

Project Title: Site Management Plan Update, Pearl Harbor Naval Complex, Oct 2004
 Pearl Harbor, Hawaii
 Reviewer: EPA, Lewis Mitani
 Date: 24 March 2005

Comment No.	Section No.	Comment
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General Comments

1		The process described in the Site Management Plan Update (the SMP Update), Appendix B, Section B.1, for conducting human health risk assessments appears in large part to be a summary of Navy guidance. EPA has developed extensive guidance for conducting human health risk assessments, and sees little value in adding additional "tiers." In addition, any risk assessment submitted by the Navy for the Pearl Harbor Naval Complex (PHNC) will ultimately be required to conform with current EPA risk assessment guidance.
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Response: The Navy respectfully disagrees with the comment regarding the "little value in adding additional tiers" to the risk assessment process. Although not identical, the Navy Human Health Risk Assessment Guidance is consistent with the EPA's current risk assessment guidance. Tier 1 is the Preliminary Assessment/Site Inspection/Listing Site Inspection (PA/SI/LSI). Tier 2 is the Baseline Risk Assessment in the Remedial Investigation (RI). Tier 3 is the Risk Evaluation of Remedial Alternatives in the Feasibility Study (FS). A "tiered" framework has been incorporated into the Navy's Human Health Risk Assessment Guidance to facilitate health-protective, efficient, and cost effective evaluations of Navy Sites.

2		Section B.2, Ecological Risk Assessment (ERA), provides a well-written and concise, but very conceptual plan for ERAs at PHNC. Because the document is very general, specific issues will need to be resolved and documented on a site-specific basis. These issues include the assessment of risks associated with anthropogenic chemicals (see specific comments below), background comparisons, assessing risks associated with site runoff or groundwater discharge to Pearl Harbor, and selection of screening levels and toxicity reference values (TRVs). In addition, the document does not provide contingency plans in the event that the results of the Tier 2 do not allow a choice to be made (with acceptable uncertainty) between no further evaluation and proceeding to remedy development. While the Regulatory Agencies as well as the Navy hope for a clear Tier 2 with an acceptable level of uncertainty, new field data sometimes results in the need for additional assessment prior to remedy development. This fact should be acknowledged in the document or in subsequent site-specific documents.
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Response: ERA's at PHNC are done on a site-specific basis, and each ERA raises many issues including those having to do with site releases, natural and anthropogenic background, fate and transport of contaminants, and selection of appropriate screening levels and TRVs. Although some data and decisions may be applied across multiple sites in the PHNC because of similarities in setting, these are for the most part site-specific decisions.

The ERA process is an iterative process which leads to the development of PRGs at the end of Tier 2. While there is inherent uncertainty surrounding the PRGs, the process used to develop them ensures that they are appropriately conservative. Any subsequently acquired data will be taken into account during the Feasibility Study and/or Engineering Evaluation/Cost Analysis and the development of Cleanup Goals.

Specific Comments

1	Appendix A, page A-2	The Record of Decision (ROD) for Makalapa Crater has been delayed six years from last year's SMP Update. Please explain the reason for the new proposed ROD date for the project.
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Response: The ROD date has been revised to provide a more realistic schedule since the earliest funding for the investigation of the Makalapa Crater GSA will start in FY08.

2	Appendix B, Section B.1.2.1.2, Page B-8, third bullet	Please delete this bullet it adds only confusion. Chemicals that were detected above benchmarks will be retained regardless of detection frequency. Low frequency of detection but above benchmarks would necessitate further spatial analysis in accordance with the conceptual site model.
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Response: The third bullet has been deleted. The revised Appendix B is included as part of the update package.

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Comment No.	Section No.	Comment
3	Appendix B, Section B1.2.4.2, page B-15, first paragraph	Please delete the word "uncertainty" from the first sentence. Probabilistic methods quantitatively address only the variability not the uncertainty.
<p>Response: The Navy respectfully disagrees with the deletion of the word uncertainty from the first sentence because according to RAGS Volume 3 Part A, Process for Conducting Probabilistic Risk Assessment Chapter 1 (EPA 2001) both uncertainty and variability are analyzed in a PRA. As stated in the guidance, "The importance of adequately characterizing <u>variability and uncertainty</u> is addressed in the 1995 memorandum on <i>Risk Characterization Policy and Guidance</i> (EPA 1995). In the spring of 1997, EPA released the memorandum, <i>Use of Probabilistic Techniques (including Monte Carlo Analysis) in Risk Assessment</i> (EPA 1997). According to the Policy Statement of the memorandum, probabilistic analysis techniques, "given adequate supporting data and credible assumptions, can be viable statistical tools for analyzing <u>variability and uncertainty</u> in risk assessments."</p>		
4	Appendix B, Section B.1.2.4.2, page B-15	Second sentence, change "point estimate" to "deterministic".
<p>Response: The text has been modified as requested. The revised Appendix B is included as part of the update package.</p>		
5	Appendix B, Section B.1.2.4.2, page B-15	Please add a third paragraph for the project team to involve all stakeholders and to evaluate the level of effort and the cost of completing a probabilistic assessment before beginning such an assessment.
<p>Response: The following paragraph has been added to Section B.1.2.4.2:</p> <p>PRA's generally require more time, resources, and expertise than traditional risk assessments. In general, PRA's should only be considered at sites where remediation costs are expected to be high and the savings offered by performing a PRA are significant. Stakeholders should be consulted in determining whether a PRA should be performed.</p> <p>The revised Appendix B is included as part of the update package.</p>		
6	Section B.2.2.1, Refinement of Exposure Assumptions , page B-20	The document states that COPCs will be evaluated in accordance with the Navy Policy on the Use of Background Chemical Levels (DON, 2004), but this policy does not clearly state that the potential for impacts on upper trophic level receptors will be considered. Anthropogenic chemicals potentially present at PHNC sites include organochlorine pesticides that are known to bioaccumulate. Please revise the document to state that the potential impacts of anthropogenic chemicals, even at background levels, will be considered using exposure modeling and comparison with relevant TRVs.
<p>Response: Non site-related anthropogenic chemicals will be compared to risk-based benchmarks and discussed in the risk characterization section of the risk assessment. This is consistent with both Navy policy (Department of Navy [DON] 2004) and EPA policy (EPA 2002).</p>		
7	Section B.2.2.4, Risk Characterization, Pages B-24 and B- 25	The risk characterization section does not include a discussion of how site-specific background issues will be addressed. In accordance with EPA policy (1995, 2002), background should be addressed in the risk characterization section and the risk characterization should fully, openly, and clearly characterize these risks. Please revise this section to explain how site-specific background issues will be addressed in the risk characterization.
<p>Response: The following sentence has been added to the end of Section B.2.2.4 to address background: Background chemicals that exceed RBCs will be identified and discussed in the risk characterization section. The revised Appendix B is included as part of the update package.</p>		

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8	Section B.2.2.4, Additional References, Page B-30	The Appendix cites the 2002 version of the EPA Region IX preliminary remediation goals (PRGs), but a new version was published in October 2004 (EPA, 2004), shortly before the SMP Update was submitted for review. Please use the most recent PRG tables in the SMP Update and in subsequent site-specific documents.
Response: The reference to the 2002 PRGs has been replaced with the new version published in 2004. The revised Appendix B is included as part of the update package.		
9	Appendix C, Section C.1, page C-2, last paragraph	Please change "Texas" to "California". Travis AFB is in Fairfield, CA.
Response: The text has been corrected. A replacement page has been provided as part of the update package.		

References:

Department of the Navy (DON). 2004. *Navy Policy on the Use of Background Chemical Levels*. CNO Policy Letter Ser N45C/N4U732212. January.

Environmental Protection Agency, United States (EPA). 1995. *Guidance for Risk Characterization*. U.S. Environmental Protection Agency Science Policy Council. February.

Environmental Protection Agency, United States (EPA). 1997. *Use of Probabilistic Techniques (including Monte Carlo Analysis) in Risk Assessment*, Memorandum from the EPA Administrator. May.

Environmental Protection Agency, United States (EPA). 2001. *Risk Assessment Guidance for Superfund: Volume 3 – (Part A, Process for Conducting Probabilistic Risk Assessment)*, EPA/540/R/02/002. Office of Emergency and Remedial Response. December.

REPLACEMENT PAGES
FOR THE SITE MANAGEMENT PLAN UPDATE
FOR PEARL HARBOR NAVAL COMPLEX, PEARL HARBOR, HAWAII,
OCTOBER 2005

The following portions of the Site Management Plan Update for Pearl Harbor Naval Complex, Pearl Harbor, Hawaii, October 2004, have been updated:

Appendix A, SMP Schedules

Appendix B, Risk Assessment Protocols (replace text only, no change to attachments)

Appendix C, Background Data Evaluation Protocol (includes one page for replacement)

Appendix D, Current Status of Active PHNC Sites

Replacement pages for these portions and replacement report cover/spine and title page are provided. All other sections of the Site Management Plan remain unchanged. The unchanged portions will retain the original date of March 1997 (or October 1999 for Section 1 and October 2004 for Appendix C) in an effort to save paper and reproduction costs.

Once the replacements have been made, the revised document is the Site Management Plan Update for the Pearl Harbor Naval Complex, Pearl Harbor, Hawaii, October 2005.

Site Management Plan Update Pearl Harbor Naval Complex PEARL HARBOR, HAWAII

October 2005

Prepared for:



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Commander
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Appendix A - SMP Schedule

				DRAFT	DRAFT FINAL/FINAL
RPM	SITE	DOCUMENT	P=Primary; S=Secondary	Deadline/Target Date	Deadline/Target Date
WC	Aiea Laundry OU	RI: RI/FS	P	5/31/2002	7/31/2006
WC	Aiea Laundry OU	RI: RI/FS Addendum - GW Monit. Oct-Dec	S	3/15/2006	7/13/2006
WC	Aiea Laundry OU	RI: RI/FS Addendum - GW Monit. Apr-Jun	S	10/31/2005	2/28/2006
WC	Aiea Laundry OU	PP/ROD	P	1/17/2007	6/11/2007
WC	DRMO Manana Stor Area OU/PCJ	PP	P	8/22/2005	2/24/2006
WC	DRMO Manana Stor Area OU/PCJ	ROD	P	10/22/2006	2/19/2007
JF	Ford Island	PP (GSA)	P	11/26/2006	1/16/2007
JF	Ford Island	ROD (GSA)	P	4/1/2007	7/30/2007
JF	Ford Island - Bldg 80/302 (E of Indep St)	REM: Performance Design	S	11/30/2005	1/29/2006
JF	Ford Island - Bldg 284 slope	REM: Performance Design	S	12/1/2005	2/28/2006
HL	PHNC Subsurface Oil - MW #25 and 43 (Remedial Action Areas #12 & 13)	RI: Annual GW Monitoring (2005)	S	11/10/2005	3/28/2006
HL	PHNC Subsurface Oil - MW #25 (Remedial Action Areas #12)	RI: Annual GW Monitoring (2006)	S	10/30/2006	2/27/2007
HL	PHNC Subsurface Oil - MW #25 (Remedial Action Areas #12)	RI: Annual GW Monitoring (2007)	S	10/30/2007	2/27/2008
HL	PHNC Subsurface Oil - MW #13 and 25 (Remedial Action Areas #11 and 12)	RI: RI Planning Docs	P	10/1/2006	1/29/2007
HL	PHNC Subsurface Oil - MW #13 and 25 (Remedial Action Areas #11 and 12)	RI: RI Report	P	6/1/2008	9/29/2008
CZ	NSY 0-1 Pier Shoreline	SI: SI Report	S	4/16/2006	6/30/2006
Z	NSY 0-1 Pier Shoreline	REM: EE/CA	S	7/30/2006	11/27/2006
CZ	NSY 0-1 Pier Shoreline	REM: Design Docs	S	1/31/2007	5/31/2007
CZ	NSY 0-1 Pier Shoreline	REM: RVR	S	8/31/2007	12/30/2007
CZ	NSY Shoreline NW of DD#3	REM: PP/ROD	P	1/30/2006	6/30/2006
CZ	NSY Sites - Foundry Shop Bldg 6	SI: Expanded SI Report	S	5/19/2003	1/17/2006
CZ	NSY Sites - Foundry Shop Bldg 6	REM: EE/CA	S	2/23/2006	6/23/2006
CZ	NSY Sites - Foundry Shop Bldg 6	REM: Design Docs	S	7/20/2006	11/17/2006
CZ	NSY Sites - Foundry Shop Bldg 6	REM: RVR	S	1/30/2007	5/30/2007
CZ	NSY Sites-Bldg 394	REM: EE/CA Addendum	S	1/20/2006	5/20/2006
CZ	NSY Sites-Bldg 394	REM: Work Plan	S	4/22/2006	8/20/2006
CZ	NSY Sites-Bldg 394	REM: Design Docs	S	8/20/2006	12/18/2006
CZ	NSY Sites-Bldg 394	REM: RVR	S	2/15/2007	6/15/2007
CZ	NSY Sites-Bldg 215	SI: SI Report	S	7/25/2005	1/27/2006
CZ	NSY Sites-Bldg 215	REM: EE/CA	S	1/30/2006	5/30/2006
CZ	NSY Sites-Bldg 215	REM: Work Plan	S	5/30/2006	9/27/2006
CZ	NSY Sites-Bldg 215	REM: RVR	S	1/6/2007	5/6/2007
HL	Pearl City Peninsula Burn Area	REM: EE/CA	S	12/30/2008	4/29/2009
HL	Pearl City Peninsula Burn Area	REM: Design Docs	S	5/1/2011	8/29/2011
HL	Pearl City Peninsula Burn Area	REM: RVR	S	12/30/2014	4/29/2015
L	Pearl City Peninsula Burn Area	PP/ROD	P	1/30/2016	5/30/2016
HL	Pearl City Peninsula-Landfill	REM: RVR	S	12/6/2014	4/5/2015

Appendix A - SMP Schedule

RPM	SITE	DOCUMENT	P=Primary; S=Secondary	DRAFT	DRAFT
				Deadline/Target Date	FINAL/FINAL
HL	Pearl City Peninsula-Fuel Annex	REM: Work Plan	S	6/1/2006	9/1/2006
HL	Pearl City Peninsula-Fuel Annex	REM: RVR	S	2/1/2007	5/2/2007
HL	Pearl City Peninsula-Fuel Annex	PP/ROD	P	5/15/2007	8/30/2007
HL	Pearl City Peninsula-SSR identified area	SI: SI Planning Docs Addendum	S	7/1/2006	10/29/2006
HL	Pearl City Peninsula-SSR identified area	SI: SI Report	S	4/1/2007	7/30/2007
CZ	NSY Sites-NAVSHIPYD Storm Drain	SI: SI Planning Docs	S	1/20/2006	5/20/2006
CZ	NSY Sites-NAVSHIPYD Storm Drain	SI: SI Report	S	6/7/2007	10/5/2007
CZ	NSY Sites-NAVSHIPYD Storm Drain	REM: EE/CA	S	10/10/2007	2/7/2008
CZ	NSY Sites-NAVSHIPYD Storm Drain	REM: Design Docs	S	8/7/2008	12/5/2008
CZ	NSY Sites-NAVSHIPYD Storm Drain	REM: RVR	S	2/17/2009	6/17/2009
HL	NS, NSB Storm Drain	RI: RI Planning Docs	P	1/15/2009	5/14/2009
HL	NS, NSB Storm Drain	RI: RI Report	P	9/15/2009	1/15/2010
HL	NS, NSB Storm Drain	REM: EE/CA	S	4/15/2010	8/14/2010
HL	NS, NSB Storm Drain	REM: Design Docs	S	12/14/2010	3/15/2011
HL	NS, NSB Storm Drain	REM: RVR	S	8/30/2011	12/30/2011
ES	PWC Storm Drain	RI: RI Planning Docs	P	1/15/2009	5/14/2009
ES	PWC Storm Drain	RI: RI Report	P	9/15/2009	1/15/2010
ES	PWC Storm Drain	REM: EE/CA	S	4/15/2010	8/14/2010
ES	PWC Storm Drain	REM: Design Docs	S	12/14/2010	3/15/2011
ES	PWC Storm Drain	REM: RVR	S	8/30/2011	12/30/2011
ES	Makalapa Pesticide Rinsate Pit	REM: EE/CA	S	7/15/2006	10/30/2006
WC	FLETRAGRU Fire Fighting Trg	REM: EE/CA	S	5/14/2006	12/11/2006
WC	FLETRAGRU Fire Fighting Trg	REM: Design Docs	S	4/19/2007	12/17/2007
WC	FLETRAGRU Fire Fighting Trg	REM: RVR	S	11/24/2009	3/23/2010
HL	Makalapa Crater	REM: RSE Planning Docs	S	12/19/2009	4/18/2010
HL	Makalapa Crater	REM: EE/CA	S	9/25/2010	1/23/2011
HL	Makalapa Crater	REM: Design Docs	S	1/25/2011	5/25/2011
HL	Makalapa Crater	REM: RVR	S	2/1/2013	7/1/2013
HL	Makalapa Crater	PP/ROD	P	10/1/2013	2/1/2014
MY	PH Regional Sediment	RI: RI Report	P	10/31/2005	2/28/2006
MY	PH Regional Sediment	FS: Planning Documents	P	7/31/2006	11/30/2006
MY	PH Regional Sediment	FS: FS Report	P	3/31/2011	7/29/2011
MY	PH Regional Sediment	PP	P	9/30/2011	1/28/2012
MY	PH Regional Sediment	ROD	P	2/28/2012	6/27/2012
LY	Waipio Peninsula	PP/ROD	P	2/15/2006	8/15/2006
LY	West Loch	PP/ROD	P	6/15/2008	12/15/2008
WC	Naval Housing GSA	SI: SI Report	S	9/29/2006	1/27/2007
WC	Bldg S-6 Richardson GSA	SI: SI Planning Docs	S	7/14/2006	11/11/2006

