List under the Coastal Zone Management Program, and therefore not subject to further review by the Hawaii Coastal Zone Management Program.

ENVIRONMENTAL ASSESSMENT/OVERSEAS ENVIRONMENTAL ASSESSMENT

RED HILL DEFUELING AND FUEL RELOCATION,

JOINT BASE PEARL HARBOR-HICKAM,

OAHU, HAWAII

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
ABS	American Bureau of Shipping
ACM	Asbestos-containing material
AFFF	Aqueous film-forming foam
AIS	Automatic Identification System
AOC	Administrative Order on Consent
BMP	Best Management Practices
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CO	Carbon monoxide
CO_2	Carbon dioxide
COC	Contaminants of Concern
CWA	Clean Water Act
CWB	Hawaii Department of Health Clean Water Branch
CZMA	Coastal Zone Management Act
dB	Decibels
dB re 1µPa-m	Decibels referenced to a pressure of one micro Pascal at one meter
DEA/DOEA	Draft Environmental Assessment/Draft Overseas Environmental Assessment
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
DoD	United States Department of Defense
DOH	State of Hawaii Department of Health
DOT	United States Department of Transportation
EA	Environmental Assessment
ECA	Environmental Control Area
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FLC	Fleet Logistics Center, Pearl Harbor
FORFAC	Fuel Oil Reclamation Facility
ft.	Foot/feet
GHG	Greenhouse Gas
HAP	Hazardous Air Pollutant
HAR	Hawaii Administrative Rules
HNL	Daniel K. Inouye International Airport
HNS	Hazardous and Noxious Substances
HRS	Hawaii Revised Statutes
Hz	Hertz
IMO	International Maritime Organization

Acronym or Abbreviation	Definition
in	Inch(es)
INRMP	Integrated Natural Resources Management Plan
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ITOPF	International Tanker Owners Pollution Federation
JBPHH	Joint Base Pearl Harbor-Hickam
JTF-RH	Joint Task Force Red Hill
LBP	Lead-based Paint
LNAPL	Light Non-aqueous Phase Liquids
M	Million
MARPOL	International Convention for the Prevention of Pollution from Ships
MEC	Munitions and Explosives of Concern
MMPA	Marine Mammal Protection Act
MSC	Military Sealift Command
NAAQS	National Ambient Air Quality Standard
NAVFAC	Naval Facilities Engineering Systems Command
Navy	United States Department of the Navy
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NM	Nautical Miles
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NO_2	Nitrous dioxide
NOx	Nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRT	National Response Team
OEA	Overseas Environmental Assessment
OPRC 90	International Convention on Oil Pollution Preparedness, Response and Co-operation 1990
OPRC-HNS	Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances
PACFLT	United States Pacific Fleet
PCB	Polychlorinated Biphenyls
PHNSY	Pearl Harbor Naval Shipyard
PIC	Person in Charge
$PM_{2.5}$	Particulate Matter less than or equal to 2.5 microns
PM_{10}	Particulate Matter less than 10 microns
POL	Petroleum, Oil, Lubricants
PSD	Prevention of Significant Deterioration
PTS	Permanent Threshold Shift
RCRA	Resource Conservation and Recovery Act
RHBFSF	Red Hill Bulk Fuel Storage Facility
ROI	Region of Influence
SCC	Social Cost of Carbon
SECDEF	United States Secretary of Defense
SIP	State Implementation Plan

Acronym or Abbreviation	Definition
SO_2	Sulfur dioxide
SOx	Sulfur oxides
TPY	Tons Per Year
TSCA	Toxic Substances Control Act
TTS	Temporary Threshold Shift
UGPH	Underground Pump House
UIC	Underground Injection Control
U.S.	United States
USC	United States Code
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USTs	Underground Storage Tanks
UTF	Upper Tank Farm
VOC	Volatile Organic Compound
WHO	World Health Organization
$\mu g/m^3$	microgram per cubic meter

1 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment/Overseas Environmental Assessment (EA/OEA) addresses gravity-based defueling of the Red Hill Bulk Fuel Storage Facility (RHBFSF) at Joint Base Pearl Harbor-Hickam (JBPHH) and the relocation of flowable fuels to other Department of Defense (DoD) fuel supply locations in the Pacific region or sale of the fuel to commercial entities utilizing DoD contracting authorities. The Joint Task Force Red Hill (JTF-RH) and Defense Logistics Agency (DLA) prepared this EA/OEA pursuant to the National Environmental Policy Act (NEPA), as amended (42 United States Code [USC] section 4321 et seq.) and its implementing regulations issued by the Council on Environmental Quality (40 Code of Federal Regulations [CFR] Part 1500 - 1508) and Executive Order (EO) 12114.

The goal of this EA/OEA is to ensure that comprehensive consideration is given to potential environmental impacts that may result from the Proposed Action, or any reasonable alternative action, upon the human environment.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The purpose of the proposed gravity-based defueling action is to comply with State of Hawaii Department of Health (DOH) Emergency Orders (herein, DOH Emergency Orders, 2021 and 2022), the Environmental Protection Agency (EPA) 2023 Consent Order, and United States Secretary of Defense (SECDEF) Lloyd J. Austin III's order on March 7, 2022 (herein, SECDEF Memo, 2022) to defuel and permanently close the RHBFSF (DoD, 2022A).

Defueling RHBFSF is needed to protect local water supplies from further contamination. Additionally, DoD needs to defuel the facility as a first step in the process of full closure and remediation of RHBFSF.

1.3 BACKGROUND

Dating back to the 1920s, the United States (U.S.) Department of the Navy (herein, the Navy) recognized the vulnerability of its aboveground fuel tanks at Pearl Harbor and began planning for massive underground fuel storage in the late 1930s. The RHBFSF was conceived to protect vital fuel supplies from hostile forces. Work began to construct this secret facility the day after Christmas 1940 and the project was completed in September 1943 by a workforce of 3,900 working round-the-clock shifts. Initially, the facility supplied fuel to the ships and submarines going to the forward lines, as well as all the Navy's support activities in Hawaii. In later years, it also supplied fuel to aircraft. It has provided fuel for the Navy continuously since completion in 1943 (NPS, 2015).

In January 2014, during the course of refilling Red Hill Storage Tank #5, following routine maintenance and repair work, the Navy identified an estimated fuel release of up to 27,000 gallons of JP-8 jet fuel from the tank and reported the release to the DOH.

The Navy then drained the tank and collected samples from existing monitoring wells. Results taken in and around Tank 5 indicated a spike in levels of hydrocarbons in soil vapor and groundwater. Drinking water monitoring results confirmed compliance with federal and state safety standards for drinking water both before and after the January 2014 release.

In response to the January 2014 fuel release from the facility, EPA and DOH negotiated an enforceable agreement, also known as an Administrative Order on Consent (AOC), with the Navy and the DLA. The Order required the Navy and DLA to take actions, subject to DOH and EPA approval, to address fuel releases and implement infrastructure improvements to protect human health and the environment.

On May 6, 2021, a pressure surge event occurred during routine fuel movement operations at RHBFSF. The pressure surge event caused a pipeline joint failure that released over 19,000 gallons of JP-5 jet fuel onto the tunnel floor located between the underground storage tanks. The fuel ran down the tunnel floor into containment trenches and into a fire suppression system fluid sump. The sump pumps pushed fuel down the tunnel in a fire suppression system fluid drain pipeline, where the fuel remained until the drain pipeline ruptured on November 20, 2021. This ruptured drain pipeline resulted in fuel spilling into the tunnel system near the Red Hill drinking water system shaft (EPA, 2023a).

In late November 2021, the petroleum release from RHBFSF contaminated the Red Hill drinking water well. Hundreds of families, living on JBPHH and the Army's Aliamanu Military Reservation and Red Hill Housing, reported petroleum odors coming from residential tap water supplied by the Navy water system. Residents reported health symptoms arising from the contaminated drinking water.

Approximately 93,000 Navy water system users were impacted by the contaminated drinking water, many of whom relocated to temporary housing during the drinking water crisis.

EPA coordinated with the Navy, Army, and DOH in an Interagency Drinking Water System Team to restore safe drinking water to the affected residents and workers. The team launched in December 2021 and completed work to restore the drinking water system in March 2022.

Following the November 2021 contamination of JBPHH's drinking water system, the DOH issued an emergency order to the Navy that required the Navy to cease all operations at the facility and defuel the eighteen operational underground fuel storage tanks. The DOH Emergency Order was issued on December 6, 2021 (DOH, 2021a) and then a Superseding Emergency Order was issued on May 6, 2022 (DOH, 2022a).

On March 7, 2022, SECDEF Lloyd J. Austin III, directed the DoD to defuel and permanently close the RHBFSF (DoD, 2022A).

In January 2023, EPA proposed a settlement (EPA, 2022a) with the Navy and the DLA which requires steps to ensure the safe defueling and closure of RHBFSF. The EPA 2023 Consent Order does not replace the 2015 AOC between EPA, DOH, Navy, and DLA which requires the investigation and cleanup of releases.

The DoD stood up JTF-RH on September 30, 2022 to ensure the safe and expeditious defueling of Red Hill. JTF-RH completed a critical preliminary step in the defueling process, from October 25 to November 3, 2022 removing over a million gallons of fuel from the facility's fuel pipelines. The operation, known as unpacking, concluded without any issues involving the handling, transport or storage of the fuel. JTF-RH is overseeing all necessary repairs, modifications and enhancements to the Red Hill infrastructure to reduce risk of spills or accidents during the gravity-based defueling phase.

Fuel product stored at RHBFSF is owned by DLA Bulk Petroleum Supply Chain Services Division. DLA provides contract support for the DoD's bulk petroleum needs, including worldwide acquisition of fuel-related services such as government-owned, contractor-operated defense fuel support points, contractor-owned and -operated defense fuel support points, alongside aircraft fuel delivery, lab testing and environmental compliance, assessment, and remediation (DLA, 2023).

1.4 LOCATION AND SURROUNDING ENVIRONMENT

The RHBFSF sits on 144 acres on JBPHH on Oahu, Hawaii, on land just to the east of the intersection of Highway H201 and Highway H3, located approximately 2.7 miles north of the Daniel K. Inouye International Airport and 1.4 miles east of Aloha Stadium (Figure 1-1). The RHBFSF is located in a ridge of volcanic rock known as Red Hill, or Hawaiian name Kapukaki, on the western edge (leeward side) of the Koolau Mountains that divides South Halawa Valley and Moanalua Valley. The site is surrounded by Federal, State, and residential property. The majority of the surface topography of the site lies at an elevation of approximately 200 to 500 feet (ft.) above mean sea level. The Red Hill ridge extends southwesterly toward JBPHH and provides protective cover not only for the underground fuel storage facility, but also for the long tunnel that connects the fuel storage facility with the Underground Pump House (UGPH).

Figure 1-1. Red Hill Bulk Fuel Storage Facility Locaton

The Waimalu and Moanalua Aquifers, 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 (EPA, 2022a).

The RHBFSF consists of a complex of 20 vertical fuel storage tanks beneath a minimum of 100 ft. of volcanic rock (ASCE, 2023). Each tank is 100 ft. in diameter and 250 ft. high, which is large enough to enclose a 20-story building. Tank interiors are lined with quarter-inch steel plates surrounded by reinforced-concrete. Each tank has a storage capacity of approximately 12.5 million gallons. In total, the tanks at the facility have a capacity of 250 million gallons. However, the tanks presently contain approximately 104 million gallons across three fuel types:

- F-24: used in non-navy aircraft; this is a kerosene-based product used largely by the commercial airline sector but with additives to inhibit icing and corrosion.
- F-76: marine diesel primary fuel for ships
- JP-5: jet propulsion fuel used in Naval aircraft

Near Pearl Harbor, a pumping station at the end of the pipelines controls the filling of the tanks as well as dispensing fuel to ships and to nearby Upper Tank Farm (UTF) at JBPHH. Three gravity-fed pipelines run 2.5 miles inside a tunnel to fueling piers at JBPHH (CNRH, 2023). Only a small portion (approximately 5 percent or less) of the pipeline distance is direct buried; meaning 95 percent or more of the lines run above ground or within tunnels where they can be readily visually inspected.

1.5 SCOPE OF ENVIRONMENTAL ANALYSIS

This EA/OEA includes an analysis of the potential environmental impacts associated with the movement of fuel from the RHBFSF to a fueling pier at JBPHH, fuel loading onto tanker ships, and fuel relocation by ocean transit. The scope of the analysis is limited to actions for which the DoD has discretion over. The analysis of the action alternatives in this EA/OEA will begin once the fuel exits a series of valves and manifolds downstream from the Red Hill UGPH that direct fuel flow to the JBPHH fueling piers. The analysis will end when the fuel leaves Military Sealift Command (MSC) contracted vessels at the destination DoD fuel support points, or when the fuel is commercially sold.

This EA/OEA will not analyze emptying the fuel from Red Hill tanks since this is mandated in the DOH Emergency Orders, 2021 and 2022, and therefore is nondiscretionary. Defueling must be completed expeditiously to protect water supplies from further contamination and to comply with DOH Emergency Orders, 2021 and 2022 and EPA 2023 Consent Order.

DoD will undertake several stages of actions to fully close and remediate the RHBFSF. Follow-on actions beyond the scope of this EA/OEA, such as RHBFSF closure, site remediation, and potential beneficial non-fuel re-use of the facility, are also necessary but are predicated on the successful defueling action occurring first. The DoD is actively evaluating and developing alternatives for future follow-on actions which will be subject to additional future environmental compliance actions as applicable. To the extent possible and known with currently available information, this EA/OEA will evaluate the potential impacts of follow-on actions in Section 4, Cumulative Effects.

The process for identifying resources analyzed in this EA/OEA is summarized in Section 3, Introduction. Resources analyzed in detail include:

- Public Health and Safety
- Water Resources
- Marine Biological Resources
- Hazardous Materials and Waste
- Air Quality and Greenhouse Gases

Resources that were not analyzed in detail are described and explained in the introduction to Section 3, Affected Environment and Environmental Consequences.

1.6 RELEVENT LAWS AND REGULATIONS

JTF-RH and DLA have prepared this EA/OEA based on federal law and documents the Proposed Action's compliance with all applicable Executive Orders, statutes, regulations (see Section 5.4).

1.7 PUBLIC AND AGENCY PARTICIPATION AND INTERGOVERNMENTAL COORDINATION

JTF-RH and DLA are soliciting public and agency input regarding the Proposed Action through publication of the Draft EA/OEA (DEA/DOEA). The DEA/DOEA is available on the JTF-RH website: https://www.pacom.mil/JTF-Red-Hill/NEPA-Comment/.

The public comment period will begin June 9, 2023 and end June 30, 2023. A public meeting will be held on June 15, 2023 between 4 p.m. and 8 p.m. at the Keehi Lagoon Memorial, Harry and Jeannette Weinberg Memorial Hall, 2685 N. Nimitz Hwy, Honolulu, HI 96819. The public meeting will provide an opportunity for attendees to record verbal comments, otherwise all comments must be in writing and postmarked or submitted online on or before June 30, 2023.

Please address written comments to Joint Task Force Red Hill; 1025 Quincy Avenue, Suite 900; Joint Base Pearl Harbor-Hickam, HI 96860. Comments can also be submitted online at https://www.pacom.mil/JTF-Red-Hill/NEPA-Comment/. All official comments received during the public comment period will be fully considered by JTF-RH and DLA prior to rendering a decision on the Proposed Action.

1.8 PERMITS AND APPROVALS

JTF-RH and DLA are consulting with the National Marine Fisheries Service (NMFS) to comply with the Endangered Species Act (ESA) under Section 7.

JTF-RH and DLA will notify the State of Hawaii Office of Planning and Sustainable Development that the Proposed Action would be consistent with the de minimis Activities List under the Coastal Zone Management Program, and therefore not subject to further review by the Hawaii Coastal Zone Management Program.

2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action is the gravity-based defueling of the RHBFSF and relocation of the flowable fuel to other DoD fuel supply locations in the Pacific region or sale of the fuel to commercial entities utilizing DoD contracting authorities.

2.2 SCREENING FACTORS

JTF-RH and DLA thoroughly evaluated available methods and infrastructure for safe defueling and fuel transfer from RHBFSF. The defueling process requires several phases: 1) remove the fuel from the tanks, 2) transport it from RHBFSF to other transportation nodes, such as ports, and 3) deliver it to end points for DoD use or commercial sale. Site screening criteria for pipelines, transportation nodes, and end point alternatives were considered using the following criteria:

1. Defueling must occur in a safe and expeditious manner in accordance with: DOH Emergency Orders 2021 and 2022; SECDEF Memo 2022; DoD Defueling Plan of 1 June 2022; DoD Defueling Plan Supplements 1A and 1B of 7 and 28 September 2022; DoD Defueling Plan Supplement 2 of 16 May 2023; and U.S. Indo-Pacific Command fragmentary order 05 of 23 January 2023.
2. Defueling operation must not unduly burden the Oahu commercial fuel supply chain.
3. Transfer of fuel from RHBFSF to the fuel loading pier must occur through DoD-owned, existing infrastructure.
4. Fueling transfer from RHBFSF must not utilize public roadways to minimize traffic impacts and reduce risk of accidents and spills.
5. Fuel tanker loading must occur at an operational pier that can accommodate a tanker ship, and has existing infrastructure to accommodate F-76, J-P5, or F-24 fuel types.
6. If fuel is relocated for DoD use, it must be directed to locations within the DoD fuel supply chain with infrastructure to safely offload and store fuel in the type and quantity needed by the DoD at the time of defueling.
7. Relocation and/or commercial sale of fuel must be both economical and a responsible use of the taxpayer's resources.

2.3 ALTERNATIVES CARRIED FORWARD FOR ANALYSIS

This EA/OEA analyzes the No Action Alternative and two action alternatives. Both the No Action Alternative and the two action alternatives utilize existing infrastructure at RHBFSF and JBPHH to remove the fuel from RHBFSF and load it onto tanker ships. The No Action Alternative and the two action alternatives would include unpacking the associated pipelines. Removal of residual amounts of fuel products that do not flow under the force of gravity, such as sludge (unrecoverable tank bottoms) and any fuel within low points of the facility and pipelines, would occur after the gravity-based defueling stage, and is not included in the scope of environmental analysis of this EA/OEA. RHBFSF will transition to DoD's closure phase after the gravity-based defueling stage.

2.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, the fuel within RHBFSF would be supplied to JBPHH customers at regular demand rates for routine use. This alternative would ultimately remove all flowable fuel from RHBFSF because it would not receive any re-supply of fuel.

Under the No Action Alternative, flowable fuel would remain in the tanks at RHBFSF for approximately ten to fourteen months after DOH approval of the gravity-based defueling operation. Fuel from RHBFSF would be transferred to the Upper Tank Farm UTF or to fueling piers at JBPHH through existing infrastructure. Fuel from the UTF would then be sent by pipeline to Hickam Field, fuel loading piers, and truck loading racks for distribution to customary defense customers for consumption. A low demand for JP-5 fuel at JBPHH would require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program to increase the rate of JP-5 consumption. Additionally, JP-5 may be regraded to F-24 or F-76 for consumption at JBPHH.

Under the No Action Alternative, the existing locations within the DoD fuel supply chain that may receive relocated fuel from RHBFSF as part of Alternatives 2 and 3 would continue to receive their routine or planned fuel deliveries by tanker ships from other fuel sources.

> ***Flowable fuel*** *is defined as fuel that readily flows under gravity from the storage tanks through the pipelines. Any bottom sediment or sludge in the tanks which would require mechanical cleaning or scraping would be removed during subsequent remediation phases of the Red Hill facility closure.*
>
> ***Flowable tank bottom*** *is a subset of flowable fuels, used to describe the column of fuel in the bottom ten (10) ft. of the RHBFSF tanks.*
>
> ***Low points*** *are defined as those portions of the tanks and pipelines where fuel will not flow under the force of gravity alone.*
>
> ***Unpacking*** *is defined as the process of defueling the pipelines that transfer fuel from the tanks to the pier. The pipelines have capacity to hold approximately 1.3 million gallons of fuel. Conversely,* ***packing*** *is defined as filling the pipelines with fuel.*
>
> ***Unrecoverable Tank Bottoms*** *is defined as the semi-solid material that settles on the bottom of tanks over long periods of time (nominally the bottom four inches(in) for the RHBFSF) and within the low points in the pipeline system that must be removed through mechanical means (such as scraping or shoveling). Some dismantlement of pipelines, valves and various other components could be necessary to remove sludge in the RHBFSF system.*

The No Action Alternative does not meet the purpose and need for the Proposed Action because it does not expeditiously defuel RHBFSF as it could take as long as fourteen months to execute. However, as required by NEPA, the No Action Alternative is carried forward for analysis in this EA/OEA. The No Action Alternative will be used to analyze the consequences of not executing the Proposed Action, and will serve to establish a comparative baseline for analysis of the action alternatives.

2.3.2 Alternative 2: Relocation

Alternative 2 is the gravity-based defueling and relocation of the approximately 106 million gallons of flowable fuel from RHBFSF to existing locations within the DoD fuel supply chain by ocean transit. The flowable fuel that would be relocated includes 104 million gallons presently in the RHBFSF tanks, plus an estimated 2 million gallons of fuel from the pipeline packing process and emptying of the underground surge tanks. The fuel removal operation involves gravity flow of the fuel from RHBFSF through existing DoD piping and associated infrastructure to a fuel loading pier at JBPHH. This alternative would defuel RHBFSF within approximately three to four months after DOH approval of the gravity-based defueling process.

A maximum of eleven refined product tanker ship transits are required to receive and transport all the flowable fuel from RHBFSF. The tanker ships would be medium-range type vessels that are approximately 600-ft. long with a capacity of approximately 11 million gallons. No new construction is required to support fuel movement from RHBFSF to the fueling pier. Tanker ships would arrive at Pearl Harbor and be guided by tugboats to the JBPHH fueling pier. Tanker ships may also use harbor pilots to help safely navigate through Pearl Harbor. Ship speeds in Pearl Harbor are typically ten nautical miles per hour (knots) or less, to prevent collision, and five knots or less when piloting vessels in areas of known turtle presence. Once docked, several safety and procedural checks will be conducted. These safety and procedural checks are described in Section 2.5. The tanker loading operation would then commence under the direction of the assigned Person in Charge (PIC) and in compliance with the Operations Order, a standard operating procedure for fuel loading evolutions. Tanker loading would take up to three days per tanker. A maximum of two tankers per week would be loaded at the same fueling pier.

Tanker ships would depart the fueling pier guided by tugboats through Pearl Harbor. After exiting Pearl Harbor, tanker ship transits one through ten would transit within existing commercial shipping lanes to one or more (up to nine) existing DoD fuel support points throughout the Pacific. The fuel deliveries to these locations would occur in lieu of routine fuel supply deliveries. Each prospective DoD fuel support point would have adequate facilities and piers/systems to receive fuel from tanker ships. Potential receiving locations (Figure 2-1) for the ten fuel deliveries include:

- West Oahu, Hawaii (Campbell Industrial Park)
- Point Loma, California
- Selby, California
- Vancouver, Washington
- Manchester, Washington
- Sasebo, Japan
- Subic Bay, Philippines
- Port of Singapore
- Darwin, Australia

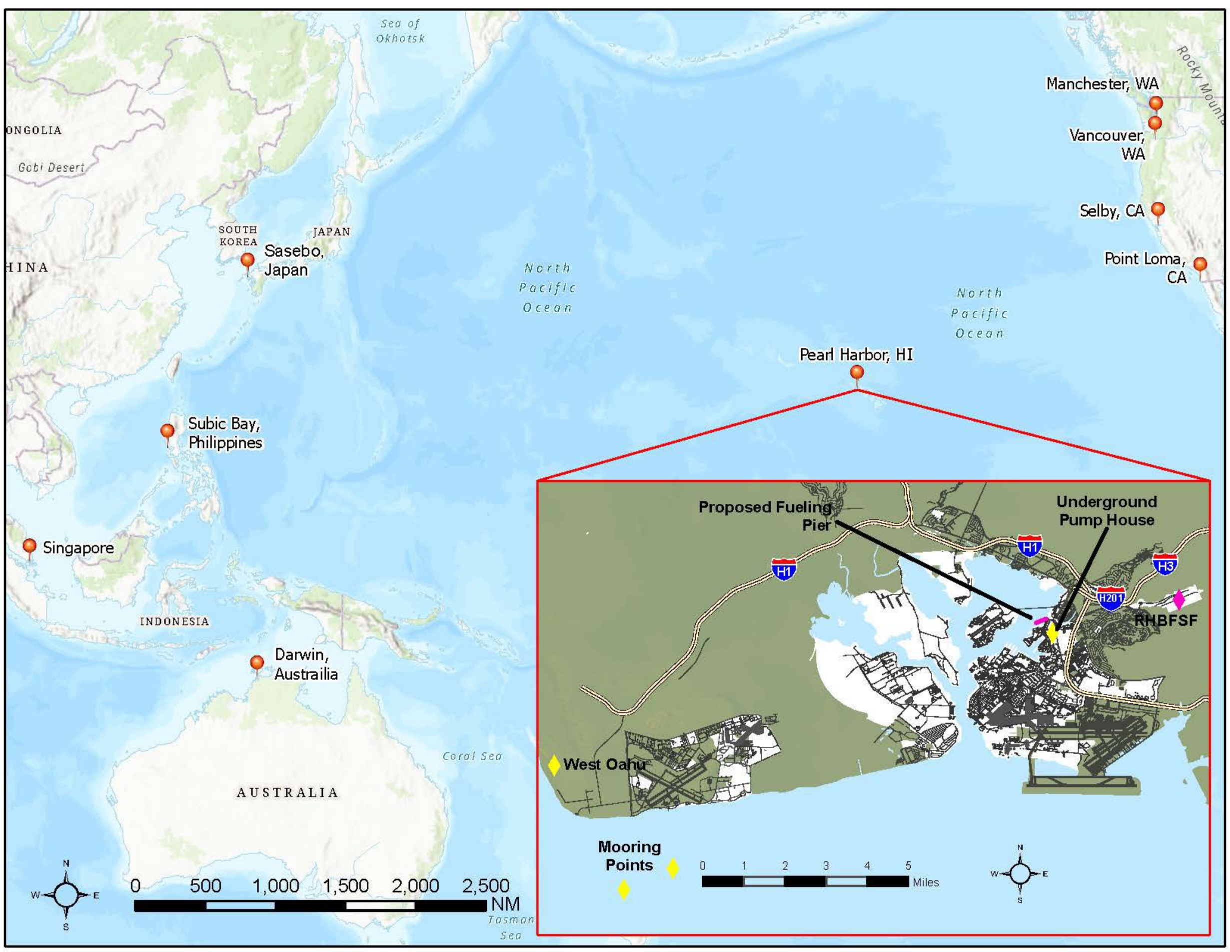

Figure 2-1. Location of Potential Fuel Receiving Sites

The quantity of fuel and number of deliveries received at each location would depend on DoD fuel inventory needs at the time of defueling. An upper bound, or maximum number, of transits for each receiving location was determined in consultation with DLA to use for planning and analysis purposes. The upper bound of transits took into account fuel types and projected volume of fuel storage available at a potential receiving location. Table 2-1 provides transit and offload information for each potential receiving location.

Table 2.3-1. Potential Receiving Locations for Fuel from RHBFSF

Potential Receiving Location	Maximum Number of Tankers to Each Location	Estimated Transit Distance (nautical miles)	Estimated Transit Duration (days)	Offload Point
West Oahu, Hawaii Campbell Industrial Park	5	13	<1 day (1 hour)	Seven Point Multipoint Mooring (MPM) System (2 miles offshore)
Naval Base Point Loma, California	2	2280	7 days	Navy Pier located at Dock Street
Selby Terminal, California	2	2120	6 days	Fuel Pier at Point Davis
Port of Vancouver, Washington	1	2350	7 days	Pier at Terminal 2, Berth 5
Manchester, Washington	1	2480	7 days	Navy Pier on Olympic Drive Manchester, WA
US Naval Fueling Station Sasebo, Japan	2	4060	12 days	Navy Fuel Piers in Sasebo Harbor
Subic Bay, Philippines	5	4830	14 days	Petroleum Oil Lubricants (POL) Pier
Port of Singapore	5	6230	18 days	Fueling Piers
Port of Darwin, Australia	2	5190	15 days	East Arm Wharf Berth 4

Note: Transit distances are approximate based on the most direct route from Oahu; routes/distances could vary in practice based on weather conditions and other factors.

Tanker ships would use established commercial shipping routes and open water ship speeds (approximately fifteen knots) during open ocean transit to its destination. Transit times would depend on the distance from JBPHH to the port of destination as shown in Table 2-1. MSC would contract tanker ships based on commercial market availability at the time of defueling.

Tanker ships would be double-hulled and have a certified oil discharge monitoring and control system (monitoring system), as well as other safety and environmental design features, as required by U.S. Coast Guard regulation Title 33, Section 157 “Rules for the Protection of the Marine Environment Relating to Tank Vessels Carrying Oil in Bulk.” (See https://www.ecfr.gov/current/title-33/chapter-I/subchapter-O/part-157). These ships have an Automatic Identification System (AIS), which is a broadcast system that acts like a transponder to provide real-time ship name, course, speed, classification, call sign, registration number and other information. AIS allows maritime authorities to track and monitor vessel movements in accordance with International Maritime Organization (IMO) International Convention for the Safety of Life at Sea.

Upon arrival at the receiving location, fuel would be offloaded, stored, and managed through the receiving entity’s standard practices and operating procedures.

The eleventh tanker or barge would be staged at the JBPHH fueling pier for approximately two to five weeks to receive flowable tank bottoms and fuel from the underground surge tanks and pipeline unpacking process (estimated to be 2 million gallons of fuel or a portion thereof). Fleet Logistic Center, Pearl Harbor (FLC) would sample and test this fuel to determine whether it meets specifications for DoD requirements. Based on results of testing and fuels inventory at the time of defueling, two options for distribution of this remaining fuel would be available:

Flowable Tank Bottoms Option A: Upper Tank Farm

With Option A, fuel that meets specifications for DoD requirements may be pumped from the eleventh tanker or barge back through existing piping and infrastructure to the UTF for consumption at JBPHH. The removal of flowable fuel from RHBFSF would be complete following the transfer of fuel from the eleventh tanker or barge to the UTF under Option A. The RHBFSF would then transition to the Navy for follow-on closure activities beyond the scope of the Proposed Action and not included in this EA/OEA, which includes site remediation and potential beneficial non-fuel re-use.

Flowable Tank Bottoms Option B: Commercial Sale

With Option B, fuel loaded onto the eleventh tanker or barge after line unpacking would be transported and sold to a commercial entity. Transit route and destination of the eleventh tanker would not be known until the time of sale. The removal of flowable fuel from RHBFSF would be complete following the loading and departure of the eleventh tanker under Option B. The RHBFSF would then transition to the Navy for follow-on closure activities beyond the scope of the Proposed Action and not included in this EA/OEA, which includes site remediation and potential beneficial non-fuel re-use.

2.3.3 Alternative 3: Commercial Sale and Relocation

Alternative 3 is the commercial sale of a portion of the approximately 106 million gallons of flowable fuel from RHBFSF combined with the relocation of the remaining portion of the fuel to existing locations within the DoD fuel supply chain by ocean transit. The flowable fuel that would be relocated includes 104 million gallons presently in the RHBFSF tanks, plus an estimated 2 million gallons of fuel from the pipeline packing process and emptying of the underground surge tanks. A maximum of eleven tanker ships would be required to receive all of the flowable fuel from RHBFSF.

With Alternative 3, up to ten tanker loads of fuel from RHBFSF may be commercially sold in accordance with Section 2922e of Title 10, USC, which authorizes the sale of certain fuel sources. Sale of fuel would need to coincide with defueling schedule. Therefore, the amount of fuel sold would be determined by commercial interest and purchasers' ability to receive the fuel at the time of gravity-based defueling.

As in Alternative 2, movement of fuel from RHBFSF would be accomplished by gravity flow of the fuel through existing DoD piping and associated infrastructure to a fuel loading pier at JBPHH. Tanker ships would arrive at Pearl Harbor and be guided by tugboats to the JBPHH fueling pier. Fuel sold commercially would be loaded onto purchasers' commercially-operated tanker ship(s) using the same pace and procedure as Alternative 2. The DoD's role in the transaction is fulfilled after fuel is loaded. Tanker ships would then depart the fueling pier guided by tugboats through Pearl Harbor, and transit to destinations determined by the fuel purchaser. The transit route and destination of sold fuel is at the discretion of the non-federal entity purchaser and not a part of the federal action, and therefore is not analyzed in this EA/OEA.

With Alternative 3, the portion of fuel that is not sold would be relocated from RHBFSF to existing locations within the DoD fuel supply chain by ocean transit. Relocation of fuel would be accomplished using the same process as Alternative 2. Potential DoD fuel supply chain receiving locations and upper bound of tanker transits to each location are the same as outlined in Alternative 2, shown in Table 2-1. A combined maximum of ten tanker loads of fuel would be commercially sold or relocated within the DoD fuel supply chain with Alternative 3 (e.g., three sold and seven relocated).

With Alternative 3, the process for removing flowable tank bottoms would be the same as Alternative 2, including staging the eleventh tanker/barge at the fueling pier for approximately two to five weeks to receive the flowable tank bottoms and fuel from the pipeline unpacking process. This remaining fuel would be distributed in the same manner as Alternative 2, with Flowable Tank Bottoms Options A: UTF and Option B: Commercial Sale remaining the same for Alternative 3.

The removal of flowable fuel from RHBFSF would be complete following the execution of Flowable Tank Bottoms Option A or B. The RHBFSF would then transition to the Navy for follow-on closure activities beyond the scope of the Proposed Action and not included in this EA/OEA, which includes site remediation and potential beneficial non-fuel re-use.

2.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD FOR DETAILED ANALYSIS

Additional alternatives were considered, but eliminated from further evaluation because they did not fulfill the minimum objectives and screening criteria to achieve the purpose and need for the Proposed Action as detailed in Table 2-2.

Table 2.4-1. Alternatives Considered but Eliminated from Further Study

Name of Alternative	Why Alternative was Excluded
Transfer of Fuel from Red Hill to Transportation Nodes on Oahu via road (e.g., use of tanker trucks)	Large tanker trucks for fuel typically hold between 9,000 and 9,800 gallons. With approximately 104 million gallons to transport from the bulk tanks at RHBFSF, this alternative would require between 10,600 and 11,560 trucks. This number of vehicle trips would increase the defueling time significantly and increase traffic and air pollution in the area. This action would involve thousands of fuel transfer actions that would be prone to spills and would not meet screening criteria number one. To achieve the defueling timeline goals and to limit environmental impacts, the use of tanker trucks for this action was eliminated from further study in this EA/OEA.
Sale of and Transfer of Fuel to Honolulu Airport on Oahu	DLA considered selling fuel from RHBFSF to commercial entities on Oahu, including the Daniel K. Inouye International Airport located within 3.5 miles of the RHBFSF. DLA exchanged correspondence with the airport management about this alternative. However, the airport uses Jet-A fuel, and the fuels available from RHBFSF are not formulated for commercial aircraft operations. Of the three fuel types at RHBFSF (see Section 1.4), the closest type to Jet-A is F-24; however, the military additives in F-24 may adversely affect some commercial fuels operations at the airport who does not wish to pursue this alternative.
Sale of and Transfer of Fuel to Oil-fueled Electric Plants on Oahu	In 2021, approximately 65 percent of utility-scale electric generation came from fuel oil power stations. The Kahe, Waiau, and Campbell Industrial Park stations (owned by Hawaiian Electric) in Honolulu County provide up to 1230 MW of power. However, the best use for the fuels from RHBFSF would be for their intended military applications if they are deemed to meet quality specifications. DLA's directive mandates the most economical and beneficial use of fuels within the Defense Fuel Supply System. For any fuels that do not meet specifications for DoD use, DLA would accept bids from private entities to sell the fuel but would not restrict sales to Hawaii in order to meet screening criteria number seven and receive the best price and value for the government
Donation of Fuel	By DLA Directive 5105.22, DLA is required to ensure the best value supply chain support to the customer for all managed commodities and services DLA provides. DoD Manual 4140.25-M "DoD Management of Bulk Petroleum Products, Natural Gas, and Coal" requires DLA to: store and distribute petroleum products in an economical and efficient manner; maintain essential and properly positioned inventories in support of peacetime and wartime requirements; and to provide efficient financial management and effective use of resources for DoD bulk petroleum while eliminating duplication of effort. Because defense fuels from Red Hill remain a needed commodity within the fuel supply chain, donating fuel from RHBFSF would not be an efficient or financially-sound practice. Furthermore, DLA does not have the authority to designate this fuel as government surplus or to donate it to private entities. This alternative would fall outside DLAs legal authority and conflicts with screening criteria number 7 in Section 2.2. For these reasons, this alternative was eliminated from further evaluation.
Removal of Fuel from RHBFSF tanks using a vacuum truck	Using vacuum trucks would require thousands of truck transits. Larger-scale vacuum trucks can hold 8,000 gallons; requiring approximately 13,000 truck-loads. The number of vehicle trips required would increase the defueling time significantly and increase traffic and air pollution in the area. This action would involve thousands of fuel transfer actions that would be prone to spills and would not meet screening criteria number one. To achieve the defueling timeline goals and to limit environmental impacts, the use of vacuum trucks for this action was eliminated from further study in this EA/OEA.

Name of Alternative	Why Alternative was Excluded
Use of multiple fueling piers	DLA considered the possibility of fueling tanker ships at JBPHH simultaneously at more than one pier to reduce the time to defuel the RHBFSF. However, because there is only one pipeline from the UGPH, splitting the fuel flow between two locations would cut the rate of flow in half, ultimately not saving appreciable time. Screening criteria number one in Section 2.2 requires defueling from RHBFSF to be completed in a safe manner. The number of appropriately-trained staff for fueling operations on the pier is limited. Transferring fuel to a single vessel may take up to three days, requiring more than one shift. With these intense periods of activity, it is important to allow rest for employees between shifts so they can remain focused and vigilant. Expanding fuel transfer to more than one pier or more than one vessel of at time was considered by JTF-RH as potentially unsafe based on worker availability and therefore does not meet screening criteria number one.
Movement of fuel to West Oahu using commercial pipeline	DLA considered the use of commercial petroleum pipelines to move fuel from RHBFSF to West Oahu (Campbell Industrial Park). The pipelines run from the Kapolei area in western Oahu to the Daniel K. Inouye International Airport (HNL) via Sand Island/Port of Honolulu area, and can be accessed via an existing connection with JBPHH. Transfer of fuel using these pipeline would require approximately fifteen days of uninterrupted use to drain one RHBFSF tank, or approximately 72 days to move all the fuel from RHBFSF. These commercial pipelines are critical to commercial operations, including the HNL airport. Limited storage capacities and significant usage at HNL airport require a continuous supply. The extended use of the commercial pipeline by DoD to move fuel from RHBFSF to West Oahu contracted storage is not feasible because it would unduly burden the Oahu commercial fuel supply chain and therefore does not meet screening criteria number three described in Section 2.2.
Transport of fuel on aircraft	The highest capacity Air Force KC model military tanker aircraft has a maximum payload of 356,000 pounds (or 52,740 gallons) of aviation fuel. Relocating all the fuels from RHBFSF using this as a primary method would require at least 1,970 individual aircraft fueling events, which may increase the potential for spills during transfers. Overall, this alternative would not be expeditious and would not meet screening criteria number one described in Section 2.2.

2.5 BEST MANAGEMENT PRACTICES

Best Management Practices (BMPs) reduce potential impacts by avoiding, minimizing, or eliminating impacts. BMPs are existing policies, practices, and measures that JTF-RH and DLA would adopt to reduce the environmental impacts of designated activities, functions, and processes.

BMPs are distinguished from mitigation measures because they are inherently part of the Proposed Action. Recognition of these practices prevents unnecessarily evaluating impacts that are unlikely to occur. Table 2.5-1 lists BMPs that JTF-RH and DLA would implement as part of the Proposed Action.

Table 2.5-1. Best Management Practices

Best Management Practice	Impacts Reduced/ Avoided	Description
BMP-1; Tanker ship arrival/departure safety	Ship movement accident avoidance	• JBPHH Port Operations would be notified in advance of arrival and departure dates for tanker ships. • Tanker captain would communicate with the JBPHH Harbormaster upon arrival to Pearl Harbor in accordance with base policy. • Tanker ships would be guided by tugboats from Pearl Harbor to and from the fueling pier.
BMP-2; Pre-staging spill control products, equipment and watch standers.	Prevent spread of potential fuel spills at the pier	• Oil-absorbent booms would be pre-deployed around the tanker and the area immediately around the pier. Additional booms would be readily available for deployment. • Skimmer boats would be pre-staged to immediately begin removing the fuel contained within the oil-absorbent boom(s). • Rovers and/or watch standers would be on the pier to inspect and perform leak checks.

