Record of Decision for Building 6

JOINT BASE PEARL HARBOR-HICKAM, PEARL HARBOR NAVAL SHIPYARD AND INTERMEDIATE MAINTENANCE FACILITY, OAHU, HAWAII

PHNC National Priorities List Site

June 2012

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Comprehensive Long-Term Environmental Action Navy
Contract Number N62742-03-D-1837, CTO HC02

CONTENTS

ATTACHMENTS

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

%	percent
°F	degrees Fahrenheit
µg/dL	microgram per deciliter
µg/kg	microgram per kilogram
µg/L	microgram per liter
µg/m^3	microgram per cubic meter
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
Bldg.	building
C&D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
CFR	Code of Federal Regulations
CIA	Controlled Industrial Area
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	chemical of concern
COPC	chemical of potential concern
CSM	conceptual site model
CTO	contract task order
DOH	Department of Health, State of Hawaii
DRO	diesel range organics
EAL	environmental action level
EPA	Environmental Protection Agency, United States
EPC	exposure point concentration
FFA	Federal Facilities Agreement
FS	feasibility study
ft^2	square feet or foot
JBPHH	Joint Base Pearl Harbor-Hickam
LRO	lube oil range organics
LUC	land use control
LUCAP	LUC Assurance Plan
LUCIP	LUC Implementation Plan
mg/kg	milligram per kilogram
mg/L	milligram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
no.	number
NPL	National Priorities List
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
PHNC	Pearl Harbor Naval Complex
PHNSY & IMF	Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility
PP	proposed plan
PRG	preliminary remediation goal
RAB	Restoration Advisory Board
RACER	remedial action cost engineering and requirements
RAO	remedial action objective

RAWP	remedial action work plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
ROD	record of decision
SARA	Superfund Amendments Reauthorization Act
SI	site inspection
SRA	screening risk assessment
TBC	to be considered
TCLP	toxicity characteristic leaching procedure
TCRA	time critical removal action
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
U.S.	United States
UIC	underground injection control
UST	underground storage tank
yd^3	cubic yard

1. Declaration

1.1 Site Name and Location

The United States (U.S.) Navy (Navy) has prepared this record of decision (ROD) for Building (Bldg.) 6, the former Foundry Shop, located within the Controlled Industrial Area (CIA) of Joint Base Pearl Harbor-Hickam (JBPHH), Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility (PHNSY & IMF), Oahu, Hawaii (Figure 1). Bldg. 6 is a 52,000-square foot (ft^2) building originally constructed in 1915 to serve as a metal casting shop for ship replacement parts. The JBPHH, PHNSY & IMF is part of the Pearl Harbor Naval Complex (PHNC), which is included in the U.S. Environmental Protection Agency's (EPA's) National Priorities List (NPL) of sites and facilities being cleaned up under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments Reauthorization Act (SARA) of 1986. PHNC is identified on the NPL as EPA CERCLA Information System (CERCLIS) Number (no.) HI4170090076.

1.2 Statement of Basis and Purpose

This ROD documents for the Administrative Record the decision by the Navy and the EPA, with concurrence from the State of Hawaii Department of Health (DOH), to place a concrete cover over unpaved areas within Bldg. 6, backfill vaults and open pits with clean soil, and implement land use controls (LUCs) as the final remedy for the Bldg. 6 site (Figure 2). The final remedy for the Bldg. 6 site has been selected in accordance with CERCLA (as amended by SARA), the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (40 Code of Federal Regulations [CFR] 300.430(e)(a)(iii)), and Presidential Executive Order 12580. Information supporting the decisions leading to the selected remedy is contained in the Administrative Record file for the site. The decision to implement the final remedy identified in this ROD is based and relies on the entire Administrative Record for the Bldg. 6 site. Information not specifically summarized in this ROD, or its references, but contained in the Administrative Record has thus been considered and is relevant to selection of the remedy.

The Navy is the lead agency for the Bldg. 6 site; the EPA and DOH are support agencies. The *Federal Facilities Agreement (FFA) for the Pearl Harbor Naval Complex*[1] documents how the Navy intends to meet and implement CERCLA in partnership with the EPA and DOH (EPA Region 9, State of Hawaii, and DON 1994). This ROD documents the final response action selected for the Navy's Bldg. 6 site and does not include or affect any other sites.

1.3 Assessment of the Site

Active foundry operations at Bldg. 6 have ceased; however, chemicals of concern (COCs) including metals, polynuclear aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) are known to have impacted the surface and subsurface soil in specific areas of Bldg. 6 during past foundry operations. Total petroleum hydrocarbons (TPH)-diesel range organics (DRO) and lube oil range organics (LRO) were also detected at concentrations exceeding the DOH Environmental Action Level (EAL). All areas outside of Bldg. 6 that are subject to stormwater runoff have been paved, and the unpaved areas inside the building were covered with plastic sheeting. Because the

[1] Text in blue font identifies where detailed cross-reference site information is available (Attachment A). In the event of any inconsistency between the text in this ROD and the text in any of the cross-reference documents, the text in this ROD will take precedence.

plastic sheeting provides only interim protection from potential contact with contaminated soil, the selected final remedy described in this ROD is necessary to protect public health and welfare or the environment from actual or threatened releases of pollutants, contaminants, or hazardous substances into the environment from the Bldg. 6 site.

1.4 DESCRIPTION OF THE SELECTED REMEDY

This ROD identifies containment (cover) and long-term management as the final remedy for the Bldg. 6 site. The selected remedy includes backfilling vaults and pits with clean soil and placing a concrete cover over unpaved areas within Bldg. 6. Because the highest concentrations of contaminants exceeding industrial screening criteria are located in exposed surface soils, a concrete cover over the affected unpaved areas, vaults, and pits would significantly reduce the potential for exposure to contaminants and would allow for future industrial or commercial use of Bldg. 6. LUCs will be implemented to ensure the long-term integrity of the surface cover through inspections; and to ensure that risks to human health remain acceptable by placing restrictions on the parcel of land occupied by Bldg. 6 that restricts land use to commercial and/or industrial uses. The Navy will prepare a remedial action work plan (RAWP) to document the methods and procedures that will be used to implement the LUCs. The remedy components for Bldg. 6 include the following elements:

- Backfill open pits and vaults with clean imported soil and cover with concrete to match surrounding surface.
- Install and maintain warning and restricted land use signage.
- Implement LUCs.

1.5 STATUTORY DETERMINATIONS

The selected remedy for Bldg. 6 is protective of human health, complies with Federal and State requirements that are applicable or relevant and appropriate (ARAR), is cost-effective, and utilizes permanent solutions to the maximum extent practicable. The selected remedy does not satisfy the statutory preference for treatment as a principal element of the remedy because response action alternatives that include treatment technologies are neither cost effective nor necessary to protect human health under the current and future land use scenarios (commercial/industrial).

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on site at concentrations above levels that allow for unlimited use and unrestricted exposure, statutory reviews will be conducted every 5 years following the initiation of response action, as required under CERCLA Section 121(c) and the NCP 40 CFR 300.430(f)(4)(ii). The five-year reviews will be performed to ensure that the remedy remains protective of human health and the environment.

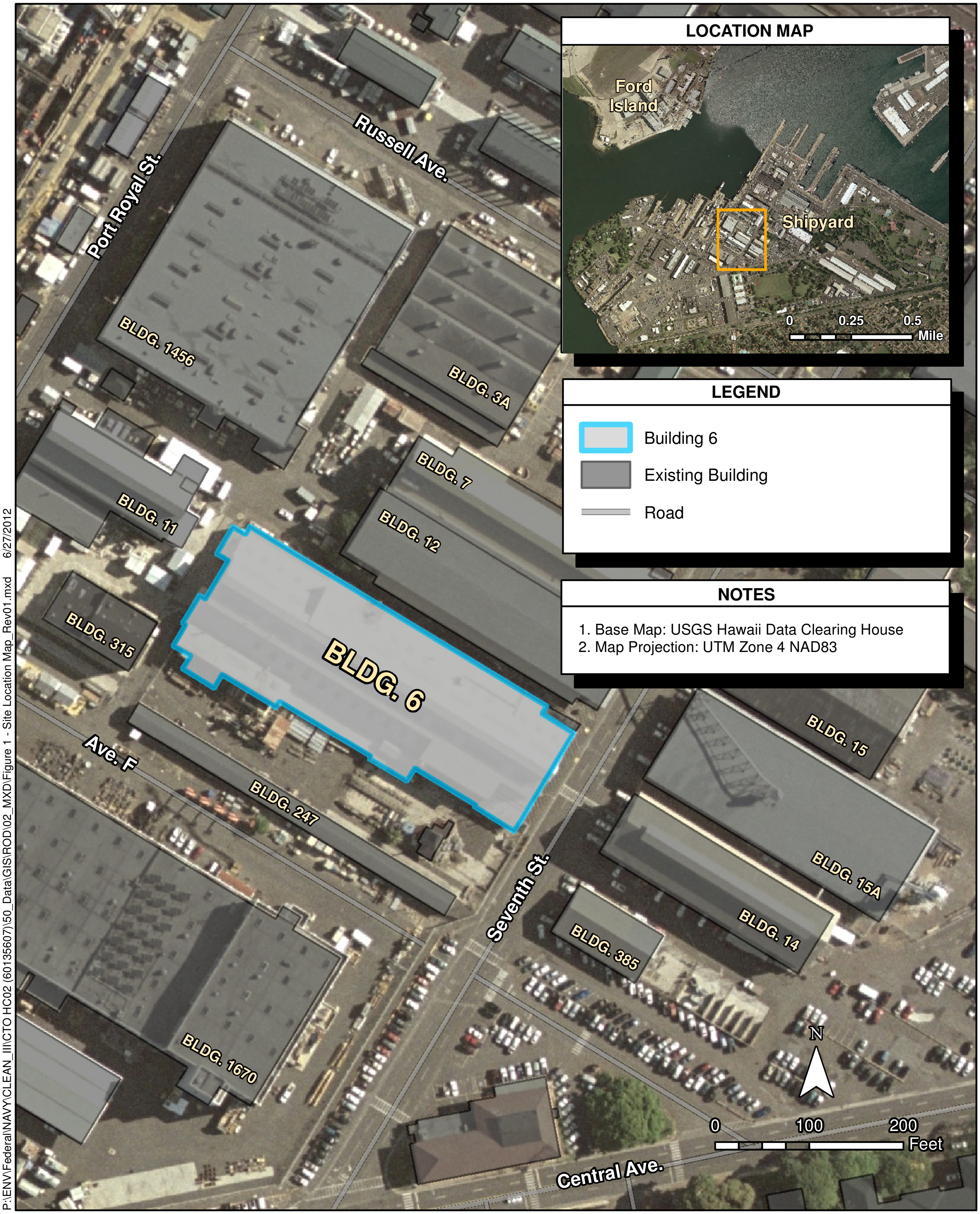
1.6 DATA CERTIFICATION CHECKLIST

The following information is presented in the Decision Summary section of this ROD (Section 2):

- Chemicals of concern (Section 2.7)
- Current and reasonably anticipated future land and groundwater use (Section 2.6)
- Human health and ecological risks (Section 2.7.2)
- Principal threat wastes (Section 2.10)

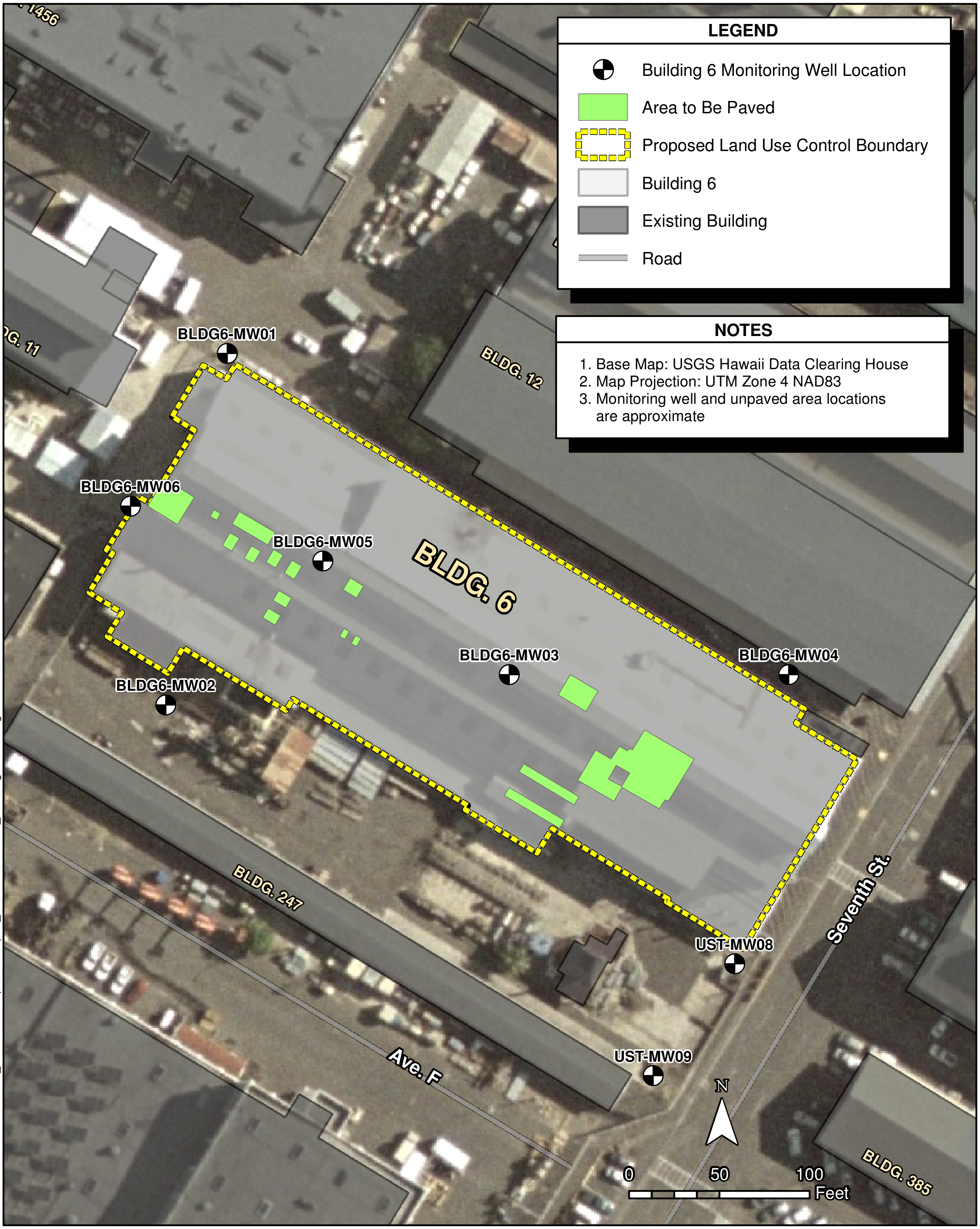
- Key factors that led to selecting the final remedy (Section 2.11.1)
- Estimated capital costs; annual operation and maintenance costs; and total present-worth costs, discount rate, and the number of years over which the remedy cost estimates are projected (Section 2.9.2 - Table 5 and Section 2.11.2.2)

Supporting documentation for the Bldg. 6 site, including a remedial investigation and feasibility study (RI/FS) (AECOM 2010) and proposed plan (PP) (DON 2011), are available in the Administrative Record file. If contamination posing unacceptable risks to human health or the environment is discovered after execution of this ROD, the Navy will undertake all necessary actions required to ensure continued protection of human health and the environment.



P:\ENV\Federal\NAVY\CLEAN_III\CTO HC02 (60135607)\50_Data\GIS\ROD\02_MXD\Figure 1 - Site Location Map_Rev01.mxd 6/27/2012

Figure 1
Site Location Map
Record of Decision
Building 6
PHNC NPL Site
JBPHH, PHNSY & IMF, Oahu, Hawaii



P:\ENV\Federal\NAVY\CLEAN_III\CTO HC02 (60135607)\50_Data\GIS\ROD\02_MXD\Figure 2 - Bldg6 LUC MWs Paved Areas.mxd 6/27/2012

Figure 2
Proposed Land Use Control Boundary
Record of Decision
Building 6
PHNC NPL Site
JBPHH, PHNSY & IMF, Oahu, Hawaii

1.7 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF FINAL REMEDY

The Navy and EPA Region 9, in coordination with EPA headquarters, and with concurrence from the DOH, have selected concrete cover of unpaved areas within Bldg. 6 along with establishing LUCs to complete the final remedy for Bldg. 6 as described in this ROD. This final remedy is protective of human health and the environment. In accordance with CERCLA requirements, five-year reviews will be performed to ensure that the selected final remedy remains protective of human health at Bldg. 6, JBPHH, PHNSY& IMF, Oahu, Hawaii.

[signature] 7/12/12
J. W. James — Date
Captain, U.S. Navy
Commander
Joint Base Pearl Harbor-Hickam

[signature] 7/12/12
Michael Montgomery — Date
Assistant Director, Federal Facility and Site Cleanup Branch
Superfund Division
U.S. Environmental Protection Agency, Region 9

The State of Hawaii DOH concurs with the selected remedy as documented in this ROD.

[signature] 7-24-12
Keith Kawaoka, D. Env. — Date
Program Manager
Hazard Evaluation and Emergency Response Office
State of Hawaii, Department of Health

2. Decision Summary

This section summarizes site characteristics, potential human health risks, potential ecological risks, evaluation of response action alternatives, and the rationale for the decisions that led to selection of the final remedy for Bldg. 6.

2.1 Site Location and Description

Bldg. 6 is a 52,000-ft^2 building located within the CIA of JBPHH, PHNSY & IMF, which is part of the PHNC. The PHNC is a 2,100-acre Navy installation located approximately 7.5 miles west of Honolulu on the island of Oahu, Hawaii. JBPHH, PHNSY & IMF is one of the six major components of the PHNC and comprises approximately 350 acres within the PHNC. As described in Section 1.1, PHNC is identified on the NPL as EPA CERCLIS No. HI4170090076.

Bldg. 6 has five parallel rows of columns supporting the structure. The majority of the building floor area is a patchwork of concrete paved areas with intermittent unpaved areas scattered throughout. These unpaved areas were typically located near furnaces. Historically, molten metals were transferred from the furnaces to molds held in place in the unpaved areas by a sand/clay mixture. During the transfer of the molten metal to the molds, metals may have been released to the sand/clay mixture and to the soil in the unpaved areas. Presently, plastic sheeting and plywood cover the exposed sand/clay mixture and soil. The largest unpaved area encompasses approximately 2,100 ft^2 and is located in the central portion of the building. This large unpaved area is roped off with signs warning of elevated concentrations of lead. Within this unpaved area is a subsurface concrete vault approximately 160 ft^2 in area and 8 feet in depth, which was used as a drip pit for molten metal-pouring activities. This unpaved area, including the concrete vault, has been backfilled with soil and sand.

The north side of the building is lined with unoccupied offices, a restroom, a locker room, storage rooms, and workshops. Two active electrical substations are located inside Bldg. 6, one in the southwest corner of the building and one in the northeast corner of the building. A third active electrical substation is located outside of the north side of the building. Some equipment used in past foundry operations has been removed, but many furnaces and other equipment remain in place. Three mullers are located on the north side of the building. Mullers were typically used in foundry operations to “knead” or mix sand before being packed into wooden molds. Two large ovens and small drying ovens are located southeast of the largest unpaved area. A high temperature oven is located on the north side of the building. Six induction furnaces surround a generator room toward the south side of Bldg. 6. A large mechanical device (shaker) is located in the central portion of the building and was historically used to mix sand with other material to line the casting molds to ensure smooth surfaces for casting. Extending north of the large shaker is a long catwalk with a series of drop chutes that extend down to approximately 5 feet above the ground.

Access to the facility is strictly controlled. In addition, access to JBPHH, PHNSY & IMF facilities is restricted to authorized personnel only, and security personnel at facility entrances and exits prohibit unauthorized trespassing by civilians to the Bldg. 6 area.

Buildings 11, 12, and 315 are adjacent to Bldg. 6 to the north and west, and Seventh Street lies to the immediate east (Figure 1). To the immediate south, adjacent to the south wall of Bldg. 6, is the hydroblast area, consisting of an unroofed area with a grated floor, a hydroblast equipment room, and a walled sand recovery pit.

2.2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Bldg. 6 Foundry Shop, constructed in 1915 to cast new or replacement parts for naval vessels, is located within the CIA of JBPHH, PHNSY & IMF along 7th Street, approximately 1,000 feet south of Pearl Harbor (Figure 1). Foundry operations began during World War I and reached a peak during and shortly after World War II. More recently, foundry operations were limited to casting small replacement metal parts. Casting operations were conducted at multiple locations throughout Bldg. 6. Most of the foundry equipment is still in place; however, foundry operations ceased altogether in 1997. Since that time, the only industrial activities that have taken place inside Bldg. 6 are the following:

- Periodic operation and maintenance of three electrical substations
- Temporary storage of equipment
- Temporary storage of CERCLA remediation wastes consisting of asbestos-containing material in 29 tri-wall boxes, which were removed after the expanded site inspection (SI) field investigation in 2002

A more detailed description of the Bldg. 6 site background is given in Section 1.3, *Site Background*, of the *Remedial Investigation / Feasibility Study for Building 6, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex* (AECOM 2010).

No employees work within the building on a regular basis. Occasionally, Navy personnel go inside the building for maintenance and operation of the electrical substations and for access to the storage areas.