Appendix A - SMP Schedule

				DRAFT	DRAFT FINAL/FINAL
RPM	SITE	DOCUMENT	P=Primary; S=Secondary	Deadline/Target Date	Deadline/Target Date
WC	Bldg S-6 Richardson GSA	SI: SI Report	S	5/28/2007	9/25/2007
LY	NISMF	PP/ROD	P	2/15/2006	8/15/2006
JF	PWC Transformer Sites/Various Transformer Sites, Oahu	REM: RVR	S	11/28/2005	3/28/2006
MY	SMP/QAPP/Radionuclide/CRP	PHNC SMP Update (2005)	P	10/30/2005	2/27/2006
MY	SMP/QAPP/Radionuclide/CRP	PHNC SMP Update (2006)	P	10/30/2006	2/27/2007
MY	SMP/QAPP/Radionuclide/CRP	PHNC SMP Update (2006)	P	10/30/2007	2/27/2008

Note: Deadline date is for primary documents. Target date is for secondary documents.

Per April 2001 Partnering Session, Ewa Junction Fuel Drumming Facility and Red Hill Oily Waste Disposal Pit sites are no longer under CERCLA due to petroleum exclusion. These sites will be conducted in accordance with the State of Hawaii Contingency Plan (SCP).

Per June 2001 correspondence with EPA and DOH, the AVGAS distribution system on Ford Island will be conducted in accordance with the SCP.

Per March 2003 meeting with the EPA and DOH, Shipyard Subsurface Oil sites are no longer under CERCLA due to petroleum exclusion. These sites will be conducted in accordance with the SCP, and therefore, will not be part of this SMP schedule.

Per May 2003 agreement between Navy, EPA, and DOH, Naval Base (NAVBASE) Subsurface Oil sites are no longer under CERCLA due to petroleum exclusion. These sites will be conducted in accordance with the SCP, and therefore, will not be part of this SMP schedule.

Per September 2005 meeting with EPA and DOH, Naval Base (NAVBASE) Subsurface Oil sites commingled with hazardous substances (i.e. PCBs) will be under CERCLA. These sites will be part of this SMP schedule.

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Attachment B-1 Navy Policy on Conducting Human Health Risk Assessments

Attachment B-2 Navy Policy on Conducting Ecological Risk Assessments

APPENDIX B

PHNC RRP RISK ASSESSMENT PROTOCOLS

A risk assessment evaluates the potential adverse effects of chemical contaminants on human health and the environment. It is the process used to determine potential risk to populations of receptors due to contamination at a hazardous waste site. Each phase of the Pearl Harbor Naval Complex (PHNC) Remedial Response Program (RRP) will follow the Navy's policies on Human Health Risk Assessment (DON 2001) and Ecological Risk Assessment (DON 1999) describing a three-tiered approach with criteria for exiting the process, included as Attachments B-1 and B-2, respectively. The Navy's three-tiered approach is consistent with the Environmental Protection Agency's Risk Assessment Guidance for Superfund (RAGS) (EPA 1989, 1991a, 1991b, 1998). The three-tiers are as follows: Tier 1-Screening Risk Assessment, Tier 2-Baseline Risk Assessment, and Tier 3-Risk Evaluation of Remedial Alternatives. This risk assessment approach uses conservative assumptions when site-specific information is not available, and leads to the development of cleanup goals in the Evaluation of Remedial Alternatives. The Data Quality Objectives (DQO) process will be employed throughout the scoping and design of the Risk Assessments (RAs) to ensure appropriate data quality and exit strategies. The RAs will be scientifically based, defensible, and cost effective while protecting human health and the environment.

B.1 HUMAN HEALTH RISK ASSESSMENT

The objectives of the human health risk assessment are to evaluate the possibility that carcinogenic or non-carcinogenic health effects could result from exposure to site contaminants and provide information to help identify if and where a response is needed. This leads to the development of cleanup goals, which will be used in evaluating remedial alternatives.

B.1.1 Tier 1 for Human Health

The purpose of the Tier 1 Screening Risk Assessment (SRA) is to identify chemicals of potential concern (COPC) that may pose unacceptable risks to human health. The Tier 1 SRA consists of two parts: Tier 1A, Risk Based Screening (RBS) and Tier 1B, Site Specific Risk Based Evaluation (SSRBE). In the risk-based screen, site chemical

concentrations will be compared to conservative risk-based concentration (RBCs) in order to determine if the site may exit the human health risk assessment process or to determine the subset of chemicals that will become the focus of subsequent site investigation and evaluation. RBCs are concentrations of chemicals in soil, air, and water that are considered protective of human health. The Tier 1 SRA process consists of the following steps:

1. Develop a conceptual site model (CSM).
2. Evaluate data quality objectives (DQOs).
3. Compare site concentrations to background and eliminate chemicals that are not elevated above concentrations.
4. Identify RBCs appropriate for Tier 1A and Tier 1B.
5. Identify appropriate Tier 1A or Tier 1B site chemical concentrations for each medium.
6. Perform risk-based screening by comparing chemical concentrations to RBCs for each medium.
7. Evaluate the results of the screening using the exit criteria to determine if the site can exit the cleanup process or warrants further study.

B.1.1.1 Development of a Conceptual Site Model

A CSM describes the relationships between the receptors, exposure points, transport pathways, and contaminant sources at a site. Pertinent information to be searched and presented is land uses, potentially exposed populations, and potentially complete exposure pathways. In accordance with RAGS (USEPA 1989), human health RAs are intended to address only contaminants for which there is a complete or potentially complete exposure pathway under current and future land use conditions. RAGS defines a complete or potentially complete exposure pathway as one that consists of the following four elements: (1) a source and mechanism of chemical release; (2) a retention or transport mechanism through an environmental medium; (3) a point of potential human contact with the contaminated medium (exposure point); and (4) an exposure route at the

exposure point. If any of these elements is missing, the exposure pathway is considered incomplete, and chemical uptake by that pathway would be expected not to occur.

B.1.1.2 Evaluation of Data Quality Objectives

The analytical data for a site will be evaluated prior to risk-based screening to ensure that the site-specific DQOs have been achieved. The key data quality objectives for risk-based screening are as follows:

- Data Quality – The analytical data will be of suitable quality for HHRA purposes. That is, data will be collected in a manner that provides a basis for making remedial decisions at a site.
- Site Characterization – There will be sufficient sample density and sample coverage to adequately characterize a site. All media of concern will be sampled at likely exposure points in order to provide a consistent basis for comparing site data and the RBCs.
- Analytical Data Limits – The analytical methods selected for a site should be sensitive enough to support the needs of the risk assessment (i.e., the detection limits for chemicals of potential concern should be less than their RBCs). The value of risk-based screening is diminished if the detection limits are greater than the RBCs.

B.1.1.3 Background Screening

In January 2004, the Office of the Chief of Naval Operations (CNO) issued the Navy Policy on the Use of Background Chemical Levels (DON 2004). The purpose of this policy is to provide clarification on the consideration of background chemical levels in the list of chemicals of potential concern (COPCs) in the Environmental Restoration Program. Navy background policy describes how to consider background chemicals levels in the program by:

1. Identifying those chemicals that are in the environment due to releases from the site;

2. Eliminating from consideration in the risk assessment process both naturally occurring and anthropogenic chemicals that are present at levels below background;
3. Ensuring documentation and discussion of potential risk from chemicals that have been eliminated during the background evaluation process; and
4. Developing remediation action levels that are not below background.

B.1.1.4 Tier 1A – Risk Based Screening for Human Health

The Tier 1A RBS is a conservative assessment of whether site contamination poses a significant risk to human health. The purpose of this assessment is to screen out areas of sites, COPCs, and exposure pathways from further investigation. The Tier 1A RBS is conducted by comparing the maximum concentration detected at the site of each chemical of each medium (soil, surface water, and groundwater) to the appropriate RBC benchmark. The RBCs may be EPA Region IX Preliminary Remediation Goals (PRGs) or other values that are based on conservative human health exposure assumptions.

PRGs are intended by USEPA to be used as initial guidelines to facilitate development of a range of appropriate remedial alternatives and to focus selection on the most effective remedy. PRGs do not establish that cleanup is warranted to meet these goals. Within USEPA Region IX, the approach to the calculation of PRGs has been refined and the values are published annually (USEPA 2004b). PRGs combine updated USEPA toxicity values with health-protective standard exposure assumptions to estimate contaminant levels in environmental media, which correspond to a lifetime excess cancer risk (above background) of one-in-a-million (1E-06) and/or hazard index (HI) of 1 for non-cancer concerns. The HI is a summation of the risk from a group of chemicals with similar toxic effects. The HI is determined using a ratio of site concentrations and PRGs. USEPA Region IX also states that PRGs can be “used to screen pollutants in environmental media, trigger future investigation, and provide an initial cleanup goal if applicable (USEPA 2004b).”

The RBCs should be agreed upon with the regulators before beginning the screen. Each COPC will be evaluated with respect to background levels (naturally occurring and anthropogenic) in accordance with the Navy Policy on the Use of Background Chemical Levels (DON 2004), detection frequency, bioavailability, and role as an essential nutrient.

The resulting product of Tier 1A is a list of constituents that will be eliminated from further evaluation, and list of COPCs that may pose an unacceptable risk to human health and will be evaluated further in either Tier 1B or Tier 2. If no constituents are identified as COPCs, then the site would proceed to the Tier 1 exit criteria (see section B.1.1.6).

If the constituents fail the Tier 1A screen and the cost associated with remedial action is high, the screening evaluation may continue to the Tier 1B. If the site concentrations are orders of magnitude above the RBC/PRGs then it may be more cost effective to simply proceed to Tier 2-Baseline Human Health Risk Assessment.

B.1.1.5 Tier 1B – Site Specific Risk-Based Evaluation

The chemicals determined in the Tier 1A risk-based screen to have an unacceptable risk using very conservative assumptions will be evaluated further in Tier 1B, Site Specific Risk-Based Evaluation (SSRBE). In the SSRBE, the conservative assumptions used in Tier 1A are refined to calculate a site-specific risk evaluation.

The SSRBE is conducted by refining the maximum RBC used in Tier 1A. The RBCs used in Tier 1B are back calculated using site-specific exposure assumptions for a risk level of 1×10^{-6} excess lifetime cancer risk. This may include re-evaluating exposure population, duration, pathways, and future and current land uses. The exposure assumptions used to calculate site-specific RBCs will be identified and the sources and assumptions clearly documented. In addition, the 95% upper confidence limit of the mean concentration may be calculated and compared to the RBC, rather than the maximum concentration used in the Tier 1A assessment.

The Tier 1B SSRBE will have two possible outcomes: (1) COPCs pose no unacceptable risks to human health, or (2) some or all COPCs may pose a potential unacceptable risk to human health. After completing Tier 1B, the site would proceed to the Tier 1 exit criteria (section B.1.1.6).

B.1.1.6 Tier 1 Exit Criteria

There are two exit paths that can occur following the Tier 1 SRA:

- (1) The site completes Tier 1A and, if conducted, Tier 1B, and no COPCs are identified that pose unacceptable risks. A determination is made that the site

poses acceptable risks to humans and the site shall be closed out for human concerns with a No Further Action (NFA) designation and thus allow exiting the HHRA process without the need for completing Tiers 2 and 3 of the process, or

- (2) The site completes Tier 1A and, if conducted, Tier 1B, and some COPCs are identified to pose potential unacceptable risks to human health. A determination is made that the site poses potentially unacceptable risks to human health and that either interim cleanup be implemented or the site moves to Tier 2, Baseline Human Health Risk Assessment.

B.1.2 Tier 2 – Baseline Human Health Risk Assessment (BHHRA)

The purpose of a Tier 2, Baseline Human Health Risk Assessment (BHHRA) is to determine if a site poses unacceptable risk levels based on current or future land use and current site conditions if no remediation or institutional controls are applied at the site. The BHHRA also provides a basis for determining levels of chemicals that can remain on site and still be adequately protective of human health.

The BHHRA is more rigorous than the SRA and will have additional documentation. The BHHRA will be conducted during the Remedial Investigation phase and be site specific. Some additional data collection may be needed to accurately estimate the potential risk, but is not required. The most important step in the BHHRA is the study design. The DQOs developed in Tier 1 are re-evaluated to ensure that appropriate data are collected to permit risk characterization and support risk-based decision-making for the site. Topics that may be considered during preparation of the study design include current and future land use settings, data collection, exposure scenarios, and exposure concentrations used in the risk estimation.

The BHHRA can be divided into five steps as follows:

- Data Evaluation and Reduction
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

- Uncertainty Analysis

B.1.2.1 Data Evaluation and Reduction

The primary purpose of data evaluation and reduction is to identify the COPCs for the site and establish the concentration term of the risk assessment equation. Performing the data evaluation and reduction includes performing the following items:

- Assess the quality of the data based on the site-specific DQOs
- Evaluate the data to identify COPCs
 - Compare site concentrations to background concentrations
 - Compare site concentrations to RBCs
 - Eliminate essential nutrients and chemicals detected infrequently from further consideration in the BHHRA
- Calculate exposure point concentrations for COPCs

B.1.2.1.1 Data Quality Objectives

The site data will be evaluated using the DQOs established for the site to ensure the data is appropriate for the risk assessment. This includes determining if: (a) the analytical data is of suitable quality for HHRA purposes; (b) the data is collected in a manner that provides a basis for making remedial decisions at the site; (c) there is sufficient sample density and sample coverage to adequately characterize the site and all media of concern; (d) the analytical methods selected for the site are sensitive enough to support the needs of the risk assessment; and (e) the detection limits for COPCs are less than the applicable benchmarks.

B.1.2.1.2 Identify COPCs

A list of COPCs will be determined once analytical methods, quantification limits, qualifiers, and blanks have been evaluated and background screening and risk-based screening have been completed. These COPCs will then be the focus of the BHHRA. Eliminating chemicals from further consideration reduces the level of effort and focuses the BHHRA on chemicals that pose the majority of the risks. Criteria for identifying COPCs for a site are as follows:

- Chemicals that were not detected in any samples for a particular medium will be eliminated from further consideration in the BHHRA (USEPA 1989).
- Essential nutrients (i.e., calcium, magnesium, potassium, iron and sodium) will be eliminated from consideration in the BHHRA because they are not associated with toxicity in humans under normal circumstances (USEPA 1991a).
- Chemicals detected at concentrations that are not representative of background concentrations will be retained for further evaluation in the BHHRA.
- Chemicals detected at concentrations that exceed RBCs will be retained for further evaluation in the BHHRA.

B.1.2.1.3 Calculate Exposure Point Concentrations

Once the COPCs have been identified, the representative concentrations of each chemical to which the population will be exposed will be determined. The issues associated with developing representative exposure point concentrations are discussed in the following sections.