Best Management Practice	Impacts Reduced/ Avoided	Description
		• Spill kits, absorbents and small portable pumps would be readily available and pre-staged.
BMP-3; Preparation for defueling (pre-fueling checks)	Avoidance of unsafe work practices; prevention of spills;	The transfer of fuel from RHBFSF to vessels would follow the established DFSP Pearl Harbor Bulk Terminal Operation, Maintenance, Environmental and Safety Plan (that governs the specific event's Operations Order) for the issuance of fuel to marine vessels from shore facilities. Several documents would be filled out by the team performing pier fueling operations, including but not limited to: a declaration of inspection certificate, hose inspection sheet, tanker/barge material inspection form, transfer record, running gauge record, barge ullage report, notice of readiness (provided by the vessel). The transfer process first requires approval by the base Commanding Officer. A series of checks would then be performed: • The Person in Charge (PIC) would hold a pre-transfer conference and complete and sign the FLC Fuel Form 703-04, Declaration of Inspection before the issue operation begins. • PIC establishes communication with the vessel's captain or vessel PIC. • Sump containments would be inspected for standing water or fuel. • All fueling hoses would undergo tightness testing. • Prior to any fuel movement operation, would review and conduct a line pack and pressure test on the piping identified in the Operations Order; Team members walk the pipeline to evaluate its condition. • Control Room Operator at the UGPH ensures that the emergency shutdown system (e.g., shutoff buttons, voice communications) are in position and operable. • In coordination with the UGPH Control Room, pipeline valves would be opened sequentially in radio communication with team members who verbally confirm valve openings. • As the pipeline is pressurized, the visual inspectors and Control Room Operator would evaluate system pressure gages and verify pipeline integrity.
BMP-4; Vessel fueling procedures	Prevention of spills; Prevention of accidents.	• The terminal PIC and vessel PIC must be on duty at the terminal during the entire transfer operation. • The PIC and fueling team would periodically check for leaks and any sheen on the water next to the pier. • PIC would conduct occasional checks of the valve pits that are in use for indication of leaks. • On regular intervals, the PIC would confirm the ship's received quantities with Navy's calculated quantities to determine any inconsistencies (a possible indicator of leaks). • The Control Room Operator would monitor fuel system pressure gauges for pipeline tightness.
BMP-5; Fueling operation temporary shut-down authority	Prevention of spills or accidents.	• The terminal PIC has the authority to shut down any operation if vessel personnel violate any of the rules in the Operations Order at any time or refuse to correct unsatisfactory conditions promptly. Safety officials (JBPHH, Fleet Logistics Center Pearl Harbor, Occupational Safety and Health Administration [OSHA]) also have the authority to shut down unsafe operations. • At the discretion of the terminal PIC and/or vessel PIC, all operations would cease in the event of an electrical storm (within five miles), high winds, earthquake, tsunami watch or warning, terror threat or incident, or other accident that may cause the operation to potentially be unsafe.

Best Management Practice	Impacts Reduced/ Avoided	Description
BMP-6; System redundancy measures	Prevention of spills or accidents	• UGPH equipped with backup electrical power. • Fuel lines from RHBFSF to fueling pier equipped with automatic fuel handling equipment, including remotely operated valves that can stop fuel flow at multiple valve station locations upstream and downstream of the UGPH.
BMP-7; JBPHH Personnel training and rest periods	Prevention of spills or accidents	• Personnel implementing and monitoring the fuel transfer from the RHBFSF to vessels at the JBPHH pier would have pre-requisite training to conduct the operations outlined in the operations order • Personnel would have previously received annual spill response training and review spill response as part of weekly safety trainings. • Personnel implementing and monitoring fuel transfer at JBPHH would be assigned to shifts that allow for adequate rest (e.g., three 12-hour shifts on and four days off per week).
BMP-8; Hazardous waste management	Prevention of releases of hazardous substances; Reduction of hazardous waste generation	• Hazardous and non-hazardous wastes including any contaminated spill response materials or debris would be handled, transported, disposed of in accordance with applicable federal and state regulations. • Spill contaminated materials would be packaged in U.S. Department of Transportation (DOT) approved containers marked and labeled in accordance with DOT and EPA requirements. • Where possible, dispose of non-hazardous wastes such as oil-contaminated absorbents at the Honolulu Program of Waste Energy Recovery (H-Power). Non-hazardous wastes that are to be disposed of at local permitted facilities must meet all requirements of the destination facility.
BMP-9; Shipment tracking	Marine Accidents and prevention of spills	• Position reports are transmitted from the tanker ships to MSC daily while in transit. Reports include tanker ship location, direction, and speed. Position reports would include information on any diversions or delays. • DLA inventory management system is updated when fuel shipment is received at destination.
BMP-10; Protection of marine species in Pearl Harbor	Protection of marine protected species in Pearl Harbor	• Personnel will not attempt to disturb, touch, ride, feed, or otherwise intentionally interact with any protected species. • Personnel will stay more than 150 ft. away from protected marine species including sea turtles and Hawaiian monk seals. • If an injured, sick, or dead protected marine species is observed, personnel will notify the JBPHH Natural Resources Manager
BMP-11; Protection of marine species from vessel collisions	Prevent vessel collisions with marine species	• Operational and maintenance standards for vessels will be practiced, and vessel operations will only occur during ocean conditions that do not compromise safe operation with contingency plans to cancel or delay the action for favorable weather conditions. • Vessel operators will halt or alter course to remain at least 150 ft. from ESA-listed marine species. • Vessels shall operate at speeds safe for the location and conditions. Per the Navy Region Hawaii Port Environmental Manual (CNRH 2018): Within Pearl Harbor, this is ten knots or less. Operators will be particularly vigilant to watch for turtles at or near the surface in areas of known or suspected turtle activity and, if practicable, reduce vessel speed to five knots or less. • If approached by an ESA-listed marine species, the vessel operator will put the engine in neutral if the animal is within 150 ft. of the vessel, until the animal has moved at least 50 ft. away, and then engage the engine and slowly move way to 150 ft. or more from the animal. • Vessel operators will not encircle or trap ESA-listed marine species between multiple vessels or between vessels and the shore.

Best Management Practice	Impacts Reduced/ Avoided	Description
		• Vessels will take reasonable steps to alert other vessels in the vicinity of marine species. • Vessels will follow established transportation channels whenever practicable. • Vessels will not allow lines to remain in the water, and no trash or other debris will be thrown overboard, thereby reducing the potential for marine mammal entanglement.
BMP-12; Foul weather preparation	Prevention of spills or accidents	As practicable, operations will be conducted during calm sea states with work stoppages during high surf, winds, and currents. In the event of approaching foul weather (e.g., tropical storms and hurricanes), equipment will be either removed from the fueling pier or adequately secured. Hurricane season in the Pacific is from 1 June to 30 November, however tropical storms can and do occur year-round. Hawaii utilizes the National Weather System's warning and watch advisories, and Navy Region Hawaii adheres to the following Condition of Readiness (COR) Levels to forecast destructive force winds (50 miles per hour): i. COR V: Lowest condition of hurricane readiness; destructive force winds are not expected. ii. COR IV: first condition of heightened hurricane readiness; within 72 hours. iii. COR III: within 48 hours. iv. COR II: within 24 hours. v. COR I: within 12 hours. In order to provide 48 hours leeway preparation, work activities will immediately begin the appropriate removal and/or securement of all in water equipment, vessels and barges once a COR III is triggered.
BMP-13; Biosecurity	Prevention of introduction of alien or invasive species	Vessels will comply with requirements of the Navy Region Hawaii Port Environmental Manual to prevent the introduction of alien or invasive species into the harbor: • Prior to entering Pearl Harbor and more than 12 nautical miles (NM) offshore, wash down anchors, anchor chains, anchor chain lockers, and other items that may have been subject to marine growth or collection of sediment, mud, and silt at another port. This will avoid introduction of alien species into Hawaii's nearshore environment. • If ballast water has been loaded from an area that is potentially polluted or within 3 NM from any shore, conduct a ballast water exchange outside 12 NM from Hawaii to prevent the introduction of water-borne alien species into Hawaii's nearshore environment. • Rat guards shall be placed by ship's company on all mooring lines and other connecting lines, such as service lines, between the ship, piers, and seawalls immediately upon berthing and during the entire time the vessel lies alongside a pier. • Ensure that all stores, equipment, supplies, personal items, etc., originating from New Guinea, Australia, or Guam are inspected for the brown tree snake. This inspection may be accomplished during on-loading of such stores or while underway. In the event the presence of an alien species is suspected, the item should not be off-loaded. Port Operations should be notified immediately, and the item should be quarantined until the item can be inspected and cleared. If a snake is sighted aboard ship, aircraft, or during training exercises on land, restrain, contain, or kill the snake until appropriate authorities arrive. Immediately notify JBPHH security of all snake sightings at 911.

Tanker ship operators will also comply with standard operating procedures in compliance with applicable regulations. Once a tanker ship leaves a DoD port, their operations are outside the authority of DoD to impose BMPs; however, U.S. and international regulations for tanker ships provide several safeguards and mandatory procedures to prevent pollution. Some of these safeguards and procedures would include (but are not limited to):

- Tankers ships will comply with the US standard for the storage and transport of liquid cargo in 33 CFR, Chapter I, Subchapter 0, Part 157 which includes details on specific ship build, regulatory standards and spill containment procedures. These regulations for oil tankers are among the most detailed, environmentally focused and strictly enforced regulations in the maritime industry. Plan reviews, certifications, and inspections of tankers are performed by the U.S. Coast Guard (USCG), or a USCG-certified class society (e.g., American Bureau of Shipping [ABS]). 33 CFR, Chapter I, Subchapter 0, Part 157 is comprehensive and gives direction on (but not limited to):
    - Design, equipment and installation of tank vessels
    - Detailed on-load/offload operation guidance
    - Crude oil management
    - Oil spill mitigation and response
    - Penalties for oil spills
- Tankers ship operators will comply with international regulatory guidelines including those of the International Safety Guide for Oil Tankers and Terminals (ISGOTT). The ISGOTT aligns tanker industry standards providing best technical guidance on oil tanker and terminal operations.
- Tanker ships will comply with additional regulators compliance and oil spill response programs including:
    - Condition Assessment Programs - specialized surveys performed by Ship Classification Societies (such as ABS) that detail assessment of a ship's actual condition, based upon strength evaluation, and fatigue strength analysis as well as detailed on-site systematic inspection of hull, machinery and cargo systems. A mitigation inspection program through the last five years of service (maximum twenty years' service for tankers) is mandatory.
    - Vessel Response Plans or Shipboard Oil Pollution Emergency Plans - International Convention for the Prevention of Pollution from Ships (MARPOL) requires owners and operators to prepare in the event of an oil spill.
- Tanker ships will comply with environmental/marine species regulations that are specific to local zones. These are well known to the international maritime industry passing through these waters with up to date warnings of specific sightings or required increased vigilance issued by the USCG Captain of the Port.

2.6 MITIGATION MEASURES

Mitigation measures are measures to reduce or offset anticipated adverse effects. They are distinguished from BMPs because they are implemented solely for the Proposed Action (not routinely implemented) and are often the result of action-specific consultation with regulatory agencies at the local, State or Federal level. Mitigation measures are often tracked at a more robust level within the DoD to ensure they are fulfilled in accordance with applicable agreements.

BMPs identified in Tables 2.5-1 are sufficient to avoid and minimize anticipated adverse impacts from the Proposed Action. Therefore, no mitigation measures are required for the Proposed Action.

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section presents a description of the environmental resources and baseline conditions that could be affected from implementing any of the alternatives and an analysis of the potential direct and indirect effects of each alternative.

All potentially relevant environmental resource areas were initially considered for analysis in this EA/OEA. In compliance with NEPA, the Council on Environmental Quality (CEQ) guidance, EO 12114, and Department of Navy guidelines; the discussion of the affected environment (i.e., existing conditions) focuses only on those resource areas potentially subject to impacts. Additionally, the level of detail used in describing a resource is commensurate with the anticipated level of potential environmental impact.

This section addresses public health and safety, water resources, marine biological resources, hazardous materials and waste, and air quality and greenhouse gases.

In accordance with CEQ memorandum CEQ-NEPA-2020-01 dated September 14, 2020 (CEQ, 2020), the DoD and JTF-RH and DLA considered whether the defueling action could be deemed an emergency action. To address the public interest in this action and the need to defuel quickly and safely, JTF-RH and DLA chose to prepare a concise, focused EA/OEA as recommended by this CEQ memorandum. To focus the analysis, potential impacts to the following resource areas were not analyzed in detail in this EA/OEA as they are anticipated to be negligible or non-existent:

- Cultural Resources: Defueling of the RHBFSF through existing pipelines and relocation by fuel tanker would involve no activities with the potential to affect historic buildings, archaeological sites, or traditional cultural properties. Cultural resources would not be affected by the Proposed Action.
- Geological Resources: Defueling and relocation of fuel from RHBFSF would not require any grading, digging, drilling, or other types of subsurface disturbance. Geologic resources would not be affected by the Proposed Action.
- Terrestrial Biological Resources: Defueling and relocation of fuel from RHBFSF would not remove, modify, physically disturb, or disrupt any terrestrial vegetation, terrestrial wildlife, or terrestrial special status species such as migratory birds or seabirds. Terrestrial biological resources would not be affected by the Proposed Action.
- Visual Resources: The action would involve existing infrastructure and the temporary docking of fuel tankers at an existing fueling pier. Large vessels routinely dock at the JBPHH fueling pier. No permanent changes to visual resources would occur.
- Land Use: Defueling and relocation of fuel from RHBFSF would use existing infrastructure and existing fuel receiving locations around the Pacific. Defueling itself would not change land use at Red Hill; however, the site's closure and potential re-uses (uses that are unknown at this time) may involve land use changes that would be subject to separate environmental compliance actions.
- Utilities: Defueling and relocation of fuel from RHBFSF would use existing infrastructure that is designed to accommodate fuel loading/unloading operations for large vessels. The action would not cause any utility service disruptions, nor create any new demand on utilities.
- Airspace: The action would not increase aviation operations nor affect airspace.
- Noise: Defueling at RHBFSF would use existing pipelines and the existing UGPH where outside noise levels are negligible and not perceivable by the community. Because tanker ships are fueled by gravity, the fueling transfer process does not generate noise levels perceptible to local residential areas. The arrival of tankers and use of tugboats may generate occasional noise from safety horns and vessel motors but such noises are considered part of the existing environment (routine and commonplace) in Pearl Harbor as large vessels are fueled or deliver fuel at this pier on average fourteen times per month.

- Road Transportation: Relocation of fuel from RHBFSF would not occur with road vehicles for the reasons described in Table 2.4-1. The process would be managed by existing workforce where no increase in daily vehicle trips on Oahu are expected.
- Socioeconomics: Fuel relocation would occur within the existing DoD fuel supply chain. Any relocation or commercial sale of the fuel would be conducted within existing DLA acquisition regulations and would not affect local economies on Oahu or potential receiving locations. Additionally, any commercial sale under the Proposed Action would comprise a minor Federal revenue stream within the DoD when compared to the DLA's annual 3.4 billion gallons of net petroleum sales (DLA, 2022).
- Environmental Justice: Defueling and relocation of fuel from RHBFSF would use existing infrastructure and fueling processes on JBPHH. Relocated fuels would be delivered to existing defense fuel support points in the U.S. or overseas or existing commercial fuel storage facilities. The process would not introduce environmental impacts to low-income or minority populations.
- Climate Change/Resiliency: Defueling and relocation of fuel from RHBFSF would be a one-time action (albeit over the course of several months) limited to a maximum of eleven tanker transits. No new facilities or infrastructure would be constructed as part of the Proposed Action that would require consideration of the effects of climate change. Emissions of greenhouse gases (GHGs) are analyzed under Air Quality and Greenhouse Gases Section 3.5.

3.1 PUBLIC HEALTH AND SAFETY

This discussion of public health and safety includes consideration for any activities, occurrences, or operations that have the potential to affect the safety, well-being, or health of members of the public. A safe environment is one in which there is no, or optimally reduced, potential for death, serious bodily injury or illness, or property damage. The primary goal is to identify and prevent potential accidents or impacts on the general public. Public health and safety risks considered in this EA/OEA pertain to community emergency services, workforce safety, and environmental health and safety risks to children and the general public.

Community emergency services are organizations which ensure public safety and health by addressing different emergencies. The three main emergency service functions include police, fire and rescue service, and emergency medical service.

Environmental health and safety risks to children are defined as those that are attributable to products or substances a child is likely to come into contact with or ingest, such as air, food, water, soil, and products that children use or to which they are exposed. Safety risks to children may also include physical hazards from vehicles and moving equipment, access to attractive nuisances (e.g., construction site), or disruptive noise.

3.1.1 Regulatory Setting

The regulatory setting for public health and safety includes laws and regulations pertaining to the transportation and treatment of hazardous materials and waste exposure, contaminants in the air and water, noise pollution, workforce safety, and the health and safety of children and vulnerable populations.

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires federal agencies to "make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."

3.1.2 Affected Environment

The "region of influence" (ROI), or area where impacts were assumed likely to occur, for the public health and safety analysis includes areas at JBPHH where the Proposed Action would take place. This includes areas of fueling infrastructure, the fueling pier, and the tanker transit routes in Pearl Harbor. There are no residential areas included in the ROI.

JBPHH is a secure military installation, with access limited to military personnel, civilian employees, contractors, and military families. The public is allowed access to JBPHH Main Base for specific purposes (e.g., special events, media coverage, visiting houseguests), but entry requires a background check and a sponsor. The public can access the nearby Pearl Harbor National Memorial, the USS Arizona Memorial, the Battleship Missouri Memorial, and the Pearl Harbor Aviation Museum, but public access does not include the ROI. JBPHH security would prevent the public and children from accessing areas of the ROI including the UGPH, fueling infrastructure, and the fueling pier. Emergency services, including fire, health, and security, are provided by the trained military and civilian staff at JBPHH.

Impacts to public health related to underground sources of drinking water were considered for communities of Oahu that receive drinking water pumped from the Waimalu and Moanalua aquifers, which are located near RHBFSF (Figure 3.1-1). About 99 percent of Hawaii's domestic water supply comes from groundwater sources (USGS, 2016). Section 3.2.2.1 provides additional details on groundwater near RHBFSF.

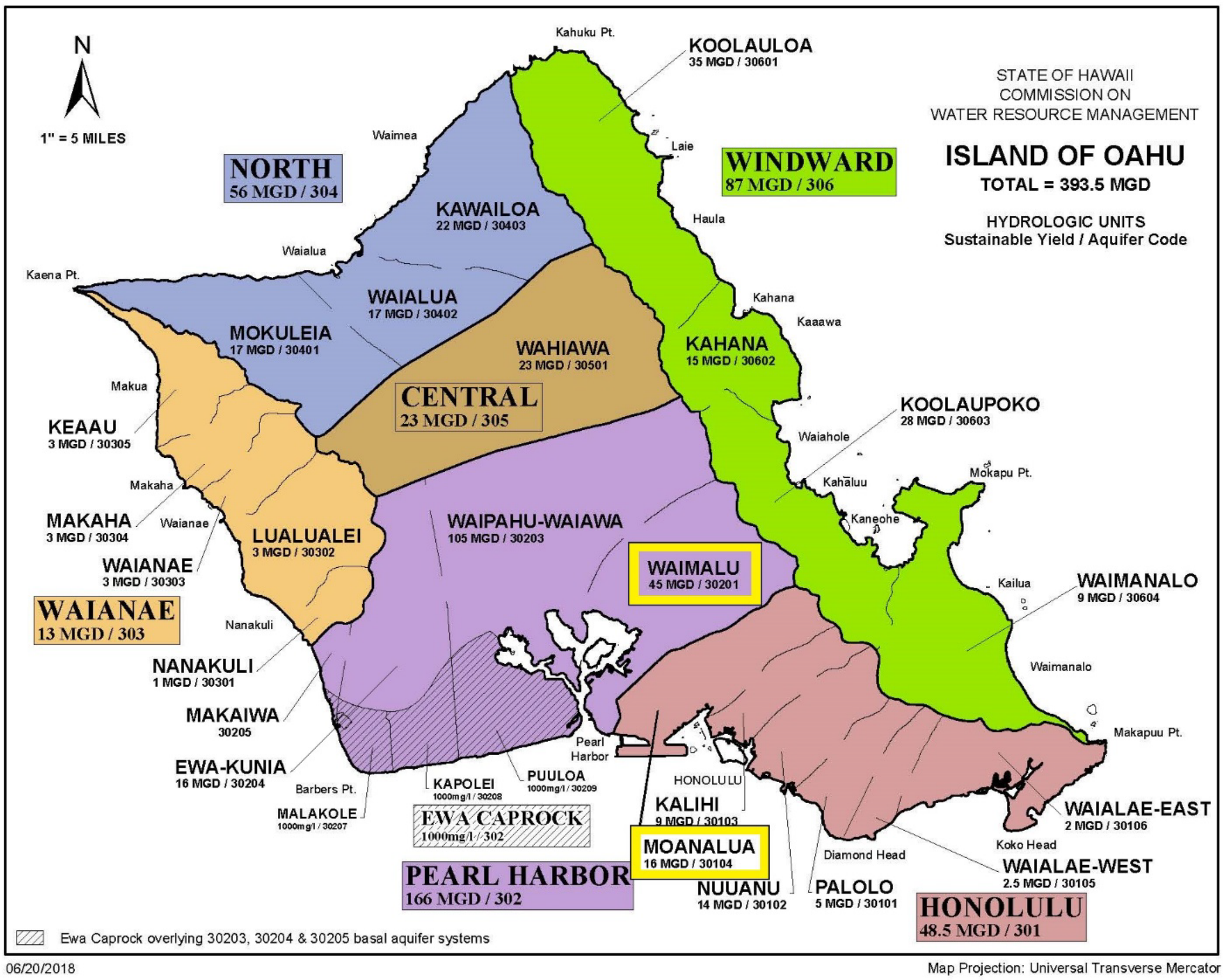

Figure 3.1-1. Waimalu and Moanalua Aquifer Location

Public health and safety impacts were not assumed likely to occur at the potential receiving locations because fuel deliveries to these locations would occur in lieu of routine or planned fuel supply deliveries. Therefore, the Proposed Action would not affect the safety, well-being, or health of children or other members of the public at these locations.

3.1.3 Environmental Consequences

The public health and safety analysis addresses issues related to the health and well-being of the public in the ROI. Specifically, this section provides information on hazards associated with implementation of the Proposed Action that could affect people living, working, or recreating in the ROI.

Potential risks to public health and safety that may occur as a result of the action alternatives include increased demand on emergency services, increased potential for occupational accidents, and increased vessel traffic and potential for vessel accidents. Impacts related to the potential for worker exposure to hazardous substances (e.g., fuel) are discussed in Section 3.4. Impacts related to air quality are discussed in Section 3.5.

Long-term beneficial effects to public health that were considered include the reduced potential for impacts to underground sources of drinking water as a result of RHBFSF defueling and follow-on actions including closure.

Ambient noise resulting from the Proposed Action would not be perceivable by local residential areas. Tanker ships are fueled by gravity, the fueling transfer process does not generate noise levels perceptible to local residential areas where children would be present. The arrival of tankers and use of tugboats may generate occasional noise from safety horns and vessel motors, but such noises are considered part of the existing environment in Pearl Harbor.

Security measures in place at JBPHH would prevent children from accessing areas of the ROI where they may be exposed to environmental health and safety risks including hazardous substances or physical hazards. Therefore, these effects to children were not further analyzed.

Drinking Water Contamination

The potential for impacts to human health through contamination of Oahu drinking water supplies was also considered. Exposure to water containing petroleum can cause adverse effects on the respiratory system, gastrointestinal tract, nervous system, skin, and ears, nose, and throat (Troeschel et al., 2022). In addition to the adverse physical health effects, people affected by previous contaminated drinking water incidents reported mental health symptoms such as anxiety, agitation/irritability, and difficulty sleeping (Troeschel et al., 2022).

The ROI at JBPHH and the potential fuel receiving location at West Oahu (Campbell Industrial Park) are both located below the Underground Injection Control (UIC) line, meaning that these locations are outside of areas identified by DOH as underground sources of drinking water. Practically, this means that a potential fuel spill at the JBPHH fueling pier or the West Oahu receiving location would not impact underground aquifers that are used as sources of drinking water. For maps depicting areas below the UIC line, see: https://health.hawaii.gov/sdwb/underground-injection-control-program/.

A large fuel spill during defueling from the RHBFSF tanks or pipelines, or from the pipeline in the underground tunnel connecting RHBFSF to the UGPH, could potentially contaminate underground sources of drinking water. DoD developed a Red Hill Defueling Plan and Supplements 1A, 1B, and 2 to address system deficiencies, identify repairs, develop defueling procedures, and implement spill prevention measures. The plan also includes preparedness measures for spill containment and response. Measures required by this plan will reduce the likelihood and severity of a spill during the defueling operation so that the risk of a spill impacting underground sources of drinking water would be considered highly unlikely. The EPA and DOH are providing oversight of the defueling process. This phase of the defueling operation is considered nondiscretionary (see Section 1.5), and is not considered in the analysis of action alternatives. To view the Red Hill Defueling Plan and Supplements 1A, 1B, and 2 see: https://cnrh.cnic.navy.mil/Operations-and-Management/Red-Hill/DoD-RHBFSF-Defuel-Plan/.

3.1.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, flowable fuel at RHBFSF would be drawn down over a period of approximately ten to fourteen months after DOH approval of the gravity-based defueling operation. Fuel from RHBFSF would be transferred to the UTF or to fueling piers at JBPHH through existing infrastructure. Fuel from the UTF can then be sent by pipeline to Hickam Field, fuel loading piers, and truck loading racks for distribution to customary defense customers for consumption.

A low demand for JP-5 fuel at JBPHH may require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program to increase the rate of JP-5 consumption. Additionally, JP-5 may be regraded to F-24 or F-76 for consumption at JBPHH. Existing locations within the DoD fuel supply chain that may receive relocated fuel from RHBFSF as part of Alternatives 2 and 3 would continue to receive their regular fuel deliveries by tanker ships from other fuel sources.

Under the No Action Alternative, there would be no change to the demand on emergency services or potential for occupational accidents because these actions represent routine operations at JBPHH. There may be a small increase in vessel traffic in Pearl Harbor if JP-5 stock rotation was required due to low demand for JP-5 fuel at JBPHH. This increase in vessel traffic would be an average of less than one vessel movement per month. There are typically about 2,000 annual naval vessel and submarine movements (i.e., one-way trips). Therefore, the JP-5 stock rotation vessels would account for a less than one percent increase in vessel traffic, and could be considered negligible. The No Action Alternative would have no significant adverse effects on public health and safety.

The No Action Alternative would have a long-term beneficial impact on underground sources of drinking water because it would ultimately defuel the RHBFSF tanks. Flowable fuel would be removed over the course of an estimated ten to fourteen month period from the time DOH authorizes defueling, thereby eliminating the risk of fuel spills from the facility that could contaminate Oahu drinking water supplies.

3.1.3.2 Alternative 2: Relocation

Alternative 2 is the relocation of flowable fuel from RHBFSF by tanker ships to existing locations within the DoD fuel supply chain by ocean transit.

Under Alternative 2, a minimal increase of demand for emergency services may result from the addition of approximately ten workers per shift during the defueling and tanker ship loading operations. The increase in operations has the potential to result in an increase in injuries from workplace accidents and therefore could increase demand on emergency services, resulting in slower response times for the general public. However, the added demand would be extremely small and not likely to have measurable impacts to existing service capacity.

Compliance with occupational safety and health regulations, standards, and instructions would minimize the potential for workplace accidents. Tanker loading would be accomplished by a team of trained military and civilian workers from FLC and Port Operations. Workers would moor the ship at the fueling pier, deploy oil-absorbent booms around the ship, connect/disconnect the flexible hoses from the pipeline to the tanker ship, and perform various inspections throughout the fuel loading process. The use of a hoist, hand tools, and power tools would be required to lift and connect the flexible hose to the tanker. Common workplace hazards associated with this type of maritime work include slips, trips, and falls, machinery and equipment hazards (e.g., hoist), hazardous chemicals, and fire hazards (OSHA, 2023). If potentially unsafe conditions such as adverse weather or worker fatigue are encountered during fuel loading operations, the PIC has the authority to cease operations (Table 2.5-1, BMP-5). Additionally, trained safety, medical, and environmental health professionals from the JTF-RH Quality Assurance directorate will provide secondary oversight throughout the defueling operation. The use of BMPs, training, and adherence to occupational safety and health regulations, standards, and instructions would reduce the likelihood and severity of potential workplace accidents.

Under Alternative 2, there would be an increase of up four additional vessel movements per week (i.e., two round-trip transits) in Pearl Harbor. There are typically about 2,000 annual naval vessel and submarine movements in Pearl Harbor. The additional vessels would account for an approximate ten percent increase in vessel traffic during the defueling operation. BMPs including notifying the Harbormaster in advance of tanker arrival/departure, maintaining communications with the Harbormaster, and use of tugboats to assist tankers would reduce the risk of vessel accidents (BMP-1).

Tanker ships would transit through established shipping lanes to industrial port facilities that routinely receive fuel deliveries by tanker ship. With Alternative 2, there would be no change to public health or safety risk at receiving locations because fuel deliveries from RHBFSF would occur in lieu of routine or planned fuel supply deliveries by similar type tanker ships.

Overall, with the use of BMPs and adherence to procedures, Alternative 2 would have less than significant adverse effects to public health and safety.

Alternative 2 would have a long-term beneficial impact on underground sources of drinking water because it would facilitate the expeditious defueling of RHBFSF in approximately three to four months from the time DOH authorizes defueling, thereby eliminating the risk of fuel spills from the facility that could harm human health through contamination of Oahu drinking water supplies.

3.1.3.3 Alternative 3: Commercial Sale and Relocation

Alternative 3 is the commercial sale of a portion of the approximately 106 million gallons of flowable fuel from RHBFSF combined with the relocation of the remaining portion of the fuel to existing locations within the DoD fuel supply chain by ocean transit. A maximum of eleven tanker ships would be required to receive all of the flowable fuel from RHBFSF.

With Alternative 3, up to ten tanker loads of fuel from RHBFSF may be commercially sold in accordance with Section 2922e of Title 10, USC, which authorizes the sale of certain fuel sources. Sale of fuel would need to coincide with gravity-based defueling schedule. Therefore, the amount of fuel sold would be determined by commercial interest and purchasers' ability to receive the fuel at the time of gravity-based defueling. Fuel sold commercially would be loaded onto purchasers' commercially-operated tanker ship(s) using the same pace and procedure as Alternative 2.

Under Alternative 3, the impacts to public health and safety would be the same as described for Alternative 2. The same number and type of tanker ships would transit through Pearl Harbor to the JBPHH fueling pier to receive fuel. Tankers would be loaded using the same workforce and procedure as Alternative 2; therefore, the potential for increase in demand for emergency services, workplace accidents, and vessel traffic and would be the same.

Overall, with the use of BMPs and adherence to procedures, Alternative 3 would have less than significant adverse effects to public health and safety.

Alternative 3 would have the same a long-term beneficial impact on underground sources of drinking water as Alternative 2 because it would also facilitate the expeditious defueling of RHBFSF in approximately three to four months from the time DOH authorizes defueling. This would eliminate the risk of fuel spills from the facility that could harm human health through contamination of Oahu drinking water supplies.

3.2 WATER RESOURCES

Water resources include marine waters, groundwater, surface water, wetlands, floodplains, and drainages. This section identifies the existing condition of water resources and analyzes the impacts of the Proposed Action on those resources. Biological resources associated with marine waters are discussed in the Marine Biological Resources Section.

The Proposed Action is centered on the defueling of the RHBFSF through the base's existing pipelines, transfer of that fuel to tanker ships at a pier on JBPHH, and transit of the fuel to other locations. The chief environmental concern related to water resources is the potential for fuel spills at any point in the process, where fuel could potentially further contaminate water resources, including drinking water sources. This analysis will describe the affected environment and analyze the potential for adverse effects for each alternative.

3.2.1 Regulatory Setting

3.2.1.1 Water Quality

The DOH Clean Water Branch (CWB) is the state agency responsible for protecting and restoring surface water resources for human and environmental health. The CWB implements surface water pollution control programs delegated from the EPA in support of the Clean Water Act (CWA) and the State's goals to protect and restore surface waters to fishable and swimmable standards for the purpose of protecting human and environmental health. The components addressed within the CWB include Water Quality Standards, Enforcement and Compliance, National Pollutant Discharge Elimination System (NPDES) permits, Water Quality Certifications, surface water quality monitoring and assessment, Total Maximum Daily Loads, and Polluted Runoff Control. These programs are intended to work in concert to ensure Hawaii's surface water resources are protected and restored. In addition, the DOH also addresses CWA components within the Safe Drinking Water Branch, which monitors and protects drinking water resources, and the Wastewater Branch, which administers engineering functions related to water pollution control and wastewater systems and treatment (DOH, 2018).

3.2.1.2 Underground Storage Tanks

Underground storage tanks (USTs) are regulated by the EPA under 42 USC Chapter 82, Subchapter IX. In 1988, EPA published technical requirements for USTs containing petroleum or hazardous substances defined under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). These requirements included leak detection, leak preventions, and corrective action for all USTs containing regulated substances. The UST provisions of the Energy Policy Act of 2005 also focused on preventing releases, including additional provisions regarding inspections, operator training, delivery prohibition, secondary containment and financial responsibility (EPA, 2023b). In 2015, EPA strengthened these regulations and included the state approval program. The State of Hawaii has an approved UST program and it is the lead implementing agency for the UST program in Hawaii with broad statutory authority to regulate the installation, operation, maintenance, and closure of USTs, as well as UST releases under Hawaii Revised Statutes (HRS) 342L-1 through 342L-53.

3.2.1.3 Preparation for Defueling Pursuant to DOH and EPA Orders

As discussed in Section 1.3, JTF-RH and DLA must complete defueling of the RHBFSF pursuant to DOH and EPA orders. The JTF-RH is overseeing all necessary repairs, modifications and enhancements to the Red Hill infrastructure to reduce risk of spills or accidents during the defueling phase. Independent third-party contractors compiled a list of 253 repairs, enhancements and modifications which was submitted by the Navy to the DOH to address the RHBFSF, the UGPH, and entire length of pipeline including at the line at the Navy's pier. This list was made available on the DOH website and includes repairs including but not limited to: replacing and repairing pipe components, valves, fittings and seals; inspecting and repairing dents in pipes; adding or repairing pipe supports and braces; and replacing deficient pressure gauges (DOH, 2022b). A third-party quality validator is reviewing all repairs to ensure they are done correctly. DOH conditionally approved DoD's Third-Party Quality Validation Plan on January 27, 2023. As of May 15, 2023, 214 repairs were successfully accomplished (JTF-RH, 2023). Progress and approvals of these repairs are posted on the ‘Defueling Dashboard’ on the JTF-RH website.

Table 2.5-1 describes best management practices that JTF-RH, DLA, and defueling operations staff would follow to avoid or minimize potential fuel spills during fuel transfers. A Spill Drill, subject to a plan approved by the EPA and DOH, will be conducted in mid-2023 to evaluate the JTF-RH’s methods and identify any areas for improvement. The results of the Spill Drill will be incorporated into the JTF-RH’s gravity-based defueling operations plan and defuel Operator Training (DOH, 2023).

3.2.1.4 International Marine Pollution Regulations

The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollutions of the marine environment from ships from operational or accidental causes. MARPOL violations can lead to criminal and civil penalties and fines. In 1992, MARPOL Annex I made it mandatory for large tankers to be fitted with double hulls with few exceptions. Annex II regulates control of pollution by noxious liquid substances in bulk. Annex III regulates prevention of pollution by harmful substances carried by sea in packaged form. Annex VI regulates pollution by sewage from ships. Annex V prevents pollution by garbage from ships and Annex VI prevents air pollution from ships.

3.2.2 Affected Environment

The RHBFSF is located in a ridge of volcanic rock known as Red Hill on the western edge (leeward side) of the Koolau Mountains that divides South Halawa Valley and Moanalua Valley. The site is surrounded by Federal, State, and residential property. The majority of the surface topography of the site lies at an elevation of approximately 200 to 500 ft. above mean sea level. The Red Hill ridge extends southwesterly toward JBPHH and provides protective cover not only for the underground fuel storage facility, but also for the long tunnel that connects the fuel storage facility with the UGPH.

3.2.2.1 Groundwater near RHBFSF

The Waimalu and Moanalua Aquifers, which are underground sources of drinking water, are located near the facility (Figure 3.2-1). The Waimalu Aquifer is part of the Pearl Harbor regional aquifers system and covers an area of 15,193 acres. The Moanalua Aquifer is part of the Honolulu regional aquifers system and covers an area of 4,442 acres (EPA, 2022a) (Figure 3.2-2).

The Navy, the U.S. Geological Survey, the Hawaii State Commission on Water Resource Management, DOH, the University of Hawaii, EPA, and the Honolulu Board of Water Supply have been studying groundwater flow below and surrounding the RHBFSF to understand the regional hydrogeology in order to assess transport of contamination relative to potable water wells in the area. While remediation is not the subject of the Proposed Action (this phase will be addressed in future actions), the flow rates and direction of groundwater in the vicinity of RHBFSF are relevant to potential spills that could occur during defueling.

Fuel contamination from RHBFSF poses a risk to public drinking water sources including three major sources that are located within 1.5 miles of the facility (Figure 3.2-1). Two of the most productive potable water sources are Maui-type wells (skimming tunnels) that draw water from the water table surface.

Because fuels are Light Non-aqueous Phase Liquids (LNAPL), they ‘float’ and move across the aquifer surface, fuel-contaminated water can potentially enter these skimming wells (WRRC, 2022). The geology in the area is challenging and complex in terms of assessing groundwater flow, as there are disjointed layers of different rock and soil types with very different permeabilities, thicknesses, and orientations. Compounding the difficulty, fuel has both free phase LNAPL (floating) and dissolved phase components, resulting in contaminants that can move throughout groundwater at different depths (WRRC, 2022). The Navy, the U.S. Geological Survey, the Hawaii State Commission on Water Resource Management, DOH, the University of Hawaii, EPA, and the Honolulu Board of Water Supply are all actively working to gain a better understanding of the groundwater flow in this area.

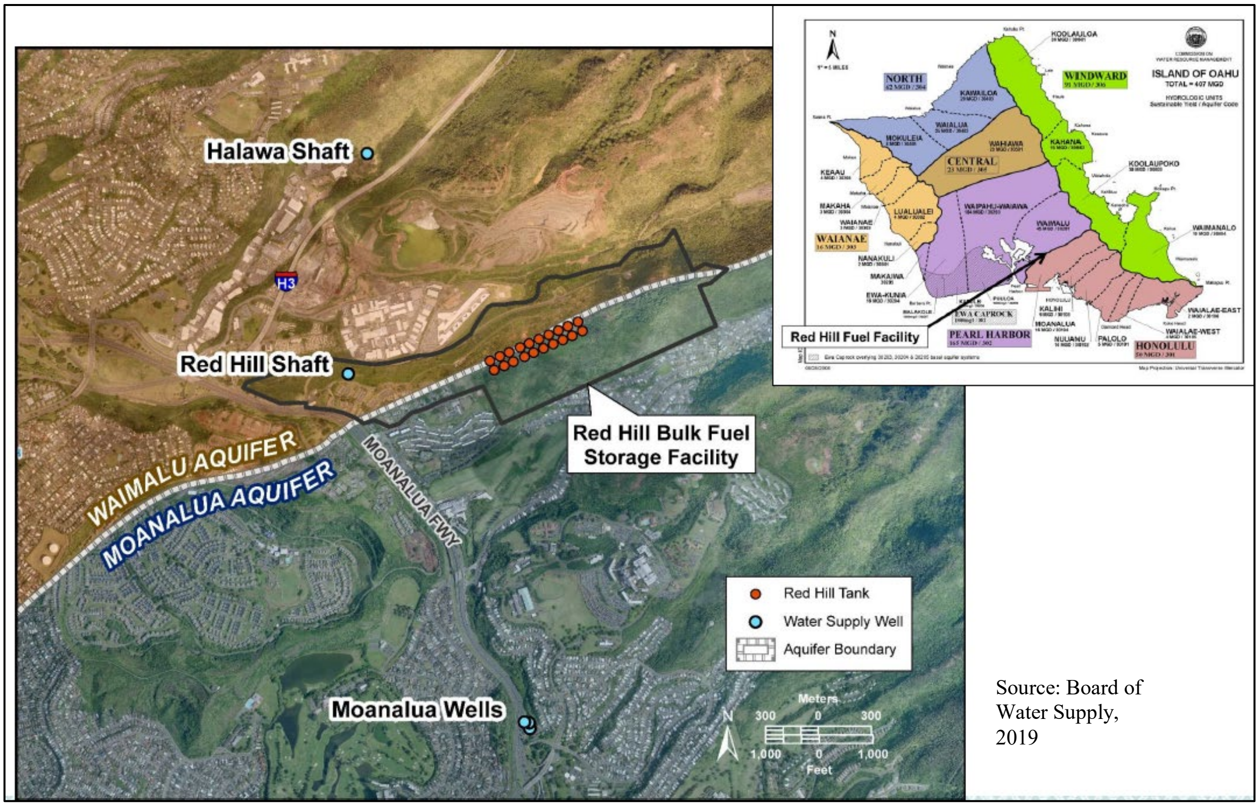

Figure 3.2-1. Aquifer Systems Near RHBFSF

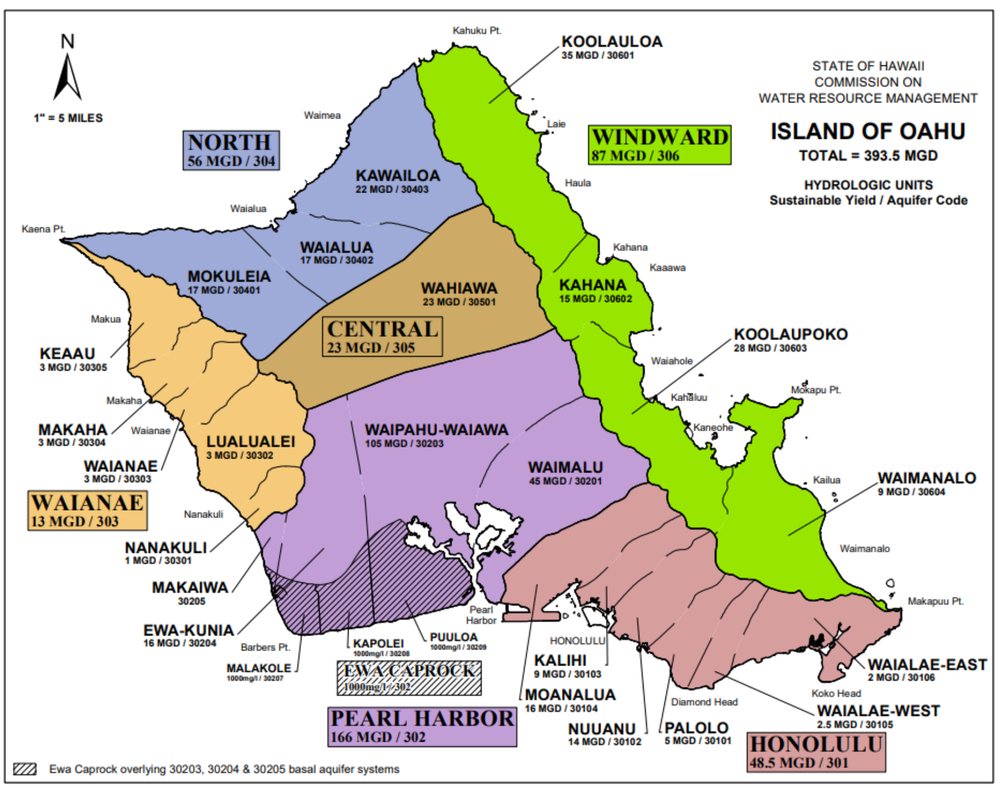

Figure 3.2-2. Oahu Regional Hydrologic Units

3.2.2.2 Surface Water and Wetlands near RHBFSF

The Halawa Stream runs relatively east-west along the northern edge of the RHBFSF. It ultimately flows directly west to Pearl Harbor adjacent to the JBPHH pier that will be used to load tanker ships. According to the State's 2020 assessment (DOH, 2020), this stream is considered impaired because water quality standards for total nitrogen, nitrate and nitrite-nitrogen, total phosphorus and turbidity are not being attained. The Moanalua Stream runs along the southern edge of RHBFSF and flows south to Keehi Lagoon east of the airport. It is impaired for total nitrogen, turbidity and trash.