2.2.1 Previous Investigations

The following environmental investigations related to the Bldg. 6 site have been conducted since 1993:

- 1987 Facility Assessment (Kearney 1987)
- 1993: Investigation by Navy personnel (Ogden 1998)
- 1995: SI (Ogden 1998)
- 1998: Navy Maintenance and Cleanup
- 2001 and 2002: Expanded SI (Earth Tech 2004)
- 2009 and 2010: RI/FS (AECOM 2010)

2.2.1.1 FACILITY ASSESSMENT

In 1987, a Facility Assessment was performed at the PHNC that recommended investigation of several solid waste management units and areas of concern within Bldg. 6 (Kearney 1987).

2.2.1.2 INVESTIGATION BY NAVY PERSONNEL

Navy personnel conducted an investigation in 1993 after soil suspected to be contaminated was discovered during construction work within Bldg. 6 (Ogden 1998). In February 1993, discolored soil was observed during excavation of the largest unpaved area in the eastern portion of the building, as part of construction work to install new equipment at the Foundry Shop. Initial sampling indicated that toxicity characteristic leaching procedure (TCLP) lead levels exceeded the 5.0 milligrams per liter (mg/L) regulatory limit in 4 of the 8 soil samples collected (Ogden 1998). An additional 36 soil samples were collected for total lead analysis. Of the additional 36 samples, 2 were collected from the former unpaved grassy area (which has since been paved), just outside of the southeast side of Bldg. 6 between columns 15 and 17; the rest were collected in and around the unpaved areas inside the building. The detected concentrations of total lead ranged from 24 milligrams per kilogram (mg/kg) to 9,550 mg/kg inside the building and from 99 to 1,305 mg/kg in the former unpaved grassy area just outside the building (Ogden 1998).

2.2.1.3 SITE INSPECTION

In 1995, the Navy conducted a SI of three sites at the JBPHH, PHNSY & IMF. One of these investigations focused on the Bldg. 6 Foundry Shop, specifically the largest unpaved area inside the building and the former unpaved grassy area adjacent to the southwest side of the building (Ogden 1998). Surface soil from 13 areas was collected from the open areas inside and outside Bldg. 6. Of the surface soil samples collected (Attachment B), two were from the grassy unpaved area on the south side of Bldg. 6, and the remaining samples were collected in the large open area inside Bldg. 6 and at the former furnace and drip pan locations. All samples were analyzed for metals, and five of the samples were also analyzed for PAHs, PCBs, and TPH.

Metals were detected in all of the surface soil samples. The highest concentration of metals detected in the surface soil appeared to be in specific hot-spot locations, including the grassy area outside Bldg. 6 and within the large unpaved interior sampling area.

PAHs were detected in all five samples analyzed for organic chemicals of potential concern (COPCs). The 16 PAH analytes had combined total concentrations ranging from 2 micrograms per kilogram (µg/kg) to 563 µg/kg. The highest concentrations of PAHs were detected on the south side of the large unpaved sampling area inside Bldg. 6.

PCBs were detected in all five samples at concentrations ranging from 26 to 3,200 µg/kg. The maximum PCB concentrations were detected in the surface soil samples from the north side of the large unpaved sampling area inside Bldg. 6.

TPH-gasoline range organics and TPH-LRO were detected in the surface soil samples from the northern portion of the large unpaved sampling area, but the TPH concentrations were below the screening criteria, with a maximum of 330 mg/kg.

A total of 12 subsurface soil samples were collected from six soil borings drilled inside Bldg. 6 at depths ranging from 2 to 8 feet below ground surface (bgs) (Attachment B). The subsurface soil samples were analyzed for metals; PAHs; PCBs; benzene, toluene, ethylbenzene, and xylenes; and TPH. Two soil borings were also drilled approximately 40 feet north of Bldg. 6 and two borings were drilled approximately 20 feet south of Bldg. 6 to evaluate background concentrations.

All 23 metals analyzed for were detected in 1 or more of the subsurface soil samples obtained from borings inside Bldg. 6. Lead, copper, and zinc were present in subsurface soils at concentrations generally an order of magnitude greater than those observed in the background borings. These metals were attributed to past metal-casting operations in Bldg. 6. The highest concentrations of metals in soil within the building were located in the subsurface vault area in the north-central portion of the large unpaved sampling area. Metals contamination was observed to depths of at least 8 feet bgs.

PAH concentrations in soil were significantly higher in subsurface soils than in surface soils in the large unpaved sampling area of Bldg. 6. Total PAH levels in subsurface soils ranged from

1.6 to 161,559 µg/kg, with the highest levels occurring in the center of the unpaved area. PAHs also increased with depth in this area, with the highest concentrations occurring in samples at 8 feet bgs.

PCB concentrations in subsurface soil samples were similar to those found in surface soils from the unpaved area of Bldg. 6, with the highest concentrations located in the northern portion of the large unpaved sampling area. However, PCB concentrations did decrease with depth to non-detectable levels at the bottom of the borings. Detected concentrations of PCBs ranged from 73 to 1,000 µg/kg.

TPH concentrations were higher in subsurface soil than in surface soils in the large unpaved sampling area of Bldg. 6. At the time of the sampling, there were no screening criteria identified for TPH; however, the maximum concentration of 1,400 mg/kg is below the 2007 DOH EAL established subsequently. The highest concentrations of TPH were present in the center portion of the unpaved area, with three locations exhibiting TPH levels increasing with depth.

Based on the analytical results of the soil sampling, the SI recommended further action because of elevated concentrations of lead.

2.2.1.4 Navy Maintenance and Cleanup

After foundry operations ceased, Navy personnel conducted a housekeeping effort in 1998, which was limited to removing dust from floors and surfaces, and covering the interior unpaved areas with plastic sheeting. Surface soil and floor-dust sweep samples were collected and analyzed for TCLP lead. Analytical results indicated leachable lead concentrations above the 5.0 mg/L hazardous waste regulatory limit in many areas of the building. In addition, under a time-critical removal action (TCRA) completed in 1998 to address environmental concerns in the catch basins at Bldg. 6, the Navy also removed and disposed of approximately 0.5 cubic yard of contaminated sediment from two catch basins associated with storm drains on the southeast side of Bldg. 6. Furthermore, the unpaved grassy area just outside of Bldg. 6 was paved over with concrete to prevent soil from entering the storm drains. A third feature, previously identified on facility drawings as a storm drain, was found to be a utility vault that did not receive discharges from the foundry operations. The removal action activities are documented in an action memorandum (DON 1998).

2.2.1.5 Expanded SI

In 2001, the Navy collected surface soil and subsurface soil samples during an expanded SI (Attachment B). Soil sampling was performed from 1 to 4 October 2001 throughout the Bldg. 6 site in accordance with the approved *Work Plan and Sampling and Analysis Plan* (Earth Tech 2001). A total of 92 soil samples were collected from 45 locations. Of these 45 locations, 39 were randomly selected based on a statistical sampling plan. A total of 80 soil samples were collected from these 39 locations and analyzed for PAHs, PCBs, and metals. Of the 45 locations, 5 locations were selected to target the areas where organic COPCs were likely to occur, near the furnace and electrical substations; 10 soil samples collected from these 5 locations were analyzed for PAHs and PCBs. Based on field observations, TPH-DRO and TPH-LRO analyses were also conducted on 13 soil samples at 8 of the soil sampling locations. The final sample location was added adjacent to the boring for a monitoring well due to observed petroleum staining. Two soil samples were collected from this location and analyzed for PAHs, PCBs, metals, and TPH-DRO/LRO (Earth Tech 2004).

Five PAHs were detected in surface soil at concentrations exceeding both industrial and residential soil screening criteria: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Benzo(a)anthracene concentrations ranged from 71 to 4,600 µg/kg, benzo(a)pyrene concentrations ranged from 2 to 6,800 µg/kg, and benzo(b)fluoranthene concentrations ranged from 55 to 8,100 μg/kg, with the maximum concentration detected in the large unpaved area in the eastern end of Bldg. 6. Dibenz(a,h)anthracene concentrations ranged from 2 to 1,700 μg/kg and indeno(1,2,3-cd)pyrene concentrations ranged from 45 to 3,700 μg/kg with the maximum concentration detected in the large unpaved area south of the electrical substation in the eastern end of Bldg. 6. For the subsurface soil data set, the same five PAHs as those found in surface soil samples were detected at concentrations exceeding screening criteria: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Maximum concentrations of several PAHs were located in the large unpaved area in the eastern end of Bldg. 6, including benzo(a)anthracene (1,000 μg/kg), benzo(a)pyrene (1,500 μg/kg), benzo(b)fluoranthene (2,100 μg/kg), dibenz(a,h)anthracene (360 μg/kg), and indeno(1,2,3-cd)pyrene (810 μg/kg).

Two PCBs were detected in soil samples during the 2001 sampling effort: Aroclor-1254 and Aroclor-1260. At the southwestern end of Bldg. 6 in the open hydroblast area, Aroclor-1254 was detected at concentrations of 23 and 29 μg/kg (both at depths from 1.0 to 1.5 feet bgs). At the eastern end of Bldg. 6 adjacent to the unpaved area and the electrical substation, Aroclor-1260 was detected at a concentration of 190 μg/kg. These concentrations, however, did not exceed their respective risk-based screening criteria. The only PCB detection (Aroclor-1248) in the 2001 subsurface soil data set occurred in a paved area at the eastern corner of Bldg. 6, near two large ovens and another set of drying ovens. The concentration of Aroclor-1248 (1.6 μg/kg) did not exceed any screening criterion.

Metal concentrations in surface soil were higher than those detected in subsurface soil. For the 2001 dataset, metals exceeding industrial PRGs occurred near equipment or the large unpaved area in the eastern end of Bldg. 6. A sample containing lead at 11,000 mg/kg, was located within the large unpaved area in the eastern end of Bldg. Unlike the metals and PAHs, the TPH-DRO and TPH-LRO concentrations were found to be higher in subsurface soil than in the surface soil. TPH-DRO concentration ranged from 11 to 13 mg/kg. TPH-LRO concentrations ranged from 35 to 250 mg/kg. These soil samples were isolated to the eastern end of Bldg. 6 located near oil furnaces and an unpaved area.

In 2002 the Navy collected additional surface soil and subsurface soil samples as part of the expanded SI (Attachment B). Soil sampling was performed on 5 November 2002 throughout the Bldg. 6 site in accordance with the approved *Work Plan and Sampling and Analysis Plan* (Earth Tech 2001). Seven soil samples were collected from four locations (Attachment B). All soil samples were surface and shallow subsurface soil samples, because refusal was encountered at depths of 1.5 to 2.0 feet bgs. Six of the seven soil samples were analyzed for PAHs, PCBs, metals, and TPH-DRO/LRO. The remaining soil sample was analyzed for PAHs, PCBs, and TPH-DRO/LRO only, because it was collected in an unpaved area adjacent to an electrical substation where COPCs did not include metals (Earth Tech 2004).

Benzo(a)pyrene in surface soil exceeded both industrial and residential screening criteria. Benzo(a)pyrene concentrations ranged from 62 to 290 μg/kg, of which the maximum concentration was detected in the furnace area in the western portion of Bldg. 6. The only other PAH exceedance in the 2002 data set was for dibenz(a,h)anthracene, also in the furnace area in the western portion of Bldg. 6.

Aroclor-1260, ranging from 64 to 5,100 μg/kg, was the only PCB detected in any of the soil samples collected during the 2002 fieldwork. It was detected in five of six surface soil samples, but the detections were all in unpaved areas adjacent to electrical substations. The maximum concentration of 5,100 μg/kg occurred in the unpaved area in the western end of Bldg. 6. Sampling points surrounding this maximum detection (from the 2001 fieldwork) did not have PCB detections, indicating a limited lateral extent of contamination. PCB soil sampling results under a separate investigation (see Section 2.2.1.7) from the area just outside the third electrical substation (designated as E-13) showed Aroclor-1260 concentrations ranging between 1,200 and 2,600 μg/kg. These detections were found in soil samples collected on the north end of E-13. Though soil sampling results under this separate investigation revealed PCB detections above screening criteria, soil sampling points located just south of E-13 did not have PCB detections. Therefore, the PCB detections for E-13 were isolated to soil areas outside of Bldg. 6. The evaluation and cleanup of the electrical substation sites are being conducted under a different Navy project as discussed in Section 2.2.1.7. In the 2002 shallow subsurface soil samples, Aroclor-1260 was detected in one sample from the unpaved area located north of an electrical substation (located in the southwestern corner of Bldg. 6) at a concentration of 320 μg/kg, which exceeded the residential screening criteria.

The majority of the elevated metal concentrations detected in 2002 (maximum lead concentration of 247,000 mg/kg) occurred in samples collected from the paved area at the western end of Bldg. 6, adjacent to one set of induction furnaces, the likely source of the metal contamination. When the metal concentrations in soil were compared to estimated background concentrations, several metals were found at Bldg. 6 within respective estimated background concentration ranges and were concluded not to reflect impacts from previous foundry operations. However, 13 metals (antimony, arsenic, barium, cadmium, cobalt, copper, lead, mercury, nickel, silver, thallium, vanadium, and zinc) did exceed the estimated background ranges. Unlike the metals and PAHs, the TPH-DRO and TPH-LRO concentrations were found to be higher in subsurface soil than in the surface soil. TPH-DRO concentrations range from 41 to 52 mg/kg (Earth Tech 2004).

Groundwater samples were collected from four previously installed wells and two new wells (Attachment B) during the 2001 and 2002 Expanded SI. Groundwater samples were also collected from two existing underground storage tank (UST) wells located southeast of Bldg. 6, and one grab sample each of sediment and water was collected from both the sub-floor vault and pour pit. Groundwater samples were analyzed for total and dissolved metals, PAHs, PCBs, TPH-DRO, TPH-LRO, and general water chemistry. PAH and dissolved aluminum were detected in groundwater at concentrations that exceeded 2002 EPA Region 9 PRGs. The dissolved aluminum exceedances (ranging from 399 μg/L to 1,020 μg/L), however, occurred only in one monitoring well (MW-01) located downgradient of Bldg. 6. The PAH exceedances included dibenz(a,h)anthracene (4 micrograms per liter [μg/L]), benzo(g,h,i)perylene (6 μg/L), fluorine (ranging from 0.243 to 1.5 μg/L), and acenaphthene (ranging from 0.31 to 2.3 μg/L) and only occurred in wells that also contained TPH DRO and TPH-LRO for which the source appears to be upgradient of Bldg. 6 (i.e., leaks from the former UST or other upgradient petroleum sources). PCBs were not detected in any of the groundwater samples collected.

2.2.1.6 Remedial Investigation and Feasibility Study

A RI/FS was conducted in 2009/2010 to determine whether further action is required for the Bldg. 6 site. The RI/FS was initiated in response to unresolved federal and state regulator comments on the Expanded SI report (Earth Tech 2004). The scope of the RI included collecting confirmation groundwater samples, re-evaluating risks to human health and ecological receptors, and addressing unresolved federal and state regulatory comments and concerns. Because human health risks were determined to be unacceptable, the FS was conducted to develop and evaluate remedial alternatives, and recommend a remedial alternative that, if implemented, will reduce, control, or mitigate unacceptable risks.

Two rounds of confirmation groundwater samples were collected to establish the current concentration of dissolved vanadium at the site and evaluate how the current data compared with previously collected data during the 2001 and 2002 collection events. The previous investigations identified elevated concentrations of PAHs and metals in the groundwater (attributed to upgradient sources). However, during the RI, the groundwater concentrations were compared to more recent DOH EALs (DOH 2007). As a result of this comparison, the EPA and DOH agreed that the only remaining concern for groundwater was vanadium, and determined that more information was necessary to accurately characterize dissolved vanadium in the groundwater at the Bldg. 6 site. One groundwater sampling round was conducted during the 2009 "dry season" and one round during the 2010 "wet or rainy season" to determine whether seasonal variability affected the concentration of dissolved vanadium present beneath the Bldg. 6 site. Groundwater samples were collected at eight wells (MW-01 through MW-06 and UST MW-08 and MW-09) in and around Bldg. 6. Dissolved vanadium was detected in all eight wells sampled with a maximum concentration of 140 microgram per liter (µg/L) detected at MW-01. No DOH water quality standard for saltwater acute toxicity (DOH 2004) exists for vanadium but the DOH EAL of 19 µg/L was exceeded at six wells (MW-01, MW-02, MW-03, MW-04, MW-06, and UST MW-08). Dissolved vanadium concentrations detected during the 2009 sampling event were similar to concentrations detected in 2001 and 2002. The reported concentrations of vanadium over several monitoring events indicate that vanadium in the groundwater is stable and there are no apparent migration pathways to Pearl Harbor. In addition, the regulators have concurred that concentrations of vanadium observed in the groundwater are likely attributable to background concentrations reflected by the vanadium concentrations naturally occurring in volcanic soils such as those found under Bldg. 6. Therefore, the RI recommended no further action for groundwater.

Risks to human health and ecological receptors were re-evaluated by initially screening historical data with the 2007 DOH Tier 1 EALs and Oahu-wide background concentration ranges for metals. Chemicals that exceeded both background (metals only) and risk-based screening levels were further evaluated in a revised human health screening risk assessment (SRA). The results of the SRA concluded that metals (primarily antimony, arsenic, and lead), PAHs, and PCBs in surface and subsurface soil could pose risk to potential future residents or industrial workers. TPH-DRO and LRO were also detected at concentrations exceeding the DOH EAL. Because contaminants exceeding industrial scenario cleanup goals are present in surface soils, the RI recommended that a response action be conducted to ensure that unacceptable worker and hypothetic future resident exposure does not occur and to allow future industrial or commercial reuse of the building. Proper closure of the vaults and pit were also recommended for worker safety, to prevent potential future exposure to contaminants in residual water (if present) or sediment, and to eliminate a potential source of soil or groundwater contamination should cracks develop in the vault or pit in the future.

The site is used for industrial purposes. Most areas are paved with no critical ecological habitat in or adjacent to the building (AECOM 2010). The ecological risk assessment concluded that chemicals detected pose no threat to wildlife or ecology because the contaminated soil is contained within a closed building, which is surrounded by a paved area, and dispersion and natural attenuation would occur along the potential offsite transport pathways (e.g., groundwater flow, storm water runoff, and wind transport).

2.2.1.7 Other Investigations

A SI (Earth Tech 2003) was conducted by the Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) II contractor under contract task order (CTO) 087 to investigate several Navy transformer sites on Oahu, Hawaii (Earth Tech 2003). Concrete and soil samples were collected at Transformer E-13 (an electrical substation located in the northeast corner of Bldg. 6).

The concrete samples were all non-detect; however, soil samples collected immediately below the asphalt adjacent to Transformer E-13 were found to contain PCB concentrations above the Toxic Substances Control Act (TSCA) screening criterion of 1 mg/kg. The SI recommended further evaluation of this transformer site, which is being conducted under the Navy CLEAN III contract, CTO HC42 (AECOM 2011) for the base-wide PCB program. The Navy will coordinate the projects to ensure that the remedies for Bldg. 6 and the base-wide PCB program will not conflict with each other, and that all remedies implemented will be protective of human health and the environment.

2.2.2 Enforcement Activities

There have been no CERCLA enforcement activities at Bldg. 6.

2.3 COMMUNITY PARTICIPATION

The Navy has encouraged public participation in the decision process for environmental response actions at the Bldg. 6 site throughout the environmental restoration and site closure processes. A Restoration Advisory Board (RAB) composed of the DOH, EPA, Navy, and community representatives was established to ensure public involvement in the decision-making process. The Navy has issued fact sheets that summarize the site investigation and cleanup activities. The RAB team has provided review and comment leading to the selection of the final remedy memorialized in this ROD. The Navy has also established a point-of-contact for the public.

The Navy prepared the PP to summarize the background and characteristics of the site, explain the findings of the human health and ecological risk assessments, describe the cleanup objectives and response action alternatives considered for the site, and present the rationale for recommending the alternative selected as the final remedy. A notice of availability was published in the Honolulu Star-Advertiser on 15 May 2011, notifying the public of the public comment period for the PP and of the public meeting. The public meeting to present the PP was held on 24 May 2011 at the Aiea Public Library. A transcript of this meeting is available in the Administrative Record.

Documents including work plans, technical reports, and other materials relating to the Bldg. 6 site investigation and cleanup activities are available in the Navy information repositories at the following libraries:

Pearl City Library
1138 Waimanu Home Road
Pearl City, Hawaii 96782
808-453-6566

Hamilton Library at the University of Hawaii at Manoa
Hawaiian and Pacific Collection
2550 McCarthy Mall
Honolulu, Hawaii 96822
808-956-8264

Project information is also located in the Administrative Record file located at Naval Facilities Engineering Command, Pacific in Pearl Harbor. The address for the Administrative Record file is:

Naval Facilities Engineering Command, Pacific
258 Makalapa Drive, Suite 100
JBPHH HI 96860-3134

2.4 Scope and Role of Response Action

Bldg. 6 is located at JBPHH, which is part of the PHNC NPL site. The PHNC is listed on the NPL, which identifies priorities among known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories.

The FFA for PHNC (EPA Region 9, State of Hawaii, and DON 1994) documents how the Navy intends to meet and implement CERCLA in partnership with the EPA Region 9 and DOH. Through the FFA and with concurrence from the DOH, the Navy and the EPA have agreed to the following:

- Ensure that environmental impacts associated with past and present activities are thoroughly investigated and that appropriate response actions are taken, as necessary, to protect public health, welfare, and the environment.
- Establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions in accordance with CERCLA, SARA, NCP, Superfund guidance and policy, Resource Conservation and Recovery Act (RCRA) guidance and policy, and applicable State of Hawaii law.
- Facilitate cooperation, exchange of information, and participation between the Navy, EPA, and the DOH.
- Ensure adequate assessment of potential injury to natural resources to ensure the implementation of response actions appropriate for achieving suitable cleanup levels.