Field Duplicate Samples

Field duplicate results will be either combined into one sample or be included in the risk assessment as discrete results. The field duplicate data may be grouped by decision rules, such as the following:

- If a chemical is detected in both of the field duplicate samples, then either the maximum or average of the values may be used
- If a chemical is detected in only one of the field duplicate samples, then the detected value may be used; or
- If a chemical is not detected in either of the field duplicate samples, then use the higher of the sample quantitation limit may be used.

Non-Detected Data

The USEPA recommends that if there is a reason to believe a chemical is present in a sample at a concentration below the sample quantitation limit (SQL), then one-half of the

SQL should be used as a proxy concentration (USEPA 1989). Detection limits greater than two times the maximum detected values will be eliminated from the statistical analysis to avoid using unrealistically high detection limits for non-detected values.

Calculating Exposure Point Concentrations

The USEPA recommends that Reasonable Maximum Exposure (RME) and Central Tendency Exposure (CTE) parameters be used to estimate risk. In general, CTE estimates are determined by replacing the exposure factors used in the RME scenario with average or median values. The minimum value between the maximum detected concentration and the 95th upper confidence limit on the mean will be used as the EPC for the RME evaluation.

B.1.2.2 Exposure Assessment

The purpose of the exposure assessment is to quantify human exposure to COPCs for complete exposure pathways. The results of the exposure assessment are combined with toxicity information to characterize potential risks. The major components of the exposure assessment are:

- Evaluate current and future land use
- Identify potentially exposed populations
- Identify complete exposure pathways
- Develop CTE and RME scenarios
- Quantify Exposure

One of the first steps in the exposure assessment is to review the CSM and revise it based on new site-specific information. The purpose of the CSM is to provide an understanding of the potential for exposure (under current and future land use) to chemicals at a site based on sources of contamination, the release mechanisms, the exposure pathways, and the receptors. The other components of the exposure assessment are discussed in the following sections.

B.1.2.2.1 Current and Future Land Use Considerations

Land use is a critical component of the risk assessment process because it dictates which exposed populations (i.e., residential, industrial, or other) should be evaluated in the BHHRA. Land use assumptions for conducting HHRA's will be based on a factual understanding of site-specific conditions and reasonably anticipated use. The land use evaluated in the risk assessment will not be based on a residential scenario, unless residential land use is plausible for the site.

B.1.2.2.2 Exposure Populations and Pathways

Population characteristics that influence exposure, such as location of people relative to the site, activity patterns, age groups, and presence of sensitive subpopulations may be identified. Exposure pathways are identified based on consideration of the sources, releases, types, and locations of chemicals at the site. In order for a COPC to pose a risk to human health, a complete exposure pathway must be present. A complete exposure pathway consists of the following elements:

- A source and mechanism of chemical release to the environment (e.g., contaminated soil);
- An environmental transport medium for the released chemical (e.g., air);
- An exposure point (i.e., a point of potential human contact with the contaminated medium) that includes a location where humans are present and where there is activity that results in exposure, referred to as an "exposure scenario;" and
- An exposure route at the point of exposure (e.g., inhalation).

Exposure pathways will be plausible and consistent with site-specific information. Temporal trends will be considered when identifying complete exposure pathways. In some cases, receptors may not be currently exposed to COPCs but may be in the future (e.g., COPCs in groundwater that migrate laterally and, in the future, impact a well used for drinking water). In this case exposures to contaminated groundwater would be evaluated based on exposures that are expected to occur in the future.

B.1.2.2.3 Develop CTE and RME Scenarios and Quantify Exposure

The USEPA has identified standard default exposure parameters that are appropriate to use as a starting point when evaluating exposures at sites (USEPA 1991c). These default parameters include algorithms and exposure parameters for incidental soil ingestion, dermal exposure to soil, inhalation of soil, and ingestion of groundwater for residential and industrial scenarios. Each parameter in these equations has a range of possible values associated with it. The exposure parameters for a given pathway will be selected so that the combination of all exposure parameters results in a realistic estimate of the CTE and RME for that pathway. The source for each exposure parameter will be documented in the BHHRA.

The last step in the exposure assessment is quantifying the daily intake of chemicals for the receptors identified in the CSM. The general equation used to calculate daily intake of a chemical is:

$$\text{Daily Intake} = \frac{\text{Chemical Concentration} \times \text{Contact Rate} \times \text{Exposure Frequency} \times \text{Duration}}{\text{Body Weight} \times \text{Averaging Time}}$$

Quantitative characterization of carcinogenic and non-carcinogenic risks requires estimating the potential human intake levels for each COPC. Daily intakes for carcinogens are averaged over the lifetime of the exposed individual (i.e., 70 years) and are referred to as the Lifetime Average Daily Intake (LADI). Daily intakes for non-carcinogens are averaged over the duration of exposure and are referred to as the Average Daily Intake (ADI).

B.1.2.3 Toxicity Assessment

In general, the toxicity assessment step of the BHHRA consists of locating and collating toxicity information that can be combined with the exposure assessment information to calculate risks. The USEPA has completed toxicity assessment for most chemicals found at sites and the resulting toxicity values have been peer reviewed. USEPA-derived toxicity values and absorption factors for COPCs will be searched from the USEPA Integrated Risk Information System (IRIS) (USEPA 2004a), the provisional peer-reviewed toxicity values (USEPA 2003), and Health Effects Assessment Summary Tables (HEAST) (USEPA 1997). All pertinent toxicological information (uncertainty factors, critical and other adverse effects, reference sources, assumptions, etc.) will be included.

USEPA Region IX toxicologists and/or Superfund Health Risk Technical Support Center at the USEPA National Center for Environmental Assessment (NCEA) may be contacted for guidance on chemicals without USEPA-derived toxicity values. Other potential sources of toxicity values that may be consulted include the California Environmental Protection Agency and the Agency for Toxic Substances and Disease Registry. To assist in the decision-making process, toxicity uncertainty associated with risk drivers at PHNC sites will also be presented.

B.1.2.4 Risk Characterization

Risk characterization integrates the results of the data evaluation, exposure assessment, and toxicity assessment into quantitative expressions of risk. The key components of the risk characterization process include the following:

- Quantify risks from individual chemicals;
- Quantify risks from multiple chemicals;
- Combine risks across exposure pathways; and
- Consider site-specific human studies (USEPA 1989).

The USEPA has typically used a hazard index (i.e., the cumulative non-cancer risks for all chemicals) of 1 or greater, or a hazard index for a target organ/critical effect of 1 or greater as a benchmark for evaluating non-carcinogenic hazard indices. For carcinogenic risk, the USEPA's approach "emphasizes the use of 1 chance in one million [i.e., 1E-06] as the point of departure while allowing site or remedy-specific factors, including potential future uses, to enter into the evaluation of what is appropriate at a given site." Generally, risk assessment evaluations will be as follows:

- Where the cumulative carcinogenic site risk to an individual based on an RME for both current and future land use is less than 1E-04 and the non-carcinogenic HI is less than 1, action generally is not warranted unless there are adverse ecological impacts.
- Records of Decision for remedial actions taken at sites posing human health risks within the 1E-04 to 1E-06 risk range will need to explain why remedial action is warranted.

- The upper boundary of the risk range is not a discrete line at 1E-04, although USEPA generally uses 1E-04 in making risk management decisions. In certain cases, USEPA may consider risk estimates slightly greater than 1E-04 to be protective.

The risk of cancer from chemical exposure is described in terms of the probability that an exposed individual will develop cancer during his/her lifetime from that exposure. The risk estimate is calculated by multiplying the daily intake of a particular chemical over a lifetime by the carcinogenic slope factor.

$$\text{Risk} = \text{LADI} \times \text{SF}$$

where:

Risk = Lifetime probability of developing cancer due to exposure to a chemical in the environment

LADI = Lifetime average daily intake of chemical (mg/kg-day)

SF = Carcinogenic slope factor for chemical (mg/kg-day)⁻¹

All carcinogenic risks for chemicals for each scenario and receptor are then summed to yield the total carcinogenic risk. A 1 in 1,000,000 cancer risk (i.e., 1E-06) means that, in a population of 1,000,000 people exposed under an identical exposure scenario (i.e., had exactly the same daily intake of a carcinogen over the same time period), there could be one additional case of cancer in the population.

Adverse non-carcinogenic health effects from exposure to a COPC are quantitatively expressed as a hazard quotient. The hazard quotient is the ratio of a human's estimated intake of a particular chemical to the RfD. A hazard index is the sum of hazard quotients with similar target organ effects.

$$\text{HQ} = \frac{\text{ADI}}{\text{RfD}}$$

Where:

HQ = Hazard Quotient. The ratio of the estimated dose of a chemical to the RfD

ADI = Average daily intake of chemical (mg/kg-day)

RfD = Reference dose for chemical (mg/kg-day)

The RfD is the threshold intake level for a particular chemical below which it is unlikely that even sensitive subpopulations would experience adverse health effects. Usually, only chronic hazard quotients are evaluated, as the sub-chronic effects within a given exposure scenario are typically less than or equal to the chronic effects for the same scenario.

For non-cancer health effects, hazard quotients are added across chemicals when they target the same organ, or produce the same critical effect, to calculate a segregated hazard index. Segregation of hazard indices requires the identification of the major effects of each chemical, including those seen at higher doses than the critical effect (e.g., the chemical may cause liver damage at a dose of 5 mg/kg-day and neurotoxicity at a dose of 25 mg/kg-day).

If the total segregated hazard index is less than one, it indicates that adverse non-carcinogenic health effects are unlikely. If the total segregated hazard index is greater than one, it indicates that adverse health effects are possible.

The results of both the cancer effects and non-cancer effects evaluations will lead to site-specific, health-based cleanup goals, that will be evaluated along with the results of the ecological risk assessment in the evaluation of remedial alternatives.

B. 1.2.4.1 Evaluation of Health Effects Posed by Lead

The traditional risk assessment approach for evaluating non-cancer effects from exposure to chemicals involves comparison of chemical intakes to a reference dose (RfD). This approach is inappropriate for lead because a no-observed-adverse-effects-level (NOAEL) for lead has not been identified (i.e., there is no RfD for lead) by the USEPA. Blood lead concentrations are accepted as the preferred measure of cumulative lead exposures. Blood lead concentrations provide an index for evaluating the likelihood of adverse effects from lead exposure. A blood lead level of 10 µg/dL has been identified by the Centers for Disease Control as a benchmark for evaluating exposure to lead, and the USEPA defines a greater-than-5-percent probability of exceeding the 10 µg/dL criterion value as posing an unacceptable threat to human health (USEPA 1994).

The risks associated with lead exposures may be evaluated based on the latest information available from the USEPA's Technical Review Workgroup (TRW) for lead. The TRW

has developed approaches, such as the Integrated Exposure Uptake Biokinetic (IEUBK) Model and the Adult Pb Model, for evaluating exposures to lead that are protective of human health. The website <http://www.epa.gov/superfund/programs/lead/trwhome.htm> may be reviewed for current information on evaluating lead exposures.

B. 1.2.4.2 Probabilistic Risk Assessment

A risk assessment performed using probabilistic methods is very similar in concept and approach to the traditional deterministic method used in the BHHRA, with the main difference being the methods used to incorporate uncertainty and variability into the risk estimate (USEPA, 1999). In the deterministic approach, a single numerical value (i.e., point estimate) is chosen for each variable. Based on the choices that are made for each individual variable, a single estimate of risk is calculated. This differs from the probabilistic approach where a range of values is used as an input to the risk equation. Thus, the output of a probabilistic risk assessment (PRA) is a range or distribution of risks experienced by the various members of the population of concern (USEPA 1999).

The primary goal of a PRA analysis is to characterize the uncertainty and variability in the estimates of exposure or risk. A secondary goal is to identify key sources of this uncertainty and variability, and to quantify their relative contribution to the overall variance of the BHHRA results (USEPA 1997). A variety of PRA modeling techniques can be used to characterize the variability and uncertainty in risk. Monte Carlo analysis is one of the most common probabilistic methods used for HHRA purposes.

PRAs generally require more time, resources, and expertise than traditional risk assessments. In general, PRAs should only be considered at sites where remediation costs are expected to be high and the savings offered by performing a PRA are significant. Stakeholders should be consulted in determining whether a PRA should be performed.

B.1.2.5 Uncertainty Analysis

The purpose of the uncertainty analysis is to present an evaluation of the uncertainties that enter the risk assessment at each step of the process in order for regulators, stakeholders, and risk managers to put the risks in proper context. The risks presented in BHHRA are conditional estimates, based on a number of assumptions about exposure and toxicity given a particular land use scenario. Uncertainties are introduced to a risk assessment

because a range of values could be used for each assumption, but only a few actually are. Consistent with USEPA policy, more conservative (i.e., upper bound) values are generally chosen for each parameter, while other values (i.e., values closer to the central tendency) may be more representative of site-specific conditions (USEPA 1989). Choosing upper bound values for each parameter typically results in overly conservative risks that do not reflect site-specific conditions. Uncertainties are used to “bracket” the range of risks that could result from choosing alternate values for the parameters used in calculating risks. USEPA guidance for Risk Characterization states that, “Particularly critical to full characterization of risk is a frank and open discussion of the uncertainty in the overall assessment and in each of its components (USEPA 1995a).”

An uncertainty analysis for a BHHRA can take on many forms depending on the complexities of the site. The types of uncertainty analyses that may be typically performed as part of a BHHRA are as follows.

- **Qualitative** – A qualitative uncertainty analysis for a BHHRA is the most common type of uncertainty analysis. The relative direction and magnitude of the uncertainty associated with the key assumptions/parameters used to calculate the risks are identified, usually in table form, based on the professional judgment of the risk assessor. This approach highlights the key uncertainties and attempts to provide some measure of the potential uncertainty and related impact on the site risk estimates.
- **Semi-Quantitative** – A semi-quantitative uncertainty analysis for a BHHRA is less common. This approach is used to evaluate the sensitivity of the risks to key model parameters (e.g., exposure factors) by recalculating the model with alternative assumptions. This provides information on the plausible upper and lower bounds of the risk estimates.
- **Quantitative** – A quantitative uncertainty analysis for a BHHRA is relatively uncommon. This approach is similar to the Semi-Quantitative approach, however more sophisticated statistical techniques (e.g., Monte Carlo Simulation) are used to evaluate/quantify uncertainty. The advantage of this approach is that a continuous distribution of risk, rather than an upper and lower bound, is developed. In addition, key issues, such as correlations between model parameters, can be accounted for in the statistical evaluation.

B.1.2.6 Exit Criteria for Tier 2

If the site has been adequately characterized and risk evaluated, then the Tier 2 Exit Criteria is as follows:

- (1) The site does not pose unacceptable risk to human health. A determination is made that no further evaluation and no remediation from a human health perspective are warranted, and the site exits the HHRA process, or
- (2) The site poses unacceptable risks to human health. A determination is made that additional evaluation in the form of remedy development and evaluation is appropriate, and the site proceeds in the HHRA process to Tier 3 (discussed in conjunction with Ecological Risk Assessments Tier 3 in B.3).

B.2 ECOLOGICAL RISK ASSESSMENT (ERA)

The Ecological Risk Assessment (ERA) process follows the same general three-tiered format that is followed for the HHRA. Between the two processes there may be opportunities to share data as needed to save resources and prevent duplicating efforts. However, the details within the tiers of the ERA process are unique and the risk assessments will be handled separately.

B.2.1 Tier 1 – Screening Ecological Risk Assessment (SERA)

The Tier 1 ERA uses existing data and conservative assumptions to identify pathways and list the COPCs that may potentially pose an unacceptable risk to appropriate ecological endpoints. This involves developing the conceptual site model and basic problem formulation along with conducting a site visit to better characterize the site.

At a minimum, the problem formulation component of a SERA will be conducted at every site to support decisions during the characterization process. The Navy conducts a site reconnaissance; summarizes existing information on contaminants, exposure pathways, and receptors; and formulates site contamination problems such as: (a) identification of potential stressors, receptors, and pathways; (b) identification of assessment and measurement endpoints; and (c) development of a conceptual model for the physical, chemical, and biological processes existing at the site.

As with the Tier 1 for human health, the exposure concentration is estimated using the maximum detected concentration of a given COPC at the site. The hazard quotient methodology will be used to compare concentrations of contaminants estimated or measured in receptors with appropriate literature benchmarks. These benchmarks reflect dose/response data on chronic or acute toxicity. Exposure point values will be divided by appropriate toxicity reference values (TRVs) to calculate hazard quotients (HQs). HQs will be used as indicators of, but not as a measure of, potential risk from a contaminant. This step will usually be conducted using data already collected. After completing the SERA, the site would proceed to the exit criteria for Tier 1 SERA.