The pipeline runs underground in a tunnel from RHBFSF to the UGPH. Along that route, the closest wetland (within the JBPHH Makalapa housing area) is approximately 950 ft. away. The only above-ground piping along the route occurs after the UGPH for approximately 700 ft. along a largely paved area that is 900 ft. from the harbor. Once at the pier, fuel lines run along the pier in a concrete trench (secondary containment) covered with steel grating.

3.2.2.3 Pearl Harbor Estuary and Marine Waters

Pearl Harbor is a navigable water of the United States and receives saltwater input from the Pacific Ocean via Mamala Bay and the Main Channel of Pearl Harbor. As is typical of an estuarine environment, water in the harbor is more saline nearest the ocean and less saline away from the ocean. DOH divides Pearl Harbor into two individual assessment units, one as "Pearl Harbor Estuary" (essentially Pearl Harbor) and another as "Pearl Harbor coastal water body" (Mamala Bay), and each has individual water quality standards. HDOH classifies the waters of the harbor as an inland estuary, Class 2. The objective/definition of a Class 2-designated water is to protect its use for recreational purposes, propagation of fish, shellfish, and other aquatic life, and agricultural and industrial water supplies, shipping, and navigation (DOH, 2020).

Pearl Harbor naturally experiences sediment fluctuations from storms, tides, floods, winds, waves, and currents. These natural oceanic events can mobilize sediment and carry it in suspension over great distances (Erftemeijer et al., 2012). As events subside, sediment will settle out of suspension and deposit in new locations. The Pearl Harbor estuary is a working harbor, with vessel movements and industrial waterfront activities occurring daily that result in increased levels of turbidity. The Pearl Harbor Estuary lochs are areas with naturally persistent levels of high turbidity due to regularly occurring vessel traffic and the presence of unconsolidated, fine silt on the bottom fed by rivers, streams, and storm water conveyances. Vessel transit occurs at high levels every day, with the majority of vessel traffic involving commissioned Navy ships and a small fleet of recreational crafts. Transiting-vessels resuspend benthic sediments by creating turbulence in the water column and marine bottom environment with the vessel's propellers. An effect known as "propeller wash". Resuspension is limited to localized scouring from maneuvering vessels operating at high power, with re-suspended sediments most likely settling at or near the point of disturbance. Based on typical vessel traffic routes within the Main Channel of Pearl Harbor, the rate of sediment resuspension is estimated to be approximately 52 tons per day (Navy, 2018).

Additionally, the watershed surrounding the Pearl Harbor Estuary regularly experiences heavy rain events. Sediment-laden runoff from disturbed upland areas affected by urbanization, commercial development, and agriculture also increases turbidity, resulting in increased benthic sedimentation. In July 2020, DOH listed both Pearl Harbor assessment units as impaired water bodies for failing to attain their respective water quality standards. Water chemistry surveys were conducted by Naval Facilities Engineering Systems Command (NAVFAC) Pacific in Pearl Harbor in 2016–2017 and 2018–2019 during a variety of weather and rainfall conditions (storm event sampling was added during the last two years of surveys in 2018 and 2019). Water quality constituents that were evaluated were consistent with the DOH report from July 2020. Comparison of the water chemistry data collected during the study to DOH-specific water quality standard criteria indicates that overall, the waters of Pearl Harbor are within attainment of DOH water quality standards (at the time of the study). The only instances of non-attainment are in surface waters immediately following storm events. These are limited to the upper 6.6 ft. to 9.8 ft. of the water column in the Main Channel and do not extend beyond the mouth of the harbor (NAVFAC PAC, 2020). The DOH 2020 Integrate Report acknowledges that additional data are needed to evaluate water quality within Pearl Harbor (DOH, 2020). Benthic sediments containing COCs (Contaminants of Concern) (including copper, lead, mercury, and total Polychlorinated Biphenyls (PCBs) area also present in CERCLA sediments within the Pearl Harbor Sediment Site.

3.2.2.4 Water Quality at Receiving Locations

Most of the potential receiving locations for the fuel (described in Section 2.3.2) are located in industrialized areas adjacent to water bodies considered impaired with regards to water quality. This section describes the most current water quality status at receiving locations and potential stressors in the region that contribute to water quality effects.

West Oahu, Hawaii

Fuel transfer would occur through an offshore mooring that transfers oil and refined products through a hose between a buoy and commercial refinery/storage facilities onshore. There is no published water quality data for the offshore waters in this area. A fuel spill that occurred as a result of a hose failure in 1998 was estimated at approximately 4,900 gallons. This spill resulted in tarballs and dead oiled birds at Kauai's Barking Sands, Polihale, Nukoli, Fujii and Kipu Kai beaches. The US Coast Guard, Tesoro and various spill response contractors conducted the cleanup on Kauai. Moreover, Tesoro conducted restoration and paid natural resource damages pursuant to a 2001 Consent Decree (USGS, 2023). This type of spill is not reasonably foreseeable, but is described here to indicate the potential for natural resources damages that could occur if a similar fuel spill were to happen as a result of the Proposed Action. It is not a reflection on the current water quality at the West Oahu oil transfer buoy. Additionally, the Honouliuli wastewater treatment plant, near the community of Ewa Gentry, treats up to 51 million gallons of raw wastewater daily. Through a series of treatment systems, approximately half of the 2021 wastewater was treated and beneficially reused or distributed to recharge the aquifer. Water not reused is discharged via a Barbers Point deep ocean outfall (about 200 ft. deep and 9,300 ft. offshore) (Honolulu, 2023).

While the State does not publish water quality data for the off-shore area around the fuel mooring at West Oahu, the presence of fuel storage, a refinery, and wastewater treatment plant in the vicinity make the waters in the area susceptible to releases that can impair water quality.

Point Loma, California (San Diego Bay)

The DFSP at Point Loma lies about 1.5 miles north of the mouth of San Diego Bay and is directly across from the airfield at Naval Air Station North Island. San Diego Bay is listed as impaired for fishing and shellfish harvesting by the State with issues identified as mercury, PCBs and Toxic Organic Chemicals (EPA, 2022b). Probable sources contributing to its impairment include but are not limited to: accidental spills, atmospheric deposition of toxics, illegal dumps or other inappropriate waste disposal, and urban runoff/storm sewers.

Selby, California (San Pablo Bay)

San Pablo Bay is listed as impaired for aquatic life and fish/shellfish consumption by the State with issues identified as dioxins, mercury, metals, nuisance plants or animals (Foreign), PCBs, and pesticides. The probable sources contributed to impairment are listed as unknown (EPA, 2022c).

Vancouver, Washington (Columbia River)

The Hayden Island-Columbia River is listed as impaired for fish and aquatic life, fishing, private domestic water supply, and public domestic water supply with issues identified as temperature and total dissolved gas, pesticides, dioxins, PCBs and polycyclic aromatic hydrocarbons (EPA, 2022d).

Manchester, Washington (Puget Sound)

According to the Washington Geospatial Open Data Portal, the water quality adjacent to the Manchester Defense Fuel Supply Port is listed as impaired for dissolved oxygen; another zone to the northeast is listed as impaired for bacteria (Washington State, 2023). Approximately 3,300 ft. to the north of the Manchester Defense Fuel Supply Point is a marine protected area called the Orchard Rocks Conservation Area. This area is closed to fishing, harvesting, and possession of fish and shellfish. Closure does not affect the harvest of clams, oysters, and mussels by tideland owners and their families. The natural bedrock and boulders provide habitats for rock associated fish and invertebrate species. Dominant invertebrates include red rock crab, spider crabs, red sea cucumber, and orange sea cucumber. Harbor seals frequently visit the site and are often seen hauled out on the exposed rocks at low tide. California sea lions are also commonly observed at the site and may be seen hauled out on nearby navigational buoys (Carta, 2023).

Sasebo, Japan (Sasebo Bay)

Sasebo Port is a large deep-water port located on the western coast of Kyushu, Japan’s third largest island. Aside from the naval berths, the port area is home to numerous heavy industries and also has berths for tanker operations. It is a busy fishing and commercial port, and it is home to shipbuilding and related industries that dominate the local economy. Approximately 200 vessels visit the port annually.

Subic Bay, Philippines

Subic Bay is a bay on the west coast of the island of Luzon in the Philippines, about 62 miles northwest of Manila Bay. Its shores were formerly the site of a major United States Navy facility, U.S. Naval Base Subic Bay, now an industrial and commercial area known as the Subic Bay Freeport Zone. Fuel transfer at the Subic Bay Freeport Zone would occur at the Port POL (Petroleum, Oil, Lubricants) Pier.

Philippine maritime territorial waters cover about 85 million square miles, wherein 103,000 square miles are coastal waters and 747 million square miles are oceanic waters within the exclusive economic zone.

The Philippines has one of the biggest plastic pollutant loads on the planet, with 0.28 to 0.75 million tons of plastic escaping into the waters each year from coastal locations in Manila Bay together with hundreds of thousands of tons of plastic waste that are dumped in the country’s rivers (Filipenco, 2023). Water quality in Subic Bay is highly impaired by partially treated sewage, nutrient inflows from changes in land use, and inadequate treatment of industrial wastes.

Port of Singapore

The Port of Singapore is currently the world's second-busiest port in terms of total shipping tonnage, it also transships a fifth of the world's shipping containers, half of the world's annual supply of crude oil, and is the world's busiest transshipment port.

Singapore has about 232 square miles of territorial seas, with about 3.7 square miles of coral reef, 2.4 square miles of mangroves, and about 2 square miles of mud flats. Over the past century, Singapore has undertaken major projects to expand the main island and protect its shores from storms and rising seas. Land reclamation and island building projects have led to the destruction of more than 80 percent of mangroves and associated wetlands bordering the island. This activity has led to high levels of pollution and suspended sediment impairment of surrounding nearshore waters.

Aquaculture and shipping are the main sources of contaminant emission into offshore territorial waters. Nutrient inputs from nearshore aquaculture operations likely contributes to increases in eutrophication. Shipping activities (mainly the wake and propeller wash from the passage of large vessels) and dredging for channel maintenance mobilize sediments, increasing turbidity.

Darwin, Australia

According to the Darwin Harbour Water Quality Report of 2021, the harbor’s water quality was graded very good in 2021 with an overall grade of ‘A’. An exception was Buffalo Creek Estuary which was impacted mainly by wastewater discharge from the Leanyer-Sanderson sewage treatment plant, which is not located in the vicinity of the potential receiving location. (Northern Territory, 2021).

3.2.2.5 Tanker ship Spill Statistics

The International Tanker Owners Pollution Federation (ITOPF) is a not-for-profit organization established to promote an effective response to marine spills of oil, chemicals and other hazardous substances. The ITOPF published Oil Tanker Spill Statistics 2022 annual report in January 2023 (ITOPF, 2023) that provides data on accidental spills of oil from tankers since 1970. Historically, information from published sources related mostly to large spills, often resulting from collisions, groundings, structural damage, fire or explosions. Over the last two decades, there have been an average of six tanker spills per year. Three of the seven incidents in 2022 were classified as 'large' spills. The total volume of oil lost to the environment from tanker spills in 2022 was approximately 15,000 metric tons. While all oil spills are harmful to the environment, to put this into context, when contrasted with the 2.95 billion metric tons of oil that is transported each year, the 2022 spill quantity equates to 0.0005 percent of all fuel transported annually.

The number of oil spills from tankers has decreased significantly over the last five decades. Spills in excess of 7 metric tons have reduced by over 90 percent since 1970. There has however been little change in the last decade. Figure 3.2-3 provides tanker spill causes from 2010 to 2022.

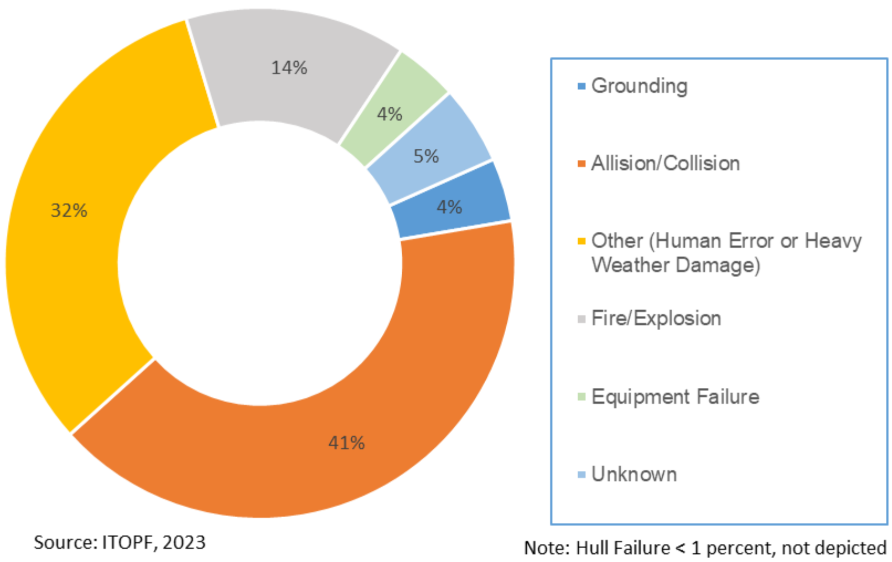

Figure 3.2-3. Causes of Large Tanker Ship Spills, 2010-2022

Trends from the ITOPF Report indicate that spills resulting from grounding and hull failure have declined since 2010 but that allision/collision, equipment failures, and fire/explosion causes have risen in the same time period. During the 1970-2022 reporting period, 50 percent of large spills occurred while the vessel was underway in open water. For spills occurring underway in inland waters or ports/harbors, allisions/collisions and groundings accounted for 99 percent of spills. Approximately 9 percent of large spills occurred during loading and discharging activities which normally take place in ports and oil terminals.

3.2.2.6 Spill Response Capabilities at Receiving Locations

The International Convention on Oil Pollution Preparedness, Response and Co-operation 1990 (OPRC 90) is the international instrument that provides a framework designed to facilitate international co-operation and mutual assistance in preparing for and responding to major oil pollution incidents. The Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS), 2000 extends this regulatory framework to address pollution incidents involving hazardous and noxious substances, i.e. chemicals.

Countries or member states that are party to OPRC 90 and OPRC-HNS Protocol are required to establish a national system for responding to oil and Hazardous and Noxious Substances (HNS) pollution incidents, including a designated national authority, a national operational contact point and a national contingency plan. This needs to be backstopped by a minimum level of response equipment, communications plans, regular training and exercises (IMO, 2023). OPRC 90 and OPRC-HNS provide the mechanism for Parties to request assistance from any other state Party, when faced with a major pollution incident. Overall, member states that are party to OPRC 90 and OPRC-HNS provide verification of their spill response capabilities and are well positioned to handle large spills on their own and can readily request help from other member states when needed.

The U.S. is a member state of OPRC 90 but not OPRC-HNS. In terms of HNS, response bilateral agreements are in place between the U.S. and Canada and the U.S. and Mexico for environmental emergencies.

Of the foreign port countries identified under Alternative 2, all meet the OPRC 90 and HNS Protocols except for the Philippines (e.g., Subic Bay).

A recent account of a tanker ship accident in the Philippines in February 2023 sheds some insight on that nation's spill response resources. On February 28, 2023, the MT Princess Empress was transporting 238,000 gallons of fuel oil when it capsized and sank near Naujan (approximately 150 miles south of Subic Bay, Philippines) (CNN Philippines, 2023). The oil slick is reported to stretch 75 miles resulting in damage to multiple areas and shorelines. The resulting pollution and full fishing ban has wreaked havoc on the coastal villages of the province, which are reliant on fishing and tourism for income. Despite not being a member state to the OPRC 90, other countries have assisted in the cleanup. In response to the Philippine government's request, the U.S. National Response Team (NRT) was activated on March 8, 2023. The NRT is a network of 15 federal agencies providing guidance, assistance, and resources for managing pollution incidents. Overall, the response team for this spill includes the Philippine Coast Guard, the U.S. NRT (including the National Oceanic and Atmospheric Administration, U.S. Navy, U.S. Coast Guard), the Japan Disaster Relief Team, and United States Agency for International Development (NOAA, 2023).

3.2.3 Environmental Consequences

3.2.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, flowable fuel at RHBFSF would be drawn down over a period of approximately ten to fourteen months after DOH approval of the gravity-based defueling operation. Flowable fuel from RHBFSF would be transferred to the UTF or to fueling piers at JBPHH through existing infrastructure. Fuel from the UTF can then be sent by pipeline to Hickam Field, fuel loading piers, and truck loading racks for distribution to customary defense customers for consumption.

A low demand for JP-5 fuel at JBPHH would require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program. Additionally, JP-5 may be regraded to F-24 or F-76 for consumption at JBPHH. Existing locations within the DoD fuel supply chain that may receive relocated fuel from RHBFSF as part of Alternative 1 would continue to receive their regular fuel deliveries by tanker ships from other fuel sources.

The potential for spills within the RHBFSF, pipelines, and UGPH would be reduced through the repairs conducted described in Section 3.2.1.3. While there is no evidence of ongoing releases of fuel from the RHBFSF to the environment, the potential exists for possible releases to occur for a longer period of time (ten to fourteen months) with the No Action Alternative versus Alternatives 2 or 3, which would remove flowable fuel in approximately three to four months from the time DOH authorizes defueling. Essentially, the No Action Alternative would extend the period of time where fuel resides in the tanks, where it could pose additional threat to groundwater and drinking water quality.

The amount of fuel to be transferred to tanker ships from Pearl Harbor for overseas deliveries would likely be substantially less than the amounts proposed under Alternatives 2 and 3. Use of tanker ships may marginally increase potential for spills to affect marine waters when compared to this alternative, which is more likely to affect onshore water resources such as streams, wetlands and aquifers. Potential fuel spills that could be associated with Alternative 1 would likely occur at points of transfer which are generally paved, such as on airfields and truck fuel transfer areas. Transfers of fuel to vessels have greater potential for spills to marine waters (e.g., Pearl Harbor) then land-based fuel transfers; however, vessel fueling would follow standard operating procedures and BMPs described in Table 2.5-1 to reduce the risk of spills. Vessels receiving fuel at the JBPHH pier would be surrounded by oil-absorbent booms to contain and capture any spills that might occur. Additionally, all tankers would be towed by tug within Pearl Harbor to prevent the allision/collision; allision/collision is statistically the highest cause of tanker spills worldwide.

It is important to note that fuel transfer and use would occur at typical defense customer distribution points using non-RHBFSF stored fuel in the absence of Alternative 1, as these are routine actions. JBPHH has fueling and spill response standard operating procedures to address potential spills and to limit their effects to the environment.

With the use of BMPs and adherence to provisions of the DOH Emergency Orders, Alternative 1 would have less than significant effects to water resources.

3.2.3.2 Alternative 2: Relocation

The expeditious gravity-based defueling of RHBFSF under Alternative 2 would reduce the potential for releases from the RHBFSF that could further contaminate groundwater sources and drinking water supplies. Alternative 2 would be the first step in the process DoD would take to close the RHBFSF as a fuel storage facility and to remediate groundwater.

Under Alternative 2, potential for releases within the RHBFSF, pipelines, and UGPH would be reduced through the repairs conducted described in Section 3.2.1.3.

Use of tanker ships to relocate flowable fuel from RHBFSF may marginally increase potential for spills to affect marine waters on Oahu, in international waters, and at receiving locations. Vessel fueling at the JBPHH pier would follow standard operating procedures and BMPs described in Table 2.5-1 to reduce the risk of spills. Vessels at the JBPHH pier would be surrounded by oil-absorbent booms to contain and capture any spills that might occur until spill response teams arrive on the scene. Additionally, all tankers would be towed by tug within Pearl Harbor to prevent the allision/collision; allision/collision is statistically the highest cause of tanker spills worldwide. The likelihood of a tanker spill is extremely low (0.0005 percent historic spill rate worldwide) based on tanker spill statistics provided by ITOPF (see Section 3.3.2.5). However, any tanker spill has the potential to cause a high-volume, extended duration (i.e., catastrophic) of fuel into the marine environment. Of the possible causes of large accidents, hull failure would be unlikely, as fuel vessels must be double-hulled in accordance with MARPOL regulations. The destination ports under this alternative are well-established with adequate channel water depth to avoid potential for grounding. Very busy ports, such as Singapore, may pose a higher potential for collision-related spills, but collisions could be avoided by following appropriate navigation and communication procedures. Root causes of spills such as human error, adverse weather, and fire/explosion can occur more unpredictably. These causes account for nearly half of spill events worldwide since 2010. Vessel operators are required to follow all applicable environmental and safety regulations, which further reduces the likelihood of a catastrophic spill.

There would be no overall risk increase from fuel unloading because fuel deliveries to receiving locations would be in lieu of routine or planned deliveries. On-site teams would respond in the event of a spill at a receiving location. Nearly all receiving locations, with the exception of Darwin, are located in areas with impaired water quality. Potential small spills which could be addressed quickly at any of the receiving locations are unlikely to have a significant adverse effect on water quality. Large spills, although unlikely, could further contaminate and exacerbate existing poor water quality in the port area for weeks or months until the spill and its effects are fully remediated. Receiving locations in the U.S. and other OPRC 90 member states are more likely to have the personnel and equipment available to respond well to spills of all sizes within their waters. Coastal areas where fishing is a primary source of income and subsistence could be especially adversely affected in the event of a large spill. Although the MT Princess Empress accident is only one example, it is probable that if such a large spill occurred under Alternative 2 in the Philippines, the NRT would be activated to assist in the response. Based on tanker spill statistics from ITOPF, the probability of a significant oil spill are very low under this alternative.

Propeller wash from vessels arriving and departing ports could resuspend bottom floor sediments by creating turbulence in the water and bottom environment with the vessel's propellers. Resuspended sediments would create localized turbidity during short periods of time and would likely not cause significant effects to water quality.

Overall, with the use of BMPs for tanker fuel transfer, Alternative 2 would have less than significant effects to water resources.

3.2.3.3 Alternative 3: Commercial Sale and Relocation

Alternative 3 is the commercial sale of a portion of the approximately 106 million gallons of flowable fuel from RHBFSF combined with the relocation of the remaining portion of the fuel to existing locations within the DoD fuel supply chain by ocean transit. A maximum of eleven tanker ships would be required to receive all of the flowable fuel from RHBFSF.

With Alternative 3, up to ten tanker loads of fuel from RHBFSF may be commercially sold in accordance with Section 2922e of Title 10, USC, which authorizes the sale of certain fuel sources. Sale of fuel would need to coincide with defueling schedule. Therefore, the amount of fuel sold would be determined by commercial interest and purchasers' ability to receive the fuel at the time of gravity-based defueling. Fuel sold commercially would be loaded onto purchasers' commercially-operated tanker ship(s) using the same pace and procedure as Alternative 2. The transit route and destination of sold fuel is at the discretion of the non-federal entity purchaser. However, it is likely the destination would be similar to those analyzed under Alternative 2 and the same BMPs would be followed at the JBPHH pier for fuel loading. Commercial tankers used under this alternative would need to be certified as meeting MARPOL safety and environmental requirements.

Use of tanker ships may marginally increase potential for spills to affect marine waters both on Oahu, in international waters, and at receiving locations. Vessel fueling at the JBPHH pier would follow standard operating procedures and BMPs described in Table 2.5-1 to reduce the risk of spills. Vessels at the JBPHH pier would be surrounded by oil-absorbent booms to contain and capture any spills that might occur until spill response teams arrive on the scene. Additionally, all tankers would be towed by tug within Pearl Harbor to prevent the allision/collision; allision/collision is statistically the highest cause of tanker spills worldwide.

While spills from tanker ships is statistically very low, any tanker spill has the potential to be catastrophic and release thousands of gallons of fuel into the marine environment. Of the possible causes of large accidents, hull failure would not be likely, as fuel vessels must be double-hulled in accordance with MARPOL regulations. It is likely the destination ports under this alternative would be well-established with adequate channel water depth to avoid potential for grounding. Very busy ports may pose a higher potential for collision-related spills but collisions could be avoided by following appropriate navigation and communication procedures. Root causes of spills such as human error, adverse weather, and fire/explosion can occur more unpredictably and these causes account for nearly half of spill events worldwide since 2010. Vessel operators would be required to follow all environmental and safety regulations which would reduce factors that could result in catastrophic spills.

Spills at receiving locations would be addressed by their on-site response teams. Small spills which are addressed quickly at any of the receiving locations would likely not have a significant adverse effect on water quality. Large spills, although unlikely, could further contaminate and exacerbate existing poor water quality in the port area for weeks or months until the spill and its effects are fully remediated. Receiving locations in the U.S. and other OPRC 90 member states are more likely to have the personnel and equipment available to respond well to spills of all sizes within their waters. Coastal areas where fishing is a primary source of income and subsistence could be especially adversely affected in the event of a large spill. Statistically, the probability of a significant oil spill are very low under this alternative.

Propeller wash from vessels arriving and departing ports could resuspend bottom floor sediments by creating turbulence in the water and bottom environment with the vessel's propellers. Resuspended sediments would create localized turbidity during short periods of time and would likely not cause significant effects to water quality.

With Alternative 3, the portion of flowable fuel from RHBFSF that is not sold would be relocated to existing locations within the DoD fuel supply chain by ocean transit described under Alternative 2. For this portion of the action, the effects would be the same as those for Alternative 2.

Overall, with the use of BMPs for tanker loading, Alternative 3 would have less than significant effects to water resources.

3.3 MARINE BIOLOGICAL RESOURCES

Biological resources include living, native, or naturalized plant and animal species and the habitats within which they occur. Plant associations are referred to generally as vegetation, and animal species are referred to generally as fauna or wildlife. Habitat can be defined as the resources and conditions present in an area that support a plant or animal. This section addresses potential impacts that could result from the Proposed Action on the following categories of marine biological resources:

- Marine vegetation
- Essential Fish Habitat (EFH)
- Marine fauna (including fishes, coral, and non-coral benthic invertebrates)
- Protected Species (including marine mammals and ESA-listed sea turtles and fishes)

3.3.1 Regulatory Setting

3.3.1.1 Endangered Species Act

The purpose of the ESA is to conserve the ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires federal agencies to consult with the NMFS and the U.S. Fish and Wildlife Service (USFWS) to ensure that any action it authorizes, funds, or carries out in the U.S. or upon the high seas is not likely to jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of critical habitat of such species. JTF-RH and DLA are consulting with NMFS for ESA under Section 7.

Under the ESA, critical habitat is defined as specific geographic areas that contain features essential to the conservation of an endangered or threatened species and that may require special management and protection. Critical habitat may also include areas that are not currently occupied by the species but would be needed for its recovery. Critical habitat cannot be designated on any areas owned, controlled, or designated for use by the DoD where an Integrated Natural Resources Management Plan (INRMP) has been developed that, as determined by the Department of Interior or Department of Commerce Secretary, provides a benefit to the species subject to critical habitat designation.

3.3.1.2 Marine Mammal Protection Act

All marine mammals are protected under the provisions of the Marine Mammal Protection Act (MMPA). The MMPA prohibits any person or vessel from “taking” marine mammals in the U.S. or the high seas without authorization. The MMPA defines “take” to mean “to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal.”

3.3.1.3 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act provides for the conservation and management of U.S. Fisheries. Under the Act, EFH consists of the waters and substrate needed by fish to spawn, breed, feed, or grow to maturity. An area within EFH that is considered particularly important and/or sensitive is known as Habitat Area of Particular Concern (HAPC). Regional Fishery Management Councils, established under the Act, are responsible for preparing and amending fishery management plans for each fishery under their authority that requires conservation and management. Federal actions that would adversely affect EFH (i.e., direct or indirect physical, chemical, or biological alterations) are subject to consultation requirements with NMFS. An adverse effect to EFH includes adverse changes to waters or substrate, species and their habitat, other ecosystem components, and quality and/or quantity of EFH.

3.3.1.4 Executive Order 12114 Evaluation

The analysis of the Proposed Action in areas beyond U.S. waters considers the potential for the action to cause significant environmental harm. Tanker transits of fuel to international receiving locations would be considered normal operations, with deliveries from RHBFSF occurring in lieu of routine or planned fuel supply deliveries. Similar to the potential impacts in U.S. waters described in Section 3.3.3, the Proposed

Action is not expected to cause significant environmental harm to marine biological resources in areas beyond U.S. waters.

3.3.2 Affected Environment

The ROI for marine biological resources includes areas of Pearl Harbor where gravity-based defueling operations would occur, the waters that encompass the vessel transit routes to the nine potential fuel receiving locations, and the marine areas at the fuel receiving locations. Detailed descriptions of Pearl Harbor and receiving locations are provided in Appendix D.

Pearl Harbor is an estuary, defined as an area where fresh water emanating from land mixes with ocean water. The northern portion of the harbor receives freshwater input from perennial streams that flow into Pearl Harbor, creating an estuarine environment with a muddy bottom. The water in Pearl Harbor becomes more saline as it nears the mouth of the harbor due to saltwater input from the Pacific Ocean via Mamala Bay and the Main Channel of Pearl Harbor. The area near the mouth of Pearl Harbor is characterized by oceanic conditions or higher salinity conditions and, as a result of this salinity gradient, coral species diversity and density is lower at the northern portion of the harbor than near the entrance channel because corals primarily prefer the salinity of ocean waters.

Pearl Harbor is one of the Navy's busiest ports, completing about 65,000 boat runs and transporting 2.4 million passengers each year. Tour boats manned by Navy personnel transport more than two million visitors to the USS Arizona Memorial each year (CNRH, 2023). The Proposed Action would require a maximum of eleven tanker transits through Pearl Harbor to the JBPHH fueling pier where tanker ships would be loaded with fuel. Tanker ships one through ten would transit to existing locations within the DoD fuel supply chain using established commercial shipping routes. The transit routes of these vessels from Pearl Harbor to the nine potential receiving locations were estimated based on commonly used commercial shipping lanes (Figure 3.3-1). Transit route and destination of the eleventh tanker would not be known until the time of sale (see Section 2.3.2). Tanker ships would operate at speeds safe for the location and conditions. While transiting the open ocean, tanker ships would travel at an average of fifteen knots. Tankers would reduce speeds in nearshore harbor areas. Within Pearl Harbor, this is typically ten knots or less, to prevent collision, and five knots or less when piloting vessels in areas of known turtle presence.

3.3.2.1 Marine Vegetation

Marine vegetation includes plants occurring in marine or estuarine waters. These may include mangroves, algae, and various grasses. The Proposed Action will use existing facilities and infrastructure, as well as established commercial shipping routes to relocate fuel from RHBFSF. Affects to marine vegetation are not anticipated because it would not be removed, modified, or disrupted by the Proposed Action. Therefore, impacts to marine vegetation were not further analyzed.

3.3.2.2 Essential Fish Habitat

EFH includes all types of aquatic habitat including wetlands, coral reefs, seagrasses, and rivers; all locations where fish spawn, breed, feed, or grow to maturity. Congress established the EFH mandate in 1996 to improve the nation's main fisheries law, the Magnuson-Stevens Fishery Conservation and Management Act, highlighting the importance of healthy habitat for federally managed fisheries. NMFS works with the regional fishery management councils to identify the essential habitat for every life stage of each federally managed species using the best available scientific information. EFH has been described for approximately 1,000 managed species to date.

The Proposed Action would have no effect on EFH present in the ROI because of the low number of tanker transits, moderately slow vessel speeds, and routine nature of fuel loading and unloading operations at JBPHH and receiving locations.

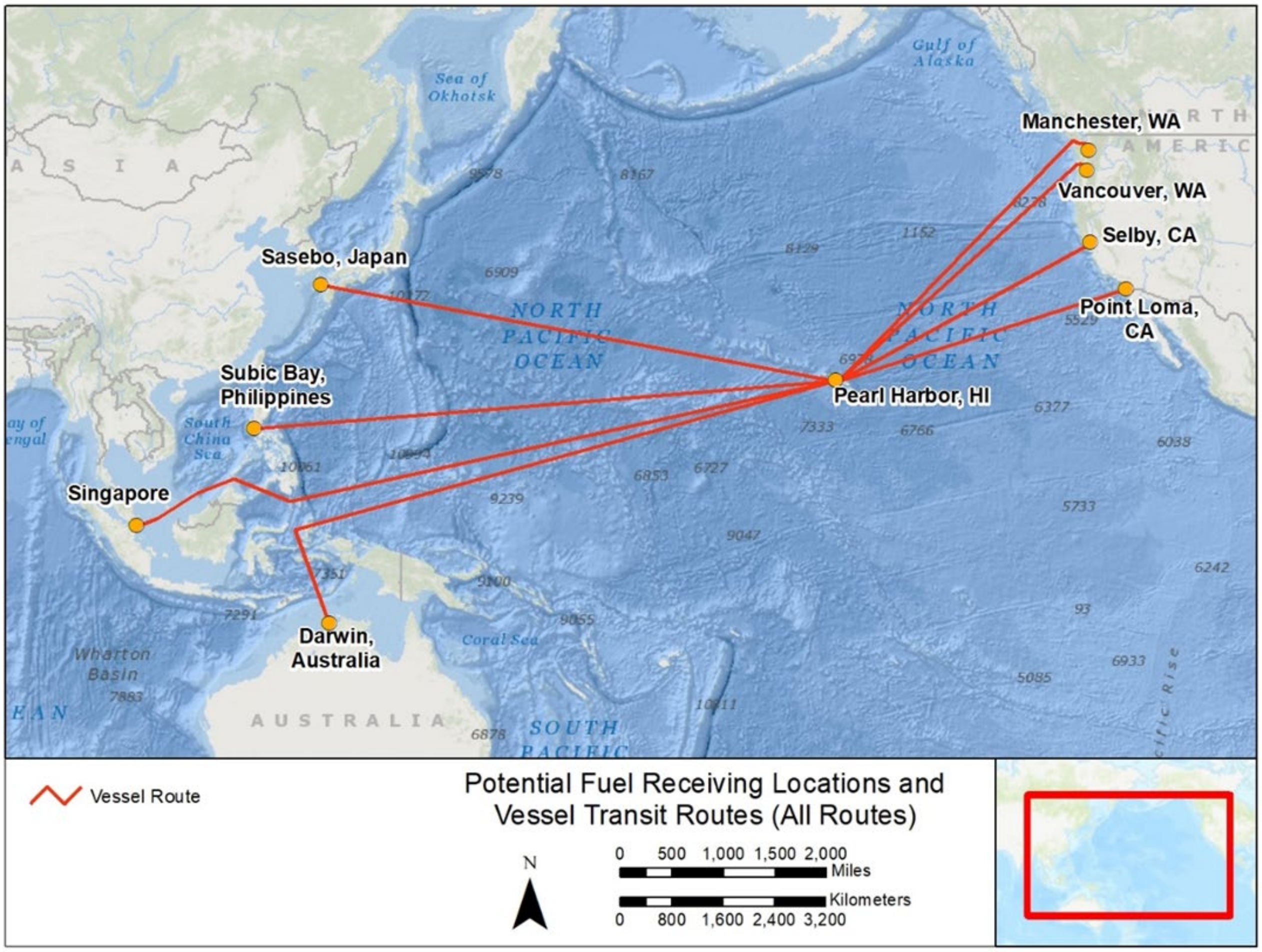

Figure 3.3-1. Potential Fuel Receiving Locations and Vessel Transit Routes

3.3.2.3 Marine Fauna

Marine fauna includes species of fishes, coral, and non-coral benthic invertebrates. Protected marine mammals, sea turtles, and fishes with the potential to be affected by the proposed action are discussed in Section 3.3.2.4.

Fishes

Fishes are vital components of the marine ecosystem. Fishes are generally defined as various aquatic vertebrates possessing gills. An extensive and diverse list of fishes exists in the Pacific Ocean. ESA-listed fishes are discussed in Section 3.3.2.4.

Coral

Corals are invertebrates that are related to anemones, jellyfish, and hydras. They are made of invertebrate polyps and can generally be categorized as either hard or soft. Hard corals have calcium carbonate skeletons, grow in colonies, and are reef-building animals that live in symbiosis with phytoplankton called zooxanthellae. Soft corals are flexible, have calcareous particles in their body walls for structural support, can be found in both tropical and cold ocean waters, do not grow in colonies or build reefs, and do not always contain zooxanthellae.

Corals would not be affected by the Proposed Action because of their demersal nature and distribution within the water column, coupled with the low number of tanker transits and moderately slow vessel speeds. Therefore, effects to coral were not further analyzed.

Non-Coral Benthic Invertebrates

Animals that live on the sea floor are called benthos. Most of these animals lack a backbone and are called invertebrates. Typical benthic invertebrates include sea anemones, sponges, corals, sea stars, sea urchins, worms, bivalves, crabs, and many more.

Non-coral marine invertebrate species would not be affected by the Proposed Action because of their demersal nature and distribution within the water column, coupled with the low number of tanker transits and moderately slow vessel speeds. Therefore, effects to non-coral marine invertebrates were not further analyzed.

3.3.2.4 Protected Species

Marine Mammals

Regulation over marine mammals within the U.S., its EEZ, or on the high seas is maintained by NMFS and the USFWS. NMFS maintains regulation over whales, dolphins, porpoises, seals, and sea lions. The USFWS maintains regulation over certain other marine mammal species, including walruses, polar bears, dugongs, sea otters, and manatees. All marine mammals are protected under the provisions of the MMPA. Marine mammals are frequently seen within waters outside of Pearl Harbor and throughout the Pacific Ocean. The Proposed Action would not result in the “take” of any marine mammals present in the ROI under MMPA.

Threatened and Endangered Species

JTF-RH and DLA are consulting with NMFS for ESA under Section 7. Threatened and endangered (i.e., ESA-listed) marine mammals and designated critical habitat present in the U.S. EEZ or on the high seas areas of the ROI are listed in Table 3.3-1. Between 2012 and 2022, eight Hawaiian monk seals were documented inside Pearl Harbor. Eleven additional species of ESA-listed marine mammals were identified to be potentially present in the vessel transit routes or potential fuel receiving locations in U.S. Waters or on the high seas. These include nine whales, one seal, and one sea lion (Table 3.3-1).

Table 3.3-1. ESA-Listed Marine Mammals Present in U.S. Waters or on the High Seas of the ROI

Common Name	Scientific Name	Designation Unit*	ESA Listing Status	Transit routes the species may be present in	Designated critical habitat overlaps with transit routes
Cetaceans (i.e., whales, dolphins, porpoises)					
Blue Whale	*Balaenoptera musculus*	Throughout Range	Endangered	All Transits	No
False Killer Whale	*Pseudorca crassidens*	Main Hawaiian Insular distinct population segment (DPS)	Endangered	All Transits	All Transits
Fin Whale	*Balaenoptera physalus*	Throughout Range	Endangered	All Transits	No
Gray Whale	*Eschrichtius robustus*	Western North Pacific DPS	Endangered	Point Loma, Selby, Vancouver, Manchester, Sasebo	No
Humpback Whale	*Megaptera novaeangliae*	Central America DPS	Endangered	Point Loma, Selby, Vancouver, Manchester	Point Loma, Selby, Vancouver, Manchester

Common Name	Scientific Name	Designation Unit*	ESA Listing Status	Transit routes the species may be present in	Designated critical habitat overlaps with transit routes
Humpback Whale	*Megaptera novaeangliae*	Mexico DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	Point Loma, Selby, Vancouver, Manchester
Humpback Whale	*Megaptera novaeangliae*	Western North Pacific DPS	Endangered	Sasebo, Subic Bay	No
Killer Whale	*Orcinus orca*	Southern Resident DPS	Endangered	Selby, Vancouver, Manchester	Selby, Vancouver, Manchester
North Pacific Right Whale	*Eubalaena japonica*	Throughout Range	Endangered	Point Loma, Selby, Vancouver, Manchester, Sasebo	No
Sei Whale	*Balaenoptera borealis*	Throughout Range	Endangered	All Transits	No
Sperm Whale	*Physeter macrocephalus*	Throughout Range	Endangered	All Transits	No
Pinnipeds (i.e., seals, sea lions, walruses)					
Guadalupe Fur Seal	*Arctocephalus townsendi*	Throughout Range	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Hawaiian Monk Seal	*Neomonachus schauinslandi*	Throughout Range	Endangered	All Transits	All Transits
Steller Sea Lion	*Eumetopias jubatus*	Western DPS	Endangered	Point Loma, Selby, Vancouver, Manchester	Selby

Note: *Certain ESA-listed species have a population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. These population groups are known as distinct population segments (DPS).