The final remedy was selected in accordance with CERCLA, as amended by the SARA, and to the extent practicable, the NCP. Information supporting the decisions leading to the selected remedy is contained in the Administrative Record file for the site.

2.4.1 Past Response Actions at Bldg. 6

Past response actions performed at Bldg. 6 include the following activities conducted in 1998, which was after foundry operations ceased:

- Navy personnel removed dust from floors and surfaces, and covered the interior unpaved areas inside Bldg. 6 with plastic sheeting. Samples collected from surface soil and floor-dust sweep were analyzed for TCLP lead, which indicated leachable lead concentrations above the 5.0 mg/L hazardous waste regulatory limit.
- The Navy completed a TCRA to remove and dispose of approximately 0.5 cubic yard of contaminated sediment from two catch basins associated with storm drains.
- The Navy paved over with concrete a former grassy area located just outside of Bldg. 6 to prevent soil from entering the storm drains.

2.4.2 Selected Remedial Action for Bldg. 6

As concluded in the RI, Bldg. 6 requires a response action to protect human receptors from exposure to surface and subsurface soil containing metals, PAHs, and PCBs. TPH-DRO and LRO were also detected at concentrations exceeding the DOH EAL. The preferred response action alternative includes adding a concrete cover over unpaved areas, backfilling vaults and pits with clean soil and covering them with concrete, and implementing LUCs. The LUCs would be implemented to ensure the long-term integrity of the cover and prevent unrestricted use of the building because soil with COC concentrations exceeding residential and industrial screening criteria would be left in place beneath the concrete cover. Periodic monitoring and five-year reviews are required to ensure that conditions at the Bldg. 6 site remain protective of human health and verify continued effectiveness of the LUCs.

2.5 SITE CHARACTERISTICS

This section describes the site characteristics at Bldg. 6. Site characteristics include climate and meteorology, surface topography, geology, hydrology and hydrogeology, demography and land use, and biological resources.

2.5.1 Climate and Meteorology

The climate at JBPHH, PHNSY & IMF is very consistent, with only a few degrees of change in temperatures throughout the year. High temperatures of 87 to 89 degrees Fahrenheit (°F) are not uncommon during mid-afternoon in summer. Nighttime temperatures during the same season range from 72 to 76°F. Winter and early spring daytime highs are typically 76 to 78°F, and nighttime lows may reach the high 50s or low 60s.

The prevailing winds at JBPHH, PHNSY & IMF are the northeast trade winds that blow approximately 9 months of the year. During the balance of the year, south to southeast winds and mild offshore breezes prevail. Winds up to 40 miles per hour occasionally occur from the north or northwest (Earth Tech 1999).

There are two distinct seasons in this region, dry and wet. The dry season extends from April to October and the wet season extends from November to March. The median rainfall for the region is 20 to 30 inches, depending on the incidence of the occasional heavy rains. These heavy rains occur principally from November to April (Earth Tech 1999).

2.5.2 Surface Topography

The topography of the area around Bldg. 6 slopes gently to the northwest toward the Pearl Harbor dry docks. The ground surface elevation within the Bldg. 6 study area is approximately 14 feet above mean sea level. The majority of the surface within the building is covered with concrete. There are numerous unpaved areas of various shapes and sizes within the building, including a 2,100-ft^2 area located in the eastern portion. The area immediately surrounding the building consists of asphalt covered parking lots, driveways, and roads.

2.5.3 Geology

The JBPHH, PHNSY & IMF is located within the Coastal Plain geomorphic province on the island of Oahu. Regionally, the bedrock formations that underlie the coastal plain are composed primarily of fill, coral-reef limestones, and volcanically derived alluvial sediments. The coral-reef limestones also include calcareous beach-sand deposits, finely laminated lagoon limestones, and volcanic sediments. Near Pearl Harbor, the caprock that overlies volcanic bedrock forms a shelf roughly 6 miles wide at its widest point and over 1,000 feet thick at the entrance to the main channel of Pearl Harbor.

The geology in the Bldg. 6 area comprises primarily of artificial fill, marine sediments, volcanic tuff, and coralline limestone. Much of the land within the JBPHH, PHNSY & IMF is artificial fill created by the deposition of dredge spoils (Ogden 1992). The lithology observed in most boreholes from the investigations show sand/silt/clay mixture with coarse gravel grading to tuff at approximately 3.5 to 4.0 feet bgs.

2.5.4 Hydrogeology

Groundwater is shallow at the site and occurs between 11 to 13 feet bgs. This unconfined shallow groundwater is present within a sand and gravel layer at the contact between the volcanic tuff and the underlying coralline limestone. The shallow groundwater beneath JBPHH, PHNSY & IMF is tidally influenced (Ogden 1994) and not hydraulically connected to the basal aquifer of Oahu. The source of shallow groundwater is believed to originate from infiltration of precipitation upgradient of the shipyard combined with intrusion of seawater from the harbor. As a result, the shallow groundwater is generally brackish. The inferred groundwater flow direction is generally oriented toward Pearl Harbor with a localized hydraulic mound at the southeast corner of the building. However, because of the low mobility of the site contaminants and minimal infiltration into the subsurface soils (i.e., the contaminated area is inside a building), the likelihood of Bldg. 6 contaminant migration to Pearl Harbor via the groundwater pathway is low.

Data collected within the PHNSY, including the IMF and Bldg. 6, suggest that the shallow caprock groundwater is likely to meet the criteria for classification as a Class II groundwater body under the EPA Groundwater Protection Strategy (i.e., a yield of at least 150 gallons per day with a total dissolved solids (TDS) concentration less than 10,000 mg/L). A Class II groundwater body is considered by the EPA to be a current or potential source of drinking water or a water body that has other beneficial uses. However, the evaluation of additional federal, state, and site-specific criteria indicates that the caprock groundwater within this study area does not present a current or potential future drinking water source (AECOM 2010). Additionally, the DOH has delineated a boundary to classify groundwater on Oahu, termed the underground injection control (UIC) line (DOH 1992). Because Bldg. 6 is located seaward of the UIC line, the DOH does not consider groundwater in the Bldg. 6 area to be a potential source of drinking water (DOH 1999).

Groundwater chemistry information for other nearby JBPHH, PHNSY & IMF sites within 0.25 mile of Bldg. 6 indicates that shallow groundwater in the volcanic tuff and limestone formations is generally brackish with TDS concentrations between 1,000 and 3,000 mg/L (Ogden 1998). The major cation and anion concentrations for groundwater in limestone and tuff monitoring wells at the nearby Transportation Yard site are considered saline and are indicative of average seawater concentrations (Ogden 1998). In contrast, the groundwater beneath Bldg. 6 did not exhibit the saline characteristics during the expanded SI as the other sites discussed above. TDS concentrations of groundwater collected from monitoring wells adjacent to and within Bldg. 6 ranged from 290 mg/L to 550 mg/L. These lower than expected TDS concentrations were attributed to a water main leak beneath Bldg. 6, which dilutes the brackish groundwater with tap water.

2.5.5 Demography and Land Use

Bldg. 6 is located within the CIA of JBPHH, PHNSY & IMF, approximately 1,000 feet south of Pearl Harbor. The CIA is a heavy industrial area that supports dry dock repair and maintenance activities for naval surface vessels and submarines. Facilities for maintenance of naval vessels, overhauls and retrofits, warehouse storage for spare and retrofitted parts, electronic repair, and metal and electronic fabrication are all located within the CIA. Bldg. 6 has a footprint of approximately 52,000 ft^2. The areas outside and around Bldg. 6 are paved driveways, parking lots, and roadways.

Foundry operations have ceased within the building. The shops and offices are also no longer in use. Some areas of the building are presently used for equipment storage, and three electrical substations remain in use within the building. No employees work within the building on a regular basis. Occasionally, Navy personnel are inside the building for maintenance and operation of the electrical substations and for access to the storage areas.

2.5.6 Biological Resources

In general, the PHNC is a completely developed area with little vegetative cover. The CIA and Bldg. 6 area of JBPHH, PHNSY & IMF are completely paved. Due to the absence of vegetation, the area occupied by Bldg. 6 is not considered an ecological habitat and cannot sustain wildlife.

2.6 CURRENT AND POTENTIAL FUTURE LAND AND GROUNDWATER USE

This section describes current and potential future uses for the land and other resources (i.e., groundwater) at the site and in the surrounding area.

2.6.1 Current and Future Onsite and Surrounding Area Land Use

As described in Section 2.5.5, the current land use designation is commercial/industrial. No change to land use is anticipated in the future.

2.6.2 Current and Future Groundwater Use

The State of Hawaii does not currently have an EPA-approved comprehensive state groundwater protection plan in place. Therefore, federal and other state guidance as well as site-specific factors were considered to determine the status of groundwater at Bldg. 6. The groundwater at Bldg. 6 was classified in accordance with the flowchart in the *Groundwater Classification Issue Paper for PACNAVFACENGCOM IR Sites Located in Hawaii. Joint Issue Paper between NAVFAC Pacific, U.S. EPA, and Hawaii State Department of Health* (NAVFAC Pacific and EPA 2001).

The groundwater beneath the Bldg. 6 site is currently not a source of potable water, is classified as a non-potable water source by DOH, and is not anticipated to be used as a potential source of potable water in the future.

2.7 SUMMARY OF SITE RISKS

This section describes the conceptual site model (CSM) (Figure 3) and the risk exposure assumptions, and presents a summary of site risks for Bldg. 6. Based on previous site activities and historical investigations, COPCs for this site include metals, PAHs, PCBs, and TPH, which were evaluated in the screening level risk assessments. However, because TPH fractions do not have toxicity values, but have indicator chemicals that are included in risk estimates, TPH-DRO and TPH-LRO were not further evaluated in the risk assessments and are not considered COCs.

As discussed in Section 2.6.1, the current land use is commercial/industrial and there are no changes anticipated in the future. However, because there are no known current prohibited land uses for this property, the screening level risk assessments used a conservative approach and compared site exposure point concentrations (EPCs) to residential PRGs. EPCs were then compared to industrial PRGs. EPCs were selected from either the maximum detected concentration or the 95 percentile upper confidence limit (when the maximum detected concentration exceeded the 95 percent UCL). If the cumulative risk was below the target incremental cancer risk of 10^{-6} or the target noncancer hazard index (HI) of 1.0, the risk evaluation was considered complete. If potential risk exceeded the target risk of 10^{-6} or the target noncancer hazard of 1.0, or if exposure pathways and parameters were identified that were not consistent with those used to develop the PRGs (such as the construction/utility worker), a site-specific risk-based evaluation was completed. In this case, only those chemicals that exceeded the residential PRG screening process were carried forward.

			Receptors									
			Current Land Use				Future Land Use					
Contributing Source	Transport Mechanism	Exposure Route	Onsite Industrial Worker	Trespasser (Adult/Child)	Offsite Resident (Adult/Child)	Offsite Ecological Receptors	Industrial Worker	Construction Worker	Theoretical Onsite Resident (Adult/Child)	Offsite Resident (Adult/Child)	Offsite Ecological Receptors	Rationale
Surface Soil	Direct Contact	Incidental Ingestion	Potentially Complete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Potentially Complete	Incomplete	Incomplete	Potentially complete for current workers; although unpaved areas inside the building are currently covered with plastic sheeting or plywood, these controls are temporary. Potentially complete for future workers or theoretical onsite resident assuming soil is uncovered, and underground utilities are constructed. Incomplete for current and future offsite residents and ecological receptors due to lack of transport pathway to those offsite receptors.
		Dermal Contact	Potentially Complete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Potentially Complete	Incomplete	Incomplete	Same as above.
	Air Transport	Inhalation of VOCs	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for all receptors because VOCs are not expected to be present in surface soil, based on previous investigations.
		Inhalation of Particulates	Potentially Complete	Incomplete	Insignificant	Incomplete	Potentially Complete	Potentially Complete	Potentially Complete	Insignificant	Insignificant	Potentially complete for current workers because unpaved areas inside building are not permanently covered. Potentially complete for future workers or resident assuming soil is uncovered and underground utilities are constructed. Insignificant for offsite residents and ecological receptors based on indoor nature of soil contamination and limited contact with wind for outside and offsite deposition of windblown particulates.
	Bio-Uptake	Ingestion of Plants/Animals	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for workers because no agricultural activities are associated with industrial land use. Incomplete for offsite residents and ecological receptors due to the lack of a transport pathway to those receptors.
	Stormwater Runoff - Drainage Sediment	Incidental Ingestion	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for all onsite human receptors because grated barriers are placed on storm sewer system, sediment was removed from two storm drains on southwest side of building, and unpaved grassy area outside of building was paved with concrete. Incomplete for offsite human and ecological receptors because outside grassy area adjacent storm drain is now paved and storm drain sediments have been removed. Therefore, there is no complete transport pathway to these offsite receptors.
		Dermal Contact	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Same as above.
	Stormwater Runoff - Discharge to Harbor	Incidental Ingestion of Sea Water	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for all onsite receptors because outside areas of Building 6 are paved, and there is no stormwater contact with contaminated soil. Incomplete for all offsite human and ecological receptors due to the lack of a transport pathway to those receptors.
		Dermal Contact with Sea Water	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Same as above.
	Bio-uptake	Ingestion of Fish/Shellfish	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for workers because no agricultural activities are associated with industrial land use. Incomplete for offsite residents and ecological receptors due to the lack of a transport pathway to those receptors.

Figure 3
Conceptual Site Model
Record of Decision
Building 6
PHNC NPL Site
JBPHH, PHNSY and IMF, Oahu, Hawaii

Contributing Source	Transport Mechanism	Exposure Route	Receptors: Current Land Use: Onsite Industrial Worker	Receptors: Current Land Use: Trespasser (Adult/Child)	Receptors: Current Land Use: Offsite Resident (Adult/Child)	Receptors: Current Land Use: Offsite Ecological Receptors	Receptors: Future Land Use: Industrial Worker	Receptors: Future Land Use: Construction Worker	Receptors: Future Land Use: Theoretical Onsite Resident (Adult/Child)	Receptors: Future Land Use: Offsite Resident (Adult/Child)	Receptors: Future Land Use: Offsite Ecological Receptors	Rationale
Subsurface Soil	Direct Contact	Incidental Ingestion	Incomplete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Incomplete	Incomplete	Incomplete	Incomplete for current workers because they do not come in contact with subsurface soil (it is not exposed). Potentially complete for future workers or theoretical resident assuming soil is uncovered, subsurface soil is brought to the surface during construction activities, and underground utilities are constructed. Incomplete for current and future offsite residents and ecological receptors due to the lack of transport pathway to these offsite receptors.
		Dermal Contact	Incomplete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Incomplete	Incomplete	Incomplete	Same as above.
	Air Transport	Inhalation of VOCs	Potentially Complete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Potentially Complete	Incomplete	Incomplete	May be complete for onsite workers because petroleum hydrocarbons were previously identified in subsurface soil at one location in Bldg. 6. Additionally, exposure to chemical vapors in air may occur in an indoor setting for industrial workers or resident.
		Inhalation of Particulates	Incomplete	Incomplete	Incomplete	Incomplete	Potentially Complete	Potentially Complete	Potentially Complete	Insignificant	Insignificant	Incomplete for current receptors because subsurface soil is not exposed inside or outside the building. Potentially complete for future workers or resident assuming soil is uncovered, subsurface soil is brought to the surface during construction activities, and underground utilities are constructed. Insignificant for offsite residents and ecological receptors based on indoor nature of soil contamination and limited contact with wind for outside and offsite deposition of windblown particulates.
	Bio-uptake	Ingestion of Plants/Animals	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Insignificant	Incomplete	Incomplete	Incomplete for current and future onsite workers because no agricultural activities are associated with industrial land use. Incomplete for offsite residents and ecological receptors due to the lack of a transport pathway to those receptors. Pathway is likely insignificant for a theoretical future resident as subsistence gardening is unlikely.
	Leaching to Groundwater	Ingestion	Incomplete	Incomplete	Incomplete	Incomplete	Insignificant	Insignificant	Incomplete	Incomplete	Incomplete	Incomplete for current workers and onsite or offsite human receptors because groundwater beneath the site and downgradient of the site is not used as a potable water source and is not expected to be used as such in the future. Direct contact to groundwater by future construction workers may occur but ingestion is considered insignificant because of construction practices that are typically used and groundwater would not be a source of their drinking water. Incomplete for ecological receptors because they do not come into direct contact with groundwater.
		Dermal Contact	Incomplete	Incomplete	Incomplete	Incomplete	Insignificant	Potentially Complete	Incomplete	Incomplete	Incomplete	Same as above, except that dermal contact with chemicals in groundwater is a potentially complete exposure pathway for construction workers who may encountered groundwater during excavation activities.
		Inhalation of VOCs	Potentially Complete	Incomplete	Incomplete	Incomplete	Potentially Complete	Insignificant	Potentially Complete	Incomplete	Incomplete	While VOCs are not COPCs, several SVOCs are sufficiently volatile that indoor exposure to them could is potentially complete for onsite workers and future onsite resident. Degree of exposure in ambient air for construction workers is insignificant due to expected dilution with fresh air.
	Discharge of Groundwater to Harbor	Ingestion	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Insignificant	Insignificant	Incomplete for onsite workers and current offsite human and ecological receptors, because current groundwater data indicate that 80 years of foundry operations have not impacted groundwater quality beneath the site. Insignificant to future offsite receptors in the Harbor due to (1) the relatively long distances to the offsite harbor receptors, (2) the relatively low solubility and mobility of soil COPCs, and (3) the significant dilution and attenuation that would occur as groundwater migrates and discharges to harbor waters.
		Dermal Contact	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Insignificant	Insignificant	Same as above. However, dermal absorption by ecological receptors is not assessed because of a lack of exposure factors for the dermal pathway.
		Inhalation of VOCs	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete for all receptors because VOCs are not COPCs in groundwater discharging to surface water, based on previous investigations.
	Bio-uptake	Ingestion of Fish/Shellfish	Incomplete	Not Applicable	Incomplete	Incomplete	Incomplete	Incomplete	Not Applicable	Insignificant	Insignificant	Incomplete for onsite workers and current offsite human and ecological receptors, because current groundwater data presented in Section 4.6 indicate that 80 years of foundry operations have not impacted groundwater quality beneath the site. Insignificant to future offsite receptors in the Harbor due to (1) the relatively long distances to the offsite harbor receptors, (2) the relatively low solubility and mobility of soil COPCs, and (3) the significant dilution and attenuation that would occur as groundwater migrates and discharges to harbor waters.

Figure 3
Conceptual Site Model
Record of Decision
Building 6
PHNC NPL Site
JBPHH, PHNSY and IMF, Oahu, Hawaii (cont'd)

2.7.1 Conceptual Site Model

The CSM developed for Bldg. 6 describes the relationships between a chemical source and potential receptor. The CSM is used to guide the evaluation of potential exposures so that relevant pathways, exposure routes, and ultimately risk can be evaluated. The primary purpose of the CSM is to determine what exposure pathways are present and whether they are complete or incomplete. Only potentially complete exposure pathways are evaluated in the SRA, consistent with EPA guidance (EPA 1989). A complete exposure pathway is defined as having the following elements:

- Sources and type of chemicals are present.
- Chemical release and transport mechanisms (spills, releases, advection, diffusion, vaporization, etc.).
- Known and potential routes of exposure (ingestion, dermal contact, inhalation, etc.).
- Known or potential human and environmental receptors (residents, industrial/commercial workers, construction workers, and plants/wildlife).

Potential receptors for the Bldg. 6 site include current and future onsite commercial/industrial workers, current trespassers, hypothetical future onsite residents, current and future offsite residents, future construction workers, and current and future offsite ecological receptors. The CSM for the Bldg. 6 site identifies exposure pathways to surface soil, subsurface soil, or groundwater for potential receptors (Figure 3). An evaluation of the exposure pathways and potential receptors is provided in the following subsections.

2.7.1.1 Surface Soil Exposure Pathways and Receptors

Metals, PAHs, and PCBs are relatively immobile and tend to bind strongly to surfaces of the soil grains, which can be transported in dust in the airstream. Exposure to contaminants in surface soils (<2 feet bgs) could be through direct contact by dermal adsorption, inhalation, or incidental ingestion of the soils. The primary receptors subject to dermal and oral exposure are persons working in the immediate site vicinity who may traverse the site and, thus, have direct contact with soil and sediment. Exposure to contaminants via inhalation of particulates is a potentially complete pathway under current use, however, the following conditions mitigate exposure at Bldg. 6: (1) the majority of the contamination is located within the building, (2) a previous response action to remove dust has occurred, and (3) the areas of exposed soil surfaces have been covered with plastic sheeting.

Bio-uptake from surface soil was also evaluated in the CSM, but was considered incomplete because there are no agricultural activities associated with the site and wildlife/vegetation is generally absent at the PHNC. Surface soil pathways at this site are potentially complete for the following current and potential future receptors:

- Current and future full-time onsite industrial/commercial workers
- Future construction/utility workers
- Hypothetical future onsite resident

2.7.1.2 Subsurface Soil Exposure Pathways and Receptors

Exposure to contaminants in subsurface soils (2 to 7.5 feet bgs) at this site could be through direct contact with the soil (by dermal adsorption or incidental ingestion), or through inhalation because TPH had previously been detected in the subsurface soil at the site. Contact would most likely be associated with excavation and grading during maintenance, construction, or other intrusive activities.