B.2.1.1 Tier 1 Exit Criteria

The criteria for exiting the Tier 1 SERA is as follows:

- (1) The site passes the SERA; there is either an absence of complete exposure pathways to ecological receptors, or an absence of unacceptable risks. If the site passes the screen then the determination is made that the site poses acceptable risks to ecological concerns.
- (2) The site fails the SERA; the site must have both a complete exposure pathway and potentially unacceptable risks. If the site fails the screen the site moves to the Tier 2 Baseline Ecological Risk Assessment (BERA; Section B.2.2), or interim cleanup may be implemented if it is cost advantageous to do so.

In most cases, the site will not pass the SERA due to the very conservative assumptions that are used in Tier 1. Many of the chemicals evaluated in the SERA may be eliminated due to incomplete pathways, no acceptable risk determined in the BERA or by an interim cleanup risk management decision.

B.2.2 Tier 2-Baseline Ecological Risk Assessment (BERA)

The BERA is much more rigorous than the Tier 1 SERA; and, therefore, will require additional documentation as well as further data collection and evaluation. The BERA will be conducted during the Remedial Investigation (RI) phase and will also refine the exposure assumptions, and problem formulation.

The BERA differs from the SERA in that (a) the analysis focuses on those COPCs that require more evaluation following the SERA because there is potential risk; (b) empirical data on exposure and potential effects are gathered to replace estimated and literature-derived data; and (c) several lines of evidence are developed to support a credible weight-of-evidence-based conclusion.

The types of data and steps in the development of the BERA and the key decisions that will be made during this phase, are summarized below.

B.2.2.1 Refinement of Exposure Assumptions

The BERA begins with a refinement of exposure assumptions. Data will be gathered, reviewed, and summarized to provide a basis for this refinement. A literature review will identify existing information about sediment conditions, biota and fisheries, contaminant sources and location, magnitude, and duration of contamination. In addition, a search will be conducted for information that is indirectly relevant to the BERA in the Pearl Harbor estuary, in particular, toxicity data for species that are local or closely related to local species, and ecological information on biological assemblages or species important to PHNC ecosystems. Information sources include the Navy, the Army Corps of Engineers, HDOH, the University of Hawaii, USEPA, U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration Status and Trends and Superfund Technical Assistance groups, National Marine Fisheries Service, and other consultants.

Information developed during this phase may include:

- Nature and sources of contamination.
- Nature and condition of the biota and fisheries
- Physical and chemical characteristics of abiotic media in the region
- Previously recorded environmental problems (e.g., Observed bioaccumulation or toxicity)
- Climatologic, hydrologic, physiographic, and geohydrologic features that could create contaminant pathways to put the biota in contact with contaminants

- Toxicological information relevant to the particular media and organisms in the estuary
- Current and projected (future) land use at the site
- Food web relationships
- Distinct onsite and offsite habitats that are potentially impacted
- Physiochemical properties of any known contaminants

These data are the basis for an evaluation of the COPCs using this further site-specific data in the Hazard Quotient approach. Using the increased data set and more appropriate assumptions often allows for a refined and reduced set of COPCs following this step. Each possible COPC will also be evaluated with respect to background levels (naturally occurring and anthropogenic) in accordance with the Navy Policy on the Use of Background Chemical Levels (DON 2004), detection frequency, bioavailability, and role as an essential nutrient.

B.2.2.2 Problem Formulation

Refining the problem formulation from the SERA synthesizes the scientific data, policy and regulatory issues, and site-specific factors to determine if stressors, receptors, and exposure pathways exist at a site and to define the objectives and scope of future ecological assessment work. The following elements are the specific components required for problem formulation:

- (1) Site Description: Describe existing site conditions.
- (2) Potential Stressors: Identify and describe potential stressors present at a site.
- (3) Potential Ecological Responses: Gather information about toxicological and other adverse effects associated with specific chemical contaminants usually found during a literature search. This research brings together information on:
 - The physiochemical characteristics and toxic mechanism of a chemical contaminant;

- Toxicological endpoint values [No Observed Adverse Effect Level (NOAEL), Lowest Observed Adverse Effect Level (LOAEL), etc.] for site-related contaminants;
 - The potential for bioconcentration, bioaccumulation, or biomagnification of chemical contaminants within receptors at the site (based upon abiotic and biotic conditions and chemical-specific data);
 - Gaps in the data on the effects of a particular chemical contaminant on given receptors; and
 - Those receptors that might be good indicators of habitat modifications or alterations that are potentially due to the presence of specific chemical contaminants.
- (4) Ecological Receptors: Identify receptors potentially at risk. These may include species, habitat, system functions, or other natural resource values.
- (5) Exposure Routes: Determine the routes along which contaminants can move from a point of release through various media to locations where exposure may occur. All data and information developed up to this point will be used to redefine a conceptual site model (CSM) that integrates information on stressors, receptors, and pathways. This model will indicate the relationship among the relevant physical, chemical, and biological features of the site and the associated systems.
- (6) Assessment and Measurement Endpoints: Develop explicit expressions of the environmental characteristics or values that are to be protected and that will be considered within the scope of the ecological risk assessment. Assessment endpoints establish a clear logical connection between regulatory goals for a site and the objectives of the ecological risk assessment. The four criteria that may be considered when establishing assessment endpoints are
- Policy goals
 - Societal values
 - Ecological relevance
 - Susceptibility to the hazardous substance

From the standpoint of general acceptance, effects on economically or socially valued populations such as trees, fish, birds, or mammals are the most understandable. If species not so valued are particularly susceptible, then their link to valued species (such as

threatened and endangered species) or other valued environmental attributes (such as aesthetics) will be described. Each assessment endpoint is related to a measurement endpoint; in some cases, this endpoint may be the same.

Although an assessment endpoint may apply to a number of sites, it will usually be specific and focused rather than broad and all-inclusive. The general form of such an endpoint is: Protection of {specific valued ecological receptor} from {specific effect} due to the presence of {specific COPC}. Examples of assessment endpoint are

- Maintenance of a marine ecosystem, with no loss of species or community alterations, due to the presence of site-related contaminants.
- No adverse effects on reproduction in piscivorous birds, due to the presence of site related contaminant.
- Protection of piscivorous birds from eggshell thinning, that would result in reduced reproductive success, due to the presence of site-related contaminants.

Measurement endpoints are quantitative expressions of an observed or measured response in receptors (related to assessment endpoints) exposed to chemical hazardous substances. Measurable and/or predictable responses that could indicate the actuality of and/or potential for adverse impacts could include, but are not necessarily limited to

- Mortality, survival (acute toxicity)
- Reproductive success, fecundity, growth (chronic toxicity)
- Abundance or occurrence
- Yield, production, or growth (for plants)
- Yield, production, or growth (for invertebrates)
- Contaminant tissue concentrations

Measurement endpoints are readily measurable phenomena and appropriate for the exposure pathways, temporal dynamics of exposure, and scale of the site being evaluated. Endpoints involving measures of reproductive success, or other effects that could conceivably impair the maintenance of the population, are likely to be preferred over

other less sensitive and less population-oriented endpoints. Examples of measurement endpoints are

- Impairment of reproduction in the Great Blue heron
- Direct testing of chronic toxicity of marine sediment and surface water on early life stages of benthic invertebrates
- Egg shell thinning in the sandpiper
- Several metrics describing the abundance and trophic structure of the marine benthic macroinvertebrate community

B.2.2.3 Study Design and Verification

The endpoints defined in the Problem Formulation give focus to the Work Plan (WP) and Sampling and Analysis Plan (SAP) for the site. The WP and SAP identify and provide rationale for the laboratory methods, field methods, and statistical analyses employed to evaluate site data. They also clearly lay out the methods that will be used to estimate and characterize ecological risks. The goal of this effort is to ensure that the appropriate data for making risk management decisions are collected, and that the assessment focuses on important ecological concerns without collection of data that will not be useful for making site management decision. Types of data often collected include samples of site media, tissue samples, toxicity testing, or community assessment.

The work plan will include a general overview of the site along with a summary of any previous site investigations, the CSM and assessment and measurement endpoints, identification of the investigations needed to determine risk to the assessment and measurement endpoints, a description of the assumptions used, and any major sources of uncertainty. These items lead directly to the formation of the sampling plan because all samples should tie back directly to each of the work plan components. No sample would be taken unless it is directly related to the CSM or an assessment or measurement endpoint.

The SAP will include the field sampling plan and the QAPP. Both will be detailed and specific about the logistics of sampling and analysis. Throughout the WP and SAP there will be an emphasis on following the Data Quality Objectives (DQO) process.

B.2.2.4 Risk Characterization

When the SAP has been implemented, the analyzed data will be used for the risk characterization. Risk characterization includes the risk estimation that is based on the interpretation of the data that was specified in the WP and SAP, the risk description that includes the risk range bounded by the NOAEL and LOAEL and narrative description of other risk factors, and an analysis of the uncertainty associated with the risk. The NOAEL is the highest concentration or dose at which no adverse effects have been observed, and the LOAEL is the lowest concentration or dose at which any adverse effect has been observed.

The risk estimate uses the interpretation methods agreed upon in problem formulation and the WP/SAP to characterize risk and identify how the measurement endpoints can make inferences back to the assessment endpoints. An important part of developing the risk estimate is using toxicity data to develop a site specific NOAEL and LOAEL for the site. These data will be important when used in conjunction with other data for the risk description and they bound the risk range. The level at which the risk is acceptable falls somewhere between the NOAEL and the LOAEL, and the narrower the range the more confidence there will be in risk management decisions.

The risk description takes this risk range bounded by the NOAEL and LOAEL, and integrates other data to make a decision using the weight of evidence approach. Site data such as the type of toxicity test run or a community analysis can influence what point in the NOAEL/LOAEL risk range will be considered acceptable risk. The following bullets show an expanded list of factors that may play into the weight of evidence:

- Presence of environmental transport mechanisms that increase the likelihood that contaminants will be brought into contact with the receptors
- Evaluation of geochemical factors to assess their influence on bioavailability of the contaminants
- Detection of acute or chronic toxicity in waters, soil, or sediment
- Evidence of tissue burdens of contaminant in bioaccumulation analyses

- Detection of biomarkers, such as increased concentration of metallothionein or induction of various cytochrome P450 isoenzymes
- Observations from ecological studies of communities or population

The risk description also includes narrative text discussing such risk factors as:

- Location and areal extent of contamination posing an unacceptable risk
- The degree of unacceptable risk
- The potential for natural recovery once all sources of contamination are removed.

Background chemicals that exceed RBCs will be identified and discussed in the risk characterization section.

B.2.2.7 Uncertainty Analysis

Uncertainty in an ecological risk assessment may result from a variety of sources, including selection methods for COPCs, estimates of toxicity data based on laboratory data that is different from site conditions, exposure assumptions, and COPC mixtures. It represents a lack of knowledge about site factors and should not be used to describe the true variability of a site. The categories of uncertainty can be described as 1) Conceptual model uncertainties that result from using professional judgments and assumptions, 2) Natural variation in the media sampled, and 3) Uncertainties related to errors in models used to describe site-specific conditions. These uncertainties will be discussed during risk characterization.

Upon completion of the BERA, the results will be examined and viewed against the Tier 2 exit criteria (B.2.2.8)

B.2.2.8 Tier 2 Exit Criteria

The BERA will provide a characterization of ecological risks posed by the site, and will help in making one of the following two decisions:

- (1) No further evaluation and no remediation from an ecological perspective are warranted because the site does not pose unacceptable risk.

- (2) The site poses unacceptable ecological risks and additional evaluation in the form of remedy development and evaluation (Tier 3; B.3) is appropriate.

B.3 TIER 3 –EVALUATION OF REMEDIAL ALTERNATIVES

Tier 3 is the Risk Evaluation of Remedial Alternatives. The list of alternatives being evaluated will include several options including the “No Action” alternative. Tier 3 is done in conjunction with the Feasibility Study (FS), which focuses on the Nine Evaluation Criteria for remedy selection as defined in the National Contingency Plan (NCP).

In doing the evaluation of remedial alternatives, there are two major steps involved:

- (1) Develop site-specific, risk-based cleanup levels
- (2) Evaluate risk posed by each alternative both short and long-term and weigh the alternatives using the 9 CERCLA Remedy Selection Criteria

B.3.1 Develop Site-Specific, Risk-Based Cleanup Levels

Cleanup levels will be developed using the preliminary remediation goals (PRGs) identified from the risk assessments. The cleanup levels may differ from the PRGs because of modifications resulting from consideration of uncertainties, technical limitations, exposure factors, and evaluation of the nine remedy selection criteria. The cleanup levels will be developed in accordance with the Navy Policy on Background Chemical Levels (DON 2004), and take into account detection frequency, bioavailability, and the COPCs role as an essential nutrient.

B.3.2 Feasibility Study

The remedial alternatives, including no further action, will be qualitatively evaluated to determine the risk posed to human health and the environment by implementation of each alternative. The NCP lists nine criteria that are used to evaluate each of the alternatives. These criteria are divided into threshold criteria, primary balancing criteria, and modifying criteria as follows:

Threshold Criteria

- (1) Overall protection of human health and the environment

- (2) Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Primary Balancing Criteria

- (1) Long-term protectiveness and permanence
- (2) Reduction of toxicity, mobility, or volume
- (3) Short-term effectiveness
- (4) Implementability
- (5) Costs (relative to overall effectiveness)

Modifying Criteria

- (6) State Acceptance
- (7) Community Acceptance

Each alternative will be evaluated for the Threshold Criteria of overall protection of human health and the environment and compliance with ARARs. Overall protection of human health and the environment requires the risk manager to balance the site risks with habitat destruction related to the remedy, consider the types and extent of habitat that will be impacted, as well as considering the ability of the impacted habitat to recover. Some ARARs that may require compliance include chemical-specific ARARs such as water quality criteria for protection of aquatic life, location specific ARARs such as the Clean Water Act for mitigation and protection of wetlands, or ARARs triggered by the remedy implementation such as the Endangered Species Act.

After evaluating the Threshold Criteria, the five Primary Balancing Criteria will be evaluated. Long-term protectiveness and permanence assesses whether the remedy will result in a long-term risk reduction, or whether the site may become recontaminated, as well as reliability of institutional or engineering controls, residual risks and recover potential of the impacted habitats. The balancing criteria also evaluates whether the remedy will reduce the toxic effects to the assessment endpoints and reduce the likelihood of the contaminants migrating to other habitats. Short-term effectiveness evaluates the ecological impacts expected with implementation, and whether habitat recovery can occur

in a short time period. Evaluation of implementability assesses the technical feasibility of the remedy along with the level of risk reduction that is possible. The final Primary Balancing Criteria is cost, and more specifically cost-effectiveness.

The final set of criteria is the Modifying Criteria. State acceptance can be facilitated by early and continuous involvement with the appropriate individuals. Active involvement can also be effective in the final criteria of Community Acceptance.

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APPENDIX C BACKGROUND EVALUATION PROTOCOL

The procedures discussed in this section will be utilized to evaluate background concentrations of metals and certain organic contaminants (such as pesticides and polycyclic aromatic hydrocarbons) that may present a human health or environmental concern at certain OUs, groups, or sites located within PHNC. The discussions are largely geared towards the evaluation of background metal concentrations in soil and ground water. However, many of the tools discussed may also be applied to organic contaminants. These compounds will be evaluated similarly if they appear to occur naturally at a site, or if it is important to separate a regional anthropogenic (i.e., man-made) background from site-specific contamination. The sample figures and tables were generated using data from the PHNC Subsurface Oil Investigation of the Halawa-Main Gate Geographic Study Area. The procedures used to evaluate background concentrations will be consistent with *Navy Policy on the Use of Background Chemical Levels* (DON 2004a), included as Attachment C-1, and Navy guidance documents for background analysis (DON 2002, DON 2003, DON 2004b).