Sea Turtles

All species of sea turtles present in the ROI are designated as either threatened or endangered under the ESA. Sea turtles are highly migratory and often utilize the waters of more than one country in their lifetimes. The USFWS and NMFS share federal regulation for sea turtles with the USFWS having lead responsibility on the nesting beaches and NMFS, the marine environment.

Two ESA-listed sea turtle species have been documented in Pearl Harbor. These populations include the threatened Central North Pacific Distinct Population Segment green sea turtle (*Chelonia mydas*) and the endangered (throughout its range) hawksbill sea turtle (*Eretmochelys imbricata*). Green sea turtle presence can be considered common within Pearl Harbor. However, the distribution and density varies from location to location. Based on past surveys, occurrence of green sea turtles is documented with relatively more observations in the entrance channel and outside Pearl Harbor (Navy, 2020d; Navy Region Hawaii, 2020d; NAVFAC PAC, 2016; UH ARL, 2021). Green sea turtles are concentrated along the margins of the channel leading into Pearl Harbor compared to other locations, and more sea turtles occurred in the channel south of Pearl Harbor in the cool season (November to April) than during the warm season (Navy, 2017). Hawksbill sea turtles are infrequent and occur in low numbers.

Three additional species of ESA-listed sea turtles were identified to be potentially present in the vessel transit routes or potential fuel receiving locations in the U.S. Waters or on the high seas (Table 3.3-2).

Table 3.3-2. ESA-Listed Sea Turtles Present in the U.S. Waters or on the High Seas of the ROI

Common Name	Scientific Name	Designation Unit*	ESA Listing Status	Transit routes the species may be present in	Designated critical habitat overlaps with transit routes
Green Sea Turtle	*Chelonia mydas*	Central North Pacific DPS	Threatened	All Transits	No
Green Sea Turtle	*Chelonia mydas*	Central South Pacific DPS	Endangered	Darwin	No
Green Sea Turtle	*Chelonia mydas*	Central West Pacific DPS	Endangered	Sasebo, Singapore, Subic Bay, Darwin	No
Green Sea Turtle	*Chelonia mydas*	East Indian – West Pacific DPS	Threatened (Foreign**)	Sasebo, Singapore, Subic Bay, Darwin	No
Green Sea Turtle	*Chelonia mydas*	East Pacific DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Green Sea Turtle	*Chelonia mydas*	Southwest Pacific DPS	Threatened (Foreign)	Darwin	No
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Throughout Range	Endangered	All Transits	No
Leatherback Sea Turtle	*Dermochelys coriacea*	Throughout Range	Endangered	All Transits	Selby, Vancouver, Manchester
Loggerhead Sea Turtle	*Caretta caretta*	North Pacific Ocean DPS	Endangered	All Transits	No
Loggerhead Sea Turtle	*Caretta caretta*	Southeast Indo-Pacific Ocean DPS	Threatened (Foreign)	Darwin, Singapore	No
Loggerhead Sea Turtle	*Caretta caretta*	South Pacific Ocean DPS	Endangered (Foreign)	Darwin	No
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	All Other Populations	Threatened	All Transits	No
Olive Ridley Sea Turtle	*Lepidochelys olivacea*	Mexico's Pacific Coast Breeding Population	Endangered	Point Loma	No

Note: *Certain ESA-listed species have a population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. These population groups are known as distinct population segments (DPS).
**Foreign ESA species occur only in the exclusive economic zone (EEZ) and/or territorial waters of foreign countries.

Fishes

ESA-listed fishes and designated critical habitat present in the U.S. Waters or on the high seas areas of the ROI are listed in Table 3.3-3. These include two rockfish, four salmon, two sharks, one manta ray, and three other species of fish.

Table 3.3-3. ESA-Listed Fishes Present in U.S. Waters or on the High Seas of the ROI

Common Name	Scientific Name	Designation Unit*	ESA Listing Status	Transit routes the species may be present in	Designated critical habitat overlaps with transit routes
Bocaccio Rockfish	*Sebastes paucispinis*	Puget Sound/Georgia Basin DPS	Endangered	Manchester	Manchester
Chinook Salmon	*Oncorhynchus tshawytscha*	California Coastal ESU	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Chinook Salmon	*Oncorhynchus tshawytscha*	Central Valley Spring - Run ESU	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Chinook Salmon	*Oncorhynchus tshawytscha*	Lower Columbia River ESU	Threatened	Vancouver, Manchester	Vancouver
Chinook Salmon	*Oncorhynchus tshawytscha*	Puget Sound ESU	Threatened	Vancouver, Manchester	Manchester
Chinook Salmon	*Oncorhynchus tshawytscha*	Sacramento River Winter - Run ESU	Endangered	Point Loma, Selby, Vancouver, Manchester	Selby
Chinook Salmon	*Oncorhynchus tshawytscha*	Snake River Fall - Run ESU	Threatened	Vancouver, Manchester	Vancouver
Chinook Salmon	*Oncorhynchus tshawytscha*	Snake River Spring/Summer Run ESU	Threatened	Vancouver, Manchester	Vancouver
Chinook Salmon	*Oncorhynchus tshawytscha*	Upper Columbia River Spring - Run ESU	Endangered	Vancouver, Manchester	Vancouver
Chinook Salmon	*Oncorhynchus tshawytscha*	Upper Willamette River ESU	Threatened	Vancouver, Manchester	Vancouver
Chum Salmon	*Oncorhynchus keta*	Columbia River ESU	Threatened	Vancouver, Manchester	Vancouver
Chum Salmon	*Oncorhynchus keta*	Hood Canal Summer - Run ESU	Threatened	Manchester	Manchester
Coho Salmon	*Oncorhynchus kisutch*	Central California Coast ESU	Endangered	Point Loma, Selby, Vancouver, Manchester	No
Coho Salmon	*Oncorhynchus kisutch*	Lower Columbia River ESU	Threatened	Vancouver, Manchester	Vancouver
Coho Salmon	*Oncorhynchus kisutch*	Oregon Coast ESU	Threatened	Vancouver, Manchester	No
Coho Salmon	*Oncorhynchus kisutch*	Southern Oregon and Northern California Coast ESU	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Eulachon	*Thaleichthys pacificus*	Southern DPS	Threatened	Selby, Vancouver, Manchester	Vancouver
Giant Manta Ray	*Manta birostris*	Throughout Range	Threatened	All Transits	No
Green Sturgeon	*Acipenser medirostris*	Southern DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	Selby, Vancouver, Manchester

Common Name	Scientific Name	Designation Unit*	ESA Listing Status	Transit routes the species may be present in	Designated critical habitat overlaps with transit routes
Oceanic White Tip Shark	*Carcharhinus longimanus*	Throughout Range	Threatened	All Transits	No
Scalloped Hammerhead Shark	*Sphyrna lewini*	Eastern Pacific DPS	Endangered	Point Loma, Selby, Vancouver, Manchester	No
Scalloped Hammerhead Shark	*Sphyrna lewini*	Indo – West Pacific DPS	Threatened	Sasebo, Subic Bay, Singapore, Darwin	No
Sockeye Salmon	*Oncorhynchus nerka*	Ozette Lake ESU	Threatened	Manchester	No
Sockeye Salmon	*Oncorhynchus nerka*	Snake River ESU	Endangered	Vancouver, Manchester	Vancouver
Steelhead	*Oncorhynchus mykiss*	California Central Valley DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Central California Coast DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Lower Columbia DPS	Threatened	Vancouver, Manchester	Vancouver
Steelhead	*Oncorhynchus mykiss*	Middle Columbia River DPS	Threatened	Vancouver, Manchester	Vancouver
Steelhead	*Oncorhynchus mykiss*	Northern California DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Puget Sound DPS	Threatened	Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Snake River Basin DPS	Threatened	Vancouver, Manchester	Vancouver
Steelhead	*Oncorhynchus mykiss*	South - Central California Coast DPS	Threatened	Point Loma, Selby, Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Southern California DPS	Endangered	Point Loma, Selby, Vancouver, Manchester	No
Steelhead	*Oncorhynchus mykiss*	Upper Columbia River DPS	Threatened	Vancouver, Manchester	Vancouver
Steelhead	*Oncorhynchus mykiss*	Upper Willamette River DPS	Threatened	Vancouver, Manchester	Vancouver
Yelloweye Rockfish	*Sebastes ruberrimus*	Puget Sound/Georgia Basin DPS	Threatened	Manchester	Manchester

Critical Habitat

It is anticipated that there would be no effect on the designated critical habitat of any ESA-listed species from the Proposed Action. Tanker ship occurrence in space and time is short. Critical habitat elements that are part of the substrate are not expected to interact with the transiting vessels and the physical and biological essential features for which these habitats were designated will not be affected.

3.3.3 Environmental Consequences

This section discusses the potential short- and long-term effects to marine biological resources that could result from the action alternatives and the No Action Alternative. The effects analysis evaluated the potential for beneficial or adverse impacts in consideration of BMPs listed in Table 2.5-1.The effects analysis is focused on impacts to protected marine fauna including ESA-listed marine mammals, sea turtles, and fishes because affects to marine vegetation, EFH, and other marine fauna from the Proposed Action are not expected, as described in Section 3.3.2. Potential stressors associated with the Proposed Action include elevated underwater noise from vessels and vessel collisions with marine species. A detailed analysis of potential stressors and environmental consequences is included in Appendix D. Although not considered reasonably likely to occur, the risk of an oil spill affecting marine biological resources present in the ROI was also considered.

3.3.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, a low demand for JP-5 fuel at JBPHH may require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program. The amount of fuel transferred to tanker ships for overseas deliveries would likely be substantially less than under Alternatives 2 and 3. The destinations of any JP-5 stock rotation movements under the No Action Alternative are likely to be one or more of the nine potential fuel receiving locations analyzed in Alternative 2.

The amount of fuel to be transferred to tanker ships in Pearl Harbor for overseas deliveries would likely be substantially less than the amounts proposed under Alternatives 2 and 3, marginally reducing the potential for spills to affect marine resources when compared to Alternatives 2 and 3. Additionally, the No Action Alternative would use vessels for fuel movement only if a low demand for JP-5 fuel at JBPHH requires stock rotation. Less vessel transits would reduce the likelihood of impacts to marine species from elevated underwater noise levels and vessel collisions. Vessels that would move JP-5 would be similar type tanker ships that would be used in Alternatives 2 and 3. Tanker ships would use the same low speeds and BMPs as Alternatives 2 and 3 (see Section 3.3.3.2). Therefore, Alternative 1 would have less than significant effects to marine biological resources.

3.3.3.2 Alternative 2: Relocation

Underwater Noise

Several factors influence the underwater noise emissions of individual vessels, such as vessel speed, draft, size, and loading (MacGillivray et al., 2019). The vessel’s propulsion system is the dominant source for sounds below 200 hertz (Hz). Most ocean-going vessels have two-stroke engines that connect directly to the ship’s hull, and due to vibrations, transmit noise underwater.

With Alternative 2, tanker ships used to relocate fuel produce lower sound levels compared to larger commercial vessels (e.g., bulk carrier), with dominant sound frequency levels around 40-60 Hz and sound levels of approximately 180 decibels referenced to a pressure of one micro Pascal at one meter (dB re 1μPa-m). In deep water, underwater sound decays by about 60 decibels (dB) within the first 500 meters of distance from a large ship, with the majority of decay within the first 100 meters (Bowles et al., 2007). Sound levels from a transiting vessel would be lower than the thresholds for continuous sound likely to cause acoustic injury including permanent threshold shift (PTS) or temporary threshold shift (TTS) in marine mammals and sea turtles.

Little data exist on the effects of vessel noise on hearing in fishes. TTS has been observed in fishes exposed to elevated background noise and other continuous sources. As noted in the *ANSI Sound Exposure*

Guideline technical report (Popper et al., 2014), some fish species with a swim bladder that is involved in hearing may be more susceptible to TTS from long-duration, continuous noise depending on the duration of the exposure. However, it is not likely that TTS would occur in any ESA-listed fish species in Table 3.3-3 because these fish either have a swim bladder not involved in hearing or do not have a swim bladder. Additionally, underwater noise produced by the tanker ships would be temporary and not considered a long-duration or continuous noise source. Fishes that are exposed to vessel noise in their natural environment, even in areas with higher levels of vessel movement, would only be exposed for a short duration (seconds or minutes) as vessels are transient and pass by.

Vessel noise also has the potential to mask low-frequency sounds that animals depend on for communication, navigation, and finding mates or prey. The likelihood of such an encounter with an ESA-listed species is extremely remote because of the low probability that individual animals overlap in space and time with the eleven one-way tanker transits. Effects would be limited temporary and recoverable behavioral disturbance to marine mammals, sea turtles, or fishes.

The temporary, low-frequency and lower intensity sound levels by the tanker ships that would be used for Alternative 2 would not result in an increased likelihood of acoustic injury (i.e., PTS or TTS) to marine mammals, sea turtles, or fishes. Sound levels would not significantly disrupt breeding, feeding, or sheltering for any ESA-listed species encountered. Therefore, the risk of elevated underwater noise is not likely to adversely affect an ESA-listed marine mammal, sea turtle, or fish and potential effects would be insignificant.

Vessel Collision

While surfacing to breathe or rest, marine fauna including marine mammals, sea turtles, and certain fish species are at risk of a collision with moving vessels. The type and severity of injury depends upon the size of the vessel, the speed and direction of the vessel if in motion, the part of the vessel that strikes the animal (i.e. hull vs. propeller), and the part of the animal's body that was impacted. Depending on these factors, a vessel collision has the potential to cause serious injury or death. Collision avoidance success is dependent on the animal's ability to identify and locate the vessel from its radiated sound and the animal's ability to maneuver away from the vessel in time.

Collisions with vessels is considered a major threat for green sea turtles (NMFS & USFWS, 1998). Higher vessel speeds are more likely to cause impacts, particularly in shallow waters where turtles are abundant and in turbid waters (Hazel et al., 2007). The National Oceanic and Atmospheric Administration (NOAA) Fisheries (2023) estimated 37.5 vessel strikes of sea turtles per year from an estimated 577,872 trips from vessels of all sizes in Hawaii. Using this estimate, this calculates to a 0.04 percent probability of a vessel strike for all vessels and trips, many of which are not reducing speeds or employing lookouts for listed species. Based on turtle stranding data from Pearl Harbor from 2006-2020, 34 incidents identified the cause of stranding to be boat impact.

Whales engaged in surface activities (e.g., feeding, breeding, and resting) may not notice an approaching vessel (Silber et al., 2010). Generally, mysticetes (i.e., baleen whales) are larger animals with less ability to maneuver away from and to avoid vessels. In addition, mysticetes do not typically aggregate in large groups and are therefore difficult to detect visually from the water surface. Between 1988 and 2007, 21 blue whale deaths were reported along the California coast, and many of these showed evidence of ship strike (Berman-Kowalewski et al., 2010).

When generally compared to mysticetes, odontocetes (i.e., toothed whales) are quicker and more capable of physically avoiding a vessel strike. Since some species occur in large groups, odontocetes are typically seen when closer to the water surface. However, ESA-listed killer whales (Van Waerebeek et al., 2007; Visser and Fertl, 2000) and sperm whales (Jaquet and Whitehead, 1996; Watkins et al., 1999; Gannier and Marty, 2015) are potentially susceptible to vessel strikes.

Ship strikes are not a global threat to pinniped populations, and pinnipeds in general appear to suffer fewer impacts from ship strikes than cetaceans (Kovacs et al., 2015). This may be due, at least in part, to the large amount of time they spend on land (especially when resting and breeding), and their high maneuverability in the water. Ship strikes are not a major concern for pinnipeds in general, including the threatened Guadalupe fur seal or for the endangered Hawaiian monk seal (Antonelis et al., 2006; Marine Mammal Commission, 2002; NMFS, 2014).

Vessels do not normally collide with adult fishes, most of which can detect and avoid them. Manta rays are presumed to be susceptible to vessel strikes due primarily to their large size, slow swimming speed, and distribution in the upper portion of the water column (Couturier et al., 2012; NMFS, 2016). Very little quantitative information on the frequency of manta ray vessel strikes is available and no information exists on the impact of injuries and mortalities resulting from vessel strikes to the overall health of the population (NMFS, 2016).

Tanker ships that would be used with Alternative 2 would travel on the open ocean at an average speed of fifteen knots, which would be considered “super slow” compared to other commercial vessels (Bonney and Leach, 2010). Tankers would reduce speeds in nearshore harbor areas. Within Pearl Harbor, this is typically ten knots or less, to prevent collision, and five knots or less when piloting vessels in areas of known turtle presence. This temporary and slow-moving presence of the maximum of eleven tanker ships would not result in an increased likelihood of injury nor would it significantly disrupt breeding, feeding, or sheltering for marine mammals, sea turtles, or fishes encountered. Species or life stages that are demersal (living close to the sea floor), as well as critical habitat elements that are on or part of the substrate, would not interact with the transiting vessels and any adverse effects are so low as to be discountable. Additionally, the likelihood of a vessel collision with a protected marine species is extremely remote because of the low probability that individual animals would overlap in space and time with the eleven tanker transits. Therefore, the risk of a vessel collision from the tanker transits in Alternative 2 is not likely to adversely affect an ESA-listed marine mammal, sea turtle, or fish and is discountable. The relatively slow speed of the vessels further reduces the chance of ship strike with marine mammals, sea turtles, and fishes. Vessels would employ measures to avoid and reduce the potential for vessel collisions and interactions with protected species (Table 2.5-1, BMP-11).

Oil Spills

Oil and other chemical spills can have damaging effects on marine fauna species directly through exposure to oil or chemicals and indirectly due to pollutants’ impacts on prey and habitat quality (Engelhardt, 1983; Marine Mammal Commission, 2010; Matkin et al., 2008; Seminoff et al., 2015). With Alternative 2, an oil spill affecting marine biological resources including ESA-listed species and critical habitat present in the ROI was not considered reasonably likely to occur. Fuel loading at the JBPHH fueling pier would follow standard operating procedures and BMPs (Table 2.5-1, BMP-2, -3, -4, -5, -6, -7) to reduce the risk of spills. When the tanker ships are docked at the JBPHH pier, oil-absorbent booms would surround the vessels, contain, and capture any spills that might occur until spill response teams arrive on the scene. Additionally, all tankers would be assisted by tug within the harbors to prevent allision/collision, which is statistically the highest cause of tanker spills worldwide. There is a very low likelihood of a spill from tanker ships during transit in the open ocean. Section 3.2.2.5 provides more information on tanker ship spill statistics.

Receiving locations would have response teams and BMPs available (e.g., equipment maintenance protocols, contingency plans, fueling restrictions) to further reduce the potential for a spill during fuel unloading. Additionally, it is unlikely that ESA-listed marine fauna species will have a high presence or abundance at the fuel unloading piers and ports, further limiting potential exposures to ESA-listed species.

Overall, with the use of BMPs, Alternative 2 would have less than significant effects to marine biological resources.

3.3.3.3 Alternative 3: Commercial Sale and Relocation

Under Alternative 3, impacts to marine biological resources would be similar to those described for Alternative 2. The same number of tanker ships would transit through Pearl Harbor to the JBPHH fueling pier to receive fuel. Tankers would be loaded using the same procedure and BMPs as Alternative 2. Tanker ships used in Alternative 3 would be similar to those used in Alternative 2, including similar size and speeds.

Therefore, the risk of underwater noise from vessels, vessel collision with marine species, and oil spills in Pearl Harbor would be the same as described Alternative 2.

The transit route and destination of sold fuel is at the discretion of the non-federal entity purchaser and not a federal action. While it is not possible to reasonably predict where the fuel would go, it is reasonable to assume that tanker transits would overlap with some of the ESA-listed species identified in Tables 3.3-1, 3.3-2, and 3.3-3. Similar to Alternative 2, the temporary and slow-moving presence of the maximum of eleven tanker ships would reduce the risk of impacts to protected species from vessel noise or collision. Vessel operators would be required to follow all environmental and safety regulations which would reduce factors that could result in catastrophic oil spills.

With the use of BMPs, Alternative 3 would result in a less than significant effects to marine biological resources.

3.4 HAZARDOUS MATERIALS AND WASTE

This section discusses potential interaction of operational activities of the Proposed Action with hazardous materials, hazardous waste, toxic substances, and contaminated sites.

3.4.1 Regulatory Setting

Hazardous materials are defined by 49 CFR section 171.8 as "hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table, and materials that meet the defining criteria for hazard classes and divisions in 49 CFR part 173." Transportation of hazardous materials is regulated by the U.S. Department of Transportation (DOT) regulations.

Hazardous wastes are defined by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments, as: "a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may (A) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (B) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed." In Hawaii, the DOH Solid & Hazardous Waste Branch regulates the handling hazardous waste materials and used oil generators and handlers.

Special hazards are those substances that might pose a risk to human health and are addressed separately from other hazardous substances. Special hazards include asbestos-containing material (ACM), PCBs, and lead-based paint (LBP). EPA is given authority to regulate special hazard substances by the Toxic Substances Control Act (TSCA). Asbestos is also regulated by EPA under the Clean Air Act (CAA), and the CERCLA.

The DoD established the Defense Environmental Restoration Program (DERP) to facilitate thorough investigation and cleanup of contaminated sites on military installations (active installations, installations subject to Base Realignment and Closure, and formerly used defense sites). The Installation Restoration Program and the Military Munitions Response Program are components of the DERP. The Installation Restoration Program requires each DoD installation to identify, investigate, and clean up hazardous waste disposal or release sites.

3.4.2 Affected Environment

The ROI for hazardous materials and hazardous waste includes the areas at JBPHH and potential receiving locations where fuel loading, transit, and unloading operations would occur. At JBPHH, this includes areas surrounding the fuel piping, associated infrastructure, and fueling pier where human or environmental exposure to hazardous materials, hazardous waste, toxic substances, and contaminated sites is possible. The ROI at JBPHH is located below the UIC line, meaning that it is outside of areas identified by DOH as underground sources of drinking water. For maps depicting areas below the UIC line, see: https://health.hawaii.gov/sdwb/underground-injection-control-program/.

The ROI also includes the tanker transit routes and areas surrounding the fuel delivery points where human or environmental exposure to hazardous materials, hazardous waste, toxic substances, and contaminated sites is possible. At the West Oahu location, fuel transfer would occur through an offshore mooring that transfers oil and refined products through a hose between ships and the refinery/storage onshore. At the other receiving locations, fuel transfer would occur though a flexible hose connecting the tanker ship to the receiving entity's fuel receiving infrastructure location on a pier or wharf.

The ROI includes tanker transits through the Pearl Harbor Naval Complex site listed on the EPA's CERCLA National Priorities List (NPL). The NPL identifies priority sites of known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories (EPA, 2023c). The Pearl Harbor Sediment Study conducted by the Navy in 2015 identified sediments impacted by chemical contamination from naval activities (i.e., ship maintenance and repair) in the southern

Southeast Loch area (Figure 3.4-1). Localized areas of copper, mercury, lead, and total PCBs were reported with subsurface sediment exceedances based on risk to human health/ecological receptors and site-specific background levels. Tanker ships transiting through Southeast Loch to the fueling pier would briefly transit above these contaminated sediments.

Ongoing remediation is occurring within Pearl Harbor that includes focused dredging of sediments containing high COC concentrations, enhancing the rate of natural recovery of sediments with moderate COC concentrations, monitoring natural recovery of sediment with low COC concentrations, and limiting the bioavailability of COCs within the sediment.

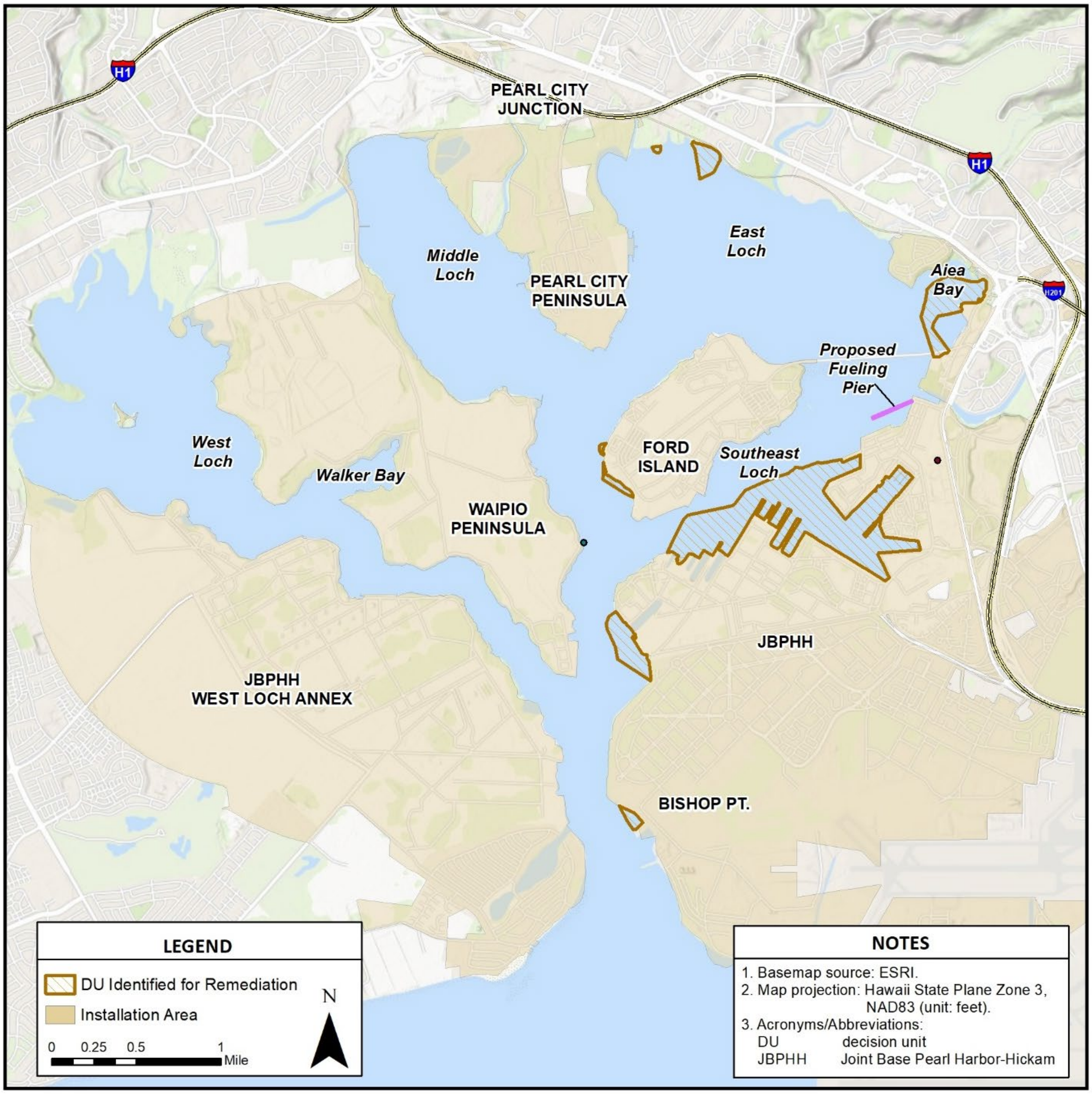

Figure 3.4-1. Areas Designated for Remediation Under CERCLA at the Pearl Harbor Sediment Site

3.4.3 Environmental Consequences

The hazardous materials and waste assessment determined the extent to which action alternatives could increase the risk of release hazardous materials or waste, particularly if it increases the potential for human exposure. Human or environmental exposure to hazardous materials or hazardous wastes from the Proposed Action could primarily result from contact with inadvertent fuel releases or spill cleanup materials during fuel transfer operations or spill response efforts. Possible routes of exposure to fuel include inhalation of vapors, skin and eye contact, and ingestion. Health effects from exposure to fuels may include irritation to unprotected skin, eye and upper respiratory irritation, fatigue, breathing difficulty, headaches, dizziness, and sleep disturbances (VA, 2023).

Exposure to contaminants resulting from the resuspension of contaminated sediments in Pearl Harbor during tanker transits was also considered. Possible routes of exposure to contaminated sediments include skin and eye contact and ingestion. The areas of Pearl Harbor where tanker ships may encounter contaminated sediments are not used for recreational swimming or watersports where there is prolonged contact with or submersion in the water (e.g., surfing, wakeboarding).

Fuel that does not meet specifications for DoD use would be managed according to Option A: Upper Tank Farm or Option B: Commercial Sale, as described in Section 2.3.2, and is not considered a waste product. The Proposed Action does not involve any ground-disturbing elements or in-water work that could result in dispersion or resuspension of contaminated soils or sediments, or the disturbance of munitions and explosives of concern (MEC). No construction and demolition debris containing hazardous materials such as asbestos-containing material (ACM), PCBs, or LBP is expected to be produced.

3.4.3.1 Alternative 1: No Action Alternative

Under the No Action Alternative, flowable fuel at RHBFSF would be drawn down over a period of approximately ten to fourteen months after DOH approval of the gravity-based defueling operation. Flowable fuel from RHBFSF would be transferred to the UTF or to fueling piers at JBPHH through existing infrastructure. Fuel from the UTF can then be sent by pipeline to Hickam Field, fuel loading piers, or truck loading racks for distribution to customary defense customers for consumption.

A low demand for JP-5 fuel at JBPHH may require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program. Additionally, JP-5 may be regraded to F-24 or F-76 for consumption at JBPHH. Existing locations within the DoD fuel supply chain that may receive relocated fuel from RHBFSF as part of Alternatives 2 and 3 would continue to receive their regular fuel deliveries by tanker ships from other fuel sources.

Inadvertent fuel releases that could be associated with Alternative 1 would mostly consist of small spills at points of consumption where fuel is transferred or dispensed. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan (Table 2.5-1, BMP-8), which includes procedures to properly collect, store, manage, and dispose of waste resulting from an oil spill response. Recoverable fuel would be processed through the JBPHH Fuel Oil Reclamation Facility (FORFAC) or processed as off-specification petroleum for reclamation through a permitted used oil processor. Contaminated solid wastes such as absorbents or debris that were characterized as non-hazardous would be disposed of at a permitted solid waste facility. Contaminated wastes and decontamination solutions that are characterized as hazardous would be disposed of at a permitted Treatment, Storage, and Disposal Facility.

Propeller wash from vessels moving JP-5 to points of immediate consumption could resuspend contaminated sediments around navigational channels and piers, thereby temporarily affecting water quality (SSC Pacific, 2016). Propeller wash could also contribute to vertical mixing, dispersion, and gradual dilution of contaminated sediments with clean sediments (Navy, 2018). Resuspension is limited to localized scouring from maneuvering vessels operating at high power, with resuspended sediments most likely settling at or near the point of disturbance. Impacts would be limited to short term resuspension of contaminated sediments in Pearl Harbor. Human exposure to resuspended contaminated sediments would not be expected because these areas are not used for recreational swimming or watersports where there is prolonged contact with or submersion in the water. BMPs limiting the disturbance of sediments, including low ship speed and use of tugboats to assist tanker ships through Pearl Harbor (Table 2.5-1, BMP-1), would minimize environmental exposure to the extent that no significant adverse impacts related to contaminated sediments are expected to occur.

With the use of BMPs, Alternative 1 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.

3.4.3.2 Alternative 2: Relocation

Alternative 2 is the relocation of approximately 106 million gallons of flowable fuel from RHBFSF to existing locations within the DoD fuel supply chain by ocean transit. A maximum of eleven tanker ships would be required to receive all of the flowable fuel from RHBFSF.

Fuel Loading and Unloading

Inadvertent fuel releases during fuel loading and unloading processes would mostly consist of small amounts of fuel escaping from the flexible hose and flexible hose connection points on the fueling pier and tanker ship. In the past three years, there was one incident at JBPHH where overfilling a vessel resulted in the release of approximately five gallons of fuel, and one incident where a pipeline failure resulted in the release of approximately 100 gallons of fuel. In the event of a fuel release, workers could be exposed to the fuel during incident response and spill cleanup activities. These type of incidents would be avoided during the RHBFSF gravity-based defueling operations by complying with operation, maintenance, environmental, and safety plans as well as strict personnel oversight and employing BMPs (Table 2.5-1, BMP-2, -3, -4, -5, -7). Personnel involved in the fuel loading operation would utilize personal protective equipment (PPE) including personal flotation device, steel toed shoes, safety glasses, and chemical resistant work gloves during the operation. Additional PPE would be donned by responders in the event of a spill in accordance with spill response procedures.

Inadvertent releases of fuel from the pipeline and flexible hose connection on the JBPHH fueling pier would be collected by a basin containment system that is routed to the FORFAC where fuel products would be separated and recovered for commercial sale or proper disposal. If fuel is inadvertently spilled into the water it would be contained inside the oil-absorbent booms which would be deployed around tanker ships prior to beginning the fuel loading operations. Water Resources Section 3.2.3.2 provides details on impacts to water resources from a spill.

JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan (Table 2.5-1, BMP-8), which includes procedures to properly collect, store, manage, and dispose of waste resulting from an oil spill response. Recoverable fuel would be processed through the FORFAC or processed as off-specification petroleum for reclamation through a permitted used oil processor. Contaminated solid wastes such as absorbents or debris that were characterized as non-hazardous would be disposed of at a permitted solid waste facility. Contaminated wastes and decontamination solutions that are characterized as hazardous would be disposed of at a permitted Treatment, Storage, and Disposal Facility.

Fuel unloading at destination locations would be accomplished in accordance with the receiving entity's standard practices and operating procedures. Spills at receiving locations would be addressed by their on-site response teams.

Tanker Transits

Tanker ships relocating fuel from RHBFSF would use existing navigational channels to transit through Mamala Bay to the Pearl Harbor Main Channel and into Southeast Loch to arrive at the JBPHH fueling pier. Up to two round-trip tanker transits per week would occur during the gravity-based defueling process, for a maximum of eleven total round-trip transits. Propeller wash from tanker ships and tugboats could resuspend contaminated sediments around navigational channels and piers, thereby temporarily affecting water quality (SSC Pacific 2016). Propeller wash could also contribute to vertical mixing, dispersion, and gradual dilution of contaminated sediments with clean sediments (Navy, 2018). Resuspension is limited to localized scouring from maneuvering vessels operating at high power, with resuspended sediments most likely settling at or near the point of disturbance. In 2022, there was an average of fourteen fueling evolutions per month for tankers, ships, and barges of varying size, draft, and fuel capacity at the JBPHH fueling pier. Impacts from the additional two tanker ships per week would be limited to short term resuspension of contaminated sediments in Pearl Harbor. Human exposure to resuspended contaminated sediments would not be expected because these areas are not used for recreational swimming or watersports where there is prolonged contact with or submersion in the water. BMPs limiting the disturbance of sediments, including low ship speed and use of tugboats to assist tanker ships through Pearl Harbor (Table 2.5-1, BMP-1), would minimize environmental exposure to the extent that no significant adverse impacts related to contaminated sediments are expected to occur.

With Alternative 2, there would be no change to the potential for human or environmental exposure to hazardous materials or waste at receiving locations because fuel deliveries from RHBFSF would occur in lieu of routine or planned fuel supply deliveries by similar type tanker ships.

With the use of BMPs, Alternative 2 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.

3.4.3.3 Alternative 3: Commercial Sale and Relocation

Alternative 3 is the commercial sale of a portion of the approximately 106 million gallons of flowable fuel from RHBFSF combined with the relocation of the remaining portion of the fuel to existing locations within the DoD fuel supply chain by ocean transit. A maximum of eleven tanker ships would be required to receive all of the flowable fuel from RHBFSF.

With Alternative 3, up to ten tanker loads of fuel from RHBFSF may be commercially sold in accordance with Section 2922e of Title 10, USC, which authorizes the sale of certain fuel sources. Sale of fuel would need to coincide with defueling schedule. Therefore, the amount of fuel sold would be determined by commercial interest and purchasers' ability to receive the fuel at the time of gravity-based defueling. Fuel sold commercially would be loaded onto purchasers' commercially-operated tanker ship(s) using the same pace and procedure as Alternative 2.

Under Alternative 3, the risk of release of hazardous materials or waste would be the same as described for Alternative 2. The same number of tanker ships would transit through Pearl Harbor to the JBPHH fueling pier to receive fuel. Tankers would be loaded using the same procedure as Alternative 2; therefore, the risk of human or environmental exposure resulting from an inadvertent fuel release would be the same. Tanker ships used in Alternative 3 would be similar to those used in Alternative 2, including similar size and speeds; therefore, the risk of exposure to resuspended contaminated sediments in Pearl Harbor would be the same as described Alternative 2.

With the use of BMPs, Alternative 3 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.

3.5 AIR QUALITY AND GREENHOUSE GASES

This section discusses potential impacts to air quality and the contribution of greenhouse gases (GHGs) that could result from the Proposed Action. Many factors influence a region's air quality, including the type and quantity of pollutants and how they are emitted into the atmosphere, the size and topography of the air basin, and the local meteorological conditions.

Most air pollutants originate from human-made sources, including mobile sources (e.g., aircraft, fuel-burning vehicles) and stationary sources (e.g., concrete batch plants, refineries, power plants), as well as indoor sources (e.g., some building materials and cleaning solvents). Natural sources, such as volcanic eruptions and forest fires, also release pollutants into the air. The concentration of various pollutants in the atmosphere comprises air quality at a location.

3.5.1 Regulatory Setting and International Standards

3.5.1.1 U.S. National Standards

The Clean Air Act (CAA) is the primary federal statute governing the control of air quality. The CAA designates six pollutants as "criteria pollutants" for which the EPA has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The criteria pollutants are carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone, suspended particulate matter less than or equal to ten microns in diameter, fine particulate matter less than or equal to 2.5 microns in diameter ($PM_{2.5}$), and lead. CO, SO_2, NO_2, lead, and some particulates are emitted directly into the atmosphere from emissions sources. Ozone, some NO_2 and particulates are formed through atmospheric chemical reactions from other pollutant emissions that are influenced by weather, ultraviolet light, and other atmospheric processes. Ozone is not emitted directly, but is formed in the atmosphere from precursor chemicals, primarily nitrogen oxides (NOx) and volatile organic compounds (VOCs), in the presence of sunlight. Potential impacts of a project on ozone levels are evaluated in terms of NOx and VOC emissions.

NAAQS are classified as primary or secondary. Primary standards protect against adverse health effects; secondary standards are designed to protect public welfare, such as prevent damage to farm crops, vegetation, and buildings. Some pollutants have long-term and short-term standards. Short-term standards are designed to protect against acute, or short-term, health effects, while long-term standards were established to protect against chronic health effects. Ambient air is defined as that portion of the atmosphere, external to buildings, to which the general public is exposed. Each ambient air quality standard has its own criteria, known as the "form" of the standard, related to if and how many times it may be exceeded before the NAAQS is considered violated.

Areas that are in compliance with the NAAQS are designated as attainment areas. Areas that do not meet NAAQS for criteria pollutants are designated "nonattainment areas" for that pollutant. Areas that have transitioned from nonattainment to attainment are designated as maintenance areas and are also required to adhere to maintenance plans to ensure continued attainment.

The CAA requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan for each nonattainment or maintenance pollutant (including the pollutant's precursor) to achieve (nonattainment) or maintain (maintenance) compliance with the appropriate NAAQS for that pollutant. These plans, known as State Implementation Plans (SIPs), are developed by state and local air quality management agencies and submitted to the EPA for approval.

States establish their own ambient air quality standards that may be more stringent than those set by federal law and for non-criteria pollutants. Section 3.5.2 describes relevant air quality and standards of ports affected by the Proposed Action and alternatives.

EPA has identified 188 hazardous air pollutants (HAPs) [also referred to as toxic air pollutants or air toxics] that are known or suspected to cause cancer or other serious health and environmental effects. NAAQS have not been established for HAPs because EPA's strategy is to use reductions of HAP emissions from stationary industrial, mobile, and indoor sources as a means to providing nationwide health protections.

National emission standards exist for HAPs, which are regulated under Section 112(b) of the 1990 CAA Amendments. The National Emission Standards for Hazardous Air Pollutants regulate HAP emissions from stationary sources (40 CFR part 61 and part 63). A National Emission Standards for Hazardous Air Pollutants NESHAP (Subpart Y) was implemented for marine loading terminals that load crude oil or gasoline; thus, it is does not apply to the Proposed Action that loads JP-5 (refined kerosene) and other low-volatile fuels such as F-24 and F-76.