Bio-uptake from subsurface soil was also evaluated in the CSM, but was considered incomplete because there are no agricultural activities associated with the site and wildlife/vegetation is generally absent at the PHNC. Subsurface soil pathways at this site are potentially complete for the following receptors:

- Current and future onsite industrial/commercial workers
- Future construction/utility workers
- Hypothetical future onsite residents

2.7.1.3 AIR EXPOSURE PATHWAYS AND RECEPTORS

Air transport of metals, PAHs, and PCBs may be a significant migration pathway under some scenarios. These contaminants tend to bind to soil particles and become airborne during soil disturbance and transported via the air stream as dust and soil particles. Exposure could occur through inhalation of contaminated airborne dust and soil particles. Additionally, certain volatile chemicals in soil and groundwater have the potential, through vaporization and soil gas migration, to enter into buildings, where human receptors may become exposed through inhalation. Inhaled chemical (via particulates or vapors) would undergo pulmonary uptake, circulate through the blood stream, and eventually be absorbed by target organs. Receptors that may be exposed to airborne contaminants in dust are similar to those who may be exposed via dermal contact and ingestion of contaminated surface and subsurface soil. While contact would most likely be associated with maintenance or construction and excavation activities that generate dust, exposure could also occur for onsite workers or onsite residents due to the suspension of dust during windy conditions. Contrarily, exposure to chemical vapors may occur without disturbance of, or otherwise direct contact with soil. Air exposure pathways from airborne contaminants in dust at this site are potentially complete for the following current and potential future receptors:

- Current and future onsite industrial/commercial workers
- Future construction/utility workers
- Hypothetical future onsite resident

Indirect exposure to volatile chemical vapors could occur for onsite workers and theoretical future residents. Exposure to these vapors would mostly occur in an indoor setting. Therefore, potential risks from the indoor inhalation of chemical vapors were also quantified for the following receptors:

- Current and future onsite industrial/commercial workers
- Future construction/utility workers
- Hypothetical future onsite residents

2.7.1.4 SURFACE WATER PATHWAY

Soils in the unpaved areas inside Bldg. 6 do not contact storm water because the building's roof and walls are intact. Grated barriers are placed on the surrounding storm sewer system by industrial/commercial workers, denying access to runoff water. Sediment was previously removed from two catch basins located on the southwest side of Bldg. 6, and sediment no longer constitutes a potential route for exposure to contaminants. The areas outside of Bldg. 6 are paved, which prevents erosion of underlying contaminants in soil. As a result, the surface water pathways were considered incomplete and were not quantitatively evaluated.

2.7.1.5 GROUNDWATER

The CSM identifies potentially complete pathways from leaching to groundwater for current and future onsite industrial/commercial workers, future construction workers, and hypothetical future onsite residents. However, COCs detected in site groundwater do not appear to be indicative of releases from over 80 years of foundry operations. The soil COCs (i.e., PAHs, metals, and PCBs) at Bldg. 6 are relatively insoluble and immobile. Other than periodic water leaks from underground utilities, the soils do not come into contact with surface water because of the presence of an intact overhead roof and/or surface pavement. An extensive stormwater drainage system also acts to channel runoff water from the concrete and asphalt areas away from open unpaved areas, further limiting recharge. Future development in the Bldg. 6 area is not expected to change the amount of recharge to groundwater. Therefore, dissolution and leaching of soil contaminants from the surface and subsurface soil to groundwater are not considered significant. Contaminants found in groundwater at Bldg. 6 are likely related to other upgradient sources. In addition, migration of contaminants to offsite human and ecological receptors in Pearl Harbor, located over 800 feet away from Bldg. 6, is considered insignificant and not quantitatively evaluated.

2.7.2 Summary of Site Risks

2.7.2.1 HUMAN HEALTH RISK ASSESSMENT RESULTS

The following points summarize the human health SRA from exposure to surface and subsurface soils:

- Estimated cancer risk from exposure to surface and subsurface soil exceeds the target risk range of 10^{-6} to 10^{-4} for the resident but not the industrial/commercial worker or construction/utility worker. This risk is driven primarily by the presence of arsenic, which is at background levels in subsurface soil.
- Noncancer hazards for both surface and subsurface soils exceeded the target hazard of 1 for all receptors. Target organ segregation resulted in organ-specific HIs that still exceeded the target HI of 1. While antimony, arsenic, and PCBs were the main contributors to this hazard in surface soil, only antimony is the main contributor in subsurface soil.
- Maximum concentrations and average concentrations (or exposure point concentrations) of lead in surface soil and subsurface soil exceeded both the residential RSL of 400 mg/kg and the industrial RSL of 800 mg/kg. For the construction/utility worker, blood lead levels were estimated and, for the evaluation of a theoretical pregnant worker, were compared to the EPA screening value of 10 micrograms per deciliter (µg/dL) for children. While exposure to the maximum or average lead concentration in surface soil resulted in blood lead levels in excess of 10 µg/dL, only exposure to the maximum concentration in subsurface soil resulted in blood lead levels that exceeded this criterion; exposure to average lead concentrations in subsurface soil produced a blood lead estimate below 10 µg/dL.
- Results of indoor air exposure to volatile chemicals from soil initially suggest a noncancer hazard that exceeds 1; however, this estimate is based on a single high detection of 2-methylnaphthalene in subsurface soil. An average concentration (closer to the chemical reporting limit) would likely produce an expected noncancer hazard that is less than 1.
- Because of the protective nature of the risk assessment process, cancer risks and noncancer hazards are likely overestimated. Main reasons include the conservative manner in which toxicity values are derived, the presumed high bioavailability of arsenic (main risk driver), and conservative assumptions about exposure factors for each receptor evaluated.

A summary of the cancer and noncancer site-specific risks to human receptors at Bldg. 6 is presented in Table 1.

Table 1: Summary of Incremental Lifetime Cancer Risks and Noncancer Hazards

Medium and Type of Evaluation	Resident		Industrial Worker		Construction/Utility Worker	
	RME	CTE	RME	CTE	RME	CTE
Surface Soil – Including Background						
ILCR	5×10^{-4}	6×10^{-5}	1×10^{-4}	6×10^{-6}	4×10^{-5}	6×10^{-6}
Contributors:	72% - arsenic 17% - BaP	73% - arsenic 16% - BaP	68% - arsenic 19% - BaP	72% - arsenic 16% - BaP	72% - arsenic 16% - BaP	65% - arsenic 20% - BaP
HI	30	5	2	0.4	7	1
Contributors:	33% - antimony 22% - arsenic 17% - Aroclor 1260	36% - antimony 24% - arsenic 16% - Aroclor 1260	33% - antimony 25% - arsenic 22% - Aroclor 1260	39% - antimony 26% - arsenic 18% - Aroclor 1260	35% - antimony 24% - arsenic 17% - Aroclor 1260	33% - antimony 26% - arsenic 26% - Aroclor 1260
Surface Soil – Excluding Background						
ILCR	5×10^{-4}	6×10^{-5}	1×10^{-4}	6×10^{-6}	4×10^{-5}	6×10^{-6}
HI	30	5	2	0.4	7	1
Subsurface Soil – Including Background						
ILCR	8×10^{-5}	1×10^{-5}	8×10^{-5}	1×10^{-6}	6×10^{-6}	2×10^{-7}
Contributors:	67% - arsenic 16% - BaP	69% - arsenic 15% - BaP	63% - arsenic 18% - BaP	68% - arsenic 16% - BaP	74% - arsenic 8% - BaP 8% - DahA	68% - arsenic 10% - BaP 10% - DahA
HI	90	20	7	1	20	3
Contributors:	89% - antimony	93% - antimony	93% - antimony	96% - antimony	91% - antimony	93% - antimony
Subsurface Soil – Excluding Background						
ILCR	8×10^{-5}	1×10^{-5}	8×10^{-5}	1×10^{-6}	6×10^{-6}	2×10^{-7}
HI	90	20	6	1	20	3
Indoor Air - Soil						
ILCR	2×10^{-7}	6×10^{-8}	4×10^{-9} (2×10^{-7})	6×10^{-10} (3×10^{-8})	—	—
Contributors:	97% - BbF	97% - BbF	97% - BbF	97% - BbF		
HI	4	2	0.2 (2)	0.1 (1)		
Contributors:	96% - 2-MN	96% - 2-MN	97% - 2-MN	96% - 2-MN		
Indoor Air - Groundwater						
ILCR	—	—	—	—	—	—
HI	<0.1	<0.1	—	—	—	—
Dermal Contact - Groundwater						
ILCR	—	—	—	—	7×10^{-9}	4×10^{-7}
HI	—	—	—	—	0.009	0.001

Note: Values in parentheses are for the industrial worker in an office setting.
— no data
2-MN 2-methylnaphthalene
BaP benzo(a)pyrene
BbF benzo(b)fluoranthene
CTE central tendency exposure
DahA dibenz(a,h)anthracene
ILCR incremental lifetime cancer risk
RME reasonable maximum exposure

2.7.2.2 ECOLOGICAL RISK

The ecological risk assessment concluded that chemicals detected in soil and groundwater pose no threat to wildlife or ecology because the contaminated soil is contained within a closed building, which is surrounded by paved areas, and dispersion and natural attenuation would occur along the potential offsite transport pathways (e.g., groundwater flow, storm water runoff, and wind transport).

2.7.3 Basis for Final Response Action

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment. Soils at the Bldg. 6 site with contaminant concentrations exceeding the DOH-approved cleanup goals have been temporarily covered. However, additional response action is required to implement a permanent remedy at the site.

2.8 FINAL REMEDIAL ACTION OBJECTIVES

The principal remedial action objective (RAO) for the Bldg. 6 site is to reduce or eliminate risk to human health under continued industrial or future commercial land use scenarios. Industrial and commercial land uses are the reasonably anticipated land uses for Bldg. 6 for the foreseeable future.

The RAO will be achieved by containment of contaminants beneath a concrete cover and long-term management of the site with LUCs. The cover will prevent most potential receptors from exposure to contaminants in the subsurface and eliminates the potential of soil erosion and sedimentation. LUCs will limit land use and serve to protect personnel involved with intrusive activities that breach the cover and expose the soil by providing advanced warning of the presence of contaminated soil.

2.9 DESCRIPTION AND COMPARATIVE ANALYSIS OF RESPONSE ACTION ALTERNATIVES

This section describes the response action alternatives and summarizes the alternative evaluation process. Detailed evaluation of the response action alternatives is presented in the RI/FS report (AECOM 2010).

2.9.1 Description of Response Action Alternatives

Response action alternatives are broad classes of actions that may meet the RAOs for a site and can include treatment, containment, excavation, extraction, disposal, LUCs, or a combination of these actions. Eight alternatives were originally identified in the FS and went through a preliminary screening for effectiveness, implementability, and cost in accordance with EPA guidance for conducting remedial investigations and feasibility studies under CERCLA (EPA 1988) (Table 2). Two of these, Alternative 7 (hot-spot removal) and Alternative 8 (building demolition and total excavation), were eliminated from further evaluation primarily based on difficulty of implementation, large volumes of waste materials to be handled, short-term risks in an active industrial area, and high costs associated with hazardous waste disposal. The following alternatives for the final response action were retained for detailed evaluation in the RI/FS for Bldg. 6 (AECOM 2010) (see Table 3 for the detailed evaluations criteria):

- Alternative 1: No action.
- Alternative 2: LUCs.
- Alternative 3: Backfill vaults and open pits with clean soil, covering exposed soil with a concrete cover, and LUCs.

- Alternative 4: In situ solidification/stabilization of soils currently exposed (i.e. not covered with asphalt or concrete) and with contaminant concentrations above industrial cleanup goals, backfill vaults and open pits with clean soil, covering exposed soil with a concrete cover, and LUCs.
- Alternative 5: In situ solidification/stabilization of all soils (either exposed or currently covered with asphalt or concrete) above industrial cleanup goals, backfill vaults and open pits with clean soil, installing or reinstalling a concrete cover over solidified soils, and LUCs.
- Alternative 6: Hot-spot soil removal of exposed contaminated soils above industrial cleanup goals and offsite disposal at a RCRA Subtitle C landfill approved to accept CERCLA waste followed by backfilling with clean soil, installation of a concrete cover, and LUCs.

2.9.2 Comparative Analysis of Response Action Alternatives

2.9.2.1 Evaluation Criteria

The response action alternatives were evaluated using the nine criteria specified by the NCP (40 CFR 300.430(e)(a)(iii)) and EPA guidance for conducting remedial investigations and feasibility studies under CERCLA (EPA 1988). The nine evaluation criteria are listed in Table 4.

The first two criteria (i.e., overall protection of human health and the environment, and compliance with ARAR and to be considered [TBC] criteria) are threshold criteria representing the statutory requirements that a response action must achieve in order to comply with CERCLA requirements. The next five criteria (i.e., long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) are the primary balancing criteria upon which selection of a response action is based. Together, these first seven criteria are considered evaluation criteria; the final two criteria (i.e., state and public acceptance) are considered modifying criteria.

The following sections compare the relative performance of each response action alternative with respect to the NCP criteria to identify the most appropriate final remedy for the Bldg. 6 site.

Table 2: Preliminary Screening of Remedial Action Alternatives

Alternative	1. No Action	2. LUCs	3. Asphalt or Concrete Cover of All Unpaved Areas, Vaults, and Pits, Including LUCs	4. In-Situ Solidification/ Stabilization of Exposed Contaminated Soils followed by Concrete or Asphalt Cover with LUCs	5. In-Situ Solidification/ Stabilization of All Soils Above Industrial Criteria followed by Concrete or Asphalt Cover with LUCs	6. Hot-Spot Soil Removal of Exposed Contaminated Soils Above Industrial Criteria and Mainland Disposal at a CERCLA Facility followed by Asphalt or Concrete Cover over Remaining Contaminated Soil and LUCs	7. Excavation All Soils Above Residential Exposure Limits and Disposal at a CERCLA Facility	8. Building Demolition and Soil Excavation followed by Asphalt or Concrete Cover
Description	No action will be taken to reduce the toxicity, mobility, or volume of contamination. No action will be taken to minimize the potential threats to human health that may result from waste exposure in the future.	LUCs will be in place to restrict access to the building to only authorized maintenance personnel and to restrict future use of the property. Full-time workers will not be allowed in Bldg. 6 under this alternative.	This alternative consists of placing a concrete or asphalt cover over all unpaved soils to prevent worker exposure. It also includes backfilling vaults and pits with clean soil followed by concrete or asphalt cover. A LUC program will be implemented to restrict future use of the building to industrial and to require annual inspection of the cover to ensure that it remains protective of human health.	This alternative involves in-situ solidification/stabilization of the exposed contaminated soils through injection of cement grout to immobilize soil contaminants. After stabilization/solidification, a final asphalt or concrete cover will be installed. Prior to the installation of the final cover, the vaults and pits will also be filled with soil followed by a cement cover. A LUC program will be utilized to restrict future land use to industrial activities and to monitor cover integrity.	This alternative involves in-situ solidification/stabilization of all soils that are above the industrial cleanup goals through injection of cement grout to immobilize soil contaminants. After stabilization/solidification, an asphalt or concrete cover will be reinstalled. Prior to the installation of the final cover, the vaults and pits will also be filled with soil followed by a cement cover. A LUC program will be utilized to restrict future land use to industrial activities and to monitor cover integrity.	The alternative involves the excavation of exposed soils above the industrial cleanup goals and off-island disposal at a CERCLA facility followed by an asphalt or concrete cover over remaining contaminated materials. Under this alternative, the materials making up the vaults and pits would be removed and disposed of off-site. LUCs would be required to restrict future use of the property and ensure that the cover material remains protective of human health.	This alternative involves excavation of all known soil containing contaminants above cleanup goals and disposal at an off-site disposal facility approved to accept CERCLA waste. Under this alternative, the materials making up the vaults and pits would also be removed and disposed of off-site. Following the remedial action, no further action would be required.	This alternative involves the removal of remaining equipment followed by building demolition. Following equipment and building removal, contaminated soils above residential cleanup goals would be excavated and disposed off-site at a facility approve to accept CERCLA waste. The vaults and pits would also be removed and the materials disposed off-site. Excavations would be backfilled. Following the remedial action, no further action would be required.
Effectiveness	Unacceptable Technology does not comply with ARARs.	Acceptable The alternative would be effective only if LUCs are properly enforced. Access restrictions and land use restrictions would be required to prevent human exposure to soil contaminants.	Acceptable Installation of a cover over all exposed soils would significantly reduce the potential for human exposure. Site contaminants have low mobility. The likelihood of contaminant migration to groundwater would be further reduced. A LUC program prevents disturbance of the cover. Inspections and maintenance of the cover would ensure the cover remains effective.	Acceptable The solidification/stabilization process would reduce the potential for future impacts to groundwater and would significantly reduce exposure pathways. A cover over the stabilized material would further reduce the potential for exposure to site contaminants. LUCs would restrict future use of the site and ensure the cover remains effective.	Acceptable The solidification/stabilization process would reduce the potential for future impacts to groundwater and would significantly reduce potential exposure pathways. A cover over the stabilized material would further reduce the potential for exposure to site contaminants. LUCs would restrict future use of the site and ensure the cover remains effective.	Acceptable Removing the contaminants that exceed industrial cleanup goals followed by installation of a cover would significantly reduce the potential for unacceptable human exposure and would allow continued industrial use of the Bldg. Because contaminants would be left in place, a LUC program would be required to ensure the remedy remains effective.	Acceptable This alternative provides maximum risk reduction, provides a permanent solution, and allows broader reuse of the Bldg. 6. This alternative would allow unrestricted future use of the property.	Acceptable This alternative would provide maximum risk reduction and provides a permanent solution. This alternative would allow unrestricted future use of the property.
Implementability	Acceptable No technical and/or administrative feasibility issues with implementation of this alternative.	Acceptable No technical feasibility issues associated with LUCs.	Acceptable No technical feasibility issues associated with placement of an asphalt or concrete cover. LUCs are not expected to present difficult challenges.	Acceptable This alternative is more difficult to implement but there are no technical feasibility issues. Would require bench-scale testing to finalize the stabilization process.	Acceptable The alternative is moderately complex due to the removal of equipment and concrete slab to stabilize soil prior to recovering contaminated soil.	Acceptable No technical feasibility issues associated with this alternative. Conventional techniques are used for excavation and disposal and placement of an asphalt or concrete cover.	Acceptable The alternative is moderately complex because of the removal of equipment and concrete prior to soil.	Acceptable No technical feasibility issues associated with this alternative. Removal of all equipment and structures associated with Bldg. 6 and subsequent disposal prior to soil excavation and disposal makes this alternative moderately difficult to implement.
Cost	Acceptable Minimal cost.	Acceptable LUC are low cost.	Acceptable Placement of cover and LUC is medium cost.	Acceptable Medium cost.	Acceptable High cost due to large soil volume.	Acceptable High cost due to soil export to mainland.	Unacceptable Very High cost due to soil export and disposal cost.	Unacceptable Very High cost due to soil export and disposal cost.
Retained for further analysis?	Yes Retained as a baseline for comparison.	Yes LUCs are adequate to ensure that the remedy remains effective, but severely restricts access and future land use at Bldg. 6.	Yes Cover will allow continued use of the building for industrial purposes and will reduce potential exposure. LUCs needed to ensure the remedy remains protective.	Yes Cover will allow continued use of the building for industrial purposes and will reduce potential exposure. Reduces the potential for contaminant migration to groundwater. LUCs needed to ensure remedy remains effective.	Yes Cover will allow continued use of the building for industrial purposes and will reduce potential exposure. Reduces the potential for contaminant migration to groundwater. LUCs needed to ensure remedy remains effective.	Yes Hot-spot removal and asphalt or concrete cover significantly reduces potential for exposure and allow continued industrial use of Bldg. 6. LUCs are required to ensure that the remedy remains effective.	No Large volumes of materials would be removed and disposed of. Significant waste characterization would be required to determine proper disposal. If off-island disposal of hazardous waste is required, associated costs will be very high.	No Because Bldg. 6 lies within the Pearl Harbor Naval Complex, a determination of the building's historical value will have to be determined prior to any demolition activities. Large volumes of materials would be required to be removed and disposed of and costs are likely to be prohibitive.

Note: Evaluation based on acceptable or unacceptable.