C.1 STRATEGY

The evaluation of natural or anthropogenic background concentrations of potential contaminants in soil can be problematic. This is especially true of metals, because naturally occurring concentrations of metals can range over several orders of magnitude depending upon variations in mineralogy and lithology. Variations in grain size may have the largest impact on the range of natural metals concentrations at a site. The metal retention capacity of a soil increases as grain size decreases and clay minerals and various aluminum, iron, and manganese oxides increase (Loring 1991, and Hanson et al. 1993). Therefore, because of the natural variation in grain size, background for most metals cannot be defined using simple arithmetic or geometric means. Because metals from natural and anthropogenic sources are found together, it can be difficult to distinguish between what is natural and what is man-made at a particular site. Similar problems are associated with potential organic contaminants at a site (e.g., pesticides) and their relationship to regional anthropogenic background levels.

The method presented combines a variety of techniques to allow evaluation of the data obtained during previous and current studies. Because site investigations typically begin with minimal knowledge of background site conditions, the greatest possible use must be made of information collected during the investigation to obtain a complete understanding of a site. With the proposed evaluation process, different data sets may be combined, where appropriate, to increase the number of data used to evaluate background. This includes potentially combining previously collected offsite reference data with the site-specific reference data set, or using data from areas that could potentially be contaminated to help define background. Reference data, in this context, refers to samples obtained from areas not suspected to be contaminated. These methods increase the statistical strength of the estimated background concentration distribution of a particular analyte while decreasing the uncertainty associated with this estimate.

The strategy discussed below was developed by the Base Realignment and Closure Cleanup Team for Naval Air Station Agana, Guam and was based, in part, on background evaluations prepared for Anderson Air Force Base on Guam and Travis Air Force Base in California. This strategy will be used for all PHNC site assessment activities associated with soils contaminated with metals where the establishment of background metals concentrations is required. Whenever possible, each of the methods described below shall be used to establish background levels of metals concentrations at PHNC sites. This will allow for a comparison of the results obtained from each of the methods. It should be noted that, while each of the methodologies described below can be used to help establish background metals concentrations, some of the methods may not be appropriate for every site. The applicability of each of the methods described below shall be determined on a site-specific basis.

C.1.1 Comparison with Regulatory Thresholds

Only metals exceeding established regulatory thresholds (e.g., human health residential PRGs) will be evaluated for establishment of background ranges since metals that are essential nutrients or that do not exceed these values will not impact clean up decisions. The appropriate regulatory thresholds shall be established, along with other DQOs, in project planning documents, and shall be presented in the associated site investigation report (e.g., RI Report). These thresholds should coincide with the current and future land uses. For example, if a site is currently being used for industrial purposes, and this land use designation will not change in the foreseeable future, then industrial health-based

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APPENDIX D CURRENT STATUS OF ACTIVE PHNC SITES

This appendix discusses the status of the active Pearl Harbor Naval Complex (PHNC) sites presented in Figure 4-1. Active PHNC sites were prioritized into Site Management Plan (SMP) groups on the basis of geography, related contamination and/or contaminant source(s), similarity in anticipated response action(s), and location within common drainage areas (see Section 2.2 for a more detailed discussion of the PHNC prioritization process).

Table D-1 lists each SMP Group and the remedial response activities planned for it (or underway). Table D-3 lists every PHNC site by SMP Group (as shown in Figure 4-1) and summarizes the results of the investigations conducted at each site to date. Sections D.1 through D.16 discuss the information presented in Tables D-1 and D-3.

D.1 AIEA LAUNDRY

The former Aiea Laundry has been designated as a single-site OU comprising the Aiea Laundry Geographic Study Area (GSA). The Navy Exchange Service Center (NEXCEN) operated the former Aiea Laundry Facility until 1998, when operations ceased and the buildings were demolished. Dry cleaning operations were conducted at the site from the early 1950s to mid 1970s using tetrachloroethene (PCE). Stoddard Solvent was then substituted as the primary dry cleaning solvent until 1994, when a self-contained PCE dry cleaning system was installed.

Site investigations conducted between 1989 and 1993 confirmed the release of dry cleaning solvents and operations wastewater from underground storage tanks (USTs) and subsurface drain pipes. A Removal Action was subsequently implemented in April 1993. Five USTs, a subsurface floor drain system, and a drainage swale area were excavated and disposed of as part of the Removal Action (Ogden 1993). Analytical results from verification samples collected during the removal effort indicated the presence of additional subsurface contaminants. Further soil gas and ambient air sampling were performed to assess potential threats to human health and the environment. These investigations confirmed the presence of contaminants in the subsurface including PCE and PCE biodegradation products such as trichloroethylene (TCE), dichloroethylene

Table D-1
REMEDIAL RESPONSE GROUP ACTIVITIES

#	SMP Group Name	Remedial Response Activities
1	Aiea Laundry	Removal, RI (OU)
2	DRMO Manana Storage	RI, Removal (OU)
3	Ford Island	RI, Removals
4	PWC Transformer Sites	Removals
5	Shipyards Subsurface Oil	RI, Removals
6	NAVBASE Subsurface Oil	RI, Removals
7	Naval Shipyards Sites	Site Evaluations, RIs, Removals
8	Red Hill Fuel Facility	Removal, RI
9	Pearl City Peninsula	Removals, Site Evaluations
10	PHNC Storm Drains	Removals, RI
11	Makalapa Pesticide Rinsate Pit	Removal
12	Ewa Junction FDF	RI
13	FLETRAGRU Fire Test Area	Removal
14	Makalapa Crater	Removals, Site Evaluations
15	Pearl Harbor Regional Sediment Study	RI
16	DRMR Pearl City Junction	Removals
17	Waipio Peninsula	Site Evaluations
18	West Loch	Site Evaluations, Removal
19	Bishop Point	Site Evaluations
20	Naval Housing	Site Evaluations
21	NISMF	Site Evaluations
22	PWC Compound	Site Evaluations
23	Halawa-Main Gate	Site Evaluations
24	Richardson	Site Evaluations
25	Various Transformer Sites	Site Evaluations

(DCE), and vinyl chloride.

An Interim Removal Action (IRA) to address potential threats to offsite receptors from VOCs detected in the soil gas, and surface, and subsurface soil underlying a portion of the site was implemented in 1996. The IRA involved construction of a soil vapor extraction (SVE) system that would be operated for approximately 3 years. The SVE system was deactivated in late-1998, after 2 years of operation, as soil vapor concentrations along the property line dropped significantly below the initial baseline readings to near non-detect levels. The IRA's primary objective of preventing offsite migration of contaminated VOCs has been accomplished, however, soil vapor concentrations near the former solvent UST remains elevated. In an attempt to reduce these persistently elevated soil vapor concentrations near the source area, the SVE system was reactivated in September 2000 and from February to May 2001. Vapor concentrations near the source area fell to below baseline concentrations and levels along the property fence line remained at trace or non-detect levels during this period. Because of these results, the SVE system was deactivated. In addition, at the request of St. Elizabeth Church and School, a soil gas survey was conducted in June 2000. The results indicated that all but one of 26 samples at 7.5' and 22.5' were at non-detect levels. The single detected sample was near the front of the church building at the detection level. These results are consistent with the ongoing soil gas monitoring at the laundry site. However, while soil vapor concentrations of PCE have generally decreased, the soil vapor concentrations of its breakdown product, vinyl chloride (VC), at the source area have increased. Anticipate reactivating the SVE system before the end of 2005 to address this increase in VC vapor concentration.

In conjunction with the SVE IRA, a remedial investigation (RI)/feasibility study (FS) is currently underway to address the long-term cleanup objectives and requirements of the OU. In particular, the RI/FS focuses on potential groundwater contamination and other areas of the site where contaminants may have been released in the past. RI/FS planning documents were finalized in August 1995 and field sampling activities were completed in October 1996. A Draft RI/FS Report was submitted in October 1997. Based on regulatory review comments, field work to further characterize the onsite/offsite extent of the contaminated groundwater plume (i.e., chlorinated solvents) was conducted in February 1999, following an approved addendum to the RI/FS planning documents in August 1998. The supplemental field work also included investigation of the potentially contaminated soil underlying the concrete building slabs since the laundry buildings were

demolished in late 1998. A revised Draft RI/FS Report was submitted in August 1999. Based on review comments by the United States Environmental Protection Agency (EPA) and State of Hawaii Department of Health (DOH), a FSP addendum was prepared to install additional offsite groundwater monitoring wells to characterize the nature and extent of the offsite VOC and diesel contaminant plume within the caprock aquifer. Results of 9 offsite groundwater monitoring wells installed between 1999 and 2001 indicate that PCE and breakdown products have migrated offsite, via the caprock aquifer, toward Aiea Bay.

Further offsite investigations and groundwater monitoring, including an assessment of ecological risks at Aiea Bay were conducted with the installation of 3 monitoring wells near the shore of Aiea Bay and obtaining 10 seep water samples in the bay. Results of groundwater samples obtained between June 2001 and February 2002 from the offsite monitoring wells and seep water samples indicate that PCE and breakdown products have migrated into Aiea Bay. A Draft Final RI/FS Report was submitted in May 2002 incorporating results of the offsite groundwater monitoring wells and seep water samples. The report concludes that the PCE and breakdown products in the groundwater poses a human health risk and recommends a monitored natural attenuation as the remedial alternative.

The extent of the diesel plume within the caprock aquifer appears to be limited to an area just offsite, across Moanalua Road. Down gradient wells show no evidence that the diesel product has progressed any further. An IRA to remove free diesel product from the groundwater underlying a former diesel UST is currently being conducted based on the recommendations of the October 1997 Draft RI/FS Report. The Engineering Evaluation/Cost Analysis (EE/CA) and Action Memorandum (AM) associated with the diesel IRA were completed in October 1998. The long-term effectiveness of the diesel IRA is addressed in the revised Draft RI/FS Report of August 1999. As of June 2005, approximately 675 gallons of diesel product have been extracted from the caprock aquifer and recycled.

Onsite and offsite groundwater monitoring was continued until September 2002. The June and September 2002 sampling results were presented in November 2002 and February 2003, respectively, as addendums to the RI/FS report. Due to contractual difficulties, groundwater monitoring was suspended from September 2002 to July 2004.

Onsite and offsite groundwater monitoring resumed in September 2004. Target completion dates for future actions are presented in the SMP Schedule in Appendix A.

D.2 DRMO MANANA STORAGE AREA

The DRMO Manana Storage Area is a 51-acre parcel that is part of the 108.7-acre Manana Storage Area located in Pearl City, Oahu, Hawaii (Figure 4-1). This site has also been predesignated a single-site OU and, as such, comprises the entire Manana Storage Area GSA. The facility consists of nine unpaved open storage areas of varying size and 14 warehouse buildings, each approximately 38,500 square feet. The DRMO facilities were constructed in the 1940s by FISC (formerly NSC) for general warehousing of World War II materials. Since 1973, portions of the DRMO facility have been used for temporary storage of both non-hazardous property and hazardous substances/wastes received from Pacific Rim military facilities. From 1973 to the present, the mission of DRMO has been to facilitate the reutilization of materials and offsite transfer or disposal of both hazardous and non-hazardous substances/wastes it receives.

In the IAS, NEESA concluded that no significant contamination existed at this site. However, inspections conducted by EPA Region IX between 1985 and 1987 noted isolated incidents of leaking drums within the warehouse structures; these releases were contained and cleaned during the inspections. In 1988 NEESA performed a PA, which recommended "no further action" at the site.

In May 1991, a site reconnaissance was conducted during which time reports, aerial photographs, and facility plans were reviewed and examined. A Site Inspection (SI) at the DRMO facility was then implemented in two phases conducted in October 1991 and November 1992. Biased sampling was conducted at locations of suspected contamination, and soil samples were collected from the ground surface to 6 feet below ground surface (bgs). The chemical analytical program was designed using information on materials storage practices and was customized for each building or open storage area. Three hundred twenty four soil samples were recovered and analyzed for VOCs, semi-volatile organic compounds (SVOCs), petroleum hydrocarbons, fuel hydrocarbons, polychlorinated biphenyls (PCBs), formaldehyde, chlorinated herbicides, organochlorine pesticides, organophosphorous pesticides, carbamate pesticides, and metals.

A human health risk-based evaluation of SI data using Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) preliminary remediation goals (PRGs), onsite background data, and statistical analyses was conducted. Constituents of potential concern were defined as those above background levels (for inorganic analytes) and above PRG values. The identified constituents of concern were antimony, arsenic, beryllium, chromium, lead, and thallium. SI recommendations included performance of additional sampling at "hot spots" to define the extent of contamination, investigation of soil less than 6 inches bgs (i.e., surface soil), and characterization of soil greater than 6 feet bgs (i.e., subsurface soil). These recommendations were implemented during an RI conducted at the site.

RI planning documents for the DRMO Manana Storage Area were finalized in July 1994. These plans included grid-based sampling of surface soil (depths <0.5 feet), and both stratified random sampling and biased sampling of subsurface soil (depths up to 50 feet). Data were also obtained from existing offsite wells to evaluate the potential for contaminant transport through the unsaturated zone beneath the site. RI samples were analyzed for VOCs, chlorinated herbicides, and metals. The RI results were evaluated in a baseline HRA to identify locations of potentially significant impacts and to identify appropriate clean-up levels. On the basis of this evaluation, limited areas of arsenic-and-lead-contaminated near-surface soil were identified as posing potential risks to human health.

The Draft RI Report was submitted in July 1995 recommending a limited Removal Action to address arsenic-and-lead-impacted soil. This report was subsequently finalized in December 1995, recommending that the exact extent of the Removal Action be determined in the Final EE/CA Report. The Draft EE/CA Report was also submitted in July 1995, along with the RI Report. Based on comments received on the draft EE/CA Report, this document was finalized and submitted in January 1996. After negotiations with EPA and recalculations of risk, the final extent of the Removal Action was presented in the Final EE/CA Report, which recommended a limited Removal Action for arsenic-contaminated soil be conducted at 13 locations spread throughout six 5,000-square-foot exposure areas.

In accordance with preliminary recommendations, the draft design package was submitted in July 1995 (6 months before the EE/CA Report was finalized). The design documents were finalized in January 1996, along with the Final EE/CA Report, and the Removal

Action was initiated in March 1996. Field work was completed in April 1996 in accordance with the property transfer deadline in May 1996. The Final Remediation Verification Report (RVR) and Draft Removal Action Decision Document (RADD) were submitted in August 1996 in accordance with the SMP deadline (see Appendix A). As indicated in the Draft RADD, analytical results from verification samples collected during the Removal Action indicate that all impacted soil containing arsenic concentrations were excavated from the site. Overall risks to potential residential human populations posed by the remaining soil are within acceptable limits (i.e., excess cancer risk below $1E-04$; Hazard Index at 1 or below). As a result, the Removal Action is considered to be complete.

On the basis of a telephone conversation between EPA and the Navy on January 11, 1996, it was agreed that a separate groundwater investigation would be conducted in the future to determine if there are any groundwater impacts. The understanding was that this future groundwater investigation need not be completed prior to the property transfer, which occurred on June 3, 1996. Final planning documents were submitted in October 1998 for a regional groundwater assessment covering the Manana Storage Area and Pearl City Junction sites.

Assessment field work began in November 2001 and was completed in February 2002. The second round (dry season) of groundwater sampling was completed in August 2002. Preliminary results indicate the contaminant of concern is not in the groundwater beneath the site. The draft Regional Groundwater Assessment report was submitted in May 2003. The report recommended no further action for the basal aquifer beneath the Manana Storage Area site and site monitoring wells be abandoned and sealed. There were no regulatory comments objecting to the draft report recommendations. The draft final Regional Groundwater Assessment report submitted in October 2003 included these same recommendations. Monitoring well abandonment was completed in June 2005.

In August 2005, a draft PP for No Further Action at this site and the Pearl City Junction site was submitted to the regulators for review. Target completion dates for future actions are presented in the SMP Schedule in Appendix A.

D.3 FORD ISLAND

This SMP Group currently consists of two sites located within the Ford Island GSA as shown in Figure 4-1. These sites, referred to as the Ford Island Landfill and Ford Island Remedial Investigation, are briefly described below.

D.3.1 Ford Island Landfill

The Ford Island Landfill is located on the southwestern end of Ford Island (see Figure 4-1) within the Ford Island GSA. This site was used for burning and disposal of solid wastes from the 1930s to the 1980s. In general, the wastes in the landfill came from the former Naval Air Station on Ford Island and are made up of household, commercial, and industrial wastes, and construction debris. The landfill is 10 to 30 feet deep and overlies coralline deposits. Groundwater ranges in depth from 5 to 15 feet bgs. A 1989 investigation of surface water quality in Pearl Harbor, conducted by the Navy, found metals, petroleum hydrocarbons, and PCBs in the vicinity of the site. On the basis of these findings, an SI of the site was conducted in 1992. The SI revealed contaminant concentrations in the groundwater underlying and surrounding the landfill below levels considered to pose a significant threat to Pearl Harbor. However, contaminated soil, debris, and cavities located on/near the surface of the landfill were considered to pose a potential threat to people who may utilize portions of the landfill in the future.