3.5.1.2 General Conformity

Federal actions proposed in U.S. nonattainment or maintenance areas are subject to the EPA General Conformity Rule that requires a conformity analysis to determine if the Proposed Action will conform to the approved SIP, the plan to bring the area into compliance by a future date and maintain compliance. A conformity applicability analysis is the first step of a conformity evaluation and assesses if a federal action must be supported by a conformity determination. This is typically done by quantifying applicable direct and indirect emissions that are projected to result due to implementation of the federal action. Indirect emissions are those emissions caused by the federal action and originating in the region of interest, but which can occur at a later time or in a different location from the action itself and are reasonably foreseeable. If the results of the applicability analysis indicate that the total emissions would not exceed the de minimis emissions thresholds, a conformity determination is not required and the conformity evaluation process is completed. De minimis levels (in tons per year [TPY]) vary by pollutant and also depend on the severity of the nonattainment status for the air quality management area. De minimis threshold emissions are presented in Table 3.5-1. Vessel emissions within 3 NM of a state seaward boundary are evaluated for CAA conformity for state nonattainment and maintenance areas (Navy, 2013).

Table 3.5-1. General Conformity De Minimis Levels

Pollutant	Area Type	TPY
Ozone (VOC or NO_X)	Serious nonattainment	50
	Severe nonattainment	25
	Extreme nonattainment	10
	Other areas outside an ozone transport region	100
Ozone (NO_X)	Marginal and moderate nonattainment inside an ozone transport region	100
	Maintenance	100
Ozone (VOC)	Marginal and moderate nonattainment inside an ozone transport region	50
	Maintenance within an ozone transport region	50
	Maintenance outside an ozone transport region	100
Carbon monoxide, SO_2 and NO_2	All nonattainment & maintenance	100
PM_{10}	Serious nonattainment	70
	Moderate nonattainment and maintenance	100
$PM_{2.5}$	Serious nonattainment	70
	All nonattainment & maintenance	100
Direct emissions, SO_2, NO2 (unless determined not to be a significant precursor), VOC or ammonia (if determined to be significant precursors)	All nonattainment & maintenance	100
Lead	All nonattainment & maintenance	25

VOC = Volatile Organic Compounds; NO_X = Nitrogen Oxides; NO_2 = Nitrogen Dioxide; SO_2 =Sulfur Dioxide; PM_{10} = Particulate Matter 10 microns or less; $PM_{2.5}$ = Particulate Matter 2.5 microns or less; Pb = Lead; TPY = tons per year

3.5.1.3 Executive Order 12114 Evaluation

The analysis of health-based air quality impacts under EO 12114 includes emission estimates covering all Federal actions outlined under the EA/OEA that occur beyond U.S. territorial seas (greater than 12 NM).

Where the receiving country does not promulgate its own de minimis thresholds, EO 12114 air quality evaluation would use the federal CAA "major source" threshold of 250 TPY emissions level as a screening level threshold of significance as described below.

The U.S. Prevention of Significant Deterioration (PSD) Program was adopted in the CAA under 40 CFR section part 52.21. The PSD Program applies to major stationary sources of air pollutants located in attainment areas, requiring that a source demonstrate that it does not significantly deteriorate the air quality in attainment areas. Under PSD, a "major source" is defined as a facility that emits equal to or greater than 250 TPY of a criteria pollutant or regulated precursor, except for 28 source categories where the threshold is 100 TPY. As such, in attainment areas, the major emitting facility threshold of 250 or 100 TPY of a pollutant is the threshold of increased concern; therefore, this threshold is also a suitable screening threshold. These thresholds serve as screening level thresholds of significance. That is, where emissions of a pollutant are below the threshold for a nonattainment, attainment or maintenance area, as applicable, they would not be significant—absent compounding factors, such as proximity of sensitive receptors. Where those emissions exceed the applicable threshold discussed above, they demand a harder look at factors such as region of dispersal. It should be noted that the thresholds are conservative in that they are designed to apply to stationary sources. However, this EA/OEA will apply these stationary source requirements to sources that may be diffused and dispersed. It should also be noted that by increasing and decreasing with the air quality of a region, these thresholds consider other activities in the region in the past and present. As such they are measures of cumulative impacts.

To determine potential significance, international air emissions were compared to the 100 TPY Prevention of Significant Deterioration (PSD) threshold where the country of the receiving location does not promulgate its own de minimis thresholds. The 100 TPY value was selected to be conservative and because of the Proposed Action's similarity to one of the 28 source categories subject to this limit under the PSD Program (e.g., petroleum storage transfer units). Because tankers are mobile sources, emissions would disperse during travel and not result in localized concentrations of pollutants that could harm human health.

3.5.1.4 International Standards

Since 1987, WHO has periodically issued health-based air quality guidelines to assist governments and civil society to reduce human exposure to air pollution and its adverse effects (WHO, 2021).The WHO air quality guidelines were last updated in 2021.The guidelines provide health-based levels for the major health-damaging air pollutants. These guidelines are not legally binding standards; however, they do provide WHO Member States with an evidence-informed tool that they can use to inform legislation and policy. Ultimately, the goal of these guidelines is to provide guidance to help reduce levels of air pollutants. Consulting firm IQAir found that no countries fully met the WHO's air quality standards for particulate matter concentrations (based on surveys of 107 cities). For frame of reference, the U.S. was found to have an average $PM_{2.5}$ concentration two times higher than the WHO's recommendation of five micrograms/square meter (Choi, 2022).

3.5.1.5 Greenhouse Gases

GHGs are gas emissions that trap heat in the atmosphere. These emissions occur from natural processes and human activities. Scientific evidence indicates a trend of increasing global temperature over the past century due to an increase in GHG emissions from human activities. The climate change associated with this global warming is predicted to produce negative economic and social consequences across the globe. CEQ guidance recommends federal agencies consider both the potential effects of a Proposed Action on climate change, as indicated by its estimated greenhouse gas emissions, and the implications of climate change for the environmental effects of a Proposed Action.

GHGs include carbon dioxide (CO_2), methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride, and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. Each

GHG is assigned a global warming potential. The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one.

To put carbon emissions in context, the average U.S. home generates 53 tons of CO_2-equivalent annually. Additionally, the social cost of carbon (SCC) (in dollars) can be calculated that reflects the damage done to society by each additional ton of carbon emissions. EO 13990, Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis (White House, 2021) emphasizes the importance of ensuring federal agencies "capture the full costs of greenhouse gas emissions as accurately as possible, including taking global damages into account." The U.S. Interagency Working Group set an interim SCC of $51/ton in February 2021. In November 2022, the EPA proposed a fourfold increase to $190/ton.

3.5.1.6 Ocean Shipping Emissions

Ocean-going vessels are a large and growing contributor to diesel emissions worldwide. While emissions of new automobiles have reduced greatly over the last twenty years and are transitioning to electric-powered models, ocean vessels lag in terms of use of renewable or low-carbon intensity fuels and are one of the largest anthropogenic sources of air pollution. However, some port authorities (for examples, Port of San Diego and Port of Aukland) are already using, or in the process of purchasing, electric tugboats to reduce their vessel emissions and carbon footprint.

The International Maritime Organization (IMO) implemented a series of regulations and operational practice guidance to reduce emissions from international ocean shipping. In 2010, the IMO officially accepted the North American Environmental Control Area (ECA), beginning in August, 2012. At that date, the sulfur content of fuel was be limited to 1 percent sulfur within 200 nautical miles (NM) of the coastline; in 2015, this limit dropped to 0.1 percent sulfur. Also, Tier III NO_X emission standards, requiring advanced emission controls such as Selective Catalytic Reduction systems, were required for vessels built in and after 2016. The U.S. West Coast and Hawaii are included in the ECA.

Outside of ECAs, IMO implemented additional caps on sulfur in fuel oil in 2020. Known as "IMO 2020", the rule limited sulfur in fuel for ships to 0.50 percent (by mass) - a significant reduction from the previous limit of 3.5 percent (IMO, 2020). However, this sulfur emission cap is still five time higher than the 2015 ECA limit. IMO 2020 applies to all ships, whether they are on international voyages, between two or more countries; or domestic voyages, solely within the waters of a Party to the MARPOL Annex.

Greenhouse gas emissions are not regulated by IMO. However, CO_2 reduction for ocean-going vessels is achievable through operational practices, such as slow-steaming or the use of alternative fuels, like biofuels. GHG emission reductions are also possible through network design by reducing vessel-cargo travel distances (S. Greene, et. al., 2020).

3.5.2 Affected Environment

3.5.2.1 Hawaii (JBPHH and West Oahu)

The air quality ROI includes the west, central, and south side of the island of Oahu in Honolulu County, where JBPHH is located, and the State of Hawaii for GHGs and climate change effects. The latest data from the Department of Health (DOH, 2021b) indicates the state is in attainment except for exceedances for SO_2 in communities near the volcano on Hawaii Island, which is considered by the EPA as a natural, uncontrollable event. Because the State is in attainment of the NAAQS, it is not subject to the CAA's General Conformity Rule.

3.5.2.2 California (Point Loma and Selby Terminal)

<u>Point Loma</u>

Naval Base Point Loma is located in San Diego County. The county is in federally-designated severe nonattainment for 8-hr ozone; unclassifiable for PM_{10}, and in attainment for other criteria pollutants. State designations are nonattainment for 8-hour ozone, 1-hour ozone, PM_{10}, $PM_{2.5}$ and attainment for other pollutants (San Diego, 2023). In 2021, monitoring stations throughout the county showed up to 10 days per year when the maximum 1-hour and 8-hour ozone standards were exceeded.

Selby Terminal

The Selby Terminal is located eighteen miles north of San Francisco on the northwest edge of Contra Costa County next to the Carquinez Strait. Air quality is managed by the Bay Area Air Quality Management District.

The county is nonattainment for 8-hr ozone (marginal) and $PM_{2.5}$ by federal standards. By state standards, the county is in nonattainment for ozone, $PM_{2.5}$ and PM_{10} (CARB, 2023). Ozone is a primary problem in summer and fine particle pollution in the winter. The area around Selby Terminal is considered an overburdened community in terms of environmental and health stressors. In July 2022, Air District regulations set more stringent health risk limits and public noticing requirements for projects located in overburdened communities. The Selby Terminal is located adjacent to the Phillips 66 Rodeo Refinery. On March 20, 2023, the Bay Area Air Quality Management District released revised fence-line air monitoring plans for several refineries, including the Phillips 66 site.

3.5.2.3 **Washington (Port of Vancouver, Manchester)**

All areas of Washington are in attainment and currently meet air quality standards, except a small area in Whatcom County (the Intalco aluminum smelter and area around it for sulfur dioxide) (EPA, 2023d).

3.5.2.4 **Overseas**

Sasebo, Japan

Sasebo is located in the southern portion of Japan on its western-most boundary. Sasebo Naval Base occasionally experiences unhealthy levels of "yellow haze", made of $PM_{2.5}$ particles, a combination of desert sand and pollution blowing in from central China (Stripes, 2013).

Subic Bay Philippines

Air pollution in the Philippines is governed by the Philippine Clean Air Act of 1999 (Republic Act No. 8749) (Philippines, 1999). This regulation sets forth National Ambient Air Quality Guideline values for particulate matter, sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide and lead. It also identifies de minimis levels for permitting of stationary sources where emissions greater or equal are considered significant and subject to Rule X: CO 100 TPY; NO_X 40 TPY; SO_2 40 TPY; TSP 25 TPY; PM_{10} 15 TPY; VOCs 40 TPY; H_2S 10 TPY.

The Philippines was ranked 69^{th} out of 131 countries for air quality in 2022 by the research firm IQAir (GMA News, 2023). The report showed that based on its average $PM_{2.5}$ concentration, air quality in the country has slightly improved to 14.9 microgram per cubic meter (μg/m³) from 15.6 μg/m³ in 2021. However, IQAir stressed that this number was still three times higher than the annual air quality guideline value set by the WHO. In 2022, Taguig (south of Manila) was particularly tagged as the country's most polluted city, while Balanga City (20 miles east of Subic Bay) was considered as the cleanest. Citing its 2016 figures, IQAir pointed out that 80 percent of the country's air pollution came from motor vehicles, while the remaining 20 percent was from stationary sources like factories and the open burning of organic matter.

Port of Singapore

The main sources of air pollution in Singapore are emissions from the industries and motor vehicles. From time to time, transboundary smoke haze from land and forest fires in the region also affect Singapore's air quality, particularly during the Southwest monsoon period from August to October. Singapore enjoys better air quality than many cities in Asia, comparable with that of cities in the United States and Europe. Singapore's Pollutant Standards Index has remained in the 'Good' and 'Moderate' range for much of 2019 (NEA, 2023).

Trend shows that the levels of PM_{10} and $PM_{2.5}$ have been decreasing over the past decade. Industries and motor vehicles are the major sources of PM_{10} and $PM_{2.5}$ in Singapore. Over the years, a multi-pronged approach involving the tightening of vehicular emission standards, fuel quality standards, and stringent enforcement action against smoke emissions from motor vehicles and industries, have reduced domestic emissions of particulate matter.

Port of Darwin Australia

The Port of Darwin is located on the northern shore of the Northern Territory State on the Timor Sea. Like the rest of Australia, Darwin generally experiences relatively healthy air quality most of the year round, in comparison to global locations. However, as in the rest of the country, Darwin is also vulnerable to experience short-term air pollution spikes from extreme events such as bushfires and dust storms, which can significantly affect air quality for short periods of time (IQAir, 2023). Although some exceedances of short-term standards were recorded for PM_{10} and $PM_{2.5}$, all air monitoring stations were compliant with the National Environment Protection (Ambient Air Quality) Measure goals (NTEPA, 2020).

3.5.3 Environmental Consequences

This analysis evaluates the potential short- and long-term effects on air quality that could result from estimated direct and indirect emissions associated with the action alternatives and No Action Alternative.

Implementation of the action alternatives would generate short-term, temporarily-emitted air pollutants emissions from combustion of fossil fuels for propulsion during ship transits. Fuel transfers may also release minor and temporarily-emitted fugitive emissions. Fugitive emissions are those that escape due to small unintended leaks in a system or from vapors from pressurized equipment.

3.5.3.1 Method for Estimating Air Pollutant Emissions for Tanker Operations

The primary source of air pollutants under the Proposed Action would be emissions from the combustion of fuel by the propulsion system of a medium-range tanker.

Tanker operating modes are categorized as transit (vessel operations between JBPHH and potential receiving locations), maneuvering (slow speed vessel operations while in port areas), and hotelling (also known as berthing or moored a pier). For simplicity, hotelling emissions are considered the same as “anchorage” for ship activity at anchor at or near a pier, but not moored to the pier.

Two types of engines are found on ocean-going vessels, main engines and auxiliary engines:

- The main engine is a very large diesel engine used primarily to propel the vessel at sea. Main engines are used during the transit and maneuvering modes.
- Auxiliary engines on ocean-going vessels provide power for uses other than propulsion (except for diesel-electric vessels). Typically, an ocean-going vessel will have a single, large main engine used for propulsion, and several smaller auxiliary “generator-set” engines. Auxiliary engines are used during all three operating modes.

In addition to the engines, most ships have auxiliary boilers to provide steam heat for a variety of uses, including fuel heating and hot water. Some crude oil tankers also use boilers for moving crude oil product on and off the ship. Boilers are used during slow speed vessel operations or in port. For the purposes of this analysis, it is assumed that boilers are operated during maneuvering, and hotelling/anchorage.

To calculate emissions for a certain transit, pollutant emission factors for each engine or boiler source during each operating mode (transit, maneuvering, and hotelling) are multiplied by the load factor (auxiliary boiler only) and anticipated duration of operation. The emission factors and calculations in this section followed the methodology outlined in the 2011 California Air Resources Board “Emissions Estimation Methodology for Ocean-Going Vessels (CARB, 2011) and emission factors from the 2020 EPA Ports Emissions Inventory Guidance (EPA, 2022e). Emissions assume use of low sulfur fuel (0.1 percent sulfur) for portions of transits within ECAs; for international transit, emissions assume use of 0.5 percent sulfur fuel. To be conservative, auxiliary boilers were assumed to use heavy fuel oil. Air pollutant emissions for each transit route were calculated in tons.

General conformity analysis in the U.S. includes vessel sources within 3 nautical miles (NM), as this is a distance where emissions could be encountered by human populations and could become concentrated at levels that could affect local air quality. Local emissions for ports in the U.S. and internationally were calculated on a 3 NM basis. The majority of emissions would occur locally at the piers during fuel transfer (e.g., vessel emissions during hotelling and fugitive emissions from fuel transfer). Based on the most direct routes, the distances each vessel would transit within 12 and 3 NM of each country on route to each potential receiving location are estimated in Table 3.5-2.

Table 3.5-2. Vessel Transit Distances between JBPHH and Potential Receiving Locations

Receiving Location	Transit Distance within 200 NM of Hawaii (NM)*	Transit Distance Outside 200 NM of either Oahu or Receiving Location	Transit Distance between 12 and 200 NM of Receiving State or Country	Transit Distance within 12 NM of Receiving Location (NM)**	Transit within 3 NM of Receiving Location	Total Transit Distance (NM)
West Oahu, HI	13	0	NA	NA	13	13
Point Loma, CA	226	**1855**	188	13	6	2282
Selby, CA	226	**1668**	188	34	25	2116
Port of Vancouver, WA	226	**1830**	188	99	90	2343
Puget Sound, WA	226	**1928**	188	141	132	2483
Sasebo, Japan	335	**3330**	**188**	**203**	**17**	4056
Subic Bay, Philippines	335	**3936**	**188**	**370**	**12**	4829
Port of Singapore	335	**5626**	**188**	**82**	**17**	6231
Darwin, Australia	212	**4740**	**230**	**30**	**3**	5192

Note: Numbers in orange bold assume use of 0.5% sulfur fuels (e.g., non-ECA zones); NA = Not applicable
* Vessel distance within ECA of Hawaii, all within 3 NM of shoreline.
** 3 NM distance is a subset of the 12 NM distance for U.S receiving locations.

VOCs can be released as fugitive emissions from the vessel during loading and transit. EPA estimates that ocean vessel loading releases 0.005 lbs/1,000 gallons transferred for kerosene (note: JP-5 is a type of refined kerosene) or number 2 fuel oil and approximately 0.005 lbs/week-1,000 gallons transported (EPA, 2008). During fueling transfers and vessel transits, fugitive emissions are apportioned based on time within each phase.

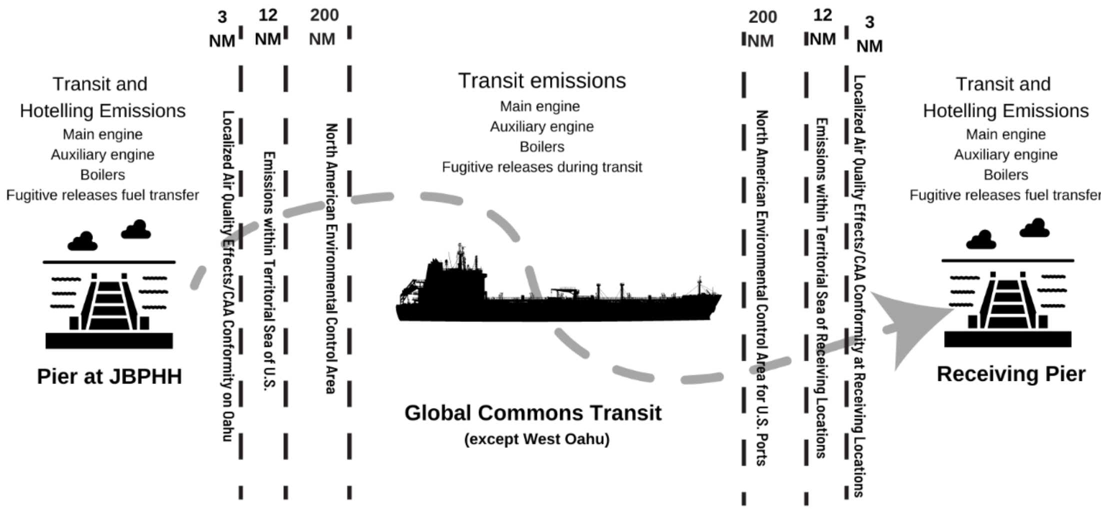

Figure 3.5-1. Emission Sources Associated with Vessel Transit

Table 3.5-3 Provides emission factors for transit per hour that combine emissions from main engines, auxiliary engines, boilers, and fugitive emissions.

Table 3.5-3. Combined Emission Factors for Tanker Transits

Sulfur Content	CH_4	CO	CO_2	NO_X	PM_{10}	$PM_{2.5}$	VOC	SO_X	HAPs
0.1 % S	0.001	0.017	11.397	0.202	0.005	0.005	0.010	0.035	0.0009
0.5 % S	0.001	0.017	11.397	0.202	0.007	0.007	0.010	0.060	0.001

Units: tons/hour; S = Sulfur; CH4 = Methane; CO = Carbon Monoxide; CO_2 =Carbon Dioxide; VOC = Volatile Organic Compounds; NO_X = Nitrogen Oxides; SO_x = Sulfur Oxides; PM_{10} = Particulate Matter 10 microns or less; $PM_{2.5}$ = Particulate Matter 2.5 microns or less.
Note: US EPA 2017 National Emissions Inventory developed HAP fractions for commercial marine vessels based on fractions of PM2.5 and VOCs. HAP emissions were estimated with a 0.0213 ratio to PM2.5 and 0.0807 to VOC (BOEM, 2021). Maneuvering emission factors are equivalent to transit emission factors.

To determine potential localized effects on air quality at receiving locations, emissions were estimated based on time the vessel is within 3 NM each receiving location (Figure 3.5-1). Emission calculation worksheets are provided in Appendix E. California ports (Selby and Point Loma) are in non-attainment areas. Accordingly, the Navy conducted an analysis of air emissions within the state and its regulated waters (all waters within 3 NM of the California baseline) (Navy, 2013). Records of Non-Applicability for Clean Air Conformity for Point Loma and Selby, California are also provided in Appendix E.

3.5.3.2 **Alternative 1: No Action Alternative**

Under the No Action Alternative, flowable fuel from RHBFSF would be transferred to the UTF or to fueling piers at JBPHH through existing infrastructure. Fuel from the UTF would then be sent by pipeline to Hickam Field, fuel loading piers, and truck loading racks for distribution to customary defense customers for consumption. A low demand for JP-5 fuel at JBPHH would require JP-5 movement by vessel to points of immediate consumption as part of a stock rotation program.

Because fueling for customary defense points of use at JBPHH is standard practice, it is considered part of the existing conditions and would not change air pollutant emissions associated with fuel transfers at JBPHH. Fugitive emissions of VOC from fuel transfer would occur across various locations at JBPHH over a ten to fourteen month period at the same locations used in standard practice, they are not expected to appreciably increase impacts above the status quo. Use of fuels from RHBFSF under this alternative would reduce the need to import fuel from overseas during the defueling timeframe, offsetting vessel deliveries to JBPHH.

As part of the stock rotation program, there were four JP-5 shipments from JBPHH to Naval Base Point Loma from 2020 through 2022 totaling 12.76 million (M) gallons. Stock rotation of JP-5 from JPBHH is an existing practice and any JP-5 relocated from RHBFSF would not increase baseline emissions.

Overall, the effect to air quality at and in the vicinity of JBPHH from the No Action Alternative would be less than significant.

3.5.3.3 Alternative 2: Relocation

As described in Chapter 2, the maximum number of tankers to receive and relocate the flowable fuel from RHBFSF is eleven. The number of vessels traveling to each receiving location may vary but are bounded by the delivery numbers in Chapter 2. The longer the transit time, the more air pollutants would be emitted by vessel engines and boilers, with longer durations for fugitive emissions from the vessel. Therefore, the analysis evaluates the maximum emission case and the minimum emission case to provide a range.

The maximum emission case is comprised of the eleven transits with the most emissions. Based on the maximum deliveries for each location and their distances, the maximum case for emissions (Table 3.5-4) would be: 5 tankers to Port of Singapore; 5 tankers to Port of Darwin; and 2 tankers to Subic Bay.

The minimum case is comprised of the eleven transits with the least emissions. The minimum emissions case (Table 3.5-5) would be: 5 tankers to West Oahu; 2 tankers to Naval Base Point Loma; 2 tankers to Selby Terminal; 1 tanker to Port of Vancouver; and 1 tanker to Puget Sound. These receiving locations represent the minimum case because their travel distances are shorter than foreign locations but they also are subject to the lower sulfur content fuel limit within the North American ECA.

Table 3.5-4. Maximum case: Emissions from Tanker Transits Including Hotelling (International Receiving Locations)

Destination	CO	GHGs CO_2e	NO_X	PM_{10}	$PM_{2.5}$	VOC	SO_X	HAPs	No. of Trips/ Multiplier
JBPHH 11th Tanker Additional Emissions	0.39	781	4.68	0.57	0.55	0.33	10.53	0.03	1
Subic Bay, Philippines (per trip)	5.62	4010	67.32	2.49	2.32	3.37	23.15	0.32	2
Port of Singapore (per trip)	7.19	5079	86.19	3.16	2.94	4.30	28.77	0.41	5
Darwin, Australia (per trip)	6.03	4287	72.20	2.68	2.50	3.61	24.81	0.34	5
Total Maximum Case Scenario (for all trips)	77.7	55633	931.3	34.7	32.4	46.6	324.8	4.4	Total trips =11

CO2e= Carbon Dioxide equivalent
Notes: Units = U.S. tons; US EPA 2017 National Emissions Inventory developed HAP fractions for commercial marine vessels based on fractions of PM2.5 and VOCs. HAP emissions were estimated with a 0.0213 ratio to PM2.5 and 0.0807 to VOC (BOEM, 2021); VOCs calculated as Reactive Organic Gases. Individual route trip emissions include JBPHH emissions for that single tanker. Because the 11th tanker could reside longer at JBPHH than the others, its emissions were calculated separately.

Table 3.5-5. Minimum Case: Emissions from Tanker Transits Including Hotelling (U.S. Receiving Locations)

Destination	CO	GHGs CO_2e	NO_X	PM_{10}	$PM_{2.5}$	VOC	SO_X	HAPs	No. of Trips/ Multiplier
JBPHH 11th Tanker Additional Emissions	0.39	781	4.68	0.57	0.55	0.33	10.53	0.03	0.39
West Oahu (per trip)	0.2	170.9	2.0	0.2	0.1	0.1	2.2	0.0	5
Point Loma, CA (per trip)	2.8	2068.7	33.0	1.3	1.2	1.7	12.7	0.2	2
Selby, CA (per trip)	2.6	1942.1	30.8	1.2	1.1	1.6	12.1	0.1	2
Port of Vancouver, WA (per trip)	2.8	2115.2	33.8	1.3	1.2	1.7	12.8	0.2	1
Puget Sound, WA (per trip)	2.99	2222	35.73	1.35	1.26	1.80	13.29	0.17	1
Total Minimum Case Scenario (for all trips)	17.8	13994.2	211.9	8.9	6.0	10.8	97.4	1.0	Total trips = 11

CO2e= Carbon Dioxide equivalent
Notes: Units = U.S. tons; US EPA 2017 National Emissions Inventory developed HAP fractions for commercial marine vessels based on fractions of PM2.5 and VOCs. HAP emissions were estimated with a 0.0213 ratio to PM2.5 and 0.0807 to VOC (BOEM, 2021); VOCs calculated as Reactive Organic Gases. Individual route trip emissions include JBPHH emissions for that single tanker. Because the 11th tanker could reside longer at JBPHH than the others, its emissions were calculated separately.

Tankers would be towed by tugboat within Pearl Harbor. Receiving locations in the U.S. and overseas may elect to use tugboats for safety reasons. Therefore, emissions from tugboats were included in the calculations in Table 3.5-4 and Table 3.5-5 and in local emissions by ports shown Table 3.5-6. Emission worksheets are provided in Appendix E.

The total emissions cases are provided for comparison purposes and to illustrate the overall emissions at and between JBPHH and receiving locations. Because tankers are mobile sources, emissions would generally disperse due to wind while at sea. Tanker emissions during ocean transits would occur over long distances where they would be dispersed and unlikely to impact the general public. Conversely, pollutant emissions emitted within 3 NM of the receiving area's coast and hotelling at piers are more likely to affect ambient air quality and has greater potential to impact the general public and sensitive populations nearby. Where local air quality is already considered to be impaired (e.g., nonattainment or frequent unhealthy air days), the addition of emissions has greater potential to cause adverse effects. However, the short (3 days) and infrequent (at 5 or less occurrences) would cause minor, transient effects for both criteria pollutants and HAPs.

In terms of local effects at JBPHH and receiving locations, Table 3.5-6 provides emissions occurring at those locations under the maximum scenario of shipments and compares those total emissions against the General Conformity de minimis thresholds as applicable (see Sections 3.5.1.2). It should be noted that the emissions provided for each listed receiving location are summed as if all the arrivals (maximum shipments) occurred simultaneously. Because tankers would depart at no more than twice a week from Oahu, the shipments would occur over the span of several days or weeks depending on the receiving location, where emissions would have time to disperse between shipments and only cause occasional and temporary minor impacts on air quality.

Table 3.5-6. Local Emissions Occurring at JBPHH and Receiving Locations

Receiving Location and Designation Status	CO	GHGs CO_2e	NO_X	PM_{10}	$PM_{2.5}$	VOC	SO_X	HAPs*
JBPHH, Oahu, HI	1.94	2872.50	22.59	2.06	1.92	1.35	34.84	0.11
De Minimis Levels	100	NA	100	100	100	100	100	25
West Oahu, HI	0.91	854.73	10.01	0.78	0.65	0.48	11.23	0.04
De Minimis Levels	100	NA	100	100	100	100	100	25
Naval Base Point Loma, CA **(Severe Non-Attainment 8-hour Ozone, PM2.5, State Non-Attainment PM10)**	0.21	337	2.40	0.25	0.23	0.15	4.29	0.01
De Minimis Levels	100	NA	25	70	100	25	100	25
Selby Terminal, CA **(Non-Attainment for 8-hr Ozone and PM2.5. State PM10 Non-Attainment)**	0.27	381	3.17	0.28	0.26	0.19	4.59	0.02
De Minimis Levels	100	NA	100	70	100	50	100	25
Port of Vancouver, WA	0.24	265	2.90	0.17	0.16	0.16	2.44	0.01
De Minimis Levels	100	NA	100	100	100	100	100	25
Puget Sound, WA	0.31	313	3.75	0.19	0.18	0.20	2.58	0.02
De Minimis Levels	100	NA	100	100	100	100	100	25
US Naval Fueling Station Sasebo, Japan	0.24	362	2.85	0.28	0.26	0.17	4.61	0.02
De Minimis Levels	100	NA	100	100	100	100	100	25
Subic Bay, Philippines	0.56	877	6.61	0.67	0.63	0.41	11.39	0.04
De Minimis Levels	100	NA	40	15	NA	40	40	25
Port of Singapore	0.61	906	7.12	0.69	0.65	0.43	11.54	0.04
De Minimis Levels	100	NA	100	100	100	100	100	25
Port of Darwin, Australia	0.49	826	5.70	0.64	0.60	0.36	11.12	0.03
De Minimis Levels	100	NA	100	100	100	100	100	25

Notes: Units in U.S. tons; local emissions are those occurring within 3 NM of affected state or country. Where a country has no published de minimis levels, US de minimis levels are shown for comparison purposes. * The National Emission Standards for Hazardous Air Pollutants (NESHAP) describes a major source as any with the potential to emit over 25 tons/year of HAPs.

As shown in Table 3.5-6, the Proposed Action would not exceed de minimis levels at JBPHH or any receiving locations. Receiving locations in nonattainment areas (Selby and Point Loma) would not result in any exceedances of General Conformity de minimis emissions thresholds; therefore, conformity determinations are not required. Naval Base Point Loma is located in a severe nonattainment area for 8-hour ozone (precursors NOx and VOC) and has the highest potential for adverse impacts; however, only up to two shipments would occur there, resulting in minor, temporary impacts. CAA General Conformity Applicability Analysis documentation for Selby and Point Loma are provided in Appendix E.

Carbon dioxide emissions contribute to global warming and their total emissions, wherever they occur, can contribute to climate change. For context, the high emissions case would emit greenhouse gases to the equivalent of the annual operation of 6,365 U.S. homes (using EPA estimate of 7.9 tons/year for an average U.S. home). With the social cost of carbon at $51/ton of CO2 emitted, the high and low case would equate to $2.84 M and $0.71 M respectively of monetized climate change damages. At the proposed $190/ton, the high and low case would be $10.57 M and $2.66 M respectively. In 2020, there were over 14,000 oil and chemical tankers worldwide (Equasis, 2020) and over 16,000 observed tanker vessel calls to U.S. ports (DOT, 2022). The Proposed Action would include up to eleven tanker deliveries, representing 0.07 percent of annual U.S. tanker deliveries. Emissions of greenhouse gases from tanker transits would be unavoidable but represent a very small fraction of international shipping emissions worldwide annually.

Overall, this alternative would emit criteria pollutants and hazardous air pollutants that would contribute to local air pollution and greenhouse gases that would contribute to global air pollution. The eleven transits would comprise a small percentage of annual global tanker ship traffic and the redistribution of fuel from RHBFSF would displace shipments that would have likely occurred without the action.

Anticipated air quality impacts from Alternative 2 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area's progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected.

3.5.3.4 **Alternative 3: Commercial Sale and Relocation**

Under Alternative 3, the DLA would enter into sales agreements with commercial entities to receive some or all of the flowable fuel. Commercial tankers would arrive at the JBPHH pier to receive the fuel and then transport it to a destination of their choice. While it is not possible to reasonably predict where the fuel would go, it is reasonable to assume that from an economic standpoint, the commercial purchaser would provide the best bid if their shipping costs were considered reasonable and justifiable based on its anticipated destination. Assuming this is the case, transport emissions would be likely less than the maximum case scenario under Alternative 2.

It is also assumed that the commercial shipper would adhere to IMO regulations and North America ECA requirements as applicable to reduce sulfur emissions. Port emissions would likely be accounted for in the receiving location's air quality planning strategies and regulations. As with Alternative 2, the sale of the fuel would likely offset the purchase of fuel from other locations, offsetting transits from other locations. Overall, the effects to air quality from Alternative 3 would contribute a very small portion to the global emissions from tanker ship annual transits.

Anticipated air quality impacts from Alternative 3 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area's progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected.

4 CUMULATIVE IMPACTS

Cumulative impacts are the result of two or more individual effects that, when considered together, compound or increase the overall impact. Cumulative impacts can arise from the individual effects of a single action or from the combined effects of past, present and/or future actions. Therefore, cumulative impacts can result from individually minor actions that collectively amount to significant actions over time.

Projects proposed, underway, or recently completed at RHBFSF, JBPHH, and other actions related to the action alternatives were reviewed during the analysis of cumulative impacts (Table 4-1). Projects at potential fuel receiving locations were not considered for the cumulative impact analysis because fuel deliveries associated with the Proposed Action would occur in lieu of routine or planned fuel deliveries; therefore, effects from tanker transits and fuel unloading at these locations would not contribute to cumulative impacts.

Table 4-1. Past, Present, and Future Actions or Trends Relevant to Cumulative Effects

Title	Description	Implementation Timeframe
On-going Ship Traffic in Pearl Harbor	Pearl Harbor is one of the Navy's busiest ports, completing about 65,000 boat runs and transporting 2.4 million passengers each year. Tour boats manned by Navy personnel transport more than two million visitors to the U.S.S. Arizona Memorial each year. There are typically about 2,000 annual naval vessel and submarine movements (i.e., one-way trips) in the harbor to support JBPHH missions. JBPHH continued to receive regular fuel deliveries by tanker ship to resupply the UTF after operations at RHBFSF ceased in late 2021. In the future, deliveries of fuel to JBPHH by tanker ship have the potential to decrease if there is an increase in the amount of fuel delivered by tanker ship to the West Oahu (Campbell Industrial Park) storage facility then transferred to JBPHH by commercial pipeline.	On-going
Red Hill Shaft Recovery and Monitoring	In response to contamination of drinking water supplies, the Navy installed a hybrid zeolite-granular activated carbon treatment system near the Red Hill Shaft, which is pumping approximately 5,000,000 gallons of water a day through the treatment system and then discharging the treated water into Halawa stream. The Navy samples water quality before and after treatment to evaluate the effectiveness of the treatment system and to ensure that water discharged into Halawa stream meets water quality standards (EPA, 2023e). Recovery and monitoring efforts also include expansion of the groundwater monitoring well network at RHBFSF and Red Hill Shaft. The Navy is using data collected from the monitoring wells to identify and track possible contamination migration and evaluate effectiveness of remediation.	January 2022-December 2025 (Navy, DOH, & EPA, 2022)
RHBFSF Soil Contamination Remediation	The Navy remediated areas near the Adit 3 exterior entrance to RHBFSF that were contaminated during the November 2021 fuel release. The Navy conducted a site assessment and soil borings in January and April 2022, followed by excavations of soil and a leach tank in May 2022 with confirmation sampling. Based on results of sampling, the Navy completed a second round of excavations in September-October 2022. The Navy submitted a closure report recommending no further action to regulators for review in February 2023.	April 2022-February 2023
RHBFSF Oily Waste Disposal Facility Risk Evaluation and Response Actions	The Navy is conducting a site investigation, environmental risk evaluation, and response actions required to close and remediate the former oily waste disposal facility at RHBFSF.	July 2016-August 2024
RHBFSF Line Unpacking	JTF-RH completed a fuel line unpacking operation that removed an estimated 1,058,187 gallons of fuel from the pipelines connecting the RHBFSF with fuel points on JBPHH. Fuel was removed using gravity flow and pumps for fuel transfer from low points. The fuel removed from the pipelines remained on JBPHH for operational use.	October-November 2022

Title	Description	Implementation Timeframe
RHBFSF Repairs	JTF-RH is working to complete 253 repairs to RHBFSF, the UGPH, and the fuel pipelines that will be used for defueling. Repairs include but are not limited to: replacing and repairing pipe components, valves, fittings and seals; inspecting and repairing dents in pipes; adding or repairing pipe supports and braces; and replacing deficient pressure gauges. A third party will validate the quality of the completed repairs.	December 2022-June 2023; Repairs to be completed prior to defueling
Fueling Pier Repairs	The Navy is conducting structural repairs at the fueling pier that includes repairing piles by cleaning and repairing rebar and installing fiberglass jackets with cathodic protection. Repairs also include cleaning and repairing spalls at pile caps, beams, underdeck and deck. Riser valve replacement project will replace fuel riser valve components and platform and apply a corrosion protective coating to the new riser valves.	Structural Repairs: March 2020-January 2024 Riser Valves: February 2023-September 2024
Red Hill Water Treatment Facility	The Navy would construct a new drinking water treatment facility for removing potential contaminants at the Red Hill water supply shaft and ensure that treated water continues to meet all Federal and State drinking water standards. The water treatment facility would be constructed on existing Navy property near the Red Hill water supply shaft. Granular activated carbon treatment would continue to be used for the treatment of the potential contaminants that may impact the Red Hill water supply.	June 2024-June 2027
RHBFSF Closure	The Navy will permanently close the RHBFSF underground storage tanks, four surge tanks, and associated valves and piping systems at the RHBFSF, following the Hawaii underground storage tank regulations, Chapter 11-280.1 of the Hawaii Administrative Rules (HAR). The Navy has submitted a Tank Closure Plan to EPA and DOH (Navy, 2022b). Closure will also include management of sludge and waste material and site assessment. The Navy has currently proposed closing the tanks in place with the option for beneficial repurposing them (ensuring no storage of hazardous materials).	January 2024-August 2027
RHBFSF Beneficial Reuse	The Navy is evaluating options for beneficial non-fuel reuse of the RHBFSF tanks using an inclusive, science-based approach that will collect ideas from interested parties. Studies collecting ideas from various community, academic, and political stakeholders are ongoing. The Navy will closely coordinate with DOH and EPA on the final proposed beneficial non-fuel reuse of the facility.	Beneficial non-fuel reuse plans would be implemented after Tank Closure Operations conclude in August 2027
Pearl Harbor Sediment Site	The site is part of the Pearl Harbor Naval Complex National Priorities List, which identifies priorities among known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The Pearl Harbor Sediment Site comprises six remediation areas of the harbor, identified as Decision Units (Navy, 2018). Selected remedies for the Pearl Harbor Sediment Site include the following: Dredging of sediments containing high contaminant of concern (COC) concentrations. Enhancing the rate of natural recovery of sediments with moderate COC concentrations by incorporating a clean sand cap. Monitoring natural recovery of sediment with low COC concentrations. Limiting the bioavailability of COCs within the sediment through the use of activated carbon during the natural recovery period.	Projected completion 2026-2028

Title	Description	Implementation Timeframe
Hotel Pier Release and Response	In March 2020, the Navy observed a slow discharge of petroleum into Halawa Stream and Pearl Harbor from a wharf located at petroleum pipeline manifold area near Hotel Pier at JBPHH. In September 2020, the Navy excavated an area between the pipeline manifold and the discharge location into Pearl Harbor to determine the source of the leak. Additional investigations conducted in December 2020 determined the leak to be un-weathered JP-5 fuel presumably originating from a leaking underground fuel pipeline at the manifold area located at the mouth of Halawa Stream where Halawa Stream enters Pearl Harbor. The Navy continues to perform work to recover residual oil from the ground, mitigate migration of oil to the water, and recover any oil that does reach the water (Navy, 2021).	March 2020-Present
Pearl Harbor Naval Shipyard (PHNSY) Dry Dock 5 Construction	The Navy will construct and operate a graving dry dock sized to accommodate current and future class fast-attack submarines at Pearl Harbor Naval Shipyard, including auxiliary facilities and utilities. Construction activities will include dredging, fill, pile driving, installation of new temporary and permanent in-water structures, demolition of existing landside structures, and construction of new temporary and permanent landside facilities. Marine traffic in Pearl Harbor from construction-related vessels will increase, including longer transit times to allow safe navigation around construction equipment, moored barges, and materials vessels.	April 2023-Janaury 2028
JBPHH Wastewater Treatment Plant Upgrade	The Navy plans to upgrade the wastewater treatment plant at JBPHH. The new plant will operate in full compliance with all applicable laws and regulations related to the discharge of treated wastewater into the ocean. In addition, the Navy will develop a plan to prevent and respond to potential infrastructure failures at the plant, should they occur.	Complete by Winter 2025-2026

4.1 CUMULATIVE EFFECTS ANALYSIS

4.1.1 Public Health and Safety

Actions described in Table 4-1 could increase vessel traffic and demand for emergency services at JBPHH, resulting in additive adverse effects to maritime safety, such as vessel collisions, if they occur at the same time as the Proposed Action. Timelines for both the Proposed Action and future actions are dependent on many factors; based on current information available, it was assumed that there may be some temporal overlap of the Proposed Action with PHNSY Dry Dock 5 Construction, Pearl Harbor Sediment Site dredging, and Fueling Pier Repairs. BMPs including vessel communication with the Harbormaster and use of safety plans would also be used during these actions so that there would be no significant increase in human health risk to JBPHH workers, residents, or members of the general public.