Table 3: Remedial Action Alternatives Analysis

Remedial Action Alternative												
Land Use Category	Restricted Use Alternatives											
Alternative	1. No Action		2. LUCs		3. Concrete Cover of All Unpaved Areas, Vaults, and Pits With LUCs		4. In-Situ Solidification/Stabilization of Exposed Contaminated Soils Followed by Concrete Cover With LUCs		5. In-Situ Solidification/Stabilization of All Soils Above Industrial Criteria Followed by Concrete Cover With LUCs		6. Hot-Spot Soil Removal of Exposed Contaminated Soils Above Industrial Criteria and Mainland Disposal at a CERCLA Facility Followed by Concrete Cover Over Remaining Contaminated Soil With LUCs	
Description	No action will be taken to reduce the toxicity, mobility, or volume of contamination. No action will be taken to minimize the potential threats to human health that may result from waste exposure in the future.	Score	LUCs will be in place to restrict access to the building to only authorized maintenance personnel and to restrict future use of the property. Full-time workers will not be allowed in Bldg 6 under this alternative.	Score	This alternative consists of placing a concrete cover over all unpaved soils to prevent worker exposure. It also includes the backfilling of vaults and pits with clean soil followed by a concrete cover. A LUC program will be implemented to restrict future use of the building to industrial and to require annual inspection of the cover to ensure that it remains protective of human health.	Score	This alternative involves in situ solidification/stabilization of the exposed contaminated soils through injection of cement grout to immobilize soil contaminants. After stabilization/solidification, a final concrete cover will be installed. Prior to final cover installation, the vaults and pits will be filled with soil followed by a cement cover. A LUC program will be utilized to restrict future land use to industrial activities and to monitor cover integrity.	Score	This alternative involves in-situ solidification/stabilization of all soils that are above the industrial cleanup standards through injection of cement grout to immobilize soil contaminants. After stabilization/ solidification, a concrete cover will be reinstalled. Prior to final cover installation, the vaults and pits will be filled with soil followed by a cement cover. A LUC program will be utilized to restrict future land use to industrial activities and to monitor cover integrity.	Score	The alternative involves the excavation of exposed soils above the industrial limits and off-island disposal at a CERCLA facility followed by a concrete cover over remaining contaminated materials. Prior to final cover installation, vaults and pits removed and the materials disposed off-site. LUCs would be required to restrict future use of the property and ensure that the cover material remains protective of human health.	Score
Overall Protection of Human Health and Environment	Results in unacceptable risk for the anticipated future land use.	Poor	Exposure of human receptors to surface soil contamination is minimized by access controls and restrictions on land use.	Good	Direct exposure pathways to contaminated soils will be eliminated and risks to human health will be significantly reduced. Annual inspection and maintenance of the cover will ensure that the remedy remains protective of human health.	Very Good	Overall protection is good. Potential exposure pathways are significantly and permanently reduced in the stabilized soils. Potential for contaminant migration to groundwater are also significantly reduced. Additional concrete cover provides further long-term protection.	Excellent	Overall protection is good. Potential exposure pathways are significantly and permanently reduced in the stabilized soils. Potential for contaminant migration to groundwater are also significantly reduced. Additional concrete cover provides further long-term protection.	Excellent	Soil removal eliminates contamination posing unacceptable risks under industrial land use at the site. Disposal of soils in a secure landfill approved to accept CERCLA waste ensures no subsequent exposure to contaminants. Installation of concrete cover reduces potential for exposure to residual contamination.	Very Good
Compliance with ARARs and TBCs	Complies with ARARs. Does not meet all TBCs because contaminants exceeding risk-based cleanup goals (i.e., EPA Region 9 PRGs) will remain in place.	Fair	Complies with ARARs. Does not meet all TBCs because contaminants exceeding risk-based cleanup goals (i.e., EPA Region 9 PRGs) will remain in place.	Fair	Complies with ARARs. Does not meet all TBCs because contaminants exceeding risk-based cleanup goals (i.e., EPA Region 9 PRGs) will remain in place.	Very Good	Complies with ARARs. Does not meet all TBCs because contaminants exceeding risk-based cleanup goals (i.e., EPA Region 9 PRGs) will remain in place.	Very Good	Complies with ARARs. Does not meet all TBCs because contaminants exceeding risk-based cleanup goals (i.e., EPA Region 9 PRGs) will remain in place.	Very Good	Complies with ARARs and TBCs.	Excellent
Long-term Effectiveness and Permanence	Risk is not reduced. Controls are inadequate to protect human health and environment. This alternative does not satisfy the NCP preference for treatment.	Poor	Enforcement of LUCs will be required indefinitely for this alternative to be effective. Contaminants exceeding risk-based cleanup goals remain exposed.	Good	This is a permanent remedy designed to reduce or eliminate contaminant exposure pathways. An inspection and maintenance program would ensure reliability. As long as the cover is maintained, the exposure risk is manageable. Adequacy and reliability of controls are good. This alternative does not satisfy the NCP preference for treatment.	Very Good	This is a permanent remedy designed to reduce or eliminate contaminant exposure pathways and minimize the potential for contaminant migration. LUCs are required to ensure that the remedy remains effective.	Very Good	This is a permanent remedy designed to reduce or eliminate contaminant exposure pathways and minimize the potential for contaminant migration. LUCs are required to ensure that the remedy remains effective.	Very Good	Contamination is removed from the site, thereby reducing onsite human health risks. The offsite residual risk of the properly disposed soil is very low due to its placement in an engineered landfill. Alternative is permanent. Adequacy and reliability of controls are excellent. Contaminants exceeding industrial PRGs remain untreated. LUCs are required to ensure that the remedy remains effective.	Excellent
Reduction in Toxicity, Mobility, and Volume through Treatment	No reduction in toxicity, mobility, or volume.	Poor	No reduction in toxicity, mobility, or volume.	Poor	Reduces mobility by further limiting infiltration pathways. Toxicity and volume are not reduced by this alternative.	Good	Reduces contaminant mobility and toxicity through treatment but does not reduce volume.	Very Good	Reduces contaminant mobility and toxicity through treatment but does not reduce volume.	Very Good	Placing contaminated soil in a secure landfill reduces contaminant mobility. This alternative does not satisfy the NCP preference for treatment.	Good

Remedial Action Alternative												
Land Use Category	Restricted Use Alternatives											
Alternative	1. No Action		2. LUCs		3. Concrete Cover of All Unpaved Areas, Vaults, and Pits With LUCs		4. In-Situ Solidification/Stabilization of Exposed Contaminated Soils Followed by Concrete Cover With LUCs		5. In-Situ Solidification/Stabilization of All Soils Above Industrial Criteria Followed by Concrete Cover With LUCs		6. Hot-Spot Soil Removal of Exposed Contaminated Soils Above Industrial Criteria and Mainland Disposal at a CERCLA Facility Followed by Concrete Cover Over Remaining Contaminated Soil With LUCs	
Short-term Effectiveness	Remedial Action Objectives (RAO) are not met. Implementation of alternative will not increase risk to workers, community, or environment.	Poor	Implementation of LUCs will not increase risk to workers, community, or the environment.	Excellent	RAO of reducing risk is met upon construction of the cover. Implementation of alternative will not increase risk to community or environment. Minimal risk to workers during cover installation. Implementing the requirements of OSHA 1910.120 during field activities will effectively and reliably protect onsite workers.	Excellent	RAO of reducing risk is met upon solidification/stabilization and construction of the final cover. Because construction activities will be conducted within the building, there should be little increase risk to the community or the environment. Risks to workers during the stabilization/ solidification and cover installation processes will be minimized by implementing the requirements of OSHA 1910.120.	Good	RAO of reducing risk is met upon solidification/stabilization and construction of the final cover. Because construction activities will be conducted within the building, there should be little increase risk to the community or the environment. Risks to workers during the stabilization/solidification and cover installation processes will be minimized by implementing the requirements of OSHA 1910.120.	Good	RAO of reducing risk is met upon completing excavation and disposal and cover installment. Implementation of alternative may temporarily increase risk to the community or environment during excavation and transportation. Implementing the requirements of OSHA 1910.12.0 during field activities will effectively and reliably protect onsite workers.	Fair
Implement-ability	No technical and/or administrative feasibility issues with implementation of this alternative.	Excellent	No technical feasibility issues associated with implementation of LUCs.	Excellent	No technical feasibility issues associated with implementation. Material and equipment for alternative are readily located on-island. No administrative issues associated with implementation.	Excellent	Implementation is more complex for this alternative due to the solidification/stabilization process. Bench-scale testing will likely be required to finalize the stabilization process.	Fair	Implementation is more complex for this alternative due to the solidification/stabilization process. Bench-scale testing will likely be required to finalize the stabilization process.	Fair	No major technical feasibility issues associated with implementation. Some logistical challenges associated with transoceanic transport. Material and equipment for alternative are readily located on-island. No administrative issues associated with implementation.	Very Good
Cost	NPV Cost = $0	Excellent	LUC Cost (NPV) = $1,298,975 Implementation of LUCs is low cost. However, enforcement of LUCs is required beyond 30-year cost horizon.	Very Good	NPV Cost = $1,660,439 Cover placement and LUCs are low cost. On-going O&M required beyond 30-year cost horizon.	Good	NPV Cost = $1,989,550 Solidification/stabilization costs are high. On-going O&M required beyond 30-year cost horizon.	Fair	NPV Cost = $2,245,209 Solidification/stabilization costs are high. On-going O&M required beyond 30-year cost horizon.	Poor	NPV Cost = $2,412,440 Large volume of soil to be excavated. Transoceanic transport of soil is very expensive. On-going O&M required beyond 30-year cost horizon.	Poor
Projected Regulator Acceptance	Alternative would not likely be accepted since implementation does not result in reducing risk to an acceptable level.	Poor	Alternative would not likely be accepted since contamination exceeding industrial cleanup levels remain in place. If LUCs are not properly enforced, unacceptable exposure to site workers could occur.	Fair	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. It does result in a reduction in contaminant mobility but does not reduce toxicity or volume through treatment. Regulator approval is achievable since the alternative reduces human health risks to appropriate levels. The property does not meet criteria for unrestricted land use and LUCs must be in place to restrict land use to industrial purposes.	Very Good	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. Achieves reduction in contaminant toxicity and mobility. Regulator approval is achievable since the alternative reduces human health risks to appropriate levels. The property does not meet criteria for unrestricted land use and LUCs must be in place to restrict land use to industrial purposes.	Very Good	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. Achieves reduction in contaminant toxicity and mobility. Regulator approval is achievable since the alternative reduces human health risks to appropriate levels. The property does not meet criteria for unrestricted land use and LUCs must be in place to restrict land use to industrial purposes.	Very Good	Alternative is permanent, and contamination posing an unacceptable risk to workers is removed. Removes contamination permanently from the site. Regulator approval is achievable since the alternative reduces human health risks to appropriate levels. The property does not meet criteria for unrestricted land use and LUCs must be in place to restrict land use to industrial purposes.	Very Good
Projected Community Acceptance	Alternative would not likely be accepted since implementation does not result in reducing risk to an acceptable level.	Poor	Community approval is attainable if it can be demonstrated that the LUC are protective of human health under industrial land use scenarios.	Good	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. Community approval is attainable since the alternative reduces the human health risks to appropriate levels.	Very Good	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. Community approval is attainable since the alternative reduces the human health risks to appropriate levels.	Very Good	Alternative is permanent, but leaves contamination in place and requires inspection and maintenance. Community approval is attainable since the alternative reduces the human health risks to appropriate levels.	Very good	Alternative is permanent, and contamination posing an unacceptable risk to workers is removed. Community approval is attainable since the alternative reduces human health risks to appropriate levels. Acceptance of transporting contaminated soils through the community is required.	Good
TOTAL SCORE		Fair		Good		Very good		Very good		Very good		Good

Table 4: Nine Evaluation Criteria for Analysis of Response Action Alternatives

Criterion	Application of Criterion and Rating on 5-Tiered Scale
Threshold Criteria	
Overall Protectiveness of Public Health and the Environment	Application: Assesses the ability of an alternative to eliminate, reduce, or control the risks associated with exposure pathways, including direct contact, potential migration, and risks to ecosystems. Rating: Excellent if highly protective. Poor if not protective.
Compliance with ARARs	Application: Evaluates the potential of an alternative to comply with chemical-, location-, and action-specific ARARs and TBC criteria. Rating: Excellent if compliant. Poor if non-compliant.
Primary Balancing Criteria	
Long-Term Effectiveness and Permanence	Application: Measures the ability of an alternative to permanently protect human health and the environment. Rating: Excellent if highly effective. Poor if not effective.
Reduction of Toxicity, Mobility, or Volume Through Treatment	Application: Evaluates the ability of an alternative to permanently or significantly reduce the toxicity, mobility, or volume of the constituents through treatment. Rating: Excellent if reduces all contaminants of concern. Poor if no reduction.
Short-Term Effectiveness	Application: Assesses the capability of an alternative to protect human health and the environment during implementation of a response action. Rating: Excellent if highly effective. Poor if not effective.
Implementability	Application: Evaluates technical feasibility and the difficulty of applying the alternative at the site, the reliability of the technology, the unknowns associated with the alternative, and the need for treatability studies. Assesses administrative requirements, including regulatory agency approval, permits and waivers, mobilization needs, accessibility of equipment, and availability of trained personnel required to implement the alternative. Rating: Excellent if highly feasible and available. Poor if not feasible and available.
Cost	Application: Assesses the capital, operation and maintenance, and net present value costs of each alternative. Rating: Excellent if < $1 Million. Poor if >$4 Million.
Modifying Criteria	
Regulatory Agency Acceptance	Application: Evaluates the likelihood of approval by the regulatory agencies. Rating: Excellent if highly acceptable. Poor if not acceptable.
Public acceptance	Application: Assesses the anticipated level of acceptance by the public. Rating: Excellent if highly acceptable. Poor if not acceptable.

2.9.2.2 DETAILED ANALYSIS OF ALTERNATIVES

Except for the No Action alternative, the retained alternatives are acceptable in terms of protection of human health, compliance with ARARs, and short-term effectiveness. However, the alternatives differ in their long-term effectiveness, reduction in mobility, toxicity, and volume through treatment, implementability, cost, and project regulatory and community acceptance. Table 3 summarizes the comparison. Table 5 provides a detailed summary of the cost estimates. Ratings differ on the following criteria:

- **Long-term Effectiveness.** Alternative 6 scored the highest for long-term effectiveness because contaminants are removed, greatly reducing the potential for exposure and contaminant migration. Removing vault and pit material eliminate potential exposure to contaminated sediments. The concrete cover further reduces the potential for exposure. Alternatives 3, 4, and 5 also provide long-term effectiveness, but leave contamination at higher concentrations in place, resulting in a higher reliance on LUCs to ensure that the remedy remains effective. Alternative 2 provides a lesser amount of long-term effectiveness because it relies entirely on administrative controls to restrict access and land use; therefore, there is a risk of inadvertent exposure if the administrative controls fail. Alternative 1 provides no long-term effectiveness.

- **Reduction in Toxicity, Mobility, and Volume.** Alternatives 4 and 5 scored highest for reducing mobility and toxicity through treatment by stabilizing contaminants. Alternative 6 sreduces contaminant mobility by placing soils with the highest concentrations in a properly designed disposal facility. However, it does not meet the preference for a reduction in toxicity or volume through treatment. Alternative 3 reduces some mobility by eliminating potential water infiltration. It does not meet the preference for a reduction in toxicity or volume through treatment. Alternatives 1 and 2 do not meet the preference for a reduction in toxicity, mobility, or volume through treatment.
- **Short-term Effectiveness.** Alternative 6 scores low for short-term risk because the alternative involves excavation and transportation of potentially hazardous materials from the site to an offsite disposal area. Alternatives 4 and 5 involve a large amount of material handling and pose a greater risk to workers during the construction phase of the remedy. Alternatives 2 and 3 scored higher because they pose the least amount of short-term risk. Alternative 1 poses no short-term risk.
- **Implementability.** Alternatives 1, 2, and 3 are easily implemented and scored high for this criterion. Alternative 6 scored slightly lower because of the increased logistical challenges of excavation, indoor paving or concrete cover, and offsite disposal. Alternatives 4 and 5 scored the lowest for implementability because of the complexity of the solidification/stabilization process. A treatability study would likely be required to ensure that the solidification/stabilization process is effective in reducing potential human exposure and contaminant migration.

Table 5: RACER Cost Estimate Summary

Task	Notes	Cost
Pearl Harbor Bldg. 6 Alternative 2: LUCs		
Implement LUCs at Bldg. 6	The task cost includes a LUCAP and a LUCIP.	$247,835
Perform monitoring and enforcement of the LUCs for a 30-year period	Includes preparation of annual notice letters, site visit/inspections and an annual report and certification with annual costs of $42,391.50 for 30 years.	$1,271,745
Conduct six five-year reviews over a 30-year period	Total cost for each review is $43,888.	$263,327
Modify or terminate the LUCs at the end of the 30-year period	Includes preparation of site closure documents (work plans, close out reports and decision documents).	$101,428
Net present value discount for 30 years	2.7% prorated over 30 years.	($585,360)
	Alternative 2 Total	**$1,298,975**
Pearl Harbor Bldg. 6 Alternative 3: Concrete Cover of all Unpaved Areas, Vaults, and Pits with LUCs		
Remedial Design	Based on a percentage of the construction costs for the cap.	$15,841
Install Cover	Construct a RCRA D (Non Hazardous Waste) cap with a concrete impermeable cover and install 6 inches of concrete over exposed areas that exceed industrial soil criteria.	$226,298
Contractor management of the construction work	N/A	$44,271
Implement LUC at Bldg. 6	The task cost includes a LUCAP and a LUCIP.	$247,835

Task	Notes	Cost
Perform monitoring and enforcement of the LUCs for a 30-year period	Includes preparation of annual notice letters, site visit/inspections and an annual report and certification with annual costs of $42,391.50 for 30 years.	$1,271,745
Perform Operations and Maintenance of the concrete cap for a 30-year period	This will consist of repairing and/or replacing a portion of the concrete cover each year at a cost of $3,205.70 for 30 years.	$96,171
Conduct six five-year reviews over a 30-year period	Total cost for each review is $48,689.	$292,135
Modify or terminate the LUCs at the end of the 30-year period	Includes preparation of site closure documents (work plans, close out reports and decision documents).	$101,428
Net present value discount for 30 years	2.7 percent prorated over 30 years.	($635,285)
	Alternative 3 Total	**$1,660,439**
Pearl Harbor Bldg. 6 Alternative 4: In-Situ Solidification/Stabilization of Exposed Contaminated Soils followed by Concrete Cover with LUCs		
Remedial Design	Based on a percentage of the construction costs for the cap.	$29,912
Install Cover	Construct a RCRA D (Non Hazardous Waste) cap with a concrete impermeable cover and install 6 inches of concrete over exposed areas that exceed industrial soil criteria.	$226,297
In Situ Stabilization of 3,100 ft^2 of impacted soil with concrete mix to a depth of 2 feet	N/A	$272,235
Contractor management of the construction work	N/A	$95,582
Implement LUCs at Bldg. 6	The task cost includes a LUCAP and a LUCIP.	$247,835
Perform monitoring and enforcement of the LUCs for a 30-year period	Includes preparation of annual notice letters, site visit/inspections and an annual report and certification with annual costs of $42,391.50 for 30 years.	$1,271,745
Perform Operations and Maintenance of the concrete cap for a 30-year period	This will consist of repairing and/or replacing a portion of the concrete cover each year at a cost of $3,205.70 for 30 years.	$96,171
Conduct six five-year reviews over a 30-year period	Total cost for each review is $48,689.	$292,135
Modify or terminate the LUCs at the end of the 30-year period	Includes preparation of site closure documents (work plans, close out reports and decision documents).	$101,428
Net present value discount for 30 years	2.7% prorated over 30 years.	($643,790)
	Alternative 4 Total	**$1,989,550**
Pearl Harbor Bldg. 6 Alternative 5: In-Situ Solidification/Stabilization of all Soils above Industrial Criteria followed by Concrete Cover with LUCs		
Remedial Design	Based on a percentage of the construction costs for the cap.	$29,912
Install Cover	Construct a RCRA D (Non Hazardous Waste) cap with a concrete impermeable cover and install 6 inches of concrete over all areas that exceed industrial soil criteria.	$326,798
In Situ Stabilization of 9,410 ft^2 of impacted soil with concrete mix to a depth of 2 feet	N/A	$359,732
Remove a 7,000 ft^2 area of mesh reinforced concrete area	58 yd^3 of concrete removed from the excavation area will be trucked to a C&D recycling facility.	$42,946
Contractor management of the construction work	N/A	$127,201
Implement LUCs at Bldg. 6	The task cost includes a LUCAP and a LUCIP.	$247,835

Task	Notes	Cost
Perform monitoring and enforcement of the LUCs for a 30-year period	Includes preparation of annual notice letters, site visit/inspections and an annual report and certification with annual costs of $42,391.50 for 30 years.	$1,271,745
Perform Operations and Maintenance of the concrete cap for a 30-year period	This will consist of repairing and/or replacing a portion of the concrete cover each year at a cost of $3,205.70 for 30 years.	$96,171
Conduct six five-year reviews over a 30-year period	Total cost for each review is $48,689.	$292,135
Modify or terminate the LUCs at the end of the 30-year period	Includes preparation of site closure documents (work plans, close out reports and decision documents).	$101,428
Net present value discount for 30 years	2.7 percent prorated over 30 years.	($650,694)
	Alternative 5 Total	**$2,245,209**
Pearl Harbor Bldg. 6 Alternative 6: Hot-Spot Removal of Exposed Contaminated Soils above Industrial Criteria and Mainland Disposal at a CERLCA Facility followed by Concrete Cover over remaining Contaminated Soil with LUCs		
Remedial Design	Based on a percentage of the construction costs for the cap.	$28,506
Excavation and disposal of contaminated soil from a 3,100 ft^2 area to a depth of 4-feet and install cover	Excavated soil will be loaded into roll off containers and shipped to Long Beach and then trucked to the Kettleman Hills landfill for disposal; install 6 inches of concrete over areas that exceed industrial soil criteria (9,410 ft^2).	$907,247
Remove a 7,000 ft^2 area of mesh reinforced concrete area	58 yd^3 of concrete removed from the excavation area will be trucked to a C&D recycling facility.	$42,946
Contractor management of the construction work	N/A	$164,060
Implement Land Use Controls (LUCs) at Building 6	The task cost includes a LUCAP and a LUCIP.	$247,835
Perform monitoring and enforcement of the LUCs for a 30-year period	Includes preparation of annual notice letters, site visit/inspections and an annual report and certification with annual costs of $42,391.50 for 30 years.	$1,271,745
Conduct six five-year reviews over a 30-year period	Total cost for each review is $43,887.83.	$263,327
Modify or terminate the LUCs at the end of the 30-year period	Includes preparation of site closure documents (work plans, close out reports and decision documents).	$101,428
Net present value discount for 30 years	2.7% prorated over 30 years.	($614,654)
	Alternative 6 Total	**$2,412,440**

% percent
C&D construction and demolition
LUCAP LUC Assurance Plan
LUCIP LUC Implementation Plan
N/A not applicable
yd^3 cubic yards

- **Cost.** Alternatives 4, 5, and 6 scored the lowest based on the high costs associated with these alternatives. Alternative 1 and 2 scored the highest because of the low cost of implementing the remedy. Alternative 3 has a moderate cost associated with filling and covering the vaults and pits and with the placement of a concrete cover over the bare soil areas. It should be noted that all of the alternatives included in the detailed analysis would leave contaminants above concentrations that allow unrestricted (i.e., residential) land use. Therefore, LUCs and five-year reviews are included in Alternatives 2, 3, 4, 5, and 6. Long-term (30 years for the purpose of costing) monitoring and maintenance of administrative and engineering controls are a large component of the estimated costs.