In 1994, a non-time critical Removal Action was initiated to install a landfill containment system or cap. Capping, in conjunction with groundwater monitoring, is an EPA-approved presumptive remedy for landfills. The Draft EE/CA was prepared in March 1995 and recommended construction of a permeable soil cap. The EE/CA was finalized in July 1995 and work began on the Draft Design documents. The Draft Design was prepared in November 1995 and finalized in March 1996. Construction of the landfill containment system, which is comprised of a permeable soil cap, vegetative cover, surface drainage system, rip-rap shore protection, and groundwater monitoring wells, commenced on July 1996 and was completed in December 1996. A Final RVR was submitted in 1997, following construction of the landfill cap. A comprehensive Groundwater Monitoring Plan (GMP) and Operation and Maintenance Plan (O&M Plan) were prepared as part of the project design documents and are currently being implemented. The 5-year groundwater monitoring program was completed in June 2002. A second 5-year groundwater monitoring and O&M program was initiated in September

2003. The Ford Island Landfill site will be included in the PP and Record of Decision (ROD) for the Ford Island GSA, in accordance with the target completion dates listed in Appendix A. A revised groundwater monitoring plan was being prepared in 2004. The revised plan is projected to be completed in late 2005.

D.3.2 Ford Island Removal Actions

In February 2003, a RI was completed for various potential release locations (PRLs) within the 450 acre Ford Island GSA. These PRLs were previously identified in the Site Summary Report (SSR) for the Ford Island GSA of October 1998. The PRLs identified throughout the Ford Island GSA included: the island-wide abandoned aviation gasoline (AVGAS) distribution system; 55 transformer sites; and eight hazardous substance sites. Potential contaminants of concern included PCBs, waste oil and petroleum compounds (e.g., polynuclear aromatic hydrocarbons [PAHs]), heavy metals, pesticides, herbicides, creosote, etc. The final RI/FS planning documents (WP, FSP, QAPjP, and HSP), were completed in June 2000. RI field work was completed in July 2000 and in-progress results were submitted in September 2000. The Draft RI Report was completed in January 2001. Following regulatory review, a Draft Final RI Report was completed in September 2002. The RI report recommended Removal Actions to remediate PCB-contaminated soil from 23 transformer sites, remove residual fuel and sludge from the AVGAS distribution pipeline system, and remove contaminated soil and sludge from five hazardous substance sites, which include the former Camel Refurbishing Area, Building 39 storm drain lines, Building 43 storm drain lines, Bldg 284, and the Hazardous Substance Storage Area. The 23 transformer sites are further discussed in Section D.25.

A time-critical removal action was completed in October 2001 on approximately 6,200 linear feet of the AVGAS distribution pipeline due to a planned housing development in the area. An RVR was completed for the time-critical AVGAS Removal Action in May 2002.

In May 2002, an Action Memorandum was completed for the remaining, approximately 27,157 linear feet of the AVGAS pipeline. This Action Memorandum was completed in accordance with the Hawaii State Contingency Plan. A non-time critical Removal Action for the remaining 27,157 linear feet of the AVGAS pipeline commenced in October 2003.

Based on the recommendations of the RI report, a draft EE/CA was prepared in December 2001 for the five hazardous substance sites recommended for further action. The EE/CA was finalized in February 2003, and an Action Memorandum was completed in May 2003. Field work for the removal actions at the hazardous substance sites commenced in July 2003. Removal actions for the hazardous substance sites were completed in June 2004. Completion dates for documents pertaining to the Ford Island Removal Actions are listed in Appendix A.

A Time Critical Action Memorandum was signed in September 2005 for a removal action at Building 80/302 Site. The removal action will involve excavation of metals contaminated soil and land-use controls.

D.4 PWC TRANSFORMER SITES

The PWC Transformer Sites are located within various GSAs as shown in Figure 4-1. Nine transformer station sites, owned and operated by PWC, are included in this SMP group. Five of the sites are located within the Ford Island GSA; two sites are located within the Shipyard GSA; one site is located within the Halawa-Main Gate GSA; and one site is located within the PWC Main Complex GSA. Previous environmental investigations identified these transformers as potential human health and/or environmental concerns on the basis of detection of PCBs in the soil and/or on the concrete pads surrounding the transformers.

Given the relatively low mobility of PCBs and the anticipated limited extent of contamination, it was determined that the Removal Action process would best address these sites. The Draft Removal Site Evaluation (RSE) planning documents for the combined sites were submitted in February 1995. Comments on the draft documents were incorporated, and the Final RSE planning documents were submitted in October 1995. The RSE was conducted between November and December 1995. Data analysis, validation, and evaluation were performed between January and March 1996. The EE/CA was conducted between February and June 1996, and the Draft EE/CA Report was submitted in June 1996. The EE/CA Report recommended on-island landfilling of soil containing PCB concentrations less than 50 mg/kg and either off-island landfilling or incineration of soil containing PCB concentrations greater than 50 mg/kg. Comments on the Draft EE/CA Report were received in September 1996. The results of the EE/CA and recommendations presented in the Draft EE/CA Report were presented during a RAB

Meeting conducted in August 1996. The Final EE/CA Report was submitted in November 1996.

In 1997, the Navy partnered with the EPA Superfund Innovative Technology Evaluation (SITE) program to demonstrate/evaluate a treatment technology for extracting PCBs from concrete. The TechXtract technology was demonstrated at Transformer Vault TG-04. The evaluation concluded that TechXtract can reduce PCB surface concentrations to less than 10 micrograms per 100 square centimeters ($\text{ug}/100 \text{ cm}^2$) from as high as 940 $\text{ug}/100 \text{ cm}^2$. TechXtract was not able to reduce the PCB surface concentrations to less than 10 $\text{ug}/100 \text{ cm}^2$ for subsurface PCB concentrations that were as high as 14,000 ug/g (1.4 percent) for the first two inches below the surface.

In 1997, the design to implement the removal action recommended in the EE/CA was finalized.

In 1998, the Navy made several changes to items that were previously agreed to, based on new information received and discussion with EPA. Cleanup goals were revised, the recommended alternative for the removal action was revised, and PCB treatment options were re-evaluated. Cleanup goals were revised to be consistent with widely accepted published TSCA, DOH, and EPA values. The revised goals are:

- Soil: 1 milligram per kilogram
- Concrete: 10 micrograms per 100 square centimeters

Because the on-island landfill had not received and was not expected to receive approval for accepting CERCLA wastes in accordance with 40 CFR 300.440, the recommendation in the EE/CA for on-island landfilling of soil with PCB concentrations less than 50 mg/kg was no longer an option. Consequently, the Navy re-evaluated options using updated cost and technical information. This re-evaluation indicated the availability of reliable treatment technologies that could be more cost effective than costly off-island disposal. The Navy initiated partnering with EPA's Superfund Technical Assistance Response Team (START) and SITE programs to identify, screen, and evaluate potential treatment options for PCB-contaminated soil. These changes were summarized in fact sheets that the Navy distributed at the February 1998 and July 2000 Pearl Harbor (PH) RAB meetings.

In 1998, the Navy conducted a treatability study to evaluate two alternatives for the feasibility of treating PCB-contaminated soil to the cleanup goal of 1 mg/kg. The two vendors selected for evaluation were 1) Commodore Advance Sciences, Inc., which uses a solvated electron technology, and 2) Terra Therm Environmental Services, Inc., which uses a thermal desorption technology. Results of the treatability study indicated that both vendors may be able to treat PCB-contaminated soil to the treatment goal of 1 mg/kg. The final Treatability Study report for PCB Contaminated Soil at PHNC was completed in September 1999.

In 1999, the Navy conducted a demonstration of the solvated electron technology developed by Commodore Advance Sciences, Inc., in cooperation with the U.S. EPA SITE program. Results of this demonstration are expected to be published soon.

In 2000, the Navy conducted an EE/CA to identify and evaluate treatment and disposal alternatives for contaminated soil from the Naval Computer and Telecommunications Area Master Station Pacific (NCTAMS PAC), former Naval Air Station (NAS) Barbers Point, and PHNC. The draft EE/CA was completed in June 2000, and results of the EE/CA pertaining to PHNC were presented at the PH RAB meeting conducted in July 2000. The final EE/CA report was completed in September 2000. The final EE/CA recommended treatment by thermal desorption for all PCB-contaminated soil. The soil would be treated to 1 mg/kg PCB as total Aroclor, which would allow the treated soil to be available for unrestricted use. The final EE/CA also recommended that the contaminated soil from NCTAMS PAC, former NAS Barbers Point, and PHNC be consolidated at one location at the former NAS Barbers Point for the purpose of treatment.

The Navy began a removal action in November 2000 to excavate PCB-contaminated soil and clean PCB-contaminated concrete at the nine PHNC transformer sites. The excavated soil was transported directly to the planned treatment site on Navy-retained land at the former NAS Barbers Point, where it was stockpiled near soil from Barbers Point for the purpose of treatment. A fact sheet summarizing the planned removal action, including changes made to the 1996 EE/CA recommendations, was distributed for a 30-day public review period in August 2000. A Notice of Availability for this fact sheet was advertised in the local newspaper on August 13, 2000. A draft Action Memorandum for the removal action at the nine PHNC transformer sites was completed in September 2000. The final Action Memorandum for the removal action was signed in October 2000. A

draft Action Memorandum for the consolidation and treatment of the excavated soil from NCTAMS, the former NAS Barbers Point, and PHNC at Barbers Point was completed in September 2000. The final Action Memorandum for treatment of soil was signed in October 2000. A final Basis of Design Report for the Thermal Desorption Treatment Unit that would operate at the former NAS Barbers Point to treat contaminated soil from NCTAMS, the former NAS Barbers Point, and PHNC, was completed in August 2001. A revised Basis of Design Report was completed in 2003. Treatment operations commenced in 2003. This PCB treatment project is further discussed in Section D.25.

In April 2003 a draft RVR was prepared to document removal action activities completed to date. Completion of removal action activities at the PWC transformer sites will be documented in a final RVR following completion of the PCB treatment project discussed in Section D.25.

Excavation of 23 transformers on Ford Island commenced in November 2003 and ended in August 2004. One of these transformers completed the excavation at a site started in the 2000 removal action. The soil from the removal action in 2000 and the 2003-2004 removal action were treated at a temporary thermal desorption facility during this period. This removal action of excavation and treatment is also discussed in Section D.25.

D.5 PHNC SHIPYARD, SUBSURFACE OIL

This SMP Group currently consists of three sites located within the Shipyard GSA as shown in Figure 4-1. These sites, referred to as Building No. 8, Oscar-2 (O-2) Pier, and the Lower Tank Farm are briefly described below.

D.5.1 Building No. 8

Building No. 8, formerly Power Plant No. 1, is located east of the harbor entrance to Dry Dock No. 1 and adjacent to Building No. 5 (see Figure 4-1) within the Shipyard GSA. A number of oil spills were reported to have occurred in the vicinity of Building No. 8 in the early 1980s. Specifically, leaks from a Navy Special Fuel Oil (NSFO) line pumped from Power Plant No. 2 are suspected to have migrated into the storm sewer system around Building No. 8 and traveled alongside the large pipes used for cooling influent and effluent water located under the building.

Reports indicate that subsurface oil in the vicinity of Building No. 8 is seeping into the

storm drain system and collecting in the building sumps. As of June 8, 1992, approximately 35,000 gallons had been collected from the system over a period of six months. Investigations of possible sources of hydrocarbon contamination in the vicinity of Building No. 8 indicate that oil is present in the subsurface soil, although abandoned fuel lines in the area were confirmed to be empty. The source of subsurface oil, therefore, may have been previous leaks from the abandoned fuel lines or an oil spill that occurred in approximately 1983. Oil is presently found in the Building No. 8 sumps, in several of the storm drain manholes leading to and from Building No. 8, and in at least one electrical manhole on the north end of Building No. 4.

Incorporating comments received on the Draft EE/CA Report (submitted in May 1995), the Final EE/CA Report was submitted in September 1995 recommending modification to the NSY storm drain system and installation of an active extraction trench system to contain and extract the non-aqueous phase liquid portion of the subsurface NSFO. The Draft (100%) Removal Action design documents were submitted in March 1996. No comments were received from DOH or EPA on the Draft Design Package, and the Final Design Package was submitted in September 1996.

Construction of the active extraction trench system was completed in August 1997. Documentation of construction activities was submitted in the Remediation Verification Report in February 1998. Operation and maintenance/performance monitoring of the system is being conducted with quarterly reports provided routinely.

D.5.2 Oscar-2 Pier

Black oil was noted on the rocks of the northwest shore off the O-2 Pier as shown in Figure 4-1. The oil appears to be old residual fuel oil similar to the oil seeping into Building No. 8; thus, the oil may be the result of subsurface discharges. The site is also adjacent to Power Plant No. 3, Building No. 177, which is no longer in service. No visible sheen was apparent during initial investigations of the site, but a light sheen sighting was reported later in the area. The oil has a tar-like viscosity and covers the rocks at inconsistent heights at the shoreline. Contamination appears to be isolated to a 30-yard section of shoreline adjacent to the O-2 Pier. In addition, two permanent oil extraction wells, installed to prevent seepage of subsurface oil to the harbor, are located near the site. The wells are monitored for oil on a monthly basis and pumped out by PWC as required.

A Removal Action was initiated to address the subsurface oil observed at this site. The RSE planning documents describing the characterization methodologies to be used at the site were finalized in August 1995 and submitted in September 1995. Field work associated with the RSE was initiated shortly after completion of the planning documents. Field work consisted of the installation of 12 monitoring wells and four piezometers; soil, groundwater, and product sampling; a tidal study; and aquifer tests. Field work was completed in October 1995, and a subsurface oil plume (NSFO) was identified on the western half of the site, along the shoreline.

The Draft EE/CA Report was submitted in February 1996. Based on the nature and extent of the plume, a passive trench recovery system was recommended for the site. Comments received from EPA and DOH were addressed, and the Final EE/CA was completed in May 1996. The Draft Design Package was completed in August 1996. The design documents were finalized in September 1997.

Construction of the interceptor/collection trench with a seawall was completed in March 1998. Documentation of construction activities was submitted in the Remediation Verification Report in May 1998 and finalized in September 1998. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

D.5.3 Lower Tank Farm

In addition to the two aforementioned sites, the Navy intends to conduct a regional subsurface oil investigation in the Shipyard area under the Hawaii State Contingency Plan (SCP). It is anticipated that this investigation will be concentrated in the area surrounding the former and existing Lower Tank Farm as shown in Figure 4-1, and other suspected fuel release areas. Draft planning documents for site characterization of subsurface fuel was completed in December 2002 and finalized in November 2003. A draft addendum to the planning documents was completed in June 2005 with the final anticipated for October 2005. Field work is anticipated to begin in early 2006.

D.6 PHNC NAVAL BASE (NAVBASE) SUBSURFACE OIL

The PHNC NAVBASE Subsurface Oil SMP Group is composed of numerous sites located throughout various commands (i.e., NAVSTA, SUBASE, and FISC) associated with potential or confirmed releases of petroleum hydrocarbons. This SMP Group is

located within the more highly industrialized areas of the PHNC (see Figure 4-1) in the Halawa-Main Gate GSA. Throughout the history of this area extensive ship repair and shoreside fuel storage, handling, and transfer activities have resulted in fuel spills or leaks being released to the subsurface. As a result of these releases, free hydrocarbons, ranging from lighter diesel fuel to viscous Bunker C, are present in the shallow soil and groundwater throughout much of the PHNC.

This SMP Group has been the subject of two phases of an RI devoted to subsurface fuel releases. Recommendations presented in the initial Draft RI report (Ogden 1994b) for further response actions to characterize and address contamination detected during the RI or suspected to be present, were initiated with the start of Phase II of this project. Planning documents to further characterize the site were finalized in December 1995 and submitted in January 1996. The bulk of field work dictated by these planning documents was conducted from December 1995 through April 1996 with IDW disposal tasks extending through July 1996.