Vibration from pile driving has the potential to damage structures if vibration amplitudes are sufficiently large. However, structure damage is generally limited to structures in close proximity of the driven pile, typically within a pile length (Caltrans, 2013). Geotechnical engineering and vibration analyses for the pile driving activities associated with the PHNSY Dry Dock 5 Construction project indicate that damage to structures from vibration would be limited to an approximately 200-foot threshold from the pile driving activity. The fueling pier and associated infrastructure that would be used for the Proposed Action are located more than one mile (5,280 ft.) from the pile driving sites; therefore, safety impacts related damage of the fueling pier and infrastructure from pile-driving vibration would not occur.

Cumulative impacts to drinking water quality from present and future actions involving soil and groundwater clean-up, recovery, remediation, and monitoring at RHBFSF are discussed in Section 4.1.2.

4.1.2 Water Resources

Actions described in Table 4-1 involving soil and groundwater clean-up, recovery, remediation, and monitoring at RHBFSF would cumulatively result in improved quality of groundwater and drinking water supplies on Oahu. Similarly, remediation and infrastructure improvement efforts at JBPHH, including the ongoing work at the Pearl Harbor Sediment Site, Hotel Pier Release and Response efforts, and the JBPHH Wastewater Treatment Plant Upgrade, would result in improved marine water quality in Pearl Harbor.

Cumulative impacts from the increased vessel traffic and use of in-water construction equipment in Pearl Harbor for the PHNSY Dry Dock 5 Construction project could result in additive effects to marine waters. There are typically about 2,000 annual naval vessel and submarine movements (i.e., one-way trips) in the harbor. These vessels can create turbulence in the water column and marine bottom environment from propeller wash, leading to resuspension of sediments that temporarily increase turbidity. High levels of vessel traffic concentrated in time can prolong turbidity in the short-term. High levels of vessel traffic can result in a commensurate increase potential for inadvertent spills to the harbor. BMPs to reduce the potential for spills identified for the Proposed Action, including use of oil-absorbent booms, fueling procedures, and vessel communication with the Harbormaster, would also be used during these actions to reduce cumulative effects to less than significant.

4.1.3 Marine Biological Resources

Cumulative impacts from current and future actions involving dredging, in-water construction, and increased vessel traffic in Pearl Harbor could result in additive effects to protected species present in Pearl Harbor if the actions have similar stressors to protected species as those identified by the Proposed Action, including vessel noise, vessel collision, and oil spills. There are typically about 2,000 annual naval vessel and submarine movements (i.e., one-way trips) in the harbor. Navy vessels transiting in Pearl Harbor use strict BMPs to avoid collisions with protected species and prevention of oil spills. Similarly, the PHNSY Dry Dock 5 Construction Project has developed BMPs, conservation measures, and mitigations in consultation with NMFS to avoid, reduce, and mitigate impacts to protected species during dredging and in-water construction. The Proposed Action is a one-time action, and would not continue to increase vessel movements in Pearl Harbor following completion of defueling of RHBFSF. The Proposed Action would not significantly contribute to the cumulative effects.

4.1.4 Hazardous Materials and Waste

Dredging, in-water construction, and increased vessel traffic in Pearl Harbor from the PHNSY Dry Dock 5 Construction project could result in additive effects from resuspension of contaminated sediments. There are typically about 2,000 annual naval vessel and submarine movements in the harbor. The Proposed Action is a one-time action, and would not continue to increase vessel movements in Pearl Harbor following completion of defueling of RHBFSF. Therefore, the resuspension of contaminated sediments from vessel transits associated with the Proposed Action would not significantly contribute to the cumulative effects.

Dredging of marine sediments associated with the Pearl Harbor Sediment Site would reduce potential impacts from resuspension of contaminated sediments by removing contaminants in the Southeast Loch. This would result in an overall benefit to environmental and human health by removing and disposing contaminated sediments.

4.1.5 Air Quality and Greenhouse Gases

Current and future construction projects and increased vessel traffic in Pearl Harbor could result in additive effects to air quality if actions overlap in time and occur within close proximity to the Proposed Action. There are typically about 2,000 annual naval vessel and submarine movements in the harbor. The Proposed Action is a one-time action, and would not continue to increase vessel movements in Pearl Harbor following completion of defueling of RHBFSF. Therefore, emissions from vessel transits associated with the Proposed Action would not significantly contribute to the cumulative effects.

The PHNSY Dry Dock 5 Construction project, which may overlap in time with the Proposed Action, is located approximately 1.3 miles from the JBPHH fueling pier. This project will implement multiple BMPs to avoid and reduce impacts from fugitive dust, vehicle emissions, on-site construction activities, and power requirements (Navy, 2022a).

5 SUMMARY AND CONCLUSIONS ON THE IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

Based on the analysis of environmental impacts of the Proposed Action and the No Action Alternative, this EA/OEA concludes that no significant adverse environmental impacts are expected as a result of the Proposed Action. Table 5-1 summarizes the potential impacts that could result from the alternatives evaluated.

Table 5-1. Comparison of Alternatives

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
Public Health and Safety	There may be a small increase in vessel traffic in Pearl Harbor if JP-5 stock rotation was required due to low demand for JP-5 fuel at JBPHH. This would result in a negligible increase in vessel traffic. The No Action Alternative would have no significant adverse effects on public health and safety.	A minimal increase of demand for emergency services may result from the addition of approximately ten workers per shift during the defueling and tanker ship loading operations. The additional tanker ships entering Pearl Harbor would account for an approximate ten percent increase in vessel traffic during the defueling operation. Overall, with the use of BMPs and adherence to procedures, Alternative 2 would have less than significant adverse effects to public health and safety.	Effects would be the same as Alternative 2.
Water Resources	Defueling would occur over a longer period of time than Alternative 2, which could pose additional threat to groundwater and drinking water sources should releases from RHBFSF occur. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 1 would have less than significant effects to water resources.	Defueling RHBFSF expeditiously would reduce potential for system releases that could further adversely affect local groundwater and drinking water supplies. Relocation of fuel via tanker may marginally increase potential for spills affecting marine waters on Oahu, international waters, and receiving location water bodies. Statistically, occurrences of catastrophic spills from oil tankers are low (0.0005 percent spill rate). Propeller wash from vessels at ports could cause short-term suspension of sediments, causing localized turbidity that would settle within days. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 3 would have less than significant effects to water resources.	Effects would be similar to those under Alternative 2. Defueling RHBFSF via commercial sale would occur over a similar expeditious timeframe as Alternative 2, reducing potential for releases that could adversely affect local groundwater and drinking water supplies. Commercially-operated tanker ships would adhere to international maritime safety and environmental regulations that reduce potential for catastrophic spills at ports and at sea. Propeller wash from vessels at ports could cause short-term suspension of sediments, causing localized turbidity that would settle within days. Completed repairs to RHBFSF and use of BMPs for fuel transfers would reduce the risk of spills during the defueling operation. Overall, Alternative 3 would have less than significant effects to water resources.

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
Marine Biological Resources	The amount of fuel transferred to tanker ships for overseas deliveries would likely be substantially less than under Alternatives 2 and 3. Tanker ships would use low speeds and BMPs to reduce the potential for vessel collisions with marine species and oil spills. Alternative 1 would have less than significant effects to marine biological resources.	The likelihood of a vessel collision with a protected marine species is extremely remote because of the low probability that individual animals of an ESA-listed species would overlap in space and time with the eleven one-way tanker transits. Additionally, the relatively slow speed of the vessels further reduces the chance of ship strike with marine mammals, sea turtles, and fishes. A tanker spill during transit has a low probability of occurrence, and the response teams and BMPs available at all ports. Overall, with the use of BMPs, Alternative 2 would have less than significant effects to marine biological resources.	Under Alternative 3, impacts to marine biological resources would be similar to those described for Alternative 2. The transit route and destination of sold fuel is at the discretion of the non-federal entity purchaser and not a federal action. Similar to Alternative 2, the temporary and slow-moving presence of the maximum of eleven tanker ships would reduce the risk of impacts to marine biological species from vessel noise or collision. With the use of BMPs, Alternative 3 would result in a less than significant effects to marine biological resources.
Hazardous Materials and Waste	Inadvertent fuel releases that could be associated with Alternative 1 would mostly consist of small spills at points of consumption where fuel is transferred or dispensed. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan. With the use of BMPs, Alternative 1 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.	Inadvertent fuel releases during fuel loading and unloading processes would mostly consist of small amounts of fuel escaping from the flexible hose and flexible hose connection points on the fueling pier and tanker ship. JBPHH has spill response procedures to address potential spills and to limit their effects to human health and the environment. Spilled fuel and contaminated absorbents or debris would be managed in accordance with the waste management plan. With the use of BMPs, Alternative 2 would result in a less than significant increase to the potential for human or environmental exposure to hazardous materials or waste.	Effects would be the same as Alternative 2.
Air Quality and Greenhouse Gases	Emissions from fuel storage and transfers would reflect the status quo and baseline levels, as deliveries would occur through existing processes on JBPHH. Effects on air quality would be less than significant.	Relocation of fuel via tanker ships would emit criteria pollutants, hazardous air pollutants (HAPs), and greenhouse gases from the combustion of fuel by tanker ships and tugboats. Anticipated air quality impacts from Alternative 2 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area’s	While the ultimate destinations under commercial sales is not known, from an economic standpoint, the purchaser would likely transport fuel the shortest distance practicable. Under this assumption, the transport emissions would likely be less than the maximum case under Alternative 2. Anticipated air quality impacts from

Resource Area	Alternative 1: No Action Alternative	Alternative 2: Relocation	Alternative 3: Commercial Sale and Relocation
		progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected. Records of Non-Applicability for the General Conformity Rule for nonattainment areas in California (Point Loma and Selby) found pollutants would be well below de minimis levels. Emission of greenhouse gases would be short-term and a small fraction of those generated by international shipping activities.	Alternative 3 are not expected to interfere with the attainment of NAAQS, hinder a nonattainment area's progress to attainment, increase the frequency or severity of existing poor air quality, or appreciably increase human health risks from HAP exposure in areas where sensitive receptors and/or public presence are expected.

The analysis provided in Section 3 of the EA/OEA describes how, in accordance with NEPA, the Proposed Action would not result in significant impacts to the physical or biological environment. In accordance with E.O. 12114, the Proposed Action would not cause significant harm to the human or biological environment in ocean waters beyond the territorial limits of the U.S.

5.1 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES

Resources that are irreversibly or irretrievably committed to an action are those that are used on a long-term or permanent basis. This includes the use of non-renewable resources such as metal and fuel, and natural or cultural resources. These resources are irretrievable in that they would be used for this action when they could have been used for other purposes. Human labor is also considered an irretrievable resource. Another impact that falls under this category is the unavoidable destruction of natural resources that could limit the range of potential uses of that particular environment.

Under the action alternatives, flowable fuel from RHBFSF would be relocated for use at other defense fuel supply points. The method of relocation (tanker ship movements) would consume fuel irretrievably. Because these shipments would displace other routine or planned deliveries to these destinations, the net effect compared to the status quo in terms of transit fuel and labor would be negligible.

Gravity-based defueling of RHBFSF itself would commit labor and resources irretrievably. The action would be a first step towards closure of the RHBFSF which would alter the way DoD fuel is stored and disbursed at JBPHH and the Pacific region. However, the decision to close RHBFSF has already been made through the order issued on March 7, 2022 by U.S. Secretary of Defense, Lloyd J. Austin III (SECDEF Memo, 2022). The gravity-based defueling under the Proposed Action is a result of the closure decision.

5.2 UNAVOIDABLE ADVERSE IMPACTS

The action alternatives would unavoidably result in emissions of air pollutants and greenhouse gases associated with tanker ship transits to other defense fuel supply points. These emissions would occur temporarily and would not impair overall air quality.

Similarly, vessel movements may cause localized turbidity in marine waters in shallower waters but these effects would be short-term and less than significant.

The transfer and movement of fuel via tanker ships may result in fuel spills to marine waters, but statistically such spills are rare (see Section 3.2.2.5). Many causes of spills are largely avoidable through proper training, through routine inspection and maintenance of equipment and vessels, by following spill prevention procedures, and abiding by appropriate and vigilant navigation procedures. Some tanker ship spills could be considered unavoidable, such as those occurring due to unforeseen rapid weather changes, human error, or unexpected equipment failures or fires/explosions. However, adverse impacts from fuel spills, should they occur, could range from minor to significant depending on the amount spilled, its location and proximity to humans and marine species.

5.3 RELATIONSHIP BETWEEN SHORT-TERM USE OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action would be one of the first steps towards closing and remediating the RHBFSF. The short-term action of defueling RHBFSF and relocating fuel would provide for long-term benefits to water quality and avoidance of potentially harmful health effects to residents receiving potable water from the vicinity. The Proposed Action would provide long-term protection of the Waimalu and Moanalua aquifers.

5.4 CONSISTENCY WITH FEDERAL POLICIES AND EXECUTIVE ORDERS

The Proposed Action is consistent with various federal policies and Executive Orders, including but not limited to: the National Environmental Policy Act; National Historic Preservation Act; Clean Water Act; Clean Air Act; Endangered Species Act; Migratory Bird Treaty Act; Sikes Act; EO 11988 – Floodplain Management EO 11990 – Protection of Wetlands; EO 12898 – Environmental Justice in Minority Populations and Low-Income Populations; EO 13045 – Protection of Children from Environmental Health Risks and Safety Risks; EO 13186 – Protection of Migratory Birds, and EO 14057 - Federal Sustainability Plan. Among those that may be particularly relevant to this EA/OEA are the following:

5.4.1 Federal Policies

5.4.1.1 Endangered Species Act

The purpose of the ESA of 1973 is to conserve and protect ecosystems upon which threatened and endangered species depend and to conserve and recover listed species. Section 7 of the ESA requires action proponents to consult with the USFWS and/or NMFS to ensure that their actions are not likely to jeopardize the continued existence of federally listed threatened and endangered species, or result in the destruction or adverse modification of designated critical habitat.

JTF-RH and DLA are consulting with NMFS for ESA under Section 7. JTF-RH and DLA determined that the Proposed Action would have no effect on ESA-listed species or designated critical habitat under regulation of USFWS.

5.4.1.2 Coastal Zone Management Act

The CZMA of 1972, as amended (16 USC 1451 et seq.), is administered by the State of Hawaii Office of Planning and Sustainable Development. The CZMA program objectives and policies are to provide coastal recreational opportunities; preserve and protect historic, scenic and coastal ecosystem resources; provide economic uses; reduce coastal hazards; improve public awareness in coastal zone management; and manage development within the coastal zone.

The CZMA requires federal agencies to conduct their planning, management, development, and regulatory activities in a manner consistent with the State's CZMA program. The Proposed Action would have insignificant direct or indirect coastal effects. Correspondence indicating the project elements within the de minimis list under the CZMA will be included in the Final EA/OEA as Appendix C.

5.4.2 Executive Orders

5.4.2.1 Executive Order 12114 – Environmental Effects Abroad of Major Federal Actions

EO 12114 (44 FR 1957), Environmental Effects Abroad of Major Federal Actions, directs federal agencies to be informed of and take account of environmental considerations when making decisions regarding major federal actions outside the United States, its territories, and possessions. The EO requires environmental consideration of actions with the potential to significantly harm the global commons, which are the geographic areas outside the jurisdiction of any nation, including the oceans beyond the territorial sea, which the United States defines as 12 NM. The purpose of EO 12114 is for agency decision makers to be informed of pertinent environmental considerations and to take environmental considerations into account, with other pertinent considerations of national policy, in making decisions.

In accordance with EO 12114 and the DoD's implementing regulations in 32 CFR Part 187, this EA/OEA evaluates the potential for significant environmental harm from the Proposed Action in ocean waters beyond the territorial limits of the United States. As described in Section 3, the Proposed Action and alternatives would not pose a significant harm abroad.

5.4.2.2 Executive Order 13045 – Protection of Children from Environmental Health Risks and Safety Risks

EO 13045 requires federal agencies to "make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children and shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." As analyzed in Section 3.1, the Proposed Action would have no disproportionate health or safety risks to children.

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APPENDIX A – RESERVED FOR PUBLIC COMMENTS AND RESPONSES

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APPENDIX B – RESERVED FOR ENDANGERED SPECIES ACT – NOAA/NMFS MARINE CONSULTATION

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APPENDIX C – RESERVED FOR COASTAL ZONE MANAGEMENT ACT COORDINATION

Reserved - To be provided in the Final EA/OEA

APPENDIX D – SUPPLEMENTAL INFORMATION FOR MARINE BIOLOGICAL RESOURCES

APPENDIX D

SUPPLEMENTAL INFORMATION FOR MARINE BIOLOGICAL RESOURCES

This appendix provides supplemental information to that which is provided in the Environmental Assessment/Overseas Environmental Assessment (EA/OEA). This section includes (1) a description of the fuel loading location (Pearl Harbor, Hawaii); (2) a description of the potential fuel receiving locations; (3) detailed information on the potential marine biological stressors and environmental consequences that could occur as a result of the Proposed Action; and (4) references.

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1 Fuel Loading Location: Pearl Harbor, Hawaii

Pearl Harbor (Figure D-1) is located on the southern coast of the island of Oahu, Hawaii. It is one of the Navy's busiest ports, completing about 65,000 boat runs and transporting 2.4 million passengers each year. Tour boats manned by Navy personnel transport more than two million visitors to the U.S.S. Arizona Memorial each year (CNRH, 2023).

Pearl Harbor is an estuary, defined as an area where fresh water emanating from land mixes with ocean water. The northern portion of the harbor receives freshwater input from perennial streams that flow into Pearl Harbor, creating an estuarine environment with a muddy bottom. The water in Pearl Harbor becomes more saline as it nears the mouth of the harbor due to saltwater input from the Pacific Ocean via Mamala Bay and the Main Channel of Pearl Harbor. The area near the mouth of Pearl Harbor is characterized by oceanic conditions or higher salinity conditions (DoN, 2022).

Marine vegetation observed within Pearl Harbor includes algae (crustose coralline algae, turf algae, cyanobacteria, and macroalgae) and seagrass. Gorilla ogo (*Gracilaria salicornia*), which is classified as invasive by the State of Hawaii Division of Aquatic Resources (DAR), occurs in dense mats in shallow nearshore areas throughout Pearl Harbor. Recent fish surveys identified at least 41 species in 16 families (NAVFAC PAC, 2020; DoN Region Hawaii, 2020a, 2021), with all being typical Hawaiian reef fishes.

No Endangered Species Act (ESA)-listed invertebrates are known to occur within Pearl Harbor. Six native species of stony corals are present within Pearl Harbor (crust coral [*Leptastrea purpurea*], lace coral [*Pocillopora damicornis*], rice coral [*Montipora capitata*], finger coral [*Porites compressa*], ringed rice coral [*M. patula*], and lobe coral [*Porites lobata*]). The most common corals are crust coral and lace coral, which are found in every benthic environment in Pearl Harbor except the soft sediment of the harbor floor. One soft coral, branched pipe coral (*Carijoa riisei*) was observed at several locations within Pearl Harbor during recent Navy surveys. Branched pipe coral is an introduced species that is considered invasive in Hawaii by the State of Hawaii DAR (DoN, 2022).

Non-coral marine invertebrates included sponge, bryozoans, bivalves, anemones, zoanthids, worms, and sea cucumbers. The orange keyhole sponge, which is classified as invasive by the State of Hawaii DAR, is abundant throughout the harbor. Other introduced species found within Pearl Harbor include erratic bryozoan (*Schizoporella errata*), sea frost worm (*Salmacina dysteri*), Christmas tree hydroid (*Pennaria disticha*), lacy tubeworm (*Filograna implexa*), white bushy bryozoan (*Amathia distans*), and feather duster worm (*Sabellastarte spectabilis*).

Two ESA-listed sea turtle species have been documented in Pearl Harbor. This includes the threatened Central North Pacific Distinct Population Segment (DPS) green sea turtle (*Chelonia mydas*) and the endangered hawksbill sea turtle (*Eretmochelys imbricata*). Green sea turtles are common within Pearl Harbor, however their distribution and density varies from location to location. Based on past surveys, occurrence of green sea turtles observed relatively more in the entrance channel and outside Pearl Harbor. Hawksbills are infrequent and occur in low numbers in Pearl Harbor.

Additionally, the ESA-listed (endangered) Hawaiian monk seals (*Neomonachus schauinslandiare*) are historically known to enter Pearl Harbor on occasion. Between 2012 and 2022, eight Hawaiian monk seals were documented inside Pearl Harbor (DoN, 2022). Between 1998 and 2000, non-ESA listed marine mammals observed within Pearl Harbor or within the vicinity included humpback whales and a potential pygmy sperm whale/unidentified whale (NAVFAC PAC, 2016).

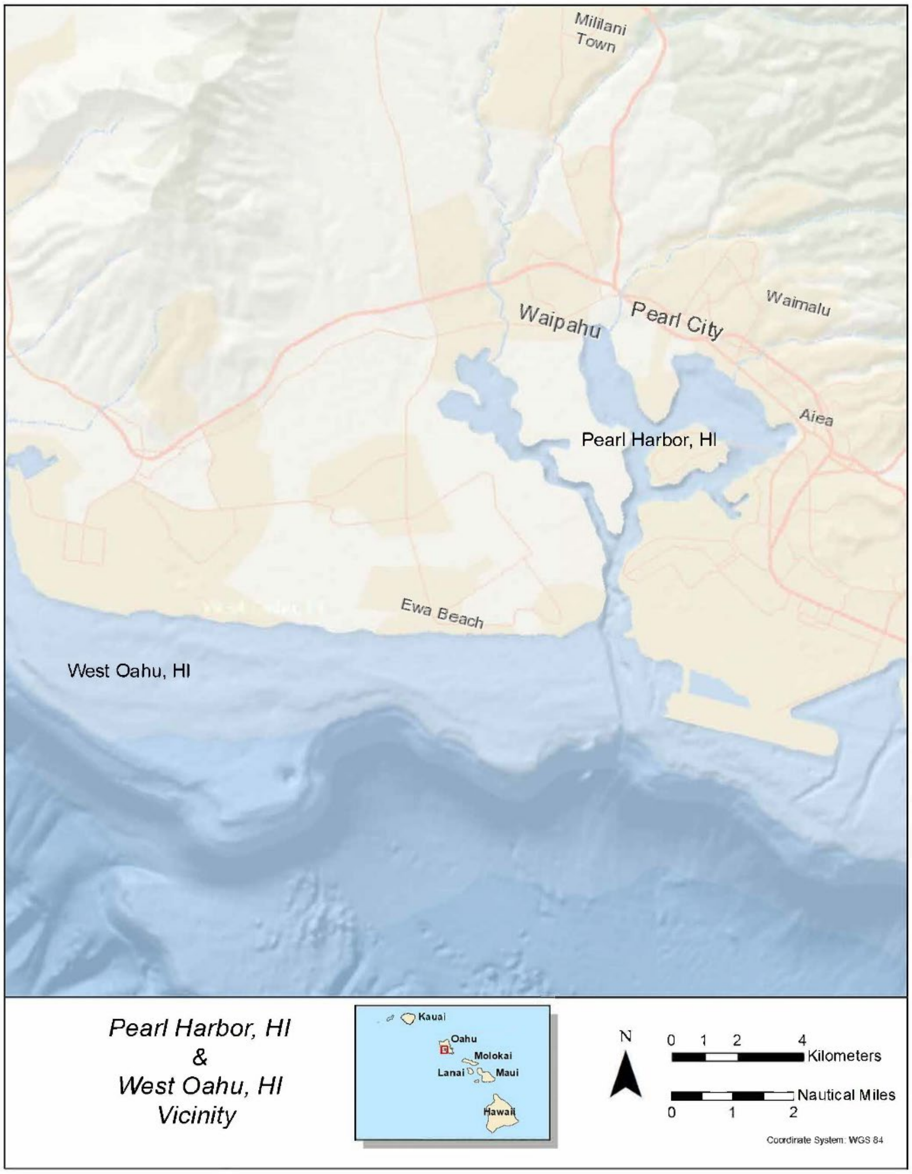

Figure D-1: Pearl Harbor, Hawaii and West Oahu, Hawaii fuel receiving location.

2 Fuel Receiving Locations

The Proposed Action includes proposed transit routes to the following receiving locations: 1) West Oahu, Hawaii, 2) Naval Base Point Loma, California, 3) Selby Terminal, California, 4) Port of Vancouver, Washington, 5) Manchester, Washington, 6) United States (U.S.) Naval Fueling Station, Sasebo, Japan, 7) Subic Bay, Philippines, 8) Port of Singapore, and 9) Port of Darwin, Australia.

2.1 WEST OAHU, HAWAII

The West Oahu, Hawaii receiving location (Figure D-1) is Seven Point Multipoint Mooring (MPM) System located two miles offshore of Barbers Point. Fuel transfer would occur through an offshore mooring that transfers oil and refined products through a hose between a buoy and commercial refinery/storage facilities onshore.

2.2 NAVAL BASE POINT LOMA, CALIFORNIA

Naval Base Point Loma (Figure D-2), located in San Diego, California on San Diego Bay, provides support to the U.S. Pacific Fleet afloat and shore based tenant commands. Port Operation’s primary focus is to provide safe, efficient, and timely hotel services to home-ported and visiting submarines, surface ships, and mine counter vessels. The secondary mission includes a facility response team for immediate oil spill response for over four nautical square miles of San Diego Bay (Commander, Navy Region Southwest, 2023).

San Diego Bay, in the southwestern corner of California, is a 15-mile (24 km^2) long, 0.2 to 3.6 miles (0.4 to 5.8 km) wide embayment separated by a sand spit extending from Imperial Beach to approximately Point Loma, California (Largier, 1995; NAVFAC SW and the Port of San Diego, 2013).

Water temperature is highest in the bay in July and August and temperatures are lowest in January and February. Surveys conducted in 1993 found temperatures to range from at 59.2°F (15.1°C) to 84.7°F (29.3°C) (Lapota et al., 1993; NAVFAC SW and the Port of San Diego, 2013). At the entrance of the bay salinity levels are similar to those of the ocean. However, as the bay continues to move away from the entrance channel, the area known as South Bay may produce salinities as high as 37 practical salinity unit (psu) in late summer, or as low as 22 psu following heavy rains (Ford, 1968; Ford and Chambers, 1973; NAVFAC SW and the Port of San Diego, 2013).

Marine mammal surveys from February 2007 recorded five marine mammal species in the bay: harbor seals, California sea lions, bottlenose dolphins, Pacific white-sided dolphins and common dolphins (Merkel and Associates, 2008).

Of note is the Port of San Diego, established in 1962, is responsible for the management of San Diego Bay and 34 miles of waterfront, serving five member cities (Chula Vista, Coronado, Imperial Beach, National City, and San Diego). The Port of San Diego oversees two maritime cargo terminals, two cruise ship terminals, 16 public parks, various wildlife reserves and environmental initiatives, a Harbor Police Department, and the leases of 600 tenant businesses around San Diego Bay (NAVFAC SW and the Port of San Diego, 2013).

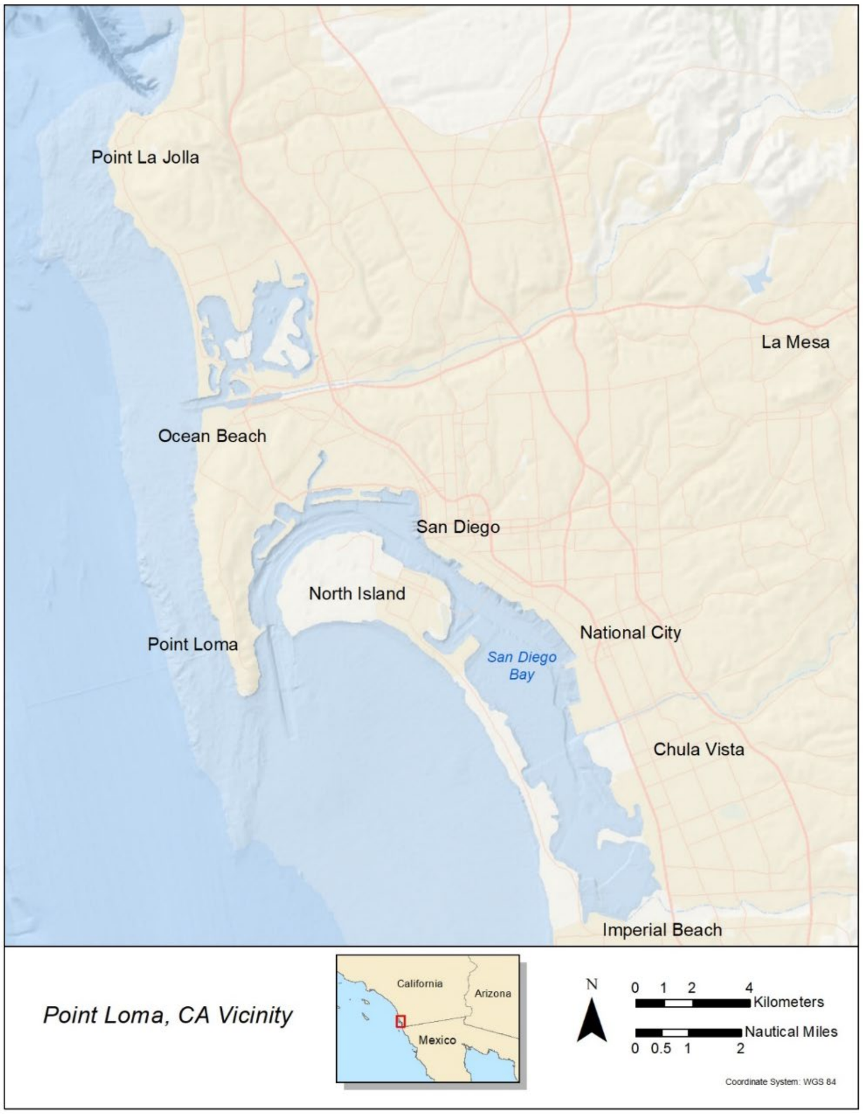

Figure D-2: Naval Base Point Loma, California receiving location.

2.3 SELBY TERMINAL, CALIFORNIA

The Selby Terminal (Figure D-3) is a deep-water terminal located in northern California, within the San Pablo Bay (IndustryNet, 2023). San Pablo Bay is a shallow tidal estuary that forms the northern extension of the San Francisco Bay. Its waters are a mixture of fresh waters from the Sacramento, San Joaquin, Petaluma and Napa rivers, as well as the Central Valley, and the salt water from the Pacific Ocean. The bay is comprised of the open bay, mudflats and intertidal habitat, and tidal marsh. The open waters act as a migratory corridor for many fishes and invertebrates, and a foraging and resting habitat for birds. Over 300 species of wildlife may occur within the San Francisco Bay estuary, inclusive of San Pablo Bay (USFWS, 2001). The San Pablo Bay National Wildlife Refuge, developed in 1974, aims to conserve and restore the bay wetlands for endangered species and migratory birds.

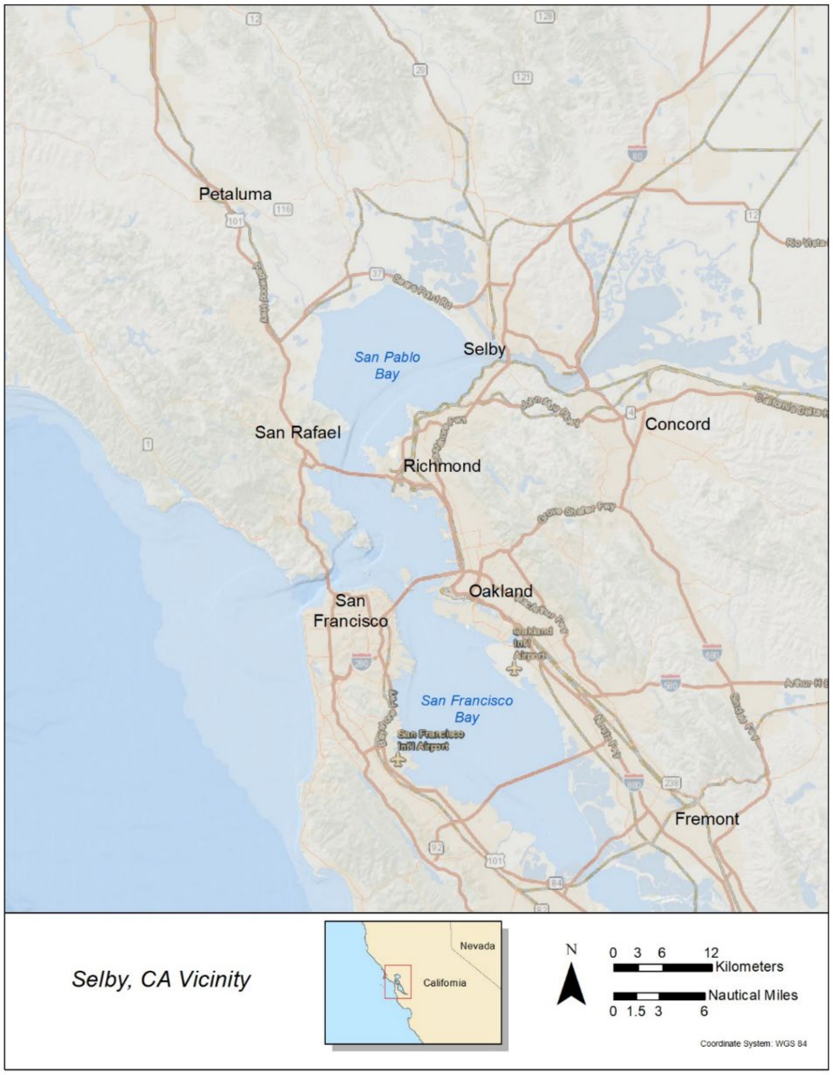

Figure D-3: Selby Terminal, California receiving location.

2.4 PORT OF VANCOUVER, WASHINGTON

The Port of Vancouver (Figure D-4), founded in 1912, is 106 miles from the Pacific Ocean and is a deep-water port located on over 2,000 acres along the Columbia River. The Port is comprised of five terminals and 13 berths. With between 400 and 500 vessel calls annually, this port handles eight million tons of cargo annually. Port activities generate $3.8 billion in annual economic activity and support more than 3,900 direct jobs and over 24,000 regional jobs (Port of Vancouver USA, 2023).

The 258,000 square mile Columbia River drains more water to the Pacific Ocean than any other river in North or South America, with increased flows in the late spring and early summer (due to snowmelt), and lower flows in the fall and winter months (Marts, 2022; American Rivers, 2023). Vancouver, Washington and Portland, Oregon act the upper limit for oceangoing navigation. The river provides drinking water, irrigates 600,000 acres of farmland is a great source of hydroelectric power, producing a third of potential U.S. hydropower (Marts, 2022; America Rivers, 2023).

Many amphibians, birds, fish, mammals, and reptiles utilize the river, including endangered species of salmon, trout, and sturgeon (Columbia River Inter-Tribal Fish Commission, 2021).

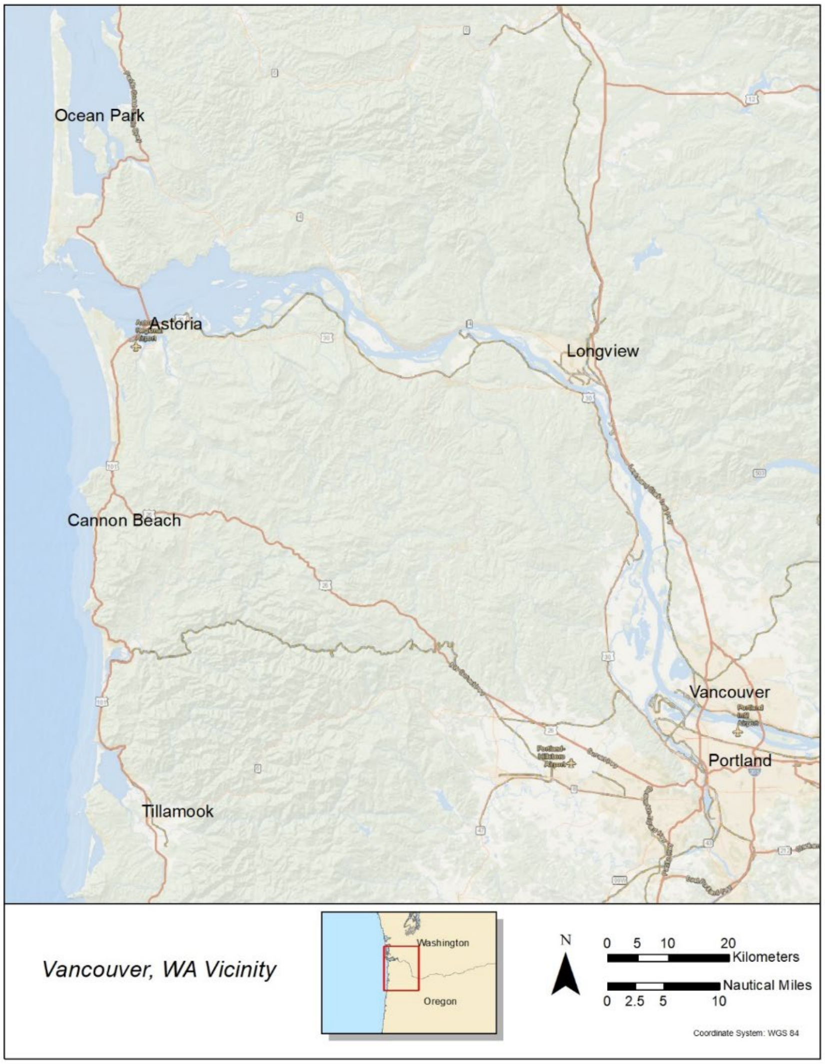

Figure D-4: Port of Vancouver, Washington receiving location.

2.5 MANCHESTER, WASHINGTON

The Manchester Fuel Depot (Figure D-5), which is a part of Naval Base Kitsap and managed by the U.S. Navy's Fleet Logistics Center (FLC) Puget Sound Fuel Department, sits on approximately two miles of Puget Sound shoreline and is approximately seven miles west of Seattle, Washington (Fuel Department Fleet and Industrial Supply Center Puget Sound, Manchester Fuel Department, 2006; Smith, 2021). The mission of the depot is to provide bulk fuel and lubricants to military and government vessels activities, providing fuel support for the U.S. and allied forced throughout Puget Sound and the Pacific (Smith, 2021).

The Pacific Northwest's Puget Sound is the second largest estuary (EPA, 2023) in the U.S, in which saltwater from the Pacific Ocean mixes with freshwater runoff from the Olympic and Cascade Mountain watersheds. Puget Sound is polyhaline with salinity ranging from 24 to 30 parts per thousand (ppt.). It is a complex system of interconnecting basins with two connections to the Strait of Juan de Fuca, and thus the Pacific Ocean – the primary Admiralty Inlet and the minor Deception Pass (Lincoln, 2020). The Sound has an average depth of 450 ft. (maximum 930 ft.; Puget Sound Estuarium, 2023) and is part of a larger marine ecosystem, the Salish Sea (EPA, 2023). Puget Sound is composed of three basins (Whidbey Basin, South Sound, and the Main Basin). Additionally, Hood Canal is found to the west of Puget Sound (Puget Sound Estuarium, 2023).

Puget Sound is home to hundreds of marine mammals, fishes, and marine invertebrates. Approximately 3,300 ft. to the north of the Manchester Defense Fuel Supply Point is a marine protected area called the Orchard Rocks Conservation Area. This area is closed to fishing, harvesting, and possession of fish and shellfish. Closure does not affect the harvest of clams, oysters, and mussels by tideland owners and their families. The natural bedrock and boulders provide habitats for rock associated fish and invertebrate species. Dominant invertebrates include red rock crab, spider crabs, red sea cucumber, and orange sea cucumber. Harbor seals frequently visit the site and are often seen hauled out on the exposed rocks at low tide. California sea lions are also commonly observed at the site and may be seen hauled out on nearby navigational buoys (Carta, 2023).