- **Projected Regulatory and Community Acceptance.** Regulatory and community acceptance is expected to be highest for alternatives that provide the best long-term protection of human health and the environment. Alternative 1 does not meet the RAOs and is unlikely to be acceptable to the regulators or the community. Alternative 2 may be acceptable, but it relies entirely on compliance with and long-term enforcement of LUCs to maintain its effectiveness. Alternatives 3, 4, 5, and 6 all provide a greater degree of long-term protection and are expected to be acceptable to the regulators and the community. None of the alternatives would result in unrestricted land use; therefore, LUCs will be required to achieve regulatory and community acceptance.

2.10 PRINCIPAL THREAT WASTES

The NCP, promulgated on 8 March 1990, states that EPA expects to use “treatment to address the principal threats posed by a site, wherever practical” and “engineering controls, such as containment for waste that poses a relatively low long-term threat” (40 CFR 300.430(a)(1)(iii)). Principal threat wastes are source materials[2] considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or to ecological receptors should exposure occur. Principal threat wastes include liquids and other highly mobile materials or materials have high concentration of toxic compounds and where risks exceed 1×10^{-3}. Low level threat wastes are those source materials that generally can be reliably contained and that would represent only a low risk in the event of a release. Low level threat wastes include source materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels. Because exposure to site media is below the threshold risk criteria of 1×10^{-3} and chemicals are not very mobile, site media is considered a low level threat waste and not a principal threat waste and therefore are not subject to treatment-only remedial alternatives.

2.11 SELECTED FINAL REMEDY

2.11.1 Rationale for Selected Remedy

Because concentrations of contaminants exceeding industrial screening criteria are present in exposed surface and subsurface soils, they pose unacceptable risk to site workers and other potential receptors. Remedial action is required to address the potential risks/hazards posed by the contaminants at Bldg. 6. The selected remedy would significantly reduce the potential for exposure and would allow for industrial or commercial use of Bldg. 6.

2.11.2 Description of Selected Remedy

Alternative 3 –concrete cover over all unpaved areas within Bldg. 6 with LUCs – is the preferred alternative for meeting the RAOs. The selected remedy includes backfilling vaults and open pits with clean soil and placing a concrete cover over unpaved areas within Bldg. 6. The alternative is easily implemented using locally available equipment and personnel. LUCs will be implemented to ensure the long-term integrity of the concrete cover through inspections and by placing institutional controls on the parcel of land occupied by Bldg. 6 that only allows commercial and/or industrial land use. LUCs will ensure that human health risks/hazards from the COCs remain acceptable by prohibiting residential land use at Bldg. 6 and barring activities/operations that would compromise the integrity of the concrete cover and expose the underlying soil. LUCs will fulfill the RAO as follows:

---

[2] A source material is defined as a material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, surface water, or air or acts as a course of direct exposure.

- Prohibits unauthorized digging, disturbance of site soil, or any other land modifications that could potentially expose contaminated soil
- Prohibits unauthorized excavation, uncontrolled soil removal without proper handling and disposal, and construction, and prevents migration or relocation of contaminated soil to areas where human or ecological exposure could occur
- Prohibits development or use of the property for residential housing, recreational activities, elementary or secondary school facilities, long-term care facilities, or child day care facilities

The Navy will prepare a RAWP to specify the institutional and engineering controls required to implement LUCs as the final remedy for the Bldg. 6 Site and submit the RAWP for EPA review and approval within 90 days of ROD signature. The RAWP will describe how the LUCs will be implemented and maintained and will provide the requirements for periodic inspections and five-year reviews. Five-year reviews will be required to ensure that the selected remedy remains protective at the Bldg. 6 site over time.

The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs. The Navy will implement internal procedures for upholding the LUCs by maintaining a database of the LUCs (i.e., the Naval Installation Restoration Information Solution). The Navy will notify the EPA in advance of any changes to internal procedures that would affect the LUCs.

LUCs will be maintained at the Bldg. 6 Site until concentrations of hazardous substances in the soil are at such levels as to allow for unrestricted land use and exposure. Five-year reviews are required for all CERCLA response actions that leave contaminants in place at concentrations above levels that allow for unlimited land use and unrestricted exposure. The Navy will perform five-year reviews to ensure that the final remedy remains effective as long as required to prevent unacceptable risk potentially associated with exposure to contaminated soil.

2.11.2.1 Land Use Control Performance Objectives

Performance objectives for the LUCs include the following:

- Prevent development of the site for any use other than commercial or industrial activities.
- Minimize or eliminate direct human contact with contaminated soil.
- Provide adequate notice of the presence of contaminated soil to site users, workers, and any potential landowners.
- Monitor the integrity of the concrete cover and maintain the cover as necessary.
- Prevent unauthorized excavation, uncontrolled soil removal, and construction, and prevent migration or relocation of contaminated soil to areas where human or ecological exposure could occur.

2.11.2.2 Estimated Cost of the Selected Final Remedy

The estimated cost of the selected final remedy, including legal and administrative costs, is $1,660,439 including LUC implementation and five-year reviews over 30 years. This is an order-of-magnitude engineering cost based on best available information and is expected to be within +50 percent and -30 percent of the actual project cost. The remedial action cost engineering and requirements (RACER) cost estimate documentation report for the selected final remedy is presented in the RI/FS report (AECOM 2010).

2.11.3 Expected Outcomes of the Selected Final Remedy

The selected final remedy for the Bldg. 6 site will reduce potential future human health risks associated with contaminated soil by preventing exposure to soil that could pose unacceptable risks or hazards under the current or potential future land-use scenarios. Site use will remain restricted to commercial/industrial use only. The caprock groundwater underlying the site is not currently used as a source of potable water, and site-specific hydrogeologic factors, along with relevant federal and state regulations and guidance, indicate that the groundwater will not be used as a potable water source in the future. The final remedy does not change the current or planned future land or groundwater use. The final remedy does not reduce the toxicity or volume of waste or contaminants through treatment at the site, and requires that LUCs be implemented because site conditions will not be compatible with unrestricted land use.

2.11.4 Statutory Determinations

Executive Order 12580 authorizes the Navy to conduct environmental cleanup and remediation activities at Navy sites. Therefore, the Navy is the lead agency for the Bldg. 6 site. The Navy has determined that the selected final remedy will ensure protection of human health and compliance with ARARs as required under CERCLA.

2.11.4.1 Protection of Human Health

The selected final remedy focuses on containment and LUCs to limit exposure pathways to COCs that could pose unacceptable risk to human receptors. The concrete cover will prevent direct contact with contaminated soil by providing a barrier between the contaminated soil and potential receptors. The cover will also reduce the mobility of the COCs in soil by preventing surface erosion and sedimentation from storm water and generation of airborne dust. LUCs will ensure that the cover remains effective as a barrier and that only appropriate activities and land use occur. The final remedy is designed to eliminate potentially unacceptable risk to human health associated with exposure to the soil containing COCs. The selected remedy will not pose unacceptable short-term risk.

2.11.4.2 Compliance with Applicable or Relevant and Appropriate Requirements

According to Navy policy, all Environmental Restoration Program response actions must be consistent with the CERCLA of 1980, as amended by the SARA of 1986 (EPA 1986) (42 United States Code §§ 9601-9675) and the NCP (40 CFR 300.430(e)(6)). CERCLA and the NCP require that response actions comply with the ARARs of federal laws or more stringent promulgated laws. Because ARARs do not exist for every chemical or circumstance, non-promulgated federal advisories, criteria, or guidance materials (TBC criteria) may help determine what is protective of a site and how to carry out certain actions or requirements. The NCP does not require agencies to follow TBC criteria, but suggests TBC criteria be used when ARARs do not exist or when ARARs alone would not adequately protect human health and the environment.

The ARAR and TBC criteria identified for the selected final remedy are summarized in Table 6. Detailed discussions of the ARAR and TBC criteria that were considered to evaluate the response action alternatives and select the final remedy are presented in the FS (AECOM 2010).

Table 6: ARAR Criteria for the Selected Final Remedy

Policy or Regulation	Issues and Requirement	Applicability To Site
Chemical-Specific ARARs and TBC Criteria		
U.S. EPA Regional Screening Levels	General risk-based criteria used to evaluate which contaminants are present in soil that warrant further assessment; replaces EPA Region 9 PRGs.	Presented for comparison purposes only. PRGs were identified as TBC for this site at the initiation of the project; however, RSLs have since been introduced and are included to show the reader any changes to the screening levels of specific chemicals.
DOH Tier 1 EALs (DOH 2007)	Chemical- specific State of Hawaii-recommended criteria for allowable soil concentrations.	TBC to screen data for potential impacts to groundwater or soil.
Location-Specific ARARs and TBC Criteria		
National Coastal Zone Management Act 16 U.S.C. §§ 1451-1464	Requirements that could affect activities that could impact coastal zone management areas.	Applicable. Applies to Bldg. 6 due to close proximity to Pearl Harbor.
National Historic Preservation Act 16 U.S.C. § 470 *et seq.* 36 C.F.R. Part 800	Federal agencies must determine whether an undertaking will have the potential to cause effects on historic properties.	Applicable. Bldg. 6 will be evaluated for historical value and will be protected in accordance with the act.
Action-Specific ARARs and TBC Criteria		
RCRA 42 U.S.C. §§ 6901 *et seq.* Hazardous Waste Determination, 40 C.F.R. § 262.11	This regulation requires generators of solid waste to determine whether the waste is regulated as hazardous waste according to 40 C.F.R. Part 261.	Applicable for soil disposal from response actions at site.
RCRA 42 U.S.C. §§ 6901 *et seq.* Land Disposal Restrictions (LDRs) Treatment Standards, 40 C.F.R. § 268.40	RCRA prohibits the disposal of specified wastes (e.g., hazardous wastes), establishes minimum treatment standards that have to be achieved prior to disposal, and defines limited circumstances under which an otherwise restricted waste may be disposed of in land disposal units.	Applicable. for soil disposal.
CERCLA Off-site Rule, 42 U.S.C. § 9621(d)(3) 40 C.F.R. § 300.440	Wastes generated during a CERCLA action may be received off site only in a facility that EPA has determined “acceptable” to receive CERCLA wastes. Potential receiving facilities include RCRA Subtitle C and D landfills and incinerators. The offsite rule generally requires that a facility used for the offsite management of CERCLA wastes must be in physical compliance with RCRA and other applicable federal and state laws.	Applicable. Any facility receiving remediation waste from a CERCLA response action must have approval from the EPA prior to receipt of such wastes.
TSCA 15 U.S.C. §§ 2601-2697 40 C.F.R. § 761.61	Any future construction or excavation activities at the site encountering soil that requires management as TSCA regulated waste must comply with TSCA requirements.	Applicable to PCB soil contamination left in place that requires management as TSCA-regulated waste and to disposal of PCB contaminated soil that requires management as TSCA-regulated waste.
Clean Air Act 42 U.S.C. §§ 7401 *et seq.* Ambient Air Quality Standards, 40 C.F.R. §§ 50.6 and 50.12	Construction and excavation actions must comply with ambient air quality standards during excavation activities. Ambient air standards are: particulate matter less than 10 micrometers in diameter (PM_{10}), concentration of 50 $\mu g/m^3$ (12-month average), 150 $\mu g/m^3$ (24-hour average), and lead concentrations of 1.5 $\mu g/m^3$ (calendar-quarter average).	Applicable to response actions.

Policy or Regulation	Issues and Requirement	Applicability To Site
Hawaii Air Pollution Control Standards, Hawaii Administrative Rules 11-60	Construction and excavation actions must comply with ambient air quality standards during excavation activities.	Applicable to response actions.

$\mu g/m^3$ micrograms per cubic meter
PM_{10} Particulate matter less than 10 micrometers in diameter

2.11.4.3 COST-EFFECTIVENESS

The response action alternative selected as the final remedy for the Bldg. 6 site is cost-effective and represents a reasonable value for the required public funds. As shown in Table 7, the costs associated with the selected final remedy are proportional to the short- and long-term effectiveness of the remedy.

Table 7: Summary of Remedial Action Alternatives for Bldg. 6

Land Use Category	Restricted Use Alternatives					
Alternative	1. No Action	2. LUCs	3. Concrete Cover of All Unpaved Areas	4. In-Situ Solidification/ Stabilization of Exposed Contaminated Soils	5. In-Situ Solidification/ Stabilization of All Soils	6. Hot-Spot Soil Removal of Exposed Contaminated Soils
Long-term Effectiveness and Permanence	Poor	Good	Very Good	Very Good	Very Good	Excellent
Reduction in Toxicity, Mobility, and Volume through Treatment	Poor	Poor	Good	Very Good	Very Good	Good
Short-term Effectiveness	Poor	Excellent	Excellent	Good	Good	Fair
Cost	Excellent Cost = $0	Very Good Cost = $1,298,975	Good Cost = $1,660,439	Fair Cost = $1,989,550	Poor Cost = $2,245,209	Poor Cost = $2,412,440
TOTAL SCORE	Fair	Good	Very good	Very good	Very good	Good

2.11.4.4 UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES

The selected final remedy represents the maximum extent to which a permanent solution can be implemented in a cost-effective manner. Specifically, this alternative provides the best short- and long-term effectiveness, is protective of human health, complies with ARARs, achieves the RAOs, reduces contaminant mobility, and is technically feasible. Details of the response action alternative evaluation are presented in the RI/FS (AECOM 2010).

2.11.4.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The preference for treatment as a principal element does not apply to the Bldg. 6 site final remedy because the contaminated media is considered a low level threat waste. As discussed in Section 2.10, contaminated site media at Bldg. 6 is considered a low level threat waste. Because the contaminated soil is a low level threat waste and not a principal threat waste, treatment is not required as a principal element of the final remedy.

2.11.4.6 *FIVE-YEAR REVIEW REQUIREMENT*

The selected final remedy will result in contaminants remaining on site at concentrations that could pose unacceptable risk if unlimited use and unrestricted exposure are allowed; therefore, five-year reviews will be required to ensure that the final remedy continues to be protective of human health.

2.11.5 Documentation of Significant Changes

The PP (DON 2011) identified Alternative 3, concrete cover over all unpaved areas within Bldg. 6 with LUCs, as the final remedy selected for the Bldg. 6 site. The PP was released for public comment on 17 May 2011, and a public meeting to present and discuss the PP was held on 24 May 2011. Comments were received during the meeting, but none affect the selection of Alternative 3 as the final remedy; therefore, no significant changes to the final remedy are required.

3. Responsiveness Summary

Public notices announcing the availability for review of the PP (DON 2011) and other project related documents were printed in the Honolulu Star-Advertiser on 15 May 2011. A 30-day public comment period for the PP was held from 17 May 2011 to 15 June 2011 and a public meeting to discuss the PP was held on 24 May 2011 at the Aiea Public Library. Four comments were received and addressed during the public meeting. The responses to public comment are provided in Table 8.

Table 8: Response to Comments for the Bldg. 6 Public Meeting on 24 May 2011

Comment Number	Comment
1	During the housekeeping done in 1998, was there any analytical testing done, was there anything to worry about, or was it just to see if it was infiltrated or the roof was falling apart?
Response: The Navy went in and cleaned up the surface and hard surface areas and covered, with plastic, the uncovered areas of the open floor. The soil and sediment that was swept up was tested and disposed of.	
2	1. It was mentioned that vanadium concentrations are stable, and does that mean that the concentrations are exactly the same number? Are the concentrations rising? 2. It was also mentioned that these are associated with background. What does that mean?
Response: 1. The concentrations are not the exact same number but the concentrations collected are approximately the same value as collected previously. There may be slight fluctuations, but are relatively within the same order of magnitude. 2. Background refers to the fact that the vanadium is naturally occurring in the soils. And since it occurs in the soils, we expect to find it in the groundwater as well. Vanadium is common in soils, at differing concentrations depending on the type of soil.	
3	In the plan, it discusses that this building might have occasional use. How often is occasional and will it continue after we establish LUCs?
Response: The occasional use is associated with maintenance with the electrical substation. The transformers supply power to adjacent buildings. This maintenance is comparable to industrial use.	
4	It was noted that the rationale for not implementing two of the alternatives was that they were difficult to implement. More detail is required as to this reasoning.
Response: This reasoning is used if technology that is not on-island might be required to implement, or if the implementation is difficult in this type of environment. As one of the nine criteria, the Navy considers if it is difficult or feasible to implement each of the proposed remedies.	

3.1 Stakeholder Issues and Lead Agency Responses

The Navy and EPA Region 9, with DOH concurrence and the approval of EPA Headquarters, have selected Alternative 3 – Concrete Cover of Unpaved Areas with LUCs as the final remedy for the Bldg. 6 site.

3.2 Technical and Legal Issues

Potential technical and legal issues for the selected final remedy consist of establishing LUCs, including restrictions on future land use. The Navy is responsible for ensuring long-term protection of human health at the site, and is committed to implementing the final remedy as required to achieve this objective. The Navy has no foreseeable plans to transfer this property; however, if there are any changes to this plan in the future, the land owner will be responsible for compliance with the conditions of the LUCs. Any activities conducted at the Bldg. 6 site that might have impact on the integrity of the ground cover materials will require approval from the Navy and EPA, and concurrence from the DOH. The Navy will retain ultimate responsibility for the long-term integrity of the final remedy.

4. References

A. T. Kearney, Inc. (Kearney). 1987. *RCRA Facility Assessment, Pearl Harbor Naval Complex, Pearl Harbor, Hawaii*. Prepared for the U.S. Environmental Protection Agency. January.

AECOM Technical Services, Inc. (AECOM). 2010. *Remedial Investigation/Feasibility Study, Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii.* November.

———. 2011. *Draft Final Remedial Investigation Work Plan for Various Transformer Sites, Pearl Harbor Naval Complex, Oahu, Hawaii.* JBPHH, HI: Naval Facilities Engineering Command, Pacific. September.

Department of Health, State of Hawaii (DOH). 1992. Hawaii Administrative Rules (HAR), Title 11, Chapter 23: *Underground Injection Control.* Honolulu. 12 November.

———. 1999. *Underground Injection Control Well Map: Island of Oahu, Underground Injection Control Areas.* Honolulu: Safe Drinking Water Branch.

———. 2004. Hawaii Administrative Rules (HAR), Title 11, Chapter 54: *Water Quality Standards*. Honolulu. 31 August.

———. 2007. *Screening for Environmental Concerns at Sites with Contaminated Soil and Groundwater*. Office of Hazard Evaluation and Emergency Response. February.

Department of the Navy (DON). 1998. *Action Memorandum Regarding Time Critical Removal Action at the Building 6 Catch Basins, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. June.

———. 2011. *Proposed Plan, Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii.* May.

Earth Tech, Inc. (Earth Tech). 1999. *Draft Work Plan and Quality Assurance Project Plan, Remedial Investigation, Ford Island Geographic Study Area, Pearl Harbor Naval Complex, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. June.

———. 2001. *Work Plan and Sampling and Analysis Plan, Expanded Site Investigation for Building 6, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. September.

———. 2003a. *Site Inspection, Various Transformer Sites, Pearl Harbor Naval Complex, Oahu, Hawaii*. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. January.

———. 2004. *Expanded Site Inspection for Building 6, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. May.

Environmental Protection Agency, United States (EPA). 1986. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986*. (42 United States Code [U.S.C.] §§ 9601-9675).

———. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. Interim Final. EPA/540/G-89/004. Office of Emergency and Remedial Response. October.

———. 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)*. Interim Final. EPA/540/1-89/002. Office of Emergency and Remedial Response. December.

Environmental Protection Agency Region 9, State of Hawaii, and United States Department of the Navy (EPA Region 9, State of Hawaii, and DON). 1994. *Federal Facility Agreement Under CERCLA Section 120, in the matter of: The U.S. Department of the Navy, Pearl Harbor Naval Complex, Oahu, Hawaii.* Administrative Docket Number 94-05. March.

Naval Facilities Engineering Command, Pacific; and Environmental Protection Agency, United States (NAVFAC Pacific and EPA). 2001. *Groundwater Classification Issue Paper for PACNAVFACENGCOM IR Sites Located in Hawaii. Joint Issue Paper between NAVFAC Pacific, U.S. EPA, and Hawaii State Department of Health.* August.

Ogden Environmental and Energy Services Company, Inc. (Ogden). 1992. *RCRA Facility Investigation, Pearl Harbor Naval Complex, Pearl Harbor, Hawaii*. Draft Report, Vols. 1–2. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. August.

———. 1994. *Naval Shipyard Pearl Harbor Phase I UST Site Characterizations.* Pearl Harbor, Hawaii: PACNAVFACENGCOM. May.