The Draft RI Report for Phase II was submitted in October 1996. The Final RI Report was submitted in October 1997. The report recommended removal actions to remove free product from five remedial action areas (RAAs), monitoring of free product levels and monitoring of VOCs at three selected areas. Monitoring of free product levels in RAAs 1, 6 through 10, and monitoring for VOCs in RAAs 11 through 13 was performed for four quarters (Sep 97, Dec 97, Mar 98, and Jun 98). A report summarizing these findings was finalized in November 1998. Monitoring for VOCs in RAAs 11, 12 and 13 were performed annually in June 1999, May 2000, February 2001, June 2002 and December 2003. Annual groundwater data packages were prepared in August 1999, August 2000, April 2001, October 2002, and March 2004. A Technical Memorandum for the Groundwater Monitoring and Recommendations for RAAs 11, 12 and 13 was prepared in June 2004. A Revised Groundwater Sampling and Monitoring Report for the Halawa Main Gate GSA was prepared in June 2004. Table D-2 summarizes the RAAs and the removal actions that have taken place. Brief descriptions of the PHNC NAVBASE Subsurface Oil SMP Group sites and the results of any previous site investigations are provided in the following sections. Under a May 2003 agreement between the Navy, EPA, and DOH, the RAAs with the exception of RAA-11, 12, and 13, will be conducted under the SCP. This agreement was modified during a September 2005 meeting to exclude from CERCLA, sites that are contaminated by petroleum only. These sites will

**TABLE D-2
 SUMMARY OF REMEDIAL ACTION AREAS
 SUBSURFACE OIL INVESTIGATION**

REMEDIAL ACTION AREA NUMBER	DESCRIPTION	STATUS
1	Hotel Pier	Construction of a fuel extraction system was completed in July 2001. Operation & maintenance of the extraction system was discontinued in October 2004. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Performance monitoring is continuing.
2	Magazine Loch Area	Fuel extraction system installed near the NEX Gas Station continues to operate. Construction of a fuel extraction system at Magazine Loch to address the plume area beyond the influence of the NEX Gas Station system was completed in October 2002. Operation and maintenance/performance monitoring began in April 2002 and is continuing.
3	Millican Field-EPMU-6 Area (Quarry Loch)	Construction of a barrier collection trench and fuel extraction system was completed in August 2002. Operation and maintenance/performance monitoring began in August 2002 and was discontinued in December 2004. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Long-term monitoring will be performed on a quarterly basis. The system will be returned to operation if cleanup objectives are no longer being achieved.
4	AUT-Middle Tank Farm Area	Investigations at Millican Field failed to conclusively link the AUT as a source. The effectiveness of the removal action alternative for Millican Field will be assessed prior to determining future action. Long-term monitoring will be performed for RAA-4 to monitor plume movement towards Quarry Loch.
5	Ward Field Area	Removal Site Evaluation performed in 2005.
6	Former Salt Pans Area	Product level monitoring was discontinued as recommended in the 1999 annual groundwater and product level report.
7	Neches Avenue Area	Being addressed as part of the removal action at Hotel Pier, RAA-1.
8	Former SUBASE Service Station Area	Product level monitoring was discontinued as recommended in the 1999 annual groundwater and product level report.
9	SUBASE-Pierce Street Area	Removal action planning documents and field work were performed in FY2003. The removal action report is currently being finalized.
10	Gabrunas Field Area	Part of the Millican Field (Quarry Loch) removal action at RAA-3.
11, 12, 13	Monitoring Wells 13, 25, 43	Monitoring at RAA 11 (MW 13) will discontinue. Monitoring at RAA 12 (MW 25) will continue annually. One additional round of groundwater sampling will be conducted at RAA 13 (MW 43). If the concentration is less than the screening criteria, then no further groundwater monitoring will be conducted. Investigation to further delineate the VOC concentrations at MW 13 and MW 25 is recommended.

be modeled after the SCP. Sites that have petroleum commingled with hazardous substances (i.e. PCBs) will be conducted under CERCLA.

D.6.1 Upper Tank Farm

The Upper Tank Farm was constructed in 1923 and originally consisted of 17 aboveground storage tanks (ASTs). The Upper Tank Farm is bordered to the east by Kamehameha Highway, to the west by North Road, and to the north by Adit-1. Three of the original tanks, used to store Navy Special Fuel Oil (NSFO), were removed in 1940, and another eight tanks were removed in 1952. The Upper Tank Farm currently consists of six 150,000-barrel (6,300,000-gallon) ASTs used for the bulk storage of JP-5 jet fuel, diesel fuel (F76), reclaimed fuel oil, and oily waste/ballast water. Each tank in the area is surrounded by a recessed and compacted 25 to 30 foot earth berm that has been lined with a geotextile liner. During the installation of the liner in the Upper Tank Farm in 1996, MW-5, located within the berm area of Tank No. 48, was destroyed by the Navy contractor and was later replaced.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), significant amounts of LNAPL product were observed in several Upper Tank Farm monitoring wells. Analytical results of 14 soil samples collected at the Upper Tank Farm indicated that the soil around Tank Nos. 48 and 54 were impacted with TPHTPH. Elevated concentrations of PAHs such as 2-methylnaphthalene, naphthalene, fluorene, and phenanthrene were also reported from the locations with the highest TPHTPH levels. Aroclor 1260 was detected in two samples. Among the metals, only arsenic, lead, and zinc were detected at maximum concentrations outside the related background ranges. Toluene, PCE, and ethylbenzene were detected at low concentrations in soil, while reported concentrations of acetone, bis(2-ethylhexyl)phthalate, 2-butanone, carbon disulfide, and methylene chloride were considered to be laboratory contaminants. LNAPL product, up to 4.95 feet in thickness, was observed in monitoring wells at several tank locations (Tank Nos. 46, 47, 48, and 54).

The risk screening results indicated that the maximum detected levels of Aroclor 1260, arsenic, and beryllium exceeded soil PRGs. However, beryllium was detected at concentrations within its respective site-specific background range, and therefore, was

considered representative of background rather than site-specific contamination. Results from groundwater sampling conducted in Phase II are presented in the Phase II RI Report.

The Phase II RI Report identified the Upper Tank Farm as part of RAA – 2, which includes the Magazine Loch Area and the NEX Gas Station. A fuel extraction system was installed in 1997 at the NEX Gas Station. Product levels in the Upper Tank Farm monitoring wells are recorded quarterly and reported in the product recovery system monitoring reports for the NEX Gas Station removal action.

An additional removal action was under taken at the Magazine Loch area to address the oil plume extending beyond the reaches of the NEX Gas Station product recovery system. Construction of a low-permeability barrier wall with an interceptor/collection trench and a passive product recovery system was completed in October 2002. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

D.6.2 Former Upper Tank Farm

The Former Upper Tank Farm area is located adjacent to and immediately south of the Upper Tank Farm, north of Makalapa Gate Road, and west of Kamehameha Highway. The area represents the original locations of the 11 tanks removed from the Upper Tank Farm. Three of the tanks were removed in 1940, and another 8 in 1952. All the tanks of the Former Upper Tank Farm previously stored NSFO. The present area is occupied by Bachelor Enlisted Quarters (BEQ), the Medical/Dental Clinic, and the Day Care Center.

Analytical results of 27 soil samples collected at the Former Upper Tank Farm for the first phase of the subsurface fuel RI indicated that there was minimal impact to the soil and the groundwater. TPHTPH was detected at levels typical of Naval bases (Ogden 1994b). In addition, no elevated concentrations of metals above the detected background ranges were observed. Several PAHs were detected at low concentrations at one soil boring location. Xylenes and ethylene dibromide (EDB) were detected once. Other VOCs such as acetone, 2-butanone, and methylene chloride were attributed to laboratory contamination. Sporadic occurrences of detectable but unmeasurable product have been detected in monitoring wells located in the vicinity of this site and approximately 1.5 feet of LNAPL product was observed in one monitoring well. Results from groundwater sampling of Phase I monitoring wells and additional soil borings, monitoring wells,

Strataprobe® borings, and microwells installed during Phase II field activities are presented in the Phase II RI Report.

The Phase II RI Report identified three Remedial Action areas, RAA-13, RAA-10, and RAA-3, that impact the former Upper Tank Farm. RAA-13 is annually monitored at MW-43 for VOCs as requested by EPA to assist in work prioritization. Further characterization of the VOCs will be conducted as part of the follow-on work to the SSR for the Halawa-Main Gate area.

RAA-10 and RAA-3 are being addressed as part of the removal action at Quarry Loch. The removal action includes the installation of a collection/barrier trench and a product recovery system, consisting of eleven sumps, five located within the trench and six located along the storm drain system. Construction of this system was completed in August 2002. Operation and maintenance of the product recovery system was conducted from August 2002 to December 2004. Operation was discontinued for reasons including, no free product has been observed in collection sumps and free phase product plumes have not shown movement towards the recovery systems or Quarry Loch since monitoring began in July 2002. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Performance monitoring is continuing to be conducted with quarterly reports provided routinely. The system will be returned to operation if cleanup objectives are no longer being achieved.

D.6.3 Past Sludge Disposal Area, Upper Tank Farm (IAS-21a)

The Upper Tank Farm Former Sludge Disposal Areas are located in the Upper Tank Farm, directly adjacent to Tank Nos. 47, 48, and 54. According to the IAS (NEESA 1983), tank-bottom sludges were buried in excavated holes within the bermed area of each tank from the 1920s through 1978. Approximately 406,000 gallons of sludge were disposed of at the Upper Tank Farm during this period.

Suspected sludge disposal areas at the Upper Tank Farm, were identified in the IAS performed by NEESA in 1983. Also described in the IAS was a site referred to as the "Canyon Disposal Area," which is located within the boundary of the Upper Tank Farm. It was concluded that the sludge disposal areas were not a threat to human health or to the

environment because the tank sludges contained only small amounts of lead and are buried; therefore, a confirmation study was not recommended at that time.

However, an SI was conducted at the Upper Tank Farm to further investigate the sludge disposal areas (HLA 1990). During the SI, a total of 21 test pits were excavated. Sludge encountered in six of the seven excavations was generally described as a black, sticky substance that oozed from the walls of the test pits. TPHTPH was detected in all samples except for the sample collected near Tank No. 55. Carbon chain lengths of the hydrocarbons detected ranged from C9 to C24, suggesting a diesel source. Concentrations of BTEX were also detected. It was concluded that petroleum-related contamination was present within bermed areas surrounding Tank Nos. 47, 48, 54, and 55. The report recommended that further investigation at the four tank locations be conducted to identify and characterize the vertical distribution of contaminants, assess the pathways of contaminant migration, and identify the potential human and environmental receptors of the contamination.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), trench soil samples were collected at the three former sludge disposal areas down to a depth of 5 feet below ground surface (bgs), where the sludge was found. TPHTPH was detected in five soil samples analyzed. The highest TPHTPH concentrations were detected in samples collected in the location of the former sludge pit near Tank No. 48. In addition, noncarcinogenic PAHs such as 2-methylnaphthalene, naphthalene, and phenanthrene were detected at elevated concentrations in the soil. In one soil sample tested, Aroclor 1260 was detected at 2 mg/kg at a depth of 4.5 feet bgs. Certain metals, such as copper, lead, mercury, silver, and zinc, were also found at elevated concentrations above the background ranges. There were no VOCs detected in the soil. Results of occurrences of PRG exceedance at the Upper Tank Farm Former Sludge Disposal Areas were similar to the Upper Tank Farm. The maximum concentrations of arsenic and beryllium were within the site-specific background ranges and were not considered site-specific contaminants.

With the installation of the geotextile lining in the Upper Tank Farm area, these sludge pits were excavated and no longer exist. Stockpiled soil from excavation activities associated with the installation of the lining were sampled and tested in September 1995. Results obtained indicated the presence of TPH levels ranging from 32 ppm to 1,194 ppm, and PCB concentrations ranging from 0.14 ppm to 48 ppm. Based on these results,

permission was obtained from the Office of Solid Waste Management, Solid and Hazardous Waste Branch, Environmental Management Division of the State of Hawaii Department of Health to dispose of the 9,100 cubic yards of contaminated soil in the Municipal Solid Waste Landfill located at Waimanalo Gulch in 1996.

This area is geographically part of RAA-2 where free product recovery is being performed. Due to the offsite removal of contaminants, no further action is planned.

D.6.4 Upper Tank Farm Canyon Disposal Area (IAS-23, NSC-13)

The Canyon Disposal Area is located along the western boundary of the Upper Tank Farm parallel to North Road and adjoining Tank Nos. 46-48. The trench was originally constructed circa 1923 and contained six to eight pipelines. These pipelines were originally connected to the tanks and were disconnected in the 1950s. The trench was subsequently used for the disposal of sludge generated during cleaning of the Upper Tank Farm ASTs during the 1970s. The trench was gradually filled in through the 1970s and completely filled around 1980.

Forty three soil samples were collected from 11 borings in the area as part of the PHNC RFI (Ogden 1992c). Chemical analyses detected low to moderate levels of TPH within the deeper accessible portions of the trench in the Canyon Disposal Area, whereas shallow fill soil were noted to be relatively free of petroleum contamination. Metal concentrations were considered comparable with other fill soil identified at other RFI site locations.

During Phase II field activities, one additional monitoring well was installed near the western fence line of the site in order to address potential impacts from fuels at the site. Results obtained from soil sampling conducted during the installation of this monitoring well are presented in the Draft Phase II RI Report. Because of the presence of approximately 2 feet of product in the well, a product sample was collected and submitted to the Navy Fuel Lab for analysis, no groundwater samples were obtained.

This area is geographically part of RAA-2 where free product recovery is being performed. This area was also impacted by the installation of a geotextile liner in the Upper Tank Farm. Excavation of soil in the area removed the contamination. Therefore, no further action is planned.

D.6.5 Middle Tank Farm Tanks

The Middle Tank Farm is located west of Kamehameha Highway, along Makalapa Gate and North Road. The tank farm originally consisted of ten aboveground fuel storage tanks (ASTs), and was used to store kerosene, stoddard solvent, diesel fuel, JP-5, and NSFO. Five of the tanks (Tank Nos. 29, 30, 31, 32, and 33) were removed in 1968. The Middle Tank Farm currently consists of four 450,000-gallon ASTs (Tank Nos. 34-37) and one 180,000-gallon AST (Tank No. 38). Each AST is controlled by the FISC Fuel Department.

An SI was conducted in 1990 to investigate suspected sludge disposal locations within bermed areas of the five tanks currently present (HLA, 1990). During the investigation, 48 trenches were excavated in suspected sludge disposal locations, but no sludge was encountered.

Analytical data from 21 soil samples obtained at the Middle Tank Farm during the first phase of the subsurface fuel RI indicate that VOCs, such as acetone, 2-butanone, and methylene chloride, were detected at low levels and may be associated with laboratory contamination (Ogden 1994b). Xylenes, acetone, and TPH were detected in the samples collected in and around the tanks themselves. No elevated concentrations of metals were detected, except for cadmium. Two monitoring wells contained measurable LNAPL product. The risk screening results indicated that only beryllium concentrations exceeded its soil PRG. Beryllium was, however, detected within the site-specific background range, and was considered to be representative of background rather than site-specific conditions. Results obtained from groundwater sampling of Phase I wells and soil samples collected from newly advanced Strataprobe® borings are presented in the Phase II RI Report.

A portion of the Middle Tank Farm, including Tanks 36, 37, and 38, was identified in the Phase II RI Report as RAA-4. Additional data was gathered as part of the removal action at Quarry Loch. However, the data did not definitively link the Middle Tank Farm as a source to the Quarry Loch storm drain oil releases. Further assessment of the Middle Tank Farm's contribution to the free product near the Millican Field area will be performed during the performance monitoring that is being conducted for Quarry Loch with quarterly reports provided routinely.

D.6.6 Former Middle Tank Farm

The Former Middle Tank Farm Area previously occupied by Tank Nos. 29-33, is located east of the Middle Tank Farm and is presently occupied by a large parking lot, BEQ, an activity center, and a bowling alley.

Analytical data from eight soil samples collected for the first phase of a subsurface fuel RI indicated the presence of TPH at concentrations typical for Naval bases (Ogden 1994b). Xylenes were detected once, at a very low concentration. Other VOCs detected at low levels were associated with laboratory contamination. A hydrocarbon sheen was detected in the five monitoring wells in this area, but no measurable LNAPL product was observed in these monitoring wells. Only the maximum detected level of beryllium exceeded the soil PRG. Because beryllium was detected within the site-specific background range, it was not considered a site-related contaminant.