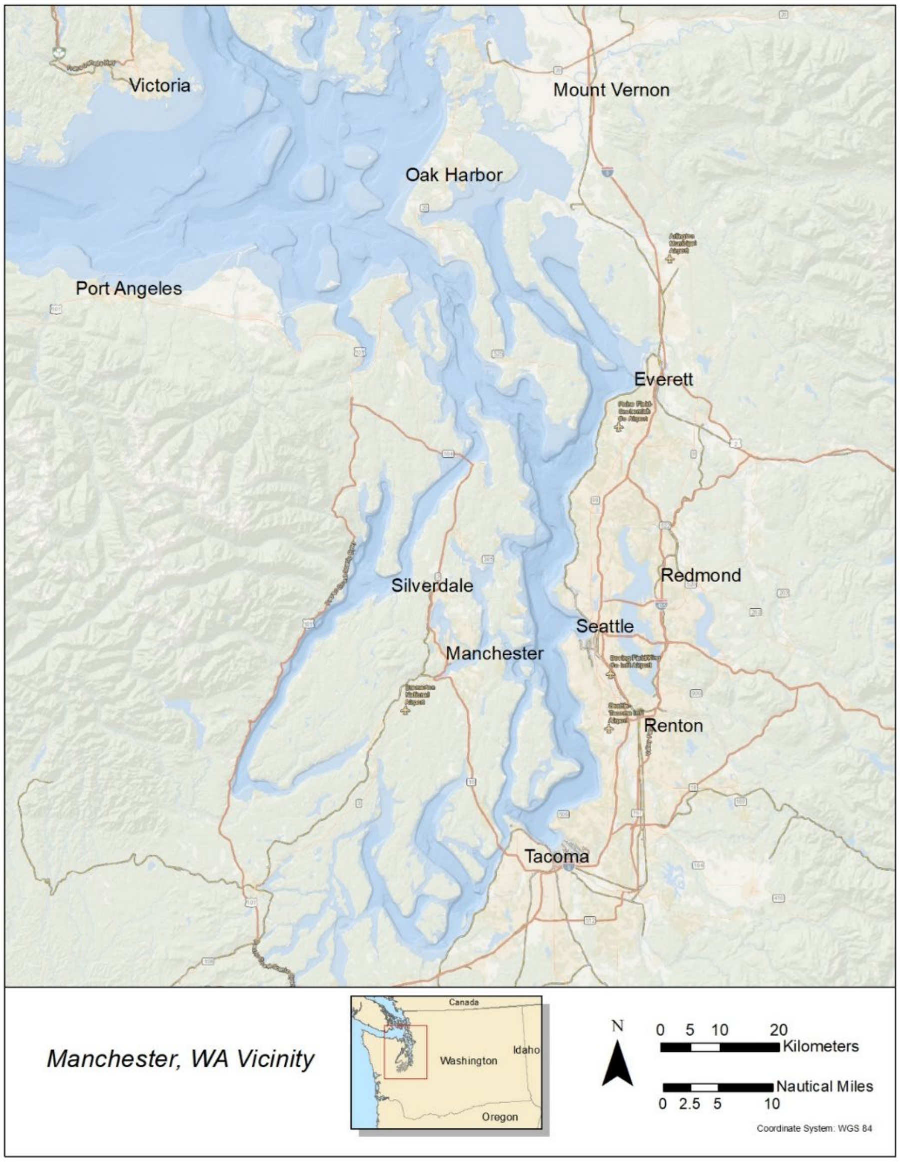

Figure D-5: Manchester, Washington receiving location.

2.6 U.S. NAVAL FUELING STATION, SASEBO, JAPAN

The Port of Sasebo (Figure D-6) is located on the western coast of Kyushu in Nagasaki Prefecture. It is a large-sized, deep-water port. Aside from the naval berths, the port area is home to numerous heavy industries and has berths for tanker operations. It is a fishing and commercial port, and is home to shipbuilding and related industry. Approximately 200 vessels visit the port annually.

Figure D-6: U.S. Naval Fueling Station, Sasebo, Japan receiving location.

2.7 SUBIC BAY, PHILIPPINES

The Philippine Coastal Storage and Pipeline Corporation (PCSPC) is located on a 160-hectare (1.6 km2; .6 mi2) facility in Subic Bay Freeport Zone (Figure D-7) and includes a marine terminal, fuel storage, and tank truck loading facilities. PCSPC is responsible for the overseeing of petroleum storage and pipeline facilities. The POL (Petroleum, oil and lubricants) pier is the marine terminal that occupies 7.2 hectares (.072 km2; .027 mi2) and includes two jetties, complete with marine loading arms and stations for berthing to discharge and load petroleum products (PCSCP, 2023).

Subic Bay (an embayment of the South China Sea) is a bay on the west coast of the island of Luzon in the Philippines (Britannica, The Editors of Encyclopedia, 2023). Until 1992, the U.S. operated Subic Bay Naval Station on the southeast coast of the bay. However, the area has since been re-developed into Subic Bay Freeport Zone, housing manufacturing plants, tourist facilities, and an international airport. One of the top tourism destinations Philippines, Subic Bay possesses a deep harbor protected by mountains and the Grande Island. Since 2012, U.S. warships have begun to have limited access to the port facilities (Britannica, The Editors of Encyclopedia, 2023).

Subic Bay has a diverse load of marine species and is considered one of the best shipwreck diving locations in the Philippines. Water temperatures range from (79 - 86°F (26 - 30°C) and visibility ranges from 2 – 30 m (7 - 98 ft.) (Dive Report, 2023). Although dated, in January and February of 1965 the U.S. Naval Oceanographic Office conducted a limited environmental survey in Subic Bay to measure environmental parameters. Salinity values ranged from 33.49 to 34.47 ppt. Core samples taken found high contents of clay and silt and maximum current speed was 0.4 knots (kts). The influence of tidal currents are thought to be responsible for the fluctuation of higher density waters through the entrance channel to Subic Bay on either slope of predicted high water (Kenney, 1970).

Figure D-7: Subic Bay, Philippines receiving location.

2.8 PORT OF SINGAPORE

The Port of Singapore (Figure D-8), located on the southern end of Malay Peninsula, is the largest publicly owned port in the world (Ship Technology, 2020). It provides connectivity with 123 countries and 600 ports (Ship Technology, 2020), handling a wide variety of cargo, including containers and conventional and bulk cargo (Ship Technology, 2020; Maritime and Port Authority of Singapore, 2023). It is the busiest container transshipment hub and, in 2019, the port handled 37.2 million twenty-foot equivalent units (TCUs) of containers and 626.2 million tonnes of cargo (Ship Technology, 2020).

The Singapore Strait is an approximately 65 mile (105 km) long, ten mile (16 km) wide channel between the Strait of Malacca and South China Sea, and includes Johore Strait at the north (Britannica, The Editors of Encyclopedia, 2017). Because it provides the deep-water passageway to the Port of Singapore, the Singapore Strait is one of the world’s busiest commercial routes, with around 2,000 merchant ships traveling through the area daily (Liang and May-E, 2017).

Figure D-8: Port of Singapore receiving location.

2.9 PORT OF DARWIN, AUSTRALIA

The Port of Darwin (Figure D-9), situated within Darwin Harbor, is located in Darwin, Northern Territory, Australia and operates commercial wharf facilities at East Arm Wharf and cruise and naval vessels at the Hill Wharf facility. The East Arm Wharf, the port handles containers and general cargo, bulk liquids, bulk materials, live exports, and heavy lift oversized cargos. The East Arm Wharf is comprised of four berths along 865 m of quay line (Landbridge Darwin Port, 2023). Darwin Harbor is a semi-diurnal, macro-tidal estuarine embayment (two high and two low tides every day), with tidal variations up to 8 m and a range of 3.7 m. The harbor is comprised of mangroves, sandy beaches, tidal flats, rocky shore, and coastal cliffs, and has a high diversity of tropical marine biota (Tonyes, 2015).

Figure D-9: Darwin, Australia receiving location.

3 Detailed Effects Analysis

The following section include an analysis of the likelihood and consequences of potential effects from the Proposed Action on fishes, marine mammals, and sea turtles. The Proposed Action would have no effect on marine invertebrates due to their demersal nature. Therefore, marine invertebrates are not discussed moving forward.

Section 7(a)(2) of the ESA of 1973, as amended (16 U.S. Code [U.S.C.] Section 1531 et seq.), requires federal agencies to consult with the National Marine Fisheries Service (NMFS) to ensure that any action it authorizes, funds, or carries out in the U.S. or upon the high seas is not likely to jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of critical habitat of such species. Therefore, a separate biological evaluation was conducted for those species listed under the ESA.

Potential effects from the Proposed Action may result from exposure to the following environmental stressors: elevated underwater sound levels and vessel collisions.

3.1 UNDERWATER NOISE

The vessel transits for the Proposed Action will contribute to elevated underwater sound levels with increased vessel traffic, and thus have the potential to impact marine mammals, sea turtles, and fishes inside Joint Base Pearl Harbor-Hickam (JBPHH) and along the proposed shipping routes. The potential effects of elevated sound levels on marine mammals, sea turtles, and fishes may include:

- Direct, physiological effects – hearing sensitivity reduction, hearing damage, tissue injury, or mortality.
- Direct, behavioral effects – disruptions to feeding, mating, breeding or nursery activities in such a way that impacts the survival or abundance of populations.
- Indirect effects – disruptions to the abundance and behavior of prey species; long-term change to population survival.

A permanent threshold shift (PTS) occurs when an animal experiences a shift in their hearing threshold caused by extreme, prolonged or repeated exposure to high sound levels that results in permanent and irreversible damage (Richardson et al., 1995). A temporary threshold shift (TTS) occurs when an animal's hearing threshold is temporarily increased (i.e., temporarily less sensitive to sound) during and immediately after exposure to a loud sound source (Richardson et al., 1995). TTS may have a duration of minutes to days to weeks, after which time full recovery is expected.

3.1.1 Fishes

Fishes have two sensory systems, which can detect sound in the water: the inner ear, which functions similarly to the inner ear in other vertebrates, and the lateral line, which consists of a series of receptors along the body of a fish (Popper and Schilt, 2008). The lateral line detects particle motion at low frequencies below 1 hertz (Hz) up to least 400 Hz (Coombs and Montgomery, 1999; Hastings and Popper, 2005; Higgs and Radford, 2013; Webb et al., 2008). Additionally, some fishes possess additional morphological adaptations or specializations that can enhance their sensitivity to sound pressure, such as a gas-filled swim bladder (Astrup, 1999; Popper and Hastings, 2009). The swim bladder can enhance sound detection by converting acoustic pressure into localized particle motion, which may then be detected by the inner ear (Radford et al., 2012). Fishes with a swim bladder generally have better sensitivity and can detect higher frequencies than fishes without a swim bladder (Popper and Hastings, 2009; Popper et al., 2014). In addition, structures such as gas-filled bubbles near the ear or swim bladder, or even connections between the swim bladder and the inner ear, also increase sensitivity and allow for high-frequency hearing capabilities and better sound pressure detection.

Although many researchers have investigated hearing and vocalizations in fish species (Ladich and Fay, 2013; Popper et al., 2014), hearing capability data only exist for just over 100 of the currently known 34,000 marine and freshwater fish species (Eschmeyer and Fong, 2016). Therefore, fish hearing groups are defined by species that possess a similar continuum of anatomical features, which result in varying degrees of hearing sensitivity (Popper and Hastings, 2009). Categories and descriptions of hearing sensitivities are further defined in this document (modified from Popper et al. 2014) as the following:

- Fishes without a swim bladder – hearing capabilities are limited to particle motion detection at frequencies well below 1 kilohertz (kHz).
- Fishes with a swim bladder not involved in hearing – species lack notable anatomical specializations and primarily detect particle motion at frequencies below 1 kHz.
- Fishes with a swim bladder involved in hearing – species can detect frequencies below 1 kHz and possess anatomical specializations to enhance hearing and are capable of sound pressure detection up to a few kHz.
- Fishes with a swim bladder and high-frequency hearing – species can detect frequencies below 1 kHz and possess anatomical specializations and are capable of sound pressure detection at frequencies up to 10 kHz to over 100 kHz.

Little data exist on the effects of vessel noise on hearing in fishes. However, TTS has been observed in fishes exposed to elevated background noise and other continuous sources (e.g., white noise). Caged studies on pressure-sensitive fishes show some hearing loss after several days or weeks of exposure to increased background sounds, although the hearing loss seems to recover (e.g., Scholik and Yan, 2002; Smith et al., 2004a; Smith et al., 2006).

As noted in the American National Standards Institute (ANSI) Sound Exposure Guideline technical report (Popper et al., 2014), some fish species with a swim bladder that is involved in hearing may be more susceptible to TTS from long-duration, continuous noise (e.g., broadband white noise) depending on the duration of the exposure (i.e., thresholds based on continuous exposure of twelve hours).

Masking refers to the presence of a noise that interferes with a fish's ability to hear biologically important sounds including those produced by prey, predators, or other fishes. Masking occurs in all vertebrate groups and can effectively limit the distance over which an animal can communicate and detect biologically relevant sounds. Human-generated continuous sounds (e.g., vessel noise) have the potential to mask sounds that are biologically important to fishes. Researchers have studied masking in fishes using continuous masking noise but masking due to intermittent, short duty cycle sounds has not been studied.

Masking could lead to potential fitness costs depending on the severity of the reaction (Radford et al., 2014; Slabbekoorn et al., 2010). For example, masking could result in changes in predator-prey relationships potentially inhibiting a fish's ability to detect predators and therefore increase its risk of predation (Simpson et al., 2015; Simpson et al., 2016). Masking may also limit the distance over which fishes can communicate or detect important signals (Codarin et al., 2009; Ramcharitar et al., 2001, 2006). If the masking signal is brief (i.e., a few seconds or less), biologically important signals may still be detected, resulting in little effect to the individual. If the signal is longer in duration (i.e., minutes or hours) or overlaps with important frequency ranges for a particular species, more severe consequences may occur, such as the inability to attract a mate and reproduce. Holt et al. (2014) were the first to demonstrate the Lombard effect in one species of fish, a potentially compensatory behavior where an animal increases its vocalizations in response to elevated noise levels. The Lombard effect is currently understood to be a reflex, which may be unnoticeable to the animal or may lead to increased energy expenditure during communication.

Although there is evidence of masking because of exposure to vessel noise, the ANSI Sound Exposure Guideline technical report (Popper et al., 2014) does not present numeric thresholds for this effect. Instead, relative risk factors are considered, and the probability of masking occurring is higher at near to moderate distances from the source (i.e., up to hundreds of meters (m)), and decreases with increasing distance (Popper et al. 2014). A fish must first be able to detect a sound above its hearing threshold and above the ambient noise level before a physiological stress reaction can occur. The initial response to a stimulus is a rapid release of stress hormones into the circulatory system, which may cause other responses such as elevated heart rate and blood chemistry changes. Although an increase in background sound has been shown to cause stress in humans and animals, only a limited number of studies have measured biochemical responses by fishes to acoustic stress (e.g., Goetz et al., 2015; Madaro et al., 2015; Remage-Healey et al., 2006; Smith et al., 2004b; Wysocki et al., 2006, 2007), and the results have varied. Researchers studied physiological stress in fishes using predator vocalizations, continuous, and impulsive noise exposures.

A stress response observed in fishes includes the production of cortisol (i.e., a stress hormone) when exposed to sounds such as boat noise, tones, or predator vocalizations. Nichols et al. (2015) found that giant kelpfish (*Heterostichus rostratus*) had increased levels of cortisol with increased sound level and intermittency of boat noise playbacks. A sudden increase in sound pressure level or an increase in overall background noise levels can increase hormone levels and alter other metabolic rates indicative of a stress response, such as increased ventilation and oxygen consumption (Pickering, 1981; Simpson et al., 2015, 2016; Smith et al., 2004a, 2004b). Although results varied, chronic or long-term (i.e., days or weeks) exposures of continuous man-made sounds can lead to a reduction in embryo viability (Sierra-Flores et al., 2015) and slowed growth rates (Nedelec et al., 2015).

However, not all species tested to date show these reactions. Smith et al. (2004b) found no increase in corticosteroid, a class of stress hormones, in goldfish exposed to a continuous, band-limited noise (0.1 to 10 kHz) with a sound pressure level of 170 decibel referenced to a pressure of 1 microPascal (dB re 1 μPa) for one month. Wysocki et al. (2007) exposed rainbow trout to continuous band-limited noise with a sound pressure level of about 150 dB re 1 μPa for nine months with no observed stress effects. Growth rates and effects on the trout's immune systems were not significantly different from control animals held at a sound pressure level of 110 dB re 1 μPa.

Fishes may have physiological stress reactions to sounds that they can hear. Generally, stress responses are more likely to occur in the presence of potentially threatening sound sources, such as predator vocalizations or the sudden onset of impulsive signals. Stress responses are typically brief (i.e., a few seconds to minutes) if the exposure is short or if fishes habituate or learn to tolerate the noise that is being presented. However, exposure to chronic noise sources can lead to more severe impacts such as reduced growth rates, which may lead to reduced survivability for an individual. It is assumed that any physiological response (e.g., hearing loss or injury) or significant behavioral response is also associated with a stress response.

Vessel traffic contributes to noise in the ocean and has the potential to affect fishes. Several studies demonstrated and reviewed avoidance responses by fishes (e.g., herring and cod) to the low-frequency sounds of vessels (De Robertis and Handegard, 2013; Engås et al., 1995; Handegard et al., 2003). Misund (1997) found fishes ahead of a ship that showed avoidance reactions at ranges of 50 to 150 m. When the vessel passed over them, some species of fish responded with sudden escape responses that included lateral avoidance or downward compression of the school.

Behavioral reactions are quite variable depending on a number of factors, such as the type of fish, its life history stage, behavior, time of day, and the sound propagation characteristics of the water column (Popper et al., 2014; Schwarz and Greer, 1984). Reactions to playbacks of continuous noise or passing vessels noted, in addition to the basic startle and avoidance responses, increased group cohesion, changes in vertical distribution in the water column, changes in swim speeds, and changes in feeding efficacy, such as reduced foraging attempts and increased mistakes (i.e., lowered discrimination between food and non-food items) (e.g., Bracciali et al., 2012; De Robertis and Handegard, 2013; Handegard et al., 2015; Nedelec et al., 2015; Neo et al., 2015; Payne et al., 2015; Purser and Radford, 2011; Sabet et al., 2016; Simpson et al., 2015, 2016; Voellmy et al., 2014a; Voellmy et al., 2014b).

During exposures to vessel noise, juvenile Ambon damselfish (*Pomacentrus amboinensis*) and European eels showed slower reaction times and lacked startle responses to predatory attacks which subsequently increased their risk of predation during both simulated and actual predation experiments (Simpson et al., 2015, 2016). In contrast, larval Atlantic cod showed a stronger anti-predator response and were more difficult to capture during simulated predator attacks (Nedelec et al., 2015). Although behavioral responses such as these were often noted during the onset of most sound presentations, these behaviors did not last long and animals quickly returned to baseline behavior patterns. In fact, in one study, when given the chance to move from a noisy tank (with sound pressure levels reaching 120 to 140 dB re 1 μPa) to a quieter tank (sound pressure levels of 110 dB re 1 μPa), there was no evidence of avoidance. The fish did not seem to prefer the quieter environment and continued to swim between the two tanks comparable to control sessions (Neo et al., 2015). However, many of these reactions are difficult to extrapolate to real world conditions due to the captive environment in which testing occurred.

Most fish species should be able to detect vessel noise due to its low-frequency content and their hearing capabilities. The ANSI Sound Exposure Guideline technical report (Popper et al., 2014) suggests that fishes have a high to moderate probability of reacting to nearby vessel noise (i.e., within tens of meters) with decreasing probability of reactions with increasing distance from the source (hundreds or more meters).

3.1.2 Marine Mammals

In 2018, NMFS released technical guidance that provided received sound levels (or acoustic thresholds), above which individual marine mammals were predicted to experience changes in their hearing ability (NMFS, 2017). In this guidance, NMFS recognized five functional hearing groups for all marine mammals, and each group was assigned acoustic thresholds for underwater sound that cause a PTS and TTS. In addition, the guidance provided separate acoustic thresholds for impulsive sound sources and non-impulsive/continuous sound sources (i.e., vessel noise). Table D-1 presents dual criteria for underwater, acoustic impact thresholds for PTS onset from impulsive sounds and one criterion for PTS from non-impulsive sounds, as well as thresholds for TTS and behavioral impacts for impulsive and non-impulsive sounds.

Table D-1: Acoustic Exposure Criteria for Non-impulsive Continuous Sounds: Marine Mammals

Acoustic Aspect	Hearing Group	Value
Underwater PTS Onset Acoustic Threshold for Non-impulsive sounds	Low-frequency cetaceans (baleen whales)	(SEL_{24h}) 199 dB re 1 μPa
Underwater PTS Onset Acoustic Threshold for Non-impulsive sounds	Mid-frequency cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	(SEL_{24h}) 198 dB re 1 μPa
Underwater PTS Onset Acoustic Threshold for Non-impulsive sounds	High-frequency cetaceans (true porpoises, Kogia, river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*)	(SEL_{24h}) 173 dB re 1 μPa
Underwater PTS Onset Acoustic Threshold for Non-impulsive sounds	Phocid pinnipeds (underwater)	(SEL_{24h}) 201 dB re 1 μPa
Underwater PTS Onset Acoustic Threshold for Non-impulsive sounds	Otariid pinnipeds (underwater)	(SEL_{24h}) 219 dB re 1 μPa
Underwater TTS Onset Acoustic Thresholds for Non-Impulsive Sounds	Low-frequency cetaceans (baleen whales)	(SEL_{24h}) 179 dB re 1 μPa
Underwater TTS Onset Acoustic Thresholds for Non-Impulsive Sounds	Mid-frequency cetaceans (dolphins, toothed whales, beaked whales, bottlenose whales)	(SEL_{24h}) 178 dB re 1 μPa
Underwater TTS Onset Acoustic Thresholds for Non-Impulsive Sounds	High-frequency cetaceans (true porpoises, Kogia, river dolphins, Cephalorhynchid, *Lagenorhynchus cruciger* and *L. australis*)	(SEL_{24h}) 153 dB re 1 μPa
Underwater TTS Onset Acoustic Thresholds for Non-Impulsive Sounds	Phocid pinnipeds (underwater)	(SEL_{24h}) 181 dB re 1 μPa
Underwater TTS Onset Acoustic Thresholds for Non-Impulsive Sounds	Otariid pinnipeds (underwater)	(SEL_{24h}) 199 dB re 1 μPa

Acoustic Aspect	Hearing Group	Value
Underwater Behavioral Onset Acoustic Thresholds (Underwater)	All marine mammal species	(SPL_{RMS}) 120 dB re 1 μPa

Notes: PTS = permanent threshold shift; TTS = temporary threshold shift; dB = decibel; μPa = micropascual; h= hours (Source: NMFS, 2017).

Any stimulus in the environment can cause a behavioral response in marine mammals. These stimuli include noise from anthropogenic sources such as vessels, sonar, air guns, or pile driving, but could also include the physical presence of a vessel or aircraft. However, these stimuli could also influence how or if a marine mammal responds to a sound such as the presence of predators, prey, or conspecifics. Furthermore, the response of a marine mammal to an anthropogenic sound may depend on the frequency, duration, temporal pattern and amplitude of the sound as well as the animal's prior experience with the sound and their behavioral state (i.e., what the animal is doing and their energetic needs at the time of the exposure; NRC, 2003). The distance from the sound source and whether it is approaching or moving away can also affect the way an animal responds to a sound (Wartzok et al., 2004).

As previously described, masking occurs when one sound interferes with the detection or recognition of another sound. The quantitative definition of masking is the amount in decibels an auditory detection or discrimination threshold is raised in the presence of a masker (Erbe et al., 2016). Masking can effectively limit the distance over which a marine mammal can communicate, detect biologically relevant sounds, and echolocate [toothed whales (odontocetes)]. Masking only occurs in the presence of the masking noise and does not persist after the cessation of the noise. Masking can lead to vocal changes (e.g., Lombard effect, increasing amplitude, or changing frequency) and behavior changes (e.g., cessation of foraging, leaving an area) to both signalers and receivers in an attempt to compensate for noise levels (Erbe et al., 2016). Furthermore, masking is more likely to occur in the presence of broadband, relatively continuous noise sources, such as vessels.

For example, right whales were observed to shift the frequency content of their calls upward while reducing the rate of calling in areas of increased anthropogenic noise (Parks et al., 2007), as well as increasing the amplitude (intensity) of their calls (Parks et al., 2009, 2011). Right whales also had their communication space reduced by up to 84 percent (%) in the presence of vessels (Clark et al., 2010). Although humpback whales did not change the frequency or duration of their vocalizations in the presence of ship noise, their source levels were lower than expected based on source level changes to wind noise, potentially indicating some signal masking (Dunlop, 2016).

3.1.3 Cetaceans (Whales, Dolphins)

Baleen whales demonstrate a variety of responses to vessel traffic and noise, from not responding at all to both horizontal (swimming away) and vertical (increased diving) avoidance (Baker et al., 1983; Gende et al., 2011; Watkins, 1981). Other common responses include changes in vocalizations, surface time, swimming speed, swimming angle or direction, respiration rates, dive times, feeding behavior, and social interactions (Au and Green, 2000; Richter et al., 2003; Williams et al., 2002).

The likelihood of a behavioral response may be driven by the distance or speed of the vessel, the animal's behavioral state, or by the prior experience of the individual or population. When baleen whales do respond to vessels, behavioral responses can be minor changes in breathing patterns (e.g., Baker et al., 1983; Jahoda et al., 2003), or can be a decrease in overall presence, as was observed during a construction project in the United Kingdom, when fewer minke whales were observed as vessel traffic increased (Anderwald et al., 2013). Avoidance responses can be an alteration in swim patterns or direction by increasing speed and heading away from the vessel (Jahoda et al., 2003), or by increasing swim speed, changing direction to avoid, and staying submerged for longer periods of time (Au and Green, 2000).

In terms of cost to individual animals, whales may choose to stop vocalizing and move away from the sound source rather than adjusting their calls. Most whales in these studies continued singing after 30 minutes passed, suggesting that the behavioral impacts from the ship noise were temporary and recoverable. The long-term consequences of vessel noise are not well understood.

Overall, baleen whale responses to vessel noise and traffic are varied but are generally minor, and habituation or disinterest was the documented predominant, long-term response. When baleen whales avoid ships, they may alter their swim and dive patterns to move away from the vessel, but no strong reactions observed. In many cases, the whales do not appear to change their behavior at all. This may result from habituation by the whales but may also result from reduced received levels near the surface due to propagation, or due to acoustic shadowing of the propeller cavitation noise by the ship's hull. Behavioral responses are evidence that individual animals are most likely compensating or overcoming the increased underwater noise in the environment. However, these responses are mostly temporary, recoverable, and ceasing once the noise source ends.

Most odontocetes (toothed whales) react neutrally to vessels, although both avoidance and attraction behaviors have been observed (Hewitt, 1985, Würsig et al., 1998). Sperm whales generally reacted only to vessels approaching within several hundred meters; however, some individuals displayed avoidance behavior, such as quick diving (Magalhães et al., 2002; Würsig et al., 1998) or a decrease in time spent at the surface (Isojunno and Miller, 2015). One study showed that after diving, sperm whales showed a reduced timeframe before they emitted the first click than prior to a vessel interaction (Richter et al., 2006).

Odontocetes may make short-term changes to vocal parameters, such as intensity as an immediate response to vessel noise, as well as increase the pitch, frequency modulation, and length of whistling (May-Collado and Wartzok, 2008), with whistle frequency increasing in the presence of low-frequency noise and whistle frequency decreasing in the presence of high-frequency noise (Gospić and Picciulin, 2016). Killer whales are also known to modify their calls during increased noise. For example, the source level of killer whale vocalizations was shown to increase with higher background noise levels associated with vessel traffic (i.e., the Lombard effect; Holt et al., 2008). In addition, calls with a high-frequency component have higher source levels than other calls, which may be related to behavioral state, or may reflect a sustained increase in background noise levels (Holt et al., 2011). On the other hand, long-term modifications to vocalizations may be indicative of a learned response to chronic noise, or of a genetic or physiological shift in the populations. This type of change has been observed in killer whales off the northwestern coast of the U.S. between 1973 and 2003. This population increased the duration of primary calls once a threshold in observed vessel density (i.e., whale watching) was reached, which is suggested as being a long-term response to increased masking noise produced by the vessels (Foote et al., 2004).

While in general, the louder the sound source the more intense the behavioral response, it was clear that the proximity of a sound source and the animal's experience, motivation, and conditioning were also critical factors influencing the response (Harris et al., 2018; Southall et al., 2016). Ellison et al. (2011) outlined an approach to assessing the effects of sound on marine mammals that incorporates contextual-based factors and not just the received sound level. These contextual-based factors include what activity the animal is engaged, the nature and novelty of the sound (i.e., is this a new sound from the animal's perspective), and the distance between the sound source and the animal. "Exposure context" greatly influenced the type of behavioral response exhibited by the animal (see technical report Criteria and Thresholds for U.S. Navy Acoustic and Explosive Effects Analysis (Phase III) (NAVFAC PAC, 2017b)). Forney et al. (2017) determined that an apparent lack of response (e.g., no displacement or avoidance of a sound source) may not necessarily mean that there is no cost to the individual or population, as some resources or habitats may be of such high value that animals may choose to stay, even when experiencing stress or hearing loss. Rather, Forney et al. (2017) recommended considering both the costs of remaining in an area of noise exposure. These costs include TTS, PTS or masking, which could lead to an increased risk of predation or other threats or a decreased capability to forage. The costs of displacement included potential increased risk of vessel strike or bycatch, increased risks of predation or competition for resources, or decreased habitat suitable for foraging, resting, or socializing.

Odontocete responses to vessel noise are varied, although many odontocete species seem to be more sensitive to vessel presence and vessel noise, and these two factors are difficult to tease apart. Some species, in particular killer whales, may be sensitized to vessels and respond at further distances and lower received levels than other delphinids (oceanic dolphins). In contrast, many odontocete species also approach vessels to bow ride, indicating either that these species are less sensitive to vessels, or that the behavioral drive to bow ride supersedes any impact of the associated noise. With these broad and disparate responses, it is difficult to assess the impacts of vessel noise on odontocetes.

3.1.4 Pinnipeds (Seals, Sea Lions)

Pinniped behavioral reactions to vessels are variable, and reports included a wide spectrum of possibilities, from avoidance and alert to cases where animals in the water are attracted, and cases on land where there is lack of significant reaction suggesting habituation to or tolerance of vessels (Richardson et al., 1995). Specific case reports in Richardson et al. (1995) vary based on factors such as routine anthropogenic activity, distance from the vessel, engine type, wind direction, and ongoing subsistence hunting.

The hearing abilities of most pinniped species are poorly understood. Although Hawaiian monk seals produce low-frequency vocalizations while on shore, production of underwater calls have not been opportunistically observed by divers (Sills et al., 2022), nor confirmed in previous research (Southall et al., 2019). Hawaiian monk seals produced vocalizations underwater in a captive study that correlated with a period of annual reproductive activity (Sills et al., 2022).

A recent study determined that monk seals have a functional hearing range in-air of 100 hertz (Hz) to 33 kilohertz (kHz) with lower sensitivity than other seal species. With respect to peak sensitivity in water, this monk seal showed elevated thresholds compared to other phocid (true seals) species but had more sensitive hearing than another Hawaiian monk seal tested over 30 years prior (Thomas et al., 1990). Results of the two 2021 studies (Ruscher et al., 2021; Sills et al., 2022) demonstrated that Hawaiian monk seals hear better at low frequencies than previously documented, displaying elevated underwater thresholds and a narrower frequency range of hearing. In addition, it appeared from the studies that monachid seals have less sensitive hearing that other phocids. Even so, Hawaiian monk seals may be more vulnerable to the effects of anthropogenic sounds in the environment than previously known (Sills et al., 2022).

3.1.5 Sea Turtles

Based on the best available scientific data, the Navy derived guidance that provided reasonable threshold values upon which potential effects to sea turtles from impulsive and non-impulsive sound were evaluated (NAVFAC PAC, 2017b). The NMFS acoustic spreadsheet (NMFS, 2020, Version 2.0) and multi-species spreadsheet (NMFS, 2021) also included these acoustic thresholds for sea turtles. Unweighted, peak pressure thresholds for TTS and PTS were developed for sea turtles based on auditory sensitivity in marine mammals (NAVFAC PAC, 2017a). Popper et al. (2014) recommended applying sound exposure level (SEL) based impact thresholds developed for fishes without a swim bladder to sea turtles, which was adjusted based on an 11- dB difference found between the SEL-based, non-impulsive TTS threshold and the SEL-based, impulsive TTS thresholds for marine mammals. Based on guidance provided in NMFS acoustic thresholds, sea turtles may respond behaviorally to underwater sound pressure levels, root mean square (SPL_{RMS}) of 175 dB re 1 micropascual (μPa) or greater (NMFS 2020b, Version 2.0). This acoustic threshold is considered the behavioral threshold, and the adjusted weighted SELs and behavioral threshold for sea turtles are shown below (Table D-2).

Table D-2: PTS, TTS, and Behavioral Thresholds for Sea Turtles Exposed to Impulsive and Non-Impulsive Sounds

Auditory Effect	Impulsive	Impulsive	Non-Impulsive/continuous
	Unweighted SPL Threshold re 1 µPa	**Weighted SPL Threshold re $\mu Pa^2 \cdot s$**	**Weighted SPL Threshold re $\mu Pa^2 \cdot s$**
PTS	232 dB Peak	204 dB SEL_{cum}	220 dB SEL_{cum}
TTS	226 dB Peak	189 dB SEL_{cum}	200 dB SEL_{cum}
Behavior	175 dB RMS	175 dB RMS	175 dB RMS

Notes: µPa = micropascual; s = second; PTS= permanent threshold shift; TTS= temporary threshold shift; dB = decibel; SELcum= cumulative sound exposure levels; RMS= root mean square
Source: NAVFAC PAC 2017a, NMFS 2021.

Sea turtle auditory sensitivity levels and functional morphology are not clearly defined nor well understood in the scientific literature. Morphological investigations demonstrated that sea turtles are poor auditory receptors to airborne sound and have adaptations for underwater sound reception, such as subtympanal fat with density like seawater and middle ear air retention (Piniak et al., 2016; Popper et al., 2014). Underwater audiograms for six sub-adult and two juvenile green turtles showed hearing sensitivities that were specialized for low-frequency levels (Bartol and Ketten, 2006). Similarly, another study produced underwater, auditory evoked potential audiograms for five juvenile green sea turtles with the same peak, low-frequency hearing sensitivity but with a wider hearing range overall (Piniak et al., 2016). The green sea turtles had lower SPL thresholds in air than underwater at (relatively) higher frequencies (i.e., >400 Hz). Hawksbill sea turtle hatchlings were capable of hearing underwater sounds at frequencies of between 50 and 1,600 Hz, with maximum sensitivity at 200 to 400 Hz (Piniak, 2012). Hearing below 80 Hz is less sensitive but still possible (Lenhardt, 1994).

Information on the importance of acoustic stimuli for sea turtles is lacking, especially to determine impacts from natural and anthropogenic sound sources (e.g., explosions, sonar, or pile driving sound; Popper et al. 2014). Sea turtle susceptibility to PTS has not been investigated, and TTS evidence in sea turtles is limited to scattered records and anecdotal accounts. Sea turtle behavioral responses to sounds were investigated mostly with seismic sound sources (NAVFAC PAC, 2017b; NMFS 2017) – an impulsive sound, whereas vessel noise is non-impulsive.

An early study documented sea turtle behavioral changes following exposure to seismic airgun sound (Moein et al., 1994). Kept in sea cages, the juvenile loggerhead turtles (*Caretta caretta*) increased their swim speed and showed the first signs of a behavioral response when airgun levels exceeded SPLrms 166 dB re 1 µPa. When airgun levels were increased above SPL_{RMS} 175 dB re 1 µPa, the turtles' swimming behavior became more erratic and suggested that the animals were in an agitated state. Based on these results, it may be that turtles would choose to swim away from or avoid loud noise, since it may cause agitation. It is important to note that exposure studies were undertaken with captive animals in controlled environments, and the results must be extrapolated carefully to open-water marine areas with different sound propagation and where animals may swim away freely from the sound source (Nelms et al., 2016). Furthermore, sea turtles rely more on visual cues than auditory input and are less sensitive to acoustic disturbances than cetaceans (Hazel et al., 2007)

3.1.6 Environmental Consequences

The worldwide merchant fleet of modern, commercial ships over 100 gross tonnage (GT) comprises approximately 100,000 ships with a combined total of about 830 million GT (McKenna et al., 2011). Commercial vessel types depend on the goods carried, and the different cargo influences the design and operating conditions of different ships. For carrying bulk goods, specifically designed ships include both bulk carrier and tanker ship-types, and these ship types comprise about 35% of global fleet. Categories of tankers include crude oil tankers, product, or chemical tankers (UNCTD, 2008). The largest of the crude oil tankers transport unrefined crude oil from the location of extraction to refineries, while product tankers carry refined petrochemicals. Chemical tankers are similar in size to product tankers and carry chemical products, and general cargos occupy the largest single category (32%) in the world merchant fleet (UNCTD, 2008).

Several factors influence the underwater noise emissions of individual vessels, such as vessel speed, draft, size, and loading. In addition, large commercial vessels in the same category may generally travel at different speeds and have different, baseline noise emissions due to vessel design, and the sources of underwater noise are from the propeller, machinery, and the hull design (MacGillivray et al., 2019). The vessel's propulsion system is the dominant source for sounds below 200 Hz. Most of the ocean-going vessels have two-stroke engines that connect directly to the ship's hull, and due to vibrations, transmit noise underwater. Propeller cavitation in slow-speed, diesel engines create tones from approximately 100 to 1,000 Hz, and large ships typically produce the greatest noise at low frequencies, in the 10 to 300 Hz frequency band (Richardson et al., 1995). The noise consists of narrowband tonal sounds below 50 Hz and broadband sounds that have greatest energy between 50 to 150 Hz. Commercial vessels (>135 m) typically cruise at speeds between 16 to 17 kts and emit noise with estimated source levels between 155-190 dB re 1µPa at 1 m (Table D-3). A 54,000 GT container ship had the highest broadband source level at 188 dB re 1µPa at 1m; while a 26,000 GT chemical tanker had the lowest at 177 dB re 1µPa at 1m. Bulk carriers had higher source levels near 100 Hz, while container ship and tanker noise (which will be used in the Proposed Action) was predominantly below 40 Hz (McKenna et al., 2012).

Table D-3: Estimated Source Levels of Noise Components From Vessels.

Vessel Type	Dominant Frequency (Hz)	Source Level (dB re 1µPa-m)	Frequency Range
Outboard	630	156	100 Hz – 3 kHz
Trawler	100	158	50 Hz – 1 KHz
Conventional Tug	1,000	164	10 Hz – 1 kHz
Tanker	60	180	-
Bulk Carrier	100	173	-
Supertanker	6.8	190	50 Hz – 300 Hz

Notes: Hz = Hertz; dB= decibel; µPa= micropascual; m= meter
(Source: Bowles et al. 2007)

The tanker ships used for relocating fuel with Alternatives 2 and 3 would have a total internal cargo volume of about 25,487 GT, a length of 180 m, a beam (i.e., width measured at widest point) of 32 m, and a draft (i.e., how shallow the boat will enter the water) of 10.275 m. Based on published data, the tanker ships would produce lower sound levels compared to larger commercial vessels, and with dominant sound frequency levels around 40 to 60 Hz. These sound levels are significantly lower than the thresholds for continuous sound likely to cause PTS or TTS in marine mammals and sea turtles. Furthermore, in deep water, underwater sound decays by about 60 dB within the first 500 m of distance from a large ship, with most of the decay within the first 100 m (Bowles et al., 2007). Therefore, it is not anticipated that the underwater noise from the tanker ships used to transport the fuel would cause either TTS or PTS, but may cause temporary and recoverable behavioral disturbance. While commercial vessel sounds are unlikely to cause serious injury to marine species, ship noise has the potential to mask sounds that animals depend on for communication, navigation, and finding mates or prey.

The overall number of eleven, one-way vessel trips to deliver the fuel is low compared to the hundreds of commercial ships that transit to these locations every day, further reducing the likelihood of overlap in space and time with the tanker ships and marine fauna.

3.2 VESSEL COLLISION

While surfacing to breathe, rest or forage, marine mammals, sea turtles, and some large, slow moving species of fish (e.g., the giant manta ray) may be at risk of a collision with moving vessels. The type and severity of injury depends upon the size of the vessel, the speed and direction of the vessel if in motion, the part of the vessel that strikes the animal (i.e., hull vs. propeller), and the part of the animal's body that was impacted. Depending on these factors, a vessel collision has the potential to cause serious injury or death.

Vessel speed is a significant factor in the likelihood of a lethal vessel/whale collision: the greater the speed at impact, the greater the risk of mortality (Conn and Silber, 2013; Gende et al., 2011; Silber et al., 2010; Vanderlaan and Taggart 2007; Woitzik et al., 2016). Vanderlaan and Taggart (2007) found that the chance of lethal injury to a large whale from a vessel strike increases from about 20% at 8.6 kts to 80% at 15 kts. For large vessels, speed and angle of approach can influence the severity of a strike. Based on modeling, Silber et al. (2010) found that whales at the surface experienced impacts that increased in magnitude with the ship's increasing speed.

3.2.1 Fishes

Vessels do not normally collide with adult fishes, most of which can detect and avoid them. However, there are a few notable exceptions to this assessment of potential vessel strike impacts on fish groups. Large slow-moving fishes, may occur near the surface in open-ocean and coastal areas, thus making them more susceptible to ship strikes which may result in blunt trauma, lacerations, fin damage, or mortality (Braun et al., 2015; Couturier et al., 2012; Deakos et al., 2011; Graham et al., 2012; Miller and Klimovich, 2017).