———. 1998. *Final Site Evaluation Report, Site Evaluation of Three Sites: Building 6, Transportation Yard, and Asbestos Shoreline (Volume I), Naval Shipyard, Pearl Harbor, Hawaii.* Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. July.

Attachment A
Portable Document Format Hyperlink Index Table

Table A-1: Portable Document Format Hyperlink Index Table

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
1	Federal Facilities Agreement (FFA) for the Pearl Harbor Naval Complex	Section 1.2 Page 1-1	Federal Facility Agreement Under CERCLA Section 120, in the matter of: The U.S. Department of the Navy, Pearl Harbor Naval Complex, Oahu, Hawaii. Administrative Docket Number 94-05, EPA Region 9, State of Hawaii, and DON, March 1994.
2	remedial investigation and feasibility study (RI/FS)	Section 1.6 Page 1-3	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.
3	proposed plan (PP)	Section 1.6 Page 1-3	Proposed Plan for Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, May 2011.
4	Facility Assessment	Section 2.2.1.1 Page 2-2	RCRA Facility Investigation, Pearl Harbor Naval Complex, Pearl Harbor, Hawaii. Draft Report, Vols. 1–2. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. Ogden. August.1992.
5	investigation in 1993	Section 2.2.1.2 Page 2-2	Final Site Evaluation Report, Site Evaluation of Three Sites: Building 6, Transportation Yard, and Asbestos Shoreline (Volume I), Naval Shipyard, Pearl Harbor, Hawaii. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. Ogden. July.1998.
6	SI of three sites	Section 2.2.1.3 Page 2-3	Final Site Evaluation Report, Site Evaluation of Three Sites: Building 6, Transportation Yard, and Asbestos Shoreline (Volume I), Naval Shipyard, Pearl Harbor, Hawaii. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. Ogden. July.1998.
7	expanded SI	Section 2.2.1.5 Page 2-4	2004. Expanded Site Inspection for Building 6, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. Earth Tech. May 2004.
8	Work Plan and Sampling and Analysis Plan	Section 2.2.1.5 Page 2-4	2001. Work Plan and Sampling and Analysis Plan, Expanded Site Investigation for Building 6, Naval Shipyard and Intermediate Maintenance Facility, Pearl Harbor Naval Complex, Oahu, Hawaii. Pearl Harbor, HI: Naval Facilities Engineering Command, Pacific. Earth Tech. September 2001.
9	RI/FS was conducted in 2009/2010	Section 2.2.1.6 Page 2-6	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.

Item	Reference Phrase in ROD	Location in ROD	Identification of Referenced Document Available in the Administrative Record
10	prepared the PP	Section 2.3 Page 2-8	Proposed Plan for Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, May 2011.
11	FFA for PHNC	Section 2.4 Page 2-9	Federal Facility Agreement Under CERCLA Section 120, in the matter of: The U.S. Department of the Navy, Pearl Harbor Naval Complex, Oahu, Hawaii. Administrative Docket Number 94-05, EPA Region 9, State of Hawaii, and DON, March 1994.
12	concluded in the RI	Section 2.4.2 Page 2-9	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.
13	AECOM 2010	Section 2.5.4 Page 2-11	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.
14	DOH 1992	Section 2.5.4 Page 2-11	State of Hawaii Administrative Rules, Title 11, Chapter 23. UIC Map of Oahu.
15	Groundwater Classification Issue Paper	Section 2.6.2 Page 2-12	Groundwater Classification Issue Paper for PACNAVFACENGCOM IR Sites Located in Hawaii. Joint Issue Paper between NAVFAC Pacific, U.S. EPA, and Hawaii State Department of Health. NAVFAC Pacific and EPA. August 2001.
16	CSM developed for Bldg. 6	Section 2.7.1 Page 2-15	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.
17	human health SRA	Section 2.7.2.1 Page 2-17	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.
18	ecological risk assessment	Section 2.7.2.2 Page 2-19	Remedial Investigation/Feasibility Study Building 6, Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility Pearl Harbor Naval Complex Oahu, Hawaii, DON, November 2010.

Attachment B
Data Summary Tables

Table B-1: Summary of 1995 Soil Data

Analyte	Surface Soil					Subsurface Soil					Sediment					Screening Criteria						
	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Residential PRG	Residential RSL[a]	Industrial PRG	Industrial RSL[a]	DOH Tier 1 EAL	Estimated Lower Background Range	Estimated Upper Background Range
Metals (mg/kg)																						
Aluminum	13	13	100.00%	661	20000	18	18	100.00%	4070	46000	2	2	100.00%	6750	7380	76000	77000	100000	990000		663	76700
Antimony	15	15	100.00%	0.52 J	53.3 J	18	18	100.00%	0.67 J	71 J	2	2	100.00%	10.8 J	10.8 J	31	31	410	410	20	0.12	8.40
Arsenic	13	13	100.00%	1.3	15	18	18	100.00%	0.6	7.3 J	2	2	100.00%	8	9.8	0.39	0.39	1.60	1.60	20	0.21	29
Barium	13	13	100.00%	17.8	534	18	18	100.00%	38.8 J	1260 J	2	2	100.00%	305	398	5400	15000	67000	190000	750	5.00	834
Beryllium	13	8	61.54%	0.07	1.9	18	11	61.11%	0.3	42	2	1	50.00%	0.42	0.42	150	160	1900	2000	4	0.01	3.30
Cadmium	14	14	100.00%	0.26	4.6	18	11	61.11%	0.18	1.509	2	2	100.00%	6.8	7	37	70	450	800	12	0.04	3
Calcium	15	15	100.00%	819 J	84300	18	18	100.00%	2050 J	49600	2	2	100.00%	14000	15200						348	380000
Chromium (Total)	13	13	100.00%	8.8	180	18	18	100.00%	27.5 J	307	2	2	100.00%	110	113	210		450		500	2.60	321
Cobalt	13	12	92.31%	1.2	57.4	18	18	100.00%	5.2 J	121 J	2	2	100.00%	15.9	16.5	900	23	1,900	300	40	0.71	94
Copper	13	13	100.00%	181	104000	18	18	100.00%	42.5	1390	2	2	100.00%	1480	1560	3100	3100	41000	41000	230	1.80	230
Iron	8	8	100.00%	3970	34000	18	18	100.00%	12600 J	92800 J	2	2	100.00%	45900	46500	23000	55000	100000	720000	400	1300	140000
Lead	13	13	100.00%	217	3870	18	18	100.00%	1.9	513	2	2	100.00%	1810	2420	400	400	800	800	200	0.19	40
Magnesium	13	13	100.00%	294 J	11000	18	18	100.00%	1320	47700	2	2	100.00%	3890	4180							
Manganese	15	15	100.00%	54.2 J	1360 J	18	18	100.00%	220	2420 J	2	2	100.00%	472 J	514 J	1800	2	19000	23000		25	3470
Mercury	13	13	100.00%	0.24	685 J	18	18	100.00%	134 J	4570	2	2	100.00%	515 J	575 J	23	23	310	310	10	0.00	0.35
Nickel	13	13	100.00%	18.3	184	18	18	100.00%	25.9 J	137 J	2	2	100.00%	254	260	1600	1500	20000	20000	150	1.64	353
Potassium	10	10	100.00%	59.96	2080																	
Selenium	15	14	93.33%	0.11 J	0.231	18	10	55.56%	0.06 J	0.38 J	2	1	50.00%	0.22 J	0.22 J	390	390	5100	5100	10	0.31	11
Silver	13	7	53.85%	0.53	27.5	18	9	50.00%	0.27	1.3	2	2	100.00%	1.8	2.3	390	390	5100	5100	20	0.03	1
Sodium	15	15	100.00%	323 J	2610 J	18	18	100.00%	413 J	12000	2	2	100.00%	700 J	749 J							
Thallium	13	7	53.85%	0.2	1.3	18	1	5.56%	0.23	0.23	2	2	100.00%	0.9	1.2	5		67		5.20	0.03	3
Vanadium	13	13	100.00%	1.1 J	98.1	18	18	100.00%	15.4	379 J	2	2	100.00%	28.1	29.2	78	5.50	1000	72	78	1.40	249
Zinc	15	15	100.00%	257 J	1810 J	18	18	100.00%	27.3	1000 J	2	2	100.00%	3600 J	3970 J	23000	23000	100000	310000	600	2	193
PAHs µg/kg																						
Acenaphthene	6	6	100.00%	2.79	20.17 J	18	9	50.00%	11.66	502.7 J	2	2	100.00%	83.33 J	89.15 J	3700000	3,400,00	29000000	33000000	19000		
Acenaphthylene	6	5	83.33%	2.17	7.33 J	18	1	5.56%	13.42	13.42	2	1	50.00%	10.14 J	10.14 J	3700000	3,400,00	29000000	33000000	19000		
Anthracene	6	6	100.00%	6.04	301.6	18	11	61.11%	2.02	1247 J	2	2	100.00%	57.97 J	96.58 J	22000000	17000000	100000000	170000000	2800		
Benzo(a)Anthracene	6	6	100.00%	17.62 J	316 J	18	15	83.33%	2.42	11112.6 J	2	2	100.00%	364 J	395.66 J	620	150	2100	2100	6200		
Benzo(a)Pyrene	6	6	100.00%	11.28 J	526.2 J	18	17	94.44%	1.84	19180 J	2	2	100.00%	780.1 J	871.7 J	62	15	210	210	620		
Benzo(b)Fluoranthene	6	6	100.00%	18.43 J	562.9 J	18	16	88.89%	2.16	19690 J	2	2	100.00%	534.9 J	608.7 J	620	530	2100	2400	6200		
Benzo(g,h,i)Perylene	6	6	100.00%	14 J	482.2 J	18	17	94.44%	2.15	19620 J	2	2	100.00%	735.5 J	791.3 J					27000		
Benzo(k)Fluoranthene	6	6	100.00%	16.41 J	500 J	18	16	88.89%	1.95	18840 J	2	2	100.00%	713.2 J	761.6 J	6,200	1,500	21000	21000	37000		
Chrysene	6	6	100.00%	36.76 J	409.9 J	18	16	88.89%	1.52	12470 J	2	2	100.00%	549.8 J	682.6 J	62,000	15,000	210000	210000	23000		
Dibenz(a,h)Anthracene	6	5	83.33%	8.81	262.1 J	18	13	72.22%	4.39 J	9176 J	2	2	100.00%	141.2 J	149.3 J	62	15	210	210	620		
Fluoranthene	6	6	100.00%	46.02 J	330.7 J	18	17	94.44%	1.19	13450 J	2	2	100.00%	460.6 J	597.1 J	2300000	2300000	22000000	22000000	40000		
Fluorene	6	6	100.00%	7.28	22.62 J	18	4	22.22%	47.53	375.3 J	2	1	50.00%	22.46 J	22.46 J	2300000	2300000	22000000	22000000	40000		
Indeno(1,2,3-cd)pyrene	6	6	100.00%	9.57 J	369 J	18	16	88.89%	1.97	14750 J	2	2	100.00%	497.8 J	572.1 J	620	150	2100	2100	6200		
Naphthalene	6	6	100.00%	47.69 J	274.1 J	18	8	44.44%	1.93 J	911.5 J	2	2	100.00%	124.6 J	133.7 J	56000	3600	190000	18000	4800		
Phenanthrene	6	6	100.00%	23.42	367 J	18	16	88.89%	1.52	5489 J	2	2	100.00%	230.3 J	300 J					11000		
Pyrene	3	3	100.00%	147.3 J	303.5 J	18	18	100.00%	1.52	14745.31 J	2	2	100.00%	579.5 J	754.4 J	2300000	1700000		17000000	85000		
Aroclor 1016	6	0	0.00%	17 U	340 U	18	0	0.00%	18 U	94 U	2	0	0.00%	25 U	25 U	220	220	740	740	1100		
Aroclor 1221	6	0	0.00%	17 U	340 U	18	0	0.00%	18 U	94 U	2	0	0.00%	25 U	25 U	220	220	740	740	1100		
Aroclor 1232	6	0	0.00%	17 U	340 U	18	0	0.00%	18 U	94 U	2	0	0.00%	25 U	25 U	220	220	740	740	1100		
Aroclor 1242	6	0	0.00%	17 U	340 U	18	0	0.00%	18 U	94 U	2	0	0.00%	25 U	25 U	220	220	740	740	1100		
Aroclor 1248	6	0	0.00%	17 U	340 U	18	0	0.00%	18 U	94 U	2	0	0.00%	25 U	25 U	220	220	740	740	1100		
Aroclor 1254	6	6	100.00%	26	3200	18	3	16.67%	93	1000	2	2	100.00%	130	230	220	220	740	740	1100		
Aroclor 1260	6	5	83.33%	22	480	18	3	16.67%	73	170	2	2	100.00%	190	240	220	220	740	740	1100		

Table B-1: Summary of 1995 Soil Data (cont'd)

	Surface Soil					Subsurface Soil					Sediment					Screening Criteria							
Analyte	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Number of Samples	Number of Detections	Detection Frequency	Minimum Value	Maximum Value	Residential PRG	Residential RSL[a]	Industrial PRG	Industrial RSL[a]	DOH Tier 1 EAL	Estimated Lower Background Range	Estimated Upper Background Range
TPH (mg/kg)																						
DRO (C14-C20)	6	5	83.33%	7.9 J	64 J	18	12	66.67%	1.2	1400	2	2	100.00%	15	18					5000		
GRO (C7-C11)	6	1	16.67%	1.1	1.1	18	3	16.67%	5.3	150	2	0	0.00%	1.4 U	1.5 U					2000		
Kerosene Range C11-14	6	2	33.33%	1.1 J	1.3	18	4	22.22%	4.2	730	2	0	0.00%	1.4 U	1.5 U					5000		
LRO (C20-C30)	6	5	83.33%	51 J	330	18	15	83.33%	5.4	300	2	2	100.00%	33	73					5000		
pH																						
PH	3	3	100.00%	6.7	8.9	4	4	100.00%	8 J	9.6 J												
VOCs µg/kg																						
Benzene						17	0	0.00%	27 U	34 U												
Ethylbenzene						17	0	0.00%	27 U	34 U												
M- AND P-XYLENE						17	1	5.88%	120	120												
O-Xylenes						17	1	5.88%	49	49												
Toluene						17	0	0.00%	27 U	34 U												

µg/kg = microgram per kilogram
DRO = diesel range organics
GRO = gasoline range organics
J = estimated value
LRO = lube oil range organics
mg/kg = milligram per kilogram
PAH = polyaromatic hydrocarbons
TPH = total petroleum hydrocarbons
U = non-detect at reporting limit
VOC = volatile organic compound

[a] The EPA RSLs were updated in November 2011. While the RSL values cited in the tables reflect the values current at the time the RI/FS was prepared, the detected concentrations and cited RSL values were also compared to the November 2011 RSL values. There were two changes in RSL values noted. The residential RSL value for benzo(b)fluoranthene decreased from 530 µg/kg to 150 µg/kg and the industrial value decreased from 2,400 µg/kg to 2,100 µg/kg. The residential value for vanadium increased from 5.5 mg/kg to 390 mg/kg and the industrial value increased from 72 mg/kg to 5,200 mg/kg. The increase in the vanadium RSL will have no impact on the recommended alternative for this project because the evaluation that was done will be more conservative. The decrease in the benzo(b)fluoranthene RSL also has no impact on the recommended alternative because the maximum concentration exceeded the previous residential and industrial RSL and therefore benzo(b)fluoranthene was included in the risk evaluation for this site.

Table B-2: Summary of Expanded SI Analytical Results for Surface Soil at Bldg. 6

	2001 Sampling Event					2002 Sampling Event					Screening Criteria			
	No. of Detects	No. of Valid Analyses [a]	Frequency of Detection (%)	Minimum Concentration	Maximum Concentration	No. of Detects	No. of Valid Analyses [a]	Frequency of Detection (%)	Minimum Concentration	Maximum Concentration	Residential PRG [b] / RSL [f]	Industrial PRG [b] / RSL [f]	DOH Tier 1 EAL	Estimated Background Range
PAHs (µg/kg)														
2-Methylnaphthalene [d]	1	53	2	39 J	39 J	1 [c]	1 [c]	100	6.8	6.8	n/a / n/a	n/a / n/a	250	NC
Benzo(a)anthracene	10	53	19	71 J	4,600	4	6	67	42 J	220 J	620 / 150	2,100 / 2,100	6,200	NC
Benzo(a)pyrene	33	53	62	2 J	6,800	5	6	83	62 J	290 J	62 / 15	210 / 210	620	NC
Benzo(b)fluoranthene	12	53	23	55 J	8,100	5	6	83	59 J	270 J	620 / 530[f]	2,100 / 2,400[f]	6,200	NC
Benzo(g,h,i)perylene[d]	9	53	17	97 J	3,200	5	6	83	63 J	240 J	n/a / n/a	n/a / n/a	27,000	NC
Benzo(k)fluoranthene	11	53	21	47 J	5,100	5	6	83	57J	280 J	6,200 / 1,500	21,000 / 21,000	37,000	NC
Chrysene	12	53	23	50 J	4,000	5	6	83	53 J	250 J	62,000 / 15,000	210,000 / 210,000	23,000	NC
Dibenzo(a,h) anthracene	22	53	42	2 J	1,700 J	3	6	50	59 J	84 J	62 / 15	210 / 210	620	NC
Fluoranthene	11	53	21	40 J	3,000	4	6	67	60 J	220 J	2.3E6 / 2.3E6	2.2E7 / 2.2E7	40,000	NC
Indeno(1,2,3-cd)pyrene	10	53	19	45 J	3,700	5	6	83	51 J	220 J	620 / 150	2,100 / 2,100	6,200	NC
Naphthalene	1	53	2	41 J	41 J	0	6	0	340 U	390 U	56,000 / 3,600	190,000 / 18,000	4,800	NC
Phenanthrene [d]	8	53	15	37 J	980 J	4	6	67	40 J	110 J	n/a / n/a	n/a / n/a	11,000	NC
Pyrene	11	53	21	40 J	3,100	4	6	67	60 J	220 J	2.3E6 / 1.7E6	2.9 E7 / 1.7E7	85,000	NC
PCBs (µg/kg)														
Aroclor-1254	2	53	4	23 J	29 J	0	6	0	100 U	110 U	220 / 220	740 / 740	1,100	NC
Aroclor 1260	1	53	2	190	190	5	6	83	64 J	5,100	220 / 220	740 / 740	1,100	NC
TPH (mg/kg)														
DRO (C14–C20) [d]	2	4	50	11 J	13 J	3	6	50	41	52	n/a / n/a	n/a / n/a	5,000	NC
LRO (C20–C30) [d]	2	4	50	35 J	250	6	6	100	14	1,700	n/a / n/a	n/a / n/a	5,000	NC
Metals (mg/kg)														
Aluminum	48	48	100	973	46,900 [e]	5	5	100	2,990	26,500	76,000 / 77,000	100,000 / 990,000	n/a	663-76,700
Antimony	22	48	46	0.45	445	5	5	100	5.4	382	31 / 31	410 / 410	20	0.12–8.4
Arsenic	29	48	60	0.69 J	539	5	5	100	3.4 J	39.5 J	0.39 (22) / 0.39	1.6 (260) / 1.6	20	0.21–29
Barium	45	48	94	8.9	1,450	5	5	100	38.1	385 J	5,400 / 15,000	67,000 / 190,000	750	5-834
Beryllium	36	48	75	0.02	3.3 [e]	5	5	100	0.2	1	150 / 160	1,900 / 2,000	4	0.01-3.3
Cadmium	39	48	81	0.2	7.2 [e]	5	5	100	1 J	5.4 J	37 / 70	450 / 800	12	0.04-3.0
Calcium	44	48	92	348 J	374,000 [e]	5	5	100	2,320	61,600	n/a / n/a	n/a / n/a	n/a	348-380,000
Chromium	48	48	100	2.9	263 [e]	5	5	100	40.4	120 J	210 (total) / n/a	450 / n/a	500	2.6–321
Cobalt	44	48	92	0.87	120 [e]	5	5	100	4.3	33 J	900 /23	1,900 / 300	40	0.71-94
Copper	46	48	96	1.8 J	11,600	5	5	100	263	14,500	3,100 / 3,100	41,000 / 41,000	230	1.8–230
Iron	48	48	100	2,510	121,000 [e]	5	5	100	16,100	45,400 J	23,000 / 55,000	100,000 / 720,000	400	1,300–140,000
Lead	39	48	81	2.9 J	24,900 J	5	5	100	485	247,000 J [e]	400 (total) / 400	800 / 800	200	0.19–40
Magnesium	48	48	100	458	57,500 [e]	5	5	100	795	16,400 J	n/a / n/a	n/a / n/a	n/a	NC
Manganese	48	48	100	25 J	2,830 [e]	5	5	100	191	2,470	1,800 / 1.800	19,000 / 23,000	n/a	25–3,470
Mercury	23	48	48	0.03	17 J	5	5	100	0.3	0.4	23 / 23	310 / 310	10	0.0035-0.35
Nickel	46	48	96	1.7 J	539	5	5	100	35.7 J	5,690 J [e]	1,600 / 1,500	20,000 / 20,000	150	1.64–353
Potassium	40	48	83	155 J	5,670 [e]	5	5	100	349	1,700 J	n/a / n/a	n/a / n/a	n/a	NC
Selenium	6	48	12	0.37	2	3	5	60	0.7 J	0.9 J	390 / 390	5,100 / 5,100	10	0.31-11
Silver	22	48	46	0.15 J	208 J	5	5	100	0.2	4.1	390 / 390	5,100 / 5,100	20	0.03-1.0
Sodium	48	48	100	194	7,630 [e]	5	5	100	664 J	1,820 J	n/a / n/a	n/a / n/a	n/a	NC
Thallium	4	48	8	0.63	4.4	1	5	20	0.8	0.8	5.2 / n/a	67 / n/a	5.2	0.03-3.0
Vanadium	43	48	90	1.4 J	264 J [e]	5	5	100	6.8	53.4	78 / 5.5[f]	1,000 / 72[f]	78	1.4-249
Zinc	38	48	79	11.2 J	1,990	5	5	100	333 J	4,730 J [e]	23,000 / 23,000	100,000 / 310,000	600	1.6-193

Note: **Bold** highlight indicates an exceedance of PRGs or EALs. Bolded values in parentheses for arsenic are non-cancer PRGs.

n/a no PRG for analyte
NC not calculated
U non-detect at reporting limit
UJ estimated non-detect at reporting limit
J estimated value

[a] Number of analyses includes all samples including duplicates.
[b] PRGs have been updated to reflect 2004 values.
[c] 2-methylnaphthalene result listed shows result from PAH analysis via 8270SIM. 2-methylnaphthalene result via 8270C yielded non-detect.
[d] Hawaii DOH soil EALs (mg/kg) were used for comparison because no PRGs exist for TPH.
[e] Maximum detections indicated here are found in a duplicate pair (i.e., either the primary or duplicate sample) and reflect actual concentrations, not averaged concentrations.
[f] The EPA RSLs were updated in November 2011. While the RSL values cited in the tables reflect the values current at the time the RI/FS was prepared, the detected concentrations and cited RSL values were also compared to the November 2011 RSL values. There were two changes in RSL values noted. The residential RSL value for benzo(b)fluoranthene decreased from 530 µg/kg to 150 µg/kg and the industrial value decreased from 2,400 µg/kg to 2,100 µg/kg. The residential value for vanadium increased from 5.5 mg/kg to 390 mg/kg and the industrial value increased from 72 mg/kg to 5,200 mg/kg. The increase in the vanadium RSL will have no impact on the recommended alternative for this project because the evaluation that was done will be more conservative. The decrease in the benzo(b)fluoranthene RSL also has no impact on the recommended alternative because the maximum concentration exceeded the previous residential and industrial RSL and therefore benzo(b)fluoranthene was included in the risk evaluation for this site.