Species, such as manta rays, are presumed to be susceptible to vessel strikes due primarily to their large size, slow swimming speed, and distribution in the upper portion of the water column (Couturier et al., 2012; NMFS, 2016). Very little quantitative information on the frequency of vessel strikes is available and no information exists on the impact of injuries and mortalities resulting from vessel strikes to the overall health of the population (NMFS, 2016).

3.2.2 Ceteceans (Whales, Dolphins)

Vessel strikes from commercial, recreational, and military vessels are known cause serious injury and occasional fatalities to cetaceans (Abramson et al., 2011; Berman-Kowalewski et al., 2010; Laggner, 2009; Van der Hoop et al., 2012, 2013; 2015). Reviews of the literature on ship strikes mainly involve collisions between commercial vessels and whales (Jensen et al., 2003; Laist et al., 2001). Ship strikes are a growing concern for most marine mammals, and mortality may be a more significant concern for species that occupy areas with high levels of vessel traffic because the likelihood of encounter would be greater (Currie et al., 2017, Rockwood et al., 2017, Van der Hoop et al., 2013, 2015). For example, while some risk of a vessel strike exists for all the U.S. west coast waters, 74% of blue whale, 82% of humpback whale, and 65% of fin whale known vessel strike mortalities occur in the shipping lanes associated with the ports of San Francisco and Los Angeles/Long Beach (Rockwood et al., 2017).

Since 1995, the U.S. Navy and Coast Guard reported all known or suspected vessel collisions with whales to NMFS. The assumed under-reporting of whale collisions by vessels other than U.S. Navy or U.S. Coast Guard makes any comparison of data involving vessel strikes heavily biased. NMFS documented this under-reporting (Bradford and Lyman, 2015), including unreported vessel strikes by civilian vessels. From 2007-2012, NMFS provided a five-year data period of ship strikes in Hawaii, including 37 reported vessel collisions between humpback whales and vessels other than those characterized as "military", and two attributed to the Navy (Bradford and Lyman, 2015). From 2010 through 2014, seven marine mammal vessel or boat strikes reported off San Diego (Carretta et al., 2022) included two California sea lions, one fin whale, two gray whales, and two humpback whales. For the U.S. West Coast between 2011 and 2015, 65 non-Navy vessel strikes involved marine mammals: 32 pinnipeds, 28 large whales, and five smaller cetaceans (Carretta et al., 2017). Vessel strikes have been documented for almost all the mysticete (i.e., baleen whale) species (Van der Hoop et al., 2012, 2013, 2015).

In southern California, evidence of significant mortality of baleen whales (mostly from data on blue, fin, and humpback whales) from commercial ship strikes in the Santa Barbara Channel of Southern California prompted a detailed analysis of factors and resolutions. There are approximately 6,500 commercial vessels annually using the Santa Barbara Channel (NOAA Fisheries, 2023a). For San Diego Bay and its entrance channel, about 225 commercial ships transit the bay per day, most during daylight hours, plus an unknown but potentially equal number of recreational vessels moving in and out of San Diego Bay. Underwater noise from passing ships is expected every few minutes in the North Bay (Lapota et al., 1993). An additional large number of vessels also transit farther offshore along the coast heading to ports beyond those in Southern California. Stranding locations appeared to be concentrated near major southern California ports, suggesting an increased likelihood of commercial vessel interactions (Berman-Kowalewski et al., 2010). This area appeared to be highly problematic, largely because it represented an overlap of important feeding grounds for these species of whale with a major shipping lane to/from Southern California ports (Abramson et al., 2011). Between 1988 and 2007, 21 blue whale deaths were reported along the California coast, and many of these showed evidence of ship strike (Berman-Kowalewski et al., 2010). In 2007, NOAA declared an Unusual Mortality Event (UME) for endangered blue whales in Southern California from commercial vessel ship strikes in that year. Several recommendations have been put forward to reduce the potential for future ship strikes in the area of southern California commercial ports, including continuing and expanding scientific studies, considering changing shipping patterns and lanes, and adaptive management approaches.

Research suggested that the increasing noise in the ocean made it difficult for whales to detect approaching vessels, which has indirectly raised the risk of vessel strike (Elvin and Taggart, 2008). For example, right whales showed little overall reaction to the playback of sounds of approaching vessels, suggesting that some whales perform only a last-second flight response (Nowacek et al., 2004). It is possible that some individuals habituate to low-frequency sounds from shipping and fail to respond to an approaching vessel (NMFS, 2017). Whales engaged in surface activities (e.g., feeding, breeding, and resting) may not notice an approaching vessel (Silber et al., 2010).

Generally, mysticetes are larger animals with less ability to maneuver away from and to avoid vessels. In addition, mysticetes do not typically aggregate in large groups and are therefore difficult to detect visually from the water surface. Mysticetes that occur within the Alternative 2 transit routes have varying patterns of occurrence and distribution, which overlap with the commercial shipping routes through which the tanker ships may travel.

In general, odontocetes (i.e., toothed whales) move quickly and seem to be less vulnerable to vessel strikes than other cetaceans. However, killer whales (Van Waerebeek et al., 2007; Visser and Fertl, 2000) and sperm whales (Jaquet and Whitehead, 1996; Watkins et al., 1999, Gannier and Marty, 2015) are potentially susceptible to vessel strikes.

Available literature suggests based on their smaller body size, maneuverability, larger group sizes, and hearing capabilities, most odontocetes (except for sperm whales) are not as likely to be struck by a tanker ship. When generally compared to mysticetes, odontocetes are more capable of physically avoiding a vessel strike, and since some species occur in large groups, odontocetes are seen when are closer to the water surface. Overall, collision avoidance success is dependent on a marine mammal's ability to identify and locate the vessel from its radiated sound and the animal's ability to maneuver away from the vessel in time. Sperm whales may be vulnerable to vessel strikes as they spend extended periods of time "rafting" at the surface in order to restore oxygen levels within their tissues after deep dives (Jaquet and Whitehead, 1996, Watkins et al., 1999). Based on hearing capabilities and dive behavior, sperm whales may not be capable of successfully completing an escape maneuver, such as a dive, in the time available after perceiving a fast-moving vessel, supporting the suggestion that vessel speed is a critical parameter for sperm whale collision risks (Gannier and Marty, 2015).

3.2.3 Pinnipeds (Seals, Sea Lions)

Vessels have a potential to cause behavioral disturbance to pinnipeds, although at variable levels related to the context of the situation and the animal's experience (Richardson et al., 1995; Southall et al., 2016). Reactions include a wide spectrum of effects, from avoidance and alert, and from animals in the water that were attracted, to animals on land with a lack of significant reaction suggesting habituation to or tolerance of vessels (Richardson et al., 1995). Physical disturbance to hauled-out harbor seals caused by approaching cruise ships (Blundell and Pendleton, 2015; Jansen et al., 2015; Young et al., 2014) and by the presence of powerboats and kayaks that stopped, lingered, or moved slowly along haul-out sites (Johnson and Acevedo-Gutiérrez, 2007) have been documented. It is unlikely that the Proposed Action's tanker ships would cause a disturbance to pinnipeds on land because the vessels would not purposefully approach pinnipeds on land. At sea, vessel presence may result in minor and insignificant changes in behavior in pinnipeds.

Ship strikes are not a major concern for pinnipeds in general, including the threatened Guadalupe fur seal or for the endangered Hawaiian monk seal (Antonelis et al., 2006; Marine Mammal Commission, 2002; NMFS, 2014). From 2010 to 2014, reported sources of human-related injury and mortality for the U.S. West Coast documented eleven California sea lions, fifteen harbor seals, and two northern elephant seals having injuries caused by boat propellers or small boat collisions (Carretta et al., 2022). Mortalities of pinnipeds (specifically harbor seals and gray seals) initially hypothesized to be injuries from ducted propellers were caused by gray seal predation, cannibalism, and infanticide (Brownlow et al., 2016). Pinnipeds in the water generally appear less responsive (Richardson et al., 1995) than those at haul-out sites. In some circumstances, individual animals respond to vessels with the same behavioral responses as predator encounters.

For Hawaiian monk seals, vessel traffic in the Main Hawaiian Islands is recognized as a risk for collisions, despite only a single recorded mortality in 2015 that was deemed most likely due to boat strike (Carretta et al., 2022). The chance that such a rare encounter would result in serious injury is extremely remote because of the low probability that a Hawaiian monk seal would overlap with the limited number of vessel movements (i.e., eleven) within Pearl Harbor from the Proposed Action.

3.2.4 Sea Turtles

Vessel collisions are a major threat for green sea turtles (NMFS and USFWS, 1998). Research suggested that sea turtles might not consistently detect and avoid vessels traveling at speeds over 2 kts (Hazel et al., 2007). Studies showed that when a vessel was traveling at a slow speed (i.e., <2 kts), the proportion of green sea turtles (either on the sea surface or in shallow coastal waters) that avoided approaching vessels by moving away from the vessels track was significantly greater than if the vessel was moving at moderate to fast speeds (Hazel et al., 2007). While the potential for vessel strikes at various speeds has not been quantified, higher vessel speeds were more likely to cause impacts, particularly in shallow waters where turtles were abundant and in turbid waters. Therefore, the success of avoiding a vessel strike with a sea turtle is largely dependent on the speed of the approaching vessel and the prevailing water clarity, rather than vessel type.

The U.S. Navy and NMFS estimated that 250 sea turtles are struck by vessels in Hawaii (NAVFAC PAC, 2017a). To estimate the rate of vessel strikes, the Navy used ship hours (number of hours that vessels were at sea), but it only included vessels 65 ft. long and larger. Additionally, there was an estimated 37.5 vessel strikes of sea turtles per year from an estimated 577,872 trips from vessels of all sizes in Hawaii (NOAA Fisheries 2023b). Using this estimate, this calculates to a 0.04% probability of a vessel strike for all vessels and trips, many of which are not reducing speeds or employing lookouts for listed species. Based on turtle stranding data from Pearl Harbor from 2006-2020, 34 incidents identified the cause of stranding to be boat impact. Of the total 283 turtle stranding reports from Pearl Harbor during this time, the strandings attributed to boat impacts represents 8.8% of all possible stranding events (NMFS 2021, Unpublished).

3.2.5 Environmental Consequences

The tanker ships in Alternatives 2 and 3 would travel at an average speed of around 15 kts. By comparison, this is slower than most commercial vessels, where full speed for a container ship is typically 24 kts (Bonney and Leach 2010). Given the advent of “slow steaming” by commercial vessels in recent years due to increasing fuel prices (Barnard, 2016; Maloni et al., 2013), a vessel speed reduction to 21 kts would be considered “slow”, with eighteen kts considered as “extra slow”, and fifteen kts considered “super slow” (Bonney and Leach, 2010). Compared to these average speeds of other commercial vessels, the tanker ships used in the Proposed Action would have significantly slower speeds, further reducing the likelihood of a collision with a marine species. In addition, the overall number of eleven, one-way, vessel trips to deliver the fuel is low considering the hundreds of commercial ships that transit to these locations every day, reducing the likelihood of overlap in space and time with the tankers and a marine species.

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APPENDIX E – CLEAN AIR ACT GENERAL CONFORMITY NON-APPLICABILITY ANALYSES AND AIR EMISSIONS WORKSHEETS

DRAFT RECORD OF NON-APPLICABILITY

FOR CLEAN AIR ACT CONFORMITY

SAN DIEGO COUNTY

The Proposed Action, including all of the three action alternatives described below, falls under the Record of Non-Applicability (RONA) category and is documented with this RONA.

The U.S. Environmental Protection Agency (USEPA) published Determining Conformity of General Federal Actions to State of Federal Implementation Plans; Final Rule on November 30, 1990 (58 Federal Register [FR] 63214; 40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). The U.S. Department of the Navy (Navy) published Navy Guidance for Compliance with the Clean Air Act (CAA) General Conformity Rule (30 July 2013), as referenced in Chief of Naval Operations Manual 5090.1. These publications provide implementing guidance to document CAA Conformity Determination requirements. Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the federal agency to determine whether a federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Section 51.850[a]).

The General Conformity Rule applies to federal actions proposed within areas that are designated as either nonattainment or maintenance for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Emissions of criteria pollutants within an area that is designated as attainment are exempt from general conformity analyses.

Federal actions within nonattainment or maintenance areas may be exempt from conformity determinations if their emissions of criteria pollutants do not exceed designated de minimis thresholds for the criteria pollutants (40 CFR Section 51.853[b]). The San Diego Air Basin has been determined by USEPA to be a serious and moderate nonattainment area for 8-hour O3 under the 2008 and 2015 standards, respectively. The State has classified the area as non-attainment for Particulate Matter (PM)2.5 and PM10. The applicable de minimis thresholds for San Diego Air Basin are listed in Table 1.

Table 1. *de minimis* Levels for Criteria Pollutants in the San Diego Air Basin

Criteria Pollutants	de minimis Thresholds (tons per year [tpy])
Volatile Organic Compounds (VOC)	25
Oxides of Nitrogen (NOx)	25
PM2.5	100
PM10	100

Note: VOC and NOx emissions are used to represent O3 generation because they are precursors of O3.

PROPOSED ACTION

Action Proponent: Joint Task Force – Red Hill

Title of Proposed Action: Red Hill Defueling and Fuel Relocation

Project Location: San Diego Bay

Proposed Action and Emissions Summary: The Navy is proposing to relocate the fuel from Red Hill Bulk Fuel Storage Facility on Joint Base Pearl Harbor Hickam, Oahu, Hawaii. One of the potential receiving locations is Point Loma, San Diego Bay.

The Navy has identified two action alternatives:

- Alternative 1: Relocation

- Alternative 2 Relocation with Commercial Sale

Under Alternative 1, up to two (2) tanker shipments would arrive at the port at Point Loma. Under Alternative 2, the fuel from RHBFSF would be commercially sold and would likely not be delivered to Point Loma.

Air Emissions Summary:

The proposed transit and off-loading of fuel from two tanker vessels under Alternative 1 would result in temporary air emissions from tankers over a period of up to 3 days per trip. Emissions from vessel transit/maneuvering within 3 nautical miles (NM) and hotelling from the tanker's engines and boilers would emit criteria pollutants and HAPs. Fugitive emissions (volatile organic compounds) would also occur during ship transit and off-loading of fuel at the pier. Emissions also include the use of two tugboats to assist the tanker to the port.

In Table 2, VOCs and NOx, precursors for ozone, were evaluated against de minimis criteria in Table 1. Emissions were estimated as those occurring within 3 NM of California for this destination port.

Table 2. Emissions Under Alternative 2, Two Vessel Trips to Point Loma

Mode	VOCs	NOX	PM2.5	PM10
One Trip Transit 3 NM	0.006	0.121	0.003	0.003
One Trip Tugboats Point Loma	0.003	0.144	0.003	0.006
One Trip Hotelling at pier (including fugitive emissions for fuel transfer)	0.067	0.936	0.110	0.113
One Trip Total	0.076	1.202	0.115	0.123
Total for 2 Trips	**0.152**	**2.403**	**0.230**	**0.245**
De minimis threshold	25	25	100	100
Exceeds de minimis level?	**No**	**No**	**No**	**No**

Note: Units = U.S. tons; VOCs = volatile organic compounds; NOx =nitrogen oxides.

As shown in Table 2, the estimated increase in emissions due to implementation of Alternative 1 is below the applicable General Conformity de minimis levels. As such, a General Conformity Determination is not required.

Proposed Action Exemptions

The Proposed Action is exempt from the General Conformity Rule requirements based on the determination that the emissions are well below the de minimis threshold for all applicable pollutants.

Emissions Evaluation Conclusion

The Navy concludes that de minimis thresholds for affected pollutants would not be exceeded as a result of implementing the Proposed Action. The emissions data supporting that conclusion is shown in Table 2 above. The calculations, methodology, data and references are contained in this appendix. Therefore, the Navy concludes that further formal Conformity Determination procedures are not required, resulting in this RONA.

RONA Approval for Alternative 1, San Diego County (Point Loma)

Signature:

Name/Rank:

Date:

Position:

DRAFT RECORD OF NON-APPLICABILITY

FOR CLEAN AIR ACT CONFORMITY

SELBY, CONTRA COSTA COUNTY

The Proposed Action, including all of the three action alternatives described below, falls under the Record of Non-Applicability (RONA) category and is documented with this RONA.

The U.S. Environmental Protection Agency (USEPA) published Determining Conformity of General Federal Actions to State of Federal Implementation Plans; Final Rule on November 30, 1990 (58 Federal Register [FR] 63214; 40 Code of Federal Regulations [CFR] Parts 6, 51, and 93). The U.S. Department of the Navy (Navy) published Navy Guidance for Compliance with the Clean Air Act (CAA) General Conformity Rule (30 July 2013), as referenced in Chief of Naval Operations Manual 5090.1. These publications provide implementing guidance to document CAA Conformity Determination requirements. Federal regulations state that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way or provide financial assistance for, license to permit, or approve any activity that does not conform to an applicable implementation plan. It is the responsibility of the federal agency to determine whether a federal action conforms to the applicable implementation plan, before the action is taken (40 CFR Section 51.850[a]).

The General Conformity Rule applies to federal actions proposed within areas that are designated as either nonattainment or maintenance for a National Ambient Air Quality Standard (NAAQS) for any of the criteria pollutants. Emissions of criteria pollutants within an area that is designated as attainment are exempt from general conformity analyses.

Federal actions within nonattainment or maintenance areas may be exempt from conformity determinations if their emissions of criteria pollutants do not exceed designated de minimis thresholds for the criteria pollutants (40 CFR Section 51.853[b]). Contra Costa County is in nonattainment for 8-hr ozone (marginal) and particulate matter (PM) 2.5 by federal standards. By state standards, the county is in nonattainment for ozone, PM2.5 and PM10. The applicable de minimis thresholds for San Diego Air Basin are listed in Table 1.

Table 1. *de minimis* Levels for Criteria Pollutants in the San Diego Air Basin

Criteria Pollutants	de minimis Thresholds (tons per year [tpy])
Volatile Organic Compounds (VOC)	50
Oxides of Nitrogen (NOx)	100
PM2.5	100
PM10	100

Note: VOC and NOx emissions are used to represent O3 generation because they are precursors of O3.

PROPOSED ACTION

Action Proponent: Joint Task Force – Red Hill

Title of Proposed Action: Red Hill Defueling and Fuel Relocation

Project Location: Selby, Contra Costa County

Proposed Action and Emissions Summary: The Navy is proposing to relocate the fuel from Red Hill Bulk Fuel Storage Facility on Joint Base Pearl Harbor Hickam, Oahu, Hawaii. One of the potential receiving locations is Selby, San Pablo Bay.

The Navy has identified two action alternatives:

- Alternative 1: Relocation
- Alternative 2 Relocation with Commercial Sale

Under Alternative 1, up to two (2) tanker shipments would arrive at the port at Selby. Under Alternative 2, the fuel from RHBFSF would be commercially sold and would likely not be delivered to Selby.

Air Emissions Summary:

The proposed transit and off-loading of fuel from two tanker vessels under Alternative 1 would result in temporary air emissions from tankers over a period of up to 3 days per trip. Emissions from vessel transit/maneuvering within 3 nautical miles (NM) and hotelling from the tanker's engines and boilers would emit criteria pollutants and HAPs. Fugitive emissions (volatile organic compounds) would also occur during ship transit and off-loading of fuel at the pier. Emissions also include the use of two tugboats to assist the tanker to the port.

In Table 2, VOCs and NOx, precursors for ozone, were evaluated against de minimis criteria in Table 1. Emissions were estimated as those occurring within 3 NM of California for this destination port.

Table 2. Emissions Under Alternative 2, Two Vessel Trips to Selby

Mode	VOCs	NOX	PM2.5	PM10
One trip - Transit 3 NM	0.025	0.505	0.012	0.013
One trip - Tugboats Selby	0.003	0.144	0.003	0.006
One trip -Hotelling at pier (including fugitive emissions for fuel transfer)	0.067	0.936	0.116	0.119
One trip Total	0.095	1.585	0.130	0.139
Total for 2 Trips	**0.190**	**3.170**	**0.260**	**0.277**
De minimis threshold	25	25	100	100
Exceeds de minimis level?	**No**	**No**	**No**	**No**

Note: Units = U.S. tons; VOCs = volatile organic compounds; NOx =nitrogen oxides.

As shown in Table 2, the estimated increase in emissions due to implementation of Alternative 1 is below the applicable General Conformity de minimis levels. As such, a General Conformity Determination is not required.

Proposed Action Exemptions

The Proposed Action is exempt from the General Conformity Rule requirements based on the determination that the emissions are well below the de minimis threshold for all applicable pollutants.

Emissions Evaluation Conclusion

The Navy concludes that de minimis thresholds for affected pollutants would not be exceeded as a result of implementing the Proposed Action. The emissions data supporting that conclusion is shown in Table 2 above. The calculations, methodology, data and references are contained in this appendix. Therefore, the Navy concludes that further formal Conformity Determination procedures are not required, resulting in this RONA.

RONA Approval for Alternative 1, Contra Costa County (Selby)

Signature:

Name/Rank:

Date:

Position:

TANKER EMISSION FACTORS -*TRANSIT MODE*

Main Engines Transit Mode g/hr (13034 kw tanker)	CH4	CO	CO2	Nox	PM10	PM2.5	ROG	SOx
medium speed 0.1% SO2	1042.72	14337.4	8406930	172048.8	3258.5	2997.82	8472.1	5213.6
Medium speed 0.5% SO2	1042.72	14337.4	8406930	172048.8	4952.92	4561.9	8472.1	27110.72

Auxiliary Engines Transit Mode g/hr (@561 kw)	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx
medium speed 0.1% SO2	50.5224	617.496	387338.4	7802.904	140.34	129.1128	291.9072	224.544
Medium speed 0.5% SO2	50.5224	617.496	387338.4	7802.904	213.3168	196.476	291.9072	1178.856

Aux Boiler Emission Factors g/hr at 1593 kw	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx
Heavy Fuel Oil	47.79	318.6	1545210	3345.3	1274.4	1242.54	175.23	26284.5

Combined Emission factors for Transit (tons/hour)	CH4	CO	CO2	NOx	PM10	PM2.5	ROG/VOC*	SOx
Fuel Type 0.1 % SO2	0.001	0.017	11.397	0.202	0.005	0.005	0.010	0.035
Fuel Type 0.5 % SO2	0.001	0.017	11.397	0.202	0.007	0.007	0.010	0.060

*includes 0.00016 tons/hr fugitive emissions from fuel storage during transit
**HAPs based on US EPA 2017 National Emissions Inventory developed HAP fractions for commercial marine vessels based on fractions of PM2.5 and VOCs. HAP emissions were estimated with a 0.0213 ratio to PM2.5 and 0.0807 to VOC (BOEM, 2021).
Note: 1 ton = 907185 grams

TANKER EMISSION FACTORS – HOTELLING MODE

Hotelling Mode: Auxiliary Engines g/kw-hr	CH4	CO	CO2	Nox	PM10	PM2.5	ROG	SOx	HAPs
medium speed 0.1% SO2	0.09	1.1	690	13.9	0.25	0.23	0.52	0.4	0.0469
Medium speed 0.5% SO2	0.09	1.1	690	13.9	0.38	0.35	0.52	2.1	0.0494

Hours	Destination (608 kw)	CH4	CO	CO2	Nox	PM10	PM2.5	ROG	SOx	HAPs
72	Any U.S. port	0.004	0.053	33.303	0.671	0.012	0.011	0.025	0.019	0.0023
72	International Ports	0.004	0.053	33.303	0.671	0.018	0.017	0.025	0.101	0.0024

Hotelling Mode: Auxiliary Boiler Emission Factors g/kw-hr	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Heavy Fuel Oil	0.03	0.2	970	2.1	0.8	0.78	0.11	16.5	0.0255

Hotelling Times (hours)	Destination (1593 kw); Case using Heavy Fuel Oil	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
72	Any port	0.004	0.025	122.638	0.266	0.101	0.099	0.014	2.086	0.0032

HOTELLING - FUGITIVE EMISSIONS

Volume (gallons)	Mode	VOC emission rate (lbs/1000 gallons fuel)	VOC emitted (tons)
11,000,000	Gallons loaded	0.005	0.03
11,000,000	Gallons unloaded	0.005	0.03

Volatile organic compounds can be released as fugitive emissions during vessel loading and transit. EPA estimates that ocean vessel loading releases 0.005 lbs/1000 gallons transferred for kerosene or number 2 fuel oil and approximately 0.005 lbs/week-1000 gallons transported (EPA, 2008).

All source emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG		SOx	HAPs
Hotelling at JBPHH	0.008	0.078	155.941	0.936	0.113	0.110	0.067		2.105	0.005
Hotelling at U.S. Destination Port	0.008	0.078	155.941	0.936	0.113	0.110	0.067		2.105	0.005
Hotelling at International Port	0.008	0.078	155.941	0.936	0.119	0.116	0.067		2.187	0.006

Calculations for Medium Range Tanker: Case using only 0.5% sulfur fuel internationally (outside ECA)

Distance outside ECA	Transit Times International (hours)	Destination	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPS
1855	123.7	Naval Base Point Loma, California	0.16	2.08	1409.5	24.97	0.88	0.82	1.24	7.44	0.12
1668	111.2	Selby Terminal, California	0.14	1.87	1267	22.46	0.79	0.74	1.11	6.69	0.11
1830	122.0	Port of Vancouver, Washington	0.15	2.05	1390	24.64	0.87	0.81	1.22	7.34	0.12
1928	128.5	Puget Sound, Washington	0.16	2.16	1465	25.96	0.91	0.85	1.29	7.73	0.12
3721	248.1	Sasebo, Japan	0.31	4.18	2827	50.09	1.76	1.64	2.48	14.92	0.24
4494	299.6	Subic Bay, Philippines	0.38	5.04	3415	60.50	2.13	1.98	3.00	18.02	0.28
5896	393.1	Port of Singapore	0.49	6.62	4480	79.38	2.79	2.60	3.94	23.65	0.37
4980	332.0	Port of Darwin	0.42	5.59	3784	67.04	2.36	2.20	3.32	19.97	0.32

DESTINATION PORT TRANSIT EMISSIONS WITHIN 12 NM AND 3 NM

Combined Emission factors for Transit (tons/hour)	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Fuel Type 0.1 % SO2	0.001	0.017	11.397	0.202	0.005	0.005	0.010	0.035	0.001
Fuel Type 0.5 % SO2	0.001	0.017	11.397	0.202	0.007	0.007	0.010	0.060	0.001

Vessel distance within 12 NM of Port	Time of transit within 12 NM (hours)	Destination	Sulfur Content in Fuel	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
13	1	Naval Base Point Loma, California	0.1% sulfur	0.001	0.015	9.878	0.175	0.004	0.004	0.009	0.030	0.001
34	2	Selby Terminal, California	0.1% sulfur	0.003	0.038	25.834	0.458	0.012	0.011	0.023	0.079	0.002
99	7	Port of Vancouver, Washington	0.1% sulfur	0.008	0.111	75.222	1.333	0.034	0.032	0.066	0.231	0.006
141	9	Puget Sound, Washington	0.1% sulfur	0.012	0.158	107.135	1.898	0.048	0.045	0.094	0.329	0.008
203	14	Sasebo, Japan	0.5% sulfur	0.017	0.228	154.244	2.733	0.096	0.090	0.136	0.814	0.014
370	25	Subic Bay, Philippines	0.5% sulfur	0.031	0.415	281.134	4.981	0.175	0.163	0.247	1.484	0.025
82	5	Port of Singapore	0.5% sulfur	0.007	0.092	62.305	1.104	0.039	0.036	0.055	0.329	0.005
30	2	Port of Darwin	0.5% sulfur	0.003	0.034	22.795	0.404	0.014	0.013	0.020	0.120	0.002

Vessel distance within 3 NM of Destination Country	Time of transit within 3 NM (hours)	Destination	Sulfur Content in Fuel	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
6	0.6	Naval Base Point Loma, California	0.1% sulfur	0.001	0.010	6.838	0.121	0.003	0.003	0.006	0.021	0.001
25	2.5	Selby Terminal, California	0.1% sulfur	0.003	0.042	28.493	0.505	0.013	0.012	0.025	0.087	0.002
90	9.0	Port of Vancouver, Washington	0.1% sulfur	0.011	0.152	102.576	1.817	0.046	0.043	0.090	0.315	0.008
132	13.2	Puget Sound, Washington	0.1% sulfur	0.017	0.222	150.445	2.666	0.068	0.064	0.132	0.462	0.012
17	1.7	Sasebo, Japan	0.5% sulfur	0.002	0.029	19.375	0.343	0.012	0.011	0.017	0.102	0.002
12	1.2	Subic Bay, Philippines	0.5% sulfur	0.002	0.020	13.677	0.242	0.009	0.008	0.012	0.072	0.001
17	1.7	Port of Singapore	0.5% sulfur	0.002	0.029	19.375	0.343	0.012	0.011	0.017	0.102	0.002
3	0.3	Port of Darwin	0.5% sulfur	0.000	0.005	3.419	0.061	0.002	0.002	0.003	0.018	0.000

EMISSIONS WITHIN US ECA

Vessel Distance within ECA (200NM US)	Transit Time within 200 NM (hours)	Destination	Sulfur Content in Fuel	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
13	1	West Oahu	0.1% sulfur	0.001	0.017	11.397	0.202	0.005	0.005	0.010	0.035	0.001
427	28	Naval Base Point Loma, California	0.1% sulfur	0.036	0.479	324.444	5.749	0.147	0.137	0.285	0.995	0.026
448	30	Selby Terminal, California	0.1% sulfur	0.038	0.503	340.400	6.031	0.154	0.144	0.299	1.044	0.027
513	34	Port of Vancouver, Washington	0.1% sulfur	0.043	0.576	389.788	6.906	0.176	0.165	0.342	1.196	0.031
555	37	Puget Sound, Washington	0.1% sulfur	0.047	0.623	421.701	7.472	0.191	0.178	0.371	1.294	0.034
335	22	Sasebo, Japan	0.1% sulfur	0.028	0.376	254.540	4.510	0.115	0.108	0.224	0.781	0.020
335	22	Subic Bay, Philippines	0.1% sulfur	0.028	0.376	254.540	4.510	0.115	0.108	0.224	0.781	0.020
335	22	Port of Singapore	0.1% sulfur	0.028	0.376	254.540	4.510	0.115	0.108	0.224	0.781	0.020
212	14	Port of Darwin	0.1% sulfur	0.018	0.238	161.082	2.854	0.073	0.068	0.142	0.494	0.013

Combined Emission factors for Transit (tons/hour)

Sulfur Content in Fuel	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Fuel type 0.1 %	0.001	0.017	11.397	0.202	0.005	0.005	0.010	0.035	0.001
Fuel Type 0.5 % SO2	0.001	0.017	11.397	0.202	0.007	0.007	0.010	0.060	0.001

SUBIC BAY EMISSIONS (TONS)

SUBIC BAY Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboat JBPHH	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within 200 NM of Oahu (ECA)	0.03	0.38	255	4.51	0.12	0.11	0.22	0.78	0.02
Transit to Subic Bay (Outside ECA)	0.38	5.04	3415	60.50	2.13	1.98	3.00	18.02	0.28
Tuboat Subic	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Subic Bay	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
Totals	0.42	5.62	3998	67.32	2.49	2.32	3.37	23.15	0.32

LOCAL Air Emissions; Max Subic Bay 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.02	14	0.24	0.01	0.01	0.01	0.07	0.00
Tugboats	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
total per event	0.01	0.11	175	1.32	0.13	0.13	0.08	2.28	0.01
Max Trips = 5	5	5	5	5	5	5	5	5	5
total all events	0.05	0.56	876	6.61	0.67	0.63	0.41	11.39	0.04

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/ VOCs	SOx	HAPs
Subic Bay Local Totals	0.56	877	6.61	0.67	0.63	0.41	11.39	0.04

SASEBO EMISSIONS (TONS)

SASEBO Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats Oahu	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu	0.03	0.38	255	4.51	0.12	0.11	0.22	0.78	0.02
Remaining Transit to Sasebo (Outside ECA)	0.31	4.18	2827.3	50.09	1.76	1.64	2.48	14.92	0.24
Tugboats Sasebo	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Sasebo	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
Totals	0.36	4.75	3410	56.91	2.13	1.98	2.85	20.05	0.27

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.03	19.4	0.34	0.01	0.01	0.02	0.10	0.00
Tugboats Sasebo	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
total per event	0.01	0.12	181	1.42	0.14	0.13	0.09	2.31	0.01
Max trips =2	2	2	2	2	2	2	2	2	2
total all events	0.02	0.24	362	2.85	0.28	0.26	0.17	4.61	0.02

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Sasebo local Totals	0.24	362	2.85	0.28	0.26	0.17	4.61	0.02

SINGAPORE EMISSIONS (TONS)

Singapore Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats JBPHH	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu	0.03	0.38	255	4.51	0.12	0.11	0.22	0.78	0.02
Remaining Transit to Singapore (Outside ECA)	0.49	6.62	4479.9	79.38	2.79	2.60	3.94	23.65	0.37
Tugboats Singapore	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Singapore	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
Totals	0.54	7.19	5063	86.19	3.16	2.94	4.30	28.77	0.41

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.03	19	0.34	0.01	0.01	0.02	0.10	0.00
Tugboats Singapore	0.00	0.01	5.54	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
total per event	0.01	0.12	181	1.42	0.14	0.13	0.09	2.31	0.01
Max trips =5	5	5	5	5	5	5	5	5	5
total all events	0.05	0.61	904	7.12	0.69	0.65	0.43	11.54	0.04

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Singapore Local Total	0.61	906	7.12	0.69	0.65	0.43	11.54	0.04

DARWIN EMISSIONS (TONS)

Darwin Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats JPBHH	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu	0.02	0.24	161	2.85	0.07	0.07	0.14	0.49	0.01
Remaining Transit to Darwin (Outside ECA)	0.42	5.59	3784	67.04	2.36	2.20	3.32	19.97	0.32
Tugboats Darwin	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Darwin	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
Totals	0.45	6.03	4274	72.20	2.68	2.50	3.61	24.81	0.34

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.01	3.4	0.06	0.00	0.00	0.00	0.02	0.00
Tugboats Darwin	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.12	0.12	0.07	2.19	0.01
total per event	0.01	0.10	165	1.14	0.13	0.12	0.07	2.22	0.01
Max trips =5	5	5	5	5	5	5	5	5	5
total all events	0.04	0.49	825	5.70	0.64	0.60	0.36	11.12	0.03

	CO	GHGs CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Darwin local totals	0.49	826	5.70	0.64	0.60	0.36	11.12	0.03

OAHU EMISSIONS (TONS)

Oahu Emissions (single trip)	CH4	CO	CO2	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
JBPHH Arrival/departure transits single vessel	0.003	0.034	22.8	0.404	0.010	0.010	0.020	0.070	0.002
Hotelling JBPHH	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats JBPHH	0.00	0.03	11	0.29	0.01	0.01	0.01	0.04	0.00
Transit to West Oahu	0.00	0.02	11	0.20	0.01	0.00	0.01	0.03	0.00
Transit within 12 NM of Oahu	See above								
Hotelling West Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01

Local Air Emissions; All tankers at JBPHH	CH4	CO	CO2	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Vessel Arrival/Departure x11	0.03	0.37	250.74	4.44	0.11	0.11	0.22	0.77	0.02
Hotelling and Tugboats at JBPHH x 11 vessels	0.09	1.18	1837	13.47	1.38	1.26	0.80	23.55	0.07
11th vessel extended hotelling	0.04	0.39	779.71	4.68	0.57	0.55	0.33	10.53	0.03
Total all tankers at JBPHH	0.16	1.94	2867.77	22.59	2.06	1.92	1.35	34.84	0.11

Portion Only To West Oahu	CH4	CO	CO2	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Transit to West Oahu	0.001	0.017	11.4	0.202	0.005	0.005	0.010	0.035	0.001
Tug to keep tanker in place	0.000	0.086	3.326	0.864	0.038	0.015	0.020	0.106	0.002
Hotelling at West Oahu	0.01	0.08	155.94	0.94	0.11	0.11	0.07	2.11	0.01

Totals	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
total per event	0.18	170.9	2.00	0.16	0.13	0.10	2.25	0.01
Max trips to West Oahu =5	5	5	5	5	5	5	5	5
total all Oahu	2.85	3722.50	32.60	2.84	2.57	1.83	46.08	0.16

Breakout by location	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Only JBPHH	1.94	2872.50	22.59	2.06	1.92	1.35	34.84	0.11
Only West Oahu	0.91	856.14	10.01	0.78	0.65	0.48	11.23	0.04

POINT LOMA EMISSIONS (TONS)

Pt Loma Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.008	0.078	156	0.94	0.113	0.110	0.067	2.11	0.005
Tugboats JBPHH	0.000	0.029	11	0.29	0.013	0.005	0.007	0.04	0.001
Transit within ECA of Oahu and Pt Loma	0.036	0.479	324	5.75	0.147	0.137	0.285	1.00	0.026
Intl Transit to Pt Loma (Outside ECA)	0.156	2.082	1409	24.97	0.878	0.818	1.238	7.44	0.124
Tugboats Pt Loma	0.000	0.014	6	0.14	0.006	0.003	0.003	0.02	0.000
Hotelling Pt Loma	0.008	0.078	156	0.94	0.113	0.110	0.067	2.11	0.005
Totals	0.21	2.76	2062	33.03	1.27	1.18	1.67	12.70	0.16

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.01	7	0.121	0.003	0.003	0.006	0.02	0.00
Tugboats Pt Loma	0.00	0.01	5.5	0.144	0.006	0.003	0.003	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.936	0.113	0.110	0.067	2.11	0.01
total per event	0.01	0.10	168	1.202	0.123	0.115	0.076	2.14	0.01
Max trips =2	2	2	2	2	2	2	2	2	2
total all events	0.02	0.21	337	2.403	0.245	0.230	0.152	4.29	0.01

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Point Loma Local Totals	0.21	337	2.40	0.25	0.23	0.15	4.29	0.01

SELBY EMISSIONS (TONS)

Selby Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	155.94	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats at JBPHH	0	0.03	11.09	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu and Selby	0.04	0.50	340.40	6.03	0.15	0.14	0.30	1.04	0.03
Intl Transit to Selby (Outside ECA)	0.14	1.87	1267.38	22.46	0.79	0.74	1.11	6.69	0.11
Tugboats at Selby	0	0.01	5.54	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Selby	0.01	0.08	155.94	0.94	0.12	0.12	0.07	2.19	0.01
Totals	0.19	2.57	1936.30	30.79	1.19	1.11	1.56	12.08	0.14

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.00	0.04	28.49	0.505	0.013	0.012	0.025	0.09	0.00
Tugboats at Selby	0.00	0.01	5.54	0.144	0.006	0.003	0.003	0.02	0.00
Hotelling at pier	0.01	0.08	155.94	0.936	0.119	0.116	0.067	2.19	0.01
total per event	0.01	0.13	189.98	1.585	0.139	0.130	0.095	2.29	0.01
Max trips =2	2	2	2	2	2	2	2	2	2
total all events	0.02	0.27	379.96	3.170	0.277	0.260	0.190	4.59	0.02

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Selby Local Totals	0.27	381	3.17	0.28	0.26	0.19	4.59	0.02

PORT VANCOUVER EMISSIONS (TONS)

Port Vancouver Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats at JBPHH	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu and Port Vancouver	0.04	0.58	390	6.91	0.18	0.16	0.34	1.20	0.03
Intl Transit to Port Vancouver (Outside ECA)	0.15	2.05	1390	24.64	0.87	0.81	1.22	7.34	0.12
Tugboats Port Vancouver	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Port Vancouver	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Totals	0.21	2.83	2109	33.85	1.29	1.20	1.71	12.80	0.16

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.01	0.15	103	1.82	0.05	0.04	0.09	0.31	0.01
Tugboats	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
total per event	0.02	0.24	264	2.90	0.17	0.16	0.16	2.44	0.01
Max trips =1	1	1	1	1	1	1	1	1	1
total all events	0.02	0.24	264	2.90	0.17	0.16	0.16	2.44	0.01

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Port Vancouver Local Totals	0.24	265	2.90	0.17	0.16	0.16	2.44	0.01

PUGET SOUND EMISSIONS (TONS)

Puget Single Trip Emissions	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Hotelling Oahu	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Tugboats JBPHH	0.00	0.03	11.1	0.29	0.01	0.01	0.01	0.04	0.00
Transit within ECA of Oahu and Puget	0.05	0.62	422	7.47	0.19	0.18	0.37	1.29	0.03
Intl Transit to Puget (Outside ECA)	0.16	2.16	1465	25.96	0.91	0.85	1.29	7.73	0.12
Tugboats Puget	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling Puget	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
Totals	0.22	2.99	2215	35.73	1.35	1.26	1.80	13.29	0.17

LOCAL AIR EMISSIONS; Max 3 NM	CH4	CO	CO2	NOx	PM10	PM2.5	ROG	SOx	HAPs
Transit 3 NM	0.02	0.22	150	2.67	0.07	0.06	0.13	0.46	0.01
Tugboat	0.00	0.01	5.5	0.14	0.01	0.00	0.00	0.02	0.00
Hotelling at pier	0.01	0.08	156	0.94	0.11	0.11	0.07	2.11	0.01
total per event	0.02	0.31	312	3.75	0.19	0.18	0.20	2.58	0.02
Max trips =1	1	1	1	1	1	1	1	1	1
total all events	0.02	0.31	312	3.75	0.19	0.18	0.20	2.58	0.02

	CO	GHGs CO2e CO2 & CH4	NOx	PM10	PM2.5	ROG/VOCs	SOx	HAPs
Puget Sound Local Totals	0.31	313	3.75	0.19	0.18	0.20	2.58	0.02