Table B-3: Summary of Expanded SI Analytical Results for Subsurface Soil at Bldg. 6

	2001 Sampling					2002 Sampling					Screening Criteria			
	No. of Detects	No. of Valid Analyses [a]	Frequency of Detection (%)	Minimum Concentration	Maximum Concentration	No. of Detects	No. of Valid Analyses [a]	Frequency of Detection (%)	Minimum Concentration	Maximum Concentration	Residential PRG [b] / RSL [f]	Industrial PRG [b] / RSL [f]	DOH Tier 1 EAL	Estimated Background Range
PAHs (µg/kg) [c]														
2-Methylnaphthalene	1	54	2	50,000 J	50,000 J	1	3	33	10	10	n/a / n/a	n/a / n/a	250	NC
Acenaphthene	0	54	0	180 U	110,000 U	1	3	33	7.7	7.7	3.7E6 / 3.4E6	2.9E7 / 3.3E7	19,000	NC
Anthracene	0	54	0	180 U	110,000 U	1	3	33	6.5	6.5	2.2E7 / 1.7E7	1.0E8 / 1.7E8	2,800	NC
Benzo(a)anthracene	4	54	7	63 J	**1,000 J**	1	3	33	11	11	620 / 150	2,100 / 2,100	6,200	NC
Benzo(a)pyrene	14	54	26	2 J	**1,500 J**	2	3	67	6.4	17	62 / 15	210 / 210	620	NC
Benzo(b)fluoranthene	4	54	7	**79 J**	**2,100**	1	3	33	21	21	620 / 530	2,100 / 2,400	6,200	NC
Benzo(g,h,i)perylene	2	54	4	87 J	860 J	1	3	33	17	17	n/a / n/a	n/a / n/a	27,000	NC
Benzo(k)fluoranthene	2	54	4	760 J	770 J	2	3	67	18	18	6,200 / 1,500	21,000 / 21,000	37,000	NC
Chrysene	4	54	7	86 J	970 J	0	3	0	5.6 U	5.6 U	62,000 / 15,000	210,000 / 210,000	23,000	NC
Dibenzo(a,h) anthracene	4	54	7	8	**360**	0	3	0	5.6 U	5.6 U	62 / 15	210 / 210	620	NC
Fluorene	0	54	0	180 U	110,000 U	2	3	67	11	13	2.6E6 / 2.3E6	2.6E7 / 2.2E7	8,900	NC
Fluoranthene	3	54	6	89 J	640 J	1	3	33	5.6	5.6	2.3E6 / 2.3E6	2.2E7 / 2.2E7	40,000	NC
Indeno(1,2,3-cd)pyrene	3	54	6	64 J	**810 J**	1	3	33	17	17	620 / 150	2,100 / 2,100	6,200	NC
Naphthalene	0	54	0	180 U	110,000 U	1	3	33	11	11	56,000 / 3,600	190,000 / 18,000	4,800	NC
Phenanthrene	3	54	6	63 J	24,000 J	1	3	33	8.1	8.1	n/a / n/a	n/a / n/a	11,000	NC
Pyrene	3	54	6	110 J	710 J	1	3	33	15	15	2.3E6 / 1.7E6	2.9 E7 / 1.7E7	85,000	NC
PCBs (µg/kg)														
Aroclor 1248	1	53	2	1.6 J	1.6 J	0	3	0	110 U	120 U	220 / 220	740 / 740	1,100	NC
Aroclor 1260	0	53	0	37 UJ	170 U	1	3	33	**320**	**320**	220 / 220	740 / 740	1,100	NC
TPH (mg/kg)														
DRO (C14–C20) [d]	6	12	50	7	**18,000**	1	3	33	13	13	n/a / n/a	n/a / n/a	5,000	NC
LRO (C20–C30) [d]	6	12	50	14	**27,600**	3	3	100	28	240	n/a / n/a	n/a / n/a	5,000	NC
Metals (mg/kg)														
Aluminum	49	49	100	1,200	67,600	2	2	100	12,600	74,200	76,000 / 77,000	100,000 / 990,000	n/a	663-76,700
Antimony	18	49	37	4.8	**2,490**	1	2	50	**1,250**	**1,250**	31 / 31	410 / 410	20	0.12–8.4
Arsenic	10	49	20	**0.68 J**	**19.9**	2	2	100	**2.5**	**3.6 J**	0.39 (22) / 0.39	1.6 (260) / 1.6	20	0.21–29
Barium	49	49	100	9.0	1,410	2	2	100	53.1J	**1,270**	5,400 / 15,000	67,000 / 190,000	250	5-834
Beryllium	47	49	96	0.1	3.6 [e]	2	2	100	0.2	2.5	150 / 160	1,900 / 2,000	4	0.01-3.3
Cadmium	41	49	84	0.17 J	8.1 J	1	2	50	1.1 J	1.1 J	37 / 70	450 / 800	12	0.04-3.0
Calcium	49	49	100	632	153,000	2	2	100	5,430	16,500	n/a / n/a	n/a / n/a	n/a	348-380,000
Chromium	49	49	100	3.9 J	**238**	2	2	100	76.8 J	**379**	210 (total) / n/a	450 / n/a	500	2.6–321
Cobalt	49	49	100	0.71 J	111 J	2	2	100	11.6 J	**92.7**	900 /23	1,900 / 300	40	0.71-94
Copper	49	49	100	31.2	**27,600 J**	2	2	100	78.1	**291**	3,100 / 3,100	41,000 / 41,000	230	1.8–230
Iron	49	49	100	3,050	**102,000**	2	2	100	21,700 J	**116,000**	23,000 / 55,000	100,000 / 720,000	n/a	1,300–140,000
Lead	33	49	67	2.6 J	**2,000**	2	2	100	12.4	251 J	400 (total) / 400	800 / 800	200	0.19–40
Magnesium	49	49	100	469	44,100	2	2	100	2,080 J	11,000	n/a / n/a	n/a / n/a	n/a	NC
Manganese	49	49	100	66.7 J	**2,580**	2	2	100	272	**2,300**	1,800 / 1.800	19,000 / 23,000	n/a	25–3,470
Mercury	17	49	35	0.04J	0.19	0	2	0	0.1 U	0.1 UJ	23 / 23	310 / 310	10	0.0035-0.35
Nickel	49	49	100	6.7	1,230	2	2	100	67 J	**238**	1,600 / 1,500	20,000 / 20,000	150	1.64–353
Potassium	49	49	100	140 J	9,310	2	2	100	1,350	1,370 J	n/a / n/a	n/a / n/a	n/a	NC
Selenium	6	49	12	0.77	4.5	1	2	50	4.3 J	4.3 J	390 / 390	5,100 / 5,100	10	0.31-11
Silver	28	49	57	0.54 J	6.1	2	2	100	0.4	0.4	390 / 390	5,100 / 5,100	20	0.03-1.0
Sodium	49	49	100	297	19,500	2	2	100	957 J	2,370	n/a / n/a	n/a / n/a	n/a	NC
Vanadium	49	49	100	2.5 J	199 J	2	2	100	38.2	**123**	78 / 5.5	1,000 / 72	78	1.4-249
Zinc	41	49	84	73.4 J	11,900 J	2	2	100	165 J	365 J	23,000 / 23,000	100,000 / 310,000	600	1.6-193

Note: **Bold** highlight indicates an exceedance of PRGs or EALs. Bolded values in parentheses for arsenic are non-cancer PRGs.

n/a no PRG for analyte
NC not calculated
U non-detect at reporting limit
UJ estimated non-detect at reporting limit
J estimated value

[a] Detections listed here include all samples including duplicates. Duplicate sample results have not been averaged.
[b] PRGs have been updated to reflect 2004 values.
[c] PAH values for 2002 sampling (subsurface soil samples only) are results obtained via 8270C SIM; PAH results (for subsurface soil samples only) via 8270C were all non-detects.
[d] Hawaii DOH soil EALs (mg/kg) were used for comparison because no PRGs exist for TPH.
[e] Maximum detections indicated here are found in a duplicate pair (i.e., either the primary or duplicate sample) and reflect actual concentrations, not averaged concentrations.
[f] The EPA RSLs were updated in November 2011. While the RSL values cited in the tables reflect the values current at the time the RI/FS was prepared, the detected concentrations and cited RSL values were also compared to the November 2011 RSL values. There were two changes in RSL values noted. The residential RSL value for benzo(b)fluoranthene decreased from 530 µg/kg to 150 µg/kg and the industrial value decreased from 2,400 µg/kg to 2,100 µg/kg. The residential value for vanadium increased from 5.5 mg/kg to 390 mg/kg and the industrial value increased from 72 mg/kg to 5,200 mg/kg. The increase in the vanadium RSL will have no impact on the recommended alternative for this project because the evaluation that was done will be more conservative. The decrease in the benzo(b)fluoranthene RSL also has no impact on the recommended alternative because the maximum concentration exceeded the previous residential RSL and therefore benzo(b)fluoranthene was included in the risk evaluation for this site.

Table B-4: Summary of TPH-DRO, TPH-LRO, PAH, and Metal Analytical Results for Unfiltered Groundwater, Expanded SI for Bldg. 6

	2001 Sampling					2002 Sampling					Screening Criteria			
COPC	No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	DOH Tier 1 EAL (<150m) [h]	DOH Water Quality Standard	Primary Drinking Water MCL	EPA NRWQC
TPH (mg/L)														
DRO	3	3	100	0.28	**3**	8	9	89	0.2 J	2.6 J	0.64	0.50	N/A	N/A
LRO	2	3	67	0.41	**0.8 J**	3	9	33	0.47	1.8	0.64	0.64	N/A	N/A
PAHs (µg/L)														
Acenaphthene	—	5	—	5 U	6 U	5	9	56	0.31	**2.3** [a]	23	320 [b]	0.2	N/A
Benzo(g,h,i) perylene	1	5	20	**6 J** [c]	**6 J** [c]	—	9	—	0.2 U	0.2 U	0.1	N/A	0.2	N/A
Dibenz(a,h)anthracene	1	5	20	**4 NJ** [d]	**4 NJ** [d]	—	9	—	0.2 U	0.2 U	0.52	N/A	0.2	N/A
Fluorene	—	5	—	5 U	6 U	7	9	78	0.24	**1.5** [a]	3.9	N/A	0.2	N/A
Metals (µg/L) (unfiltered)														
Aluminum	6	6	100	**3,320** [e]	**14,100** [d]	9	9	100	58.6	**590** [a]	N/A	260 [f]	N/A	N/A
Arsenic	1	6	17	9.3	9.3	6	9	67	5	16.6	36	36 [g]	10	36 [g]
Barium	3	6	50	137	187	2	9	22	8.1	9.1	2,000	N/A	2,000	N/A
Cadmium	6	6	100	0.35	1.0	—	9	—	2 U	2 U	3	9 [h]	5	8.8 [g]
Calcium	6	6	100	4,290 J	467,000 J	9	9	100	3,020	15,700	N/A	N/A	N/A	
Chromium	6	6	100	15.7	38.2	7	9	78	5.3	19.8	74	50 [b]	100	50 [g]
Cobalt	2	6	33	**11.6**	**13.0**	—	9	—	5 U	5 U	3	N/A	N/A	N/A
Copper	6	6	100	**8.7** [e]	**38.5** [c]	5	9	55	2	**3.2** [a]	2.9	2.9 [b]	1,300	3.1 [g]
Iron	6	6	100	4,310	15,600	9	9	100	164	788	N/A	N/A	N/A	1,000 [i]
Magnesium	6	6	100	3,930	14,400	9	9	100	2,620	14,700	N/A	N/A	N/A	N/A
Manganese	6	6	100	105	356	8	9	89	6.1	134	N/A	N/A	N/A	N/A
Nickel	6	6	100	**14.6**	**37.5**	4	9	44	**5.6**	**12.7** [a]	5	8.3 [b]	N/A	8.2 [g]
Potassium	6	6	100	6,090 J	13,400 J	9	9	100	2,810	12,500	N/A	N/A	N/A	N/A

COPC	2001 Sampling No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	2002 Sampling No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	Screening Criteria DOH Tier 1 EAL (<150m) [h]	DOH Water Quality Standard	Primary Drinking Water MCL	EPA NRWQC
Sodium	6	6	100	148,000	307,000	9	9	100	79,000	428,000	N/A	N/A	N/A	N/A
Vanadium	6	6	100	**41.6 J**	**139 J**	6	9	67	**5.7**	**121**	19	N/A	N/A	N/A
Zinc	6	6	100	**27.2**	**66.2**	—	9	—	50 U	50 U	22	86 [b]	N/A	81 [g]

Note: **Bold** highlight indicates an exceedance of any screening criterion.
— Analyte was not detected in samples.
µg/L microgram per liter
J estimated value
N/A not applicable
N presumptive evidence constituent is present at estimated value
U non-detect at the reporting limit
[a] Detection shown is from sample collected from UST MW-9.
[b] Hawaii DOH Administrative Rules Title 11 Chapter 54 Water Quality Standards for Saltwater Acute Toxicity (August 2004).
[c] Detection shown is from sample collected from MW-03.
[d] Detection shown is from sample collected from MW-02.
[e] Detection shown is from sample collected from MW-01.
[f] Hawaii DOH Administrative Rules Title 11 Chapter 54 Water Quality Standards for Freshwater Chronic Toxicity (August 2004).
[g] EPA National Recommended Water Quality Criteria for Saltwater Chronic Toxicity (November 2002).
[h] DOH Tier 1 EAL for groundwater that is not a drinking water source and is within 150 meters of surface water (DOH 2007).
[i] EPA National Recommended Water Quality Criteria for Freshwater Chronic Toxicity (April 1999).

Table B-5: Summary of Metal Analytical Results for Filtered Groundwater, Expanded SI for Bldg. 6

Metal (µg/L) (filtered)	2001 Sampling					2002 Sampling					Screening Criteria			
	No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	No. of Detects	No. of Valid Analyses	Frequency of Detection (%)	Minimum Conc.	Maximum Conc.	DOH Tier 1 EAL (<150m) [f]	DOH Water Quality Standard	Primary Drinking Water MCL	EPA NRWQC
Aluminum	1	6	17	**399** [a]	**399** [a]	2	9	22	110	**1,020** [a]	N/A	260 [b]	N/A	N/A
Arsenic	4	6	67	5.0	15.2	6	9	67	5.3	16.3	36	36 [c]	50	36 [d]
Barium	—	6	—	4.1 U	4.1 U	1	9	11	5.1	5.1	2,000	N/A	2,000	N/A
Calcium	6	6	100	1,060 J	5,390 J	9	9	100	2,760	20,600	N/A	N/A	N/A	N/A
Chromium	2	6	33	6.4	6.4	1	9	11	5.5	5.5	74	50 [c]	100	50 [d]
Iron	3	6	50	108	343	3	9	33	128	283	N/A	N/A	N/A	1,000 [e]
Magnesium	6	6	100	1,900 J	5,770 J	9	9	100	2,600	17,100	N/A	N/A	N/A	N/A
Manganese	2	6	33	13.8	17.0	4	9	44	38.2	162	N/A	N/A	N/A	N/A
Nickel	—	6	—	7.3 U	7.3 U	1	9	11	**5.4 J**	**5.4 J**	5	8.3 [c]	N/A	8.2 [d]
Potassium	6	6	100	5,480 J	10,100 J	9	9	100	2,930	13,400	N/A	N/A	N/A	N/A
Selenium	—	6	—	3.7 UJ	3.7 UJ	1	9	11	**5.4**	**5.4**	5	71 [c]	50	71 [d]
Sodium	6	6	100	140,000	257,000	9	9	100	81,000	440,000	N/A	N/A	N/A	N/A
Vanadium	3	6	50	**20.8 J**	**121 J**	6	9	67	**5.5**	**120**	19	N/A	N/A	N/A
Zinc	2	6	33	22.4	24.5	1	9	11	55.6	55.6	22	86 [c]	N/A	81 [d]

Note: **Bold** highlight indicates an exceedance of any screening criterion.
— Analyte was not detected in samples.
J estimated value
N/A not applicable
U non-detect at reporting limit
UJ estimated non-detect at reporting limit
[a] Detection shown is from sample collected from MW-01.
[b] Hawaii DOH Administrative Rules Title 11 Chapter 54 Water Quality Standards for Freshwater Acute Toxicity (October 1992).
[c] Hawaii DOH Administrative Rules Title 11 Chapter 54 Water Quality Standards for Saltwater Acute Toxicity (August 2004).
[d] EPA National Recommended Water Quality Criteria for Saltwater Chronic Toxicity (November 2002).
[e] EPA National Recommended Water Quality Criteria for Freshwater Chronic Toxicity (November 2002).
[f] DOH Tier 1 EAL for groundwater that is not a drinking water source and is within 150 meters of surface water (DOH 2007).

Attachment C
Federal Facility Land Use Control ROD Checklist

EPA Region 9 Federal Facility Land Use Control ROD Checklist for Navy LUC RODs

No.	Checklist Item	Location Where Addressed in the Bldg. 6 ROD
1	Map/Figure showing boundaries of the land use controls.	Figure 2, Section 1, page 1-7
2	Document risk exposure assumptions and reasonably anticipated land uses, as well as any known prohibited uses which might not be obvious based on the reasonably anticipated land uses. (For example, where "unrestricted industrial" use is anticipated, list prohibited uses such as on-site company day-care centers, recreation areas, etc.).	Section 2.7, paragraph 2, sentences 1 and 2, page 2-12 Figure 3, Section 2, page 2-13
3	Describe the risks necessitating the LUCs.	Section 2.7.2.1, paragraph 1, bullets 1 to 3, page 2-17
4	State the LUC performance objectives.	Section 2.11.2.1, paragraph 1, bullets 1 to 5, page 2-30
5	Generally describe the LUC (restriction), the logic for its selection and any related deed restrictions/notifications.	Section 2.11.2, paragraph 1, sentences 4 and 5, page 2-29
6	Duration language: Land Use Controls will be maintained until the concentration of hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure.	Section 2.11.2, paragraph 4, sentence 1, page 2-30
7	Include language that the Navy is responsible for implementing, maintaining, reporting on, and enforcing the land use controls. This may be modified to include another party should the site-specific circumstances warrant it.	Section 2.11.1, paragraph 3, sentence 1, page 2-30
8	Where someone else will or the Navy plans that someone else will ultimately be implementing, maintaining, reporting on, and enforcing land use controls, the following language should be included: *"Although the Navy may later transfer [has transferred] these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for remedy integrity."*	Section 3.2, paragraph 1, sentence 5, page 3-1 For the Building 6 site, the language is shown as follows: "The Navy will retain ultimate responsibility for the long-term integrity of the final remedy."
9	Refer to the remedial design (RD) or remedial action work plan (RAWP) for the implementation actions. A LUC Remedial Design will be prepared as the land use component of the Remedial Design. Within 90 days of ROD signature, the [military service] shall prepare and submit to EPA for review and approval a LUC remedial design that shall contain implementation and maintenance actions, including periodic inspections." Another option is to refer to the enforceable schedule in the IAG for the RD or RAWP.	Section 2.11.2, paragraph 2, sentence 1, page 2-30 For the Building 6 site, the language is shown as follows: "*The Navy will prepare a RAWP to specify the institutional and engineering controls required to implement LUCs as the final remedy for the Bldg. 6 Site and submit the RAWP for EPA review and approval within 90 days of ROD signature."*