Results obtained from groundwater sampling of Phase I wells and soil and groundwater samples collected from newly advanced borings and wells, respectively, are presented in the Phase II RI Report.

D.6.7 Abandoned Underground Tank (IAS-24, NSC-14)

The abandoned underground tank (AUT) site is located between the Middle Tank Farm and the Former Middle Tank Farm. Available site plans indicate that the AUT had a capacity of 193,600 barrels (8,130,000 gallons). According to the IAS, the AUT was used to store slop oil and NSFO during the early 1940s through 1977, when it was abandoned (NEESA 1983). It is believed that a significant portion of the waste stored in the tank was generated during routine cleaning and maintenance of large ASTs located in the Upper, Middle, and Lower Tank Farms (Gammon 1991).

In 1977, NSC relinquished control of the AUT to PWC Pearl Harbor for demolition. The demolition procedure consisted of drilling holes through the bottom slab and side walls for drainage, and collapsing the top ten feet of the side walls into the main portion of the tank. It was reported by NEESA (1983) that the tank contained approximately 126,000 gallons of semi-solid slop oil at the time of demolition, and that the soil near the tank was saturated with oil. Following demolition, the tank was filled with soil and the site was regraded.

An SI was performed at the AUT site in 1989. Results of chemical analysis of samples collected during the investigation indicated the presence of significant levels of hydrocarbons in soil and groundwater beneath the site. Maximum product thicknesses of 2.4 and 0.3 inches were measured in two monitoring wells. Hydrocarbon chain lengths found were characteristic of a diesel fuel source (carbon chain lengths between C11-C24). Detectable concentrations of BTEX, and four of the eight EP Toxicity metals (arsenic, barium, selenium, and silver) were also detected in the soil samples. The SI concluded that, because petroleum-related contamination was detected in soil and groundwater at the site, further investigation should be conducted to characterize the nature and extent of contamination, assess the pathways of contamination migration, and identify potential human and environmental receptors (HLA 1990).

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), 33 soil gas samples (including duplicates) were collected from 31 locations in the AUT area. Only three target analytes were detected: 1,1,1-trichloroethane (TCA), tetrachloromethane, commonly referred to as carbon tetrachloride (CCl₄), and PCE. TCA and CCl₄ were also detected in an ambient air sample. Analytical data from 12 soil samples collected at the AUT indicated that subsurface soil was impacted with noncarcinogenic PAHs and TPH. For metals, the maximum detected levels of cadmium and chromium were slightly above the upper background values, but did not appear to be a result of any site-related contamination. Product (LNAPL) thickness was observed to range from 0.01 to 0.02 feet to nearly 7 feet in thickness in monitoring wells located within the vicinity of the AUT. The only chemical detected in soil at a concentration that exceeded the soil PRG at this site was beryllium. Because beryllium was found within its respective background range, it was not considered a site-related contaminant (Ogden 1994b). Results obtained from groundwater sampling of Phase I wells are presented in the Phase II RI Report.

The AUT is identified as part of RAA-4 in the Phase II RI Report. Additional data was gathered as part of the RSE at Quarry Loch. Electromagnetic offset logging was performed to characterize the petroleum hydrocarbons. A summary of data is presented in the EE/CA for Quarry Loch. Geophysical data substantiate the RI findings that there is low potential for hydrocarbons to migrate away from the site based on geologic and hydrogeologic characteristics. Further assessment of the AUT's contribution to the free product near the Millican Field area will be performed during the performance

monitoring that is being conducted for Quarry Loch with quarterly reports provided routinely.

D.6.8 Valve Chamber No. 2

Valve Chamber No. 2 (VC-2) is a covered concrete structure located below grade near Arizona Street, immediately north of Halawa Gate. VC-2 is used to transfer fuel from Red Hill and distribute it via fuel lines to the rest of the site. Leaks from fuel lines that connect to VC-1 and VC-2, and along Arizona Street could be possible sources of the fuel contamination observed in this area.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), TPH was detected in soil at concentrations ranging from 26 to 1,000 mg/kg. Detected concentrations of acetone, carbon disulfide, methylene chloride, and bis(2-ethylhexyl)phthalate were attributed to laboratory contamination. Arsenic was detected at maximum concentrations exceeding its PRG. These maximum arsenic levels, however, were well within the site-specific background range; therefore, arsenic was not considered a site-related contaminant. Results obtained from groundwater sampling of Phase I wells are presented in the Phase II RI Report. This area was not identified as an RAA in the Phase II RI report. Therefore, no further action is planned.

D.6.9 Valve Chamber No. 3

Valve Chamber No. 3 (VC-3) is located at the eastern end of Hotel Pier, south of Halawa Stream. VC-3 is an in-ground, partially covered, four-sided concrete structure in which flow control valves for JP-5 lines supplying fuel to Hotel Pier are located. As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), TPH was detected in soil at concentrations ranging from 42 to 3,800 mg/kg. Low concentrations of PCE and xylenes were also detected. Detected acetone and 2-butanone concentrations were assumed to be laboratory contaminants. Arsenic was detected at maximum concentrations exceeding its PRG. These arsenic levels, however, were well within the site-specific background range; therefore, arsenic was not considered a site-related contaminant. Results obtained from groundwater sampling of Phase I wells are presented in the Phase II RI Report. This site is adjacent to the RAA-1 at Hotel Pier where a removal action consisting of collection sumps with belt skimmers and storm drain cut-off walls was constructed in 2001.

D.6.10 Valve Chamber No. 4

Valve Chamber No. 4 (VC-4) is an open concrete structure located below grade in the personally owned vehicle lot at the intersection of North Road and San Juan Avenue. VC-4 is used to transfer fuel from the Red Hill Fuel Storage Facility and distribute it via pipelines to the rest of PHNC.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), seven soil samples in the VC-4 area were collected and analyzed. Minimal concentrations of TPH were detected in the soil samples. There was no evidence of metal contamination. Except for xylenes detected at a concentration of 8 mg/kg; detected VOCs such as acetone, carbon disulfide, and 2-butanone were attributed to laboratory contamination. Low levels of PAHs were also detected in one boring at a 4.5-foot depth. Arsenic was detected at maximum concentrations exceeding its PRG. These maximum arsenic levels, however, were well within the site-specific background range; therefore, arsenic was not considered a site-related contaminant. In addition, the maximum concentration of benzo(a)pyrene (0.53 mg/kg) at VC-4 was slightly above its corresponding PRG of 0.39 mg/kg.

Results obtained from groundwater sampling of Phase I wells and soil samples collected from one newly advanced Strataprobe® boring are presented in the Phase II RI Report. The Phase II RI Report did not identify any RAA for this site. Therefore, further action is not planned.

D.6.11 Valve Chamber No. 7

Valve Chamber No. 7 (VC-7) is a covered concrete structure located below grade adjacent to the east side of Building 490 between North Road and Downes Street. VC-7 is also used to transfer fuel from the Red Hill Fuel Storage Facility and distribute it via pipelines to the rest of PHNC.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994) TPH was detected at concentrations ranging from 12 mg/kg to 13,000 mg/kg. Elevated concentrations of PAHs were also found at the same locations as the high TPH levels. A maximum acetone concentration of 5.1 mg/kg was detected. LNAPL product was observed in one monitoring well at a thickness of 0.35 feet. Arsenic was detected at maximum concentrations exceeding its PRG. These maximum arsenic levels, however, were well

within the site-specific background range; therefore, arsenic was not considered a site-related contaminant.

Results obtained from groundwater sampling of Phase I wells and soil and groundwater samples collected from newly advanced borings and wells are presented in the Phase II RI Report. This area is adjacent to RAA-2 where removal actions have been conducted at the NEX Gas Station and at Magazine Loch.

D.6.12 Adit 1

The Adit 1 Area is located north of the Upper Tank Farm and east of the Fuel Reclamation Facility (FRF). Adit 1 is a fuel corridor for fuel pipelines that carries primarily diesel fuel from the Red Hill Fuel Storage Facility to the Halawa - Main Gate area of the PHNC. This area includes the former PWC Hazardous Waste Storage Facility (Building 530), which was also the location of the former NSC Drumming Facility, a recreational baseball field, the Government Printing Office (Building 550), former underground surge tanks, two existing ASTs, two former lubrication oil ASTs, and the access to Adit 1. The Adit 1 area was included as an area of concern for the second phase of the Pearl Harbor Subsurface Oil RI.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional soil and Strataprobe® borings, monitoring wells, and microwells installed during Phase II field activities are presented in the Phase II RI Report. The Phase II RI Report identified RAA-6 and RAA-11 for further action. After conducting product level monitoring from Sept 1997 to June 1998, negative results led to the discontinuation of monitoring at RAA-6. Levels of VOCs, however, have continued at RAA-11 in MW-13. Annual groundwater sampling for VOCs was conducted in June 1999, May 2000, February 2001, June 2002, and December 2003. Annual groundwater sampling for VOCs will discontinue, as agreed with EPA in September 2004. Investigation to further delineate the VOC concentrations at MW 13 is recommended.

D.6.13 Waste Oil Reclamation Facility (formerly Fuel Reclamation Facility (IAS-20, NSC-[01-10]))

The FRF is an operational facility located just off North Road adjacent to the northwest corner of the Upper Tank Farm. The primary facility for processing ballast or

contaminated fuel, the FRF consists of three settling tanks, four American Petroleum Institute (API) separators, and one hot settling tank. Based on the results of the initial Subsurface Fuel RI Report (Ogden 1994b), low levels of TPH and PAHs, such as benzo(a)anthracene, chrysene, fluorene, 2-methylnaphthalene, and phenanthrene, were detected in soil samples. The only VOC detected was acetone (considered a laboratory contaminant). Observable, but not measurable, LNAPL product was detected in the monitoring well installed in this area. The only potential contaminant present in soil at a maximum concentration that exceeded the soil PRG at this site was beryllium. Because beryllium was found within its respective site-specific background range, it was not considered a site-related contaminant.

Results obtained from groundwater sampling of Phase I monitoring wells and soil and groundwater samples collected from additional Strataprobe® borings and monitoring wells installed during Phase II field activities are presented in the Phase II RI Report. This area is adjacent to RAA-2 where removal actions have been conducted at the NEX Gas Station and at Magazine Loch.

D.6.14 NEX Gas Station (formerly PWC Gas Station)

The PWC Gas Station Site (Building 1326), constructed in 1953, is an operating facility situated on North Road between FISC and SUBASE. The gas station is currently known as the NEX Gas Station. Fuel is supplied from a 6,000 gallon, fiberglass diesel fuel UST and from two 10,000-gallon, fiberglass unleaded gasoline USTs. One of the unleaded gasoline USTs failed a precision tank tightness test conducted in 1988. This event led to subsurface investigation at the site, which consisted of drilling and sampling of soil borings and installation of three groundwater monitoring wells. The investigation indicated the presence of approximately 8 feet of LNAPL product.

Subsequent subsurface investigation consisting of drilling and sampling of soil borings, installation and sampling of monitoring wells, and hydraulic testing of the shallow water table aquifer present beneath the gas station area was conducted. The investigation concluded that components of diesel and gasoline fuels are widely distributed in soil and groundwater at the PWC Gas Station (PRC 1990). The report recommended that additional investigations be performed to locate sources of contamination in the area and to further define the extent of contamination.

An RSE was performed at the PWC Gas Station in September 1992 to evaluate remediation schemes for extraction of LNAPL product from the shallow unconfined aquifer at the gas station. The RSE also consisted of a pilot-scale extraction test which involved pumping groundwater and skimming fuel product for a period of approximately 36 days. The results of the multi-phased investigation indicated that the pilot-scale extraction system was effective in recovering LNAPL from the water table aquifer at the PWC Gas Station. It is anticipated that this type of extraction system could be used in other areas of the PHNC, specifically in areas with shallow, unconfined, tidally-influenced aquifers of relatively permeable fill soil.

Analytical data from the first phase of the subsurface fuel RI (Ogden 1994b) suggests that the subsurface soil at the site has been impacted. Soil gas samples were collected from 13 locations at the PWC Gas Station site, and total volatile hydrocarbons (TVH), BTEX, and the chlorinated hydrocarbons TCE and PCE were detected. TPH was detected in five soil samples at a maximum concentration of 3,200 mg/kg. High levels of benzene, ethylbenzene, xylenes and noncarcinogenic PAHs, such as 2-methylnaphthalene, fluorene, and phenanthrene, were also detected. Other VOCs, such as acetone and 2-butanone, were detected at low levels but were considered to be laboratory contaminants. Chemicals present in soil at levels that exceeded the soil PRGs at this site included arsenic and benzene. Arsenic was present at a maximum level above its respective site-specific background range and was not considered as representative of background.

Results obtained from groundwater sampling of Phase I monitoring wells and soil samples collected from one additional Strataprobe® boring installed during Phase II field activities are presented in the Phase II RI Report. The Phase II RI Report identified this site as part of RAA-2.

A removal action was conducted in 1997 to install a groundwater drawdown/LNAPL removal system. Documentation of construction activities was submitted in the Remediation Verification Report in May 1997. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

Because the product plume appeared to be beyond the influence of the fuel extraction system, additional investigation was performed and an EE/CA, AM, and design documents have been completed for the Magazine Loch removal action. Construction of

a low-permeability barrier wall with an interceptor/collection trench and a passive fuel oil recovery system was completed in October 2002. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

D.6.15 SUBASE Gas Station

The SUBASE Service Station Area is located west of North Road. The area includes the site of the former SUBASE Service Station, a portion of the former Upper Tank Farm, the Diesel Purification Plant, and a portion of the SUBASE Area.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), analytical data from subsurface samples collected in the vicinity of the former SUBASE Service Station indicated the presence of diesel, MOGAS, and lube oil. The soil gas analytical data indicated the presence of the chlorinated compounds PCE and TCE, possibly associated with degreasing.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional soil and Strataprobe® borings and monitoring wells and microwells, respectively, installed during Phase II field activities are presented in the Phase II RI Report.

The Phase II RI Report identified RAA-8 for further monitoring. After a year of product level monitoring, negative results led to the recommendation to discontinue monitoring. A portion of this area is included as part of RAA-2. RAA-8 is being addressed as part of the removal action at Magazine Loch. Construction of a low-permeability barrier wall with an interceptor/collection trench and a passive fuel oil recovery system was completed in October 2002 at Magazine Loch. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

D.6.16 Halawa Service Station

The Halawa Service Station is located south of and adjacent to Halawa Stream, along Arizona Street. During the time frame of the Draft RI Report (Ogden 1994b), the site consisted of a vacant concrete pump island and an elevated concrete pad. Vent pipes for one 5,000-gallon UST and one 8,000-gallon UST were visible immediately east of the concrete pad.

As reported in the Draft RI Report (Ogden 1994b), eight soil samples were collected and analyzed from this site. The results indicated low levels of TPH in the soil. No elevated concentrations of metals were detected in the soil. Noncarcinogenic PAHs, such as 2-methylnaphthalene, naphthalene, fluorene, phenanthrene, and pyrene were detected at low levels. PCE, TCE, 1,2-DCE were detected at concentrations ranging from a few mg/kg to less than 200 mg/kg. The VOCs acetone, 2-butanone, and carbon disulfide were detected at very low concentrations but were attributed to laboratory contamination. Sporadic occurrences of LNAPL product was detected in two monitoring wells. The only potential contaminant detected in soil at a maximum level that exceeded the soil PRG was arsenic, which was found within its respective background range and was not considered a site-related contaminant.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional Strataprobe® borings and monitoring wells, respectively, installed during Phase II field activities are presented in the Phase II RI Report. In June 1996 the 5,000 and 8,000 gallon USTs were removed. The Phase II RI Report did not identify any RAA in this area. Therefore, no further action is planned.

D.6.17 Building 60, Sludge Disposal Pit Diesel Purification Plant

The Former Diesel Purification Plant Area is located to the west of the Upper Tank Farm. It is bordered on the west by Magazine Loch and to the north by the PWC Gas Station. The Diesel Purification Plant was used to remove contamination (i.e., water, particulates) from diesel fuel. The area is covered by a mixture of concrete, asphalt, and landscaped grass and shrubs.

The Draft Subsurface Oil RI Report (Ogden 1994b) states that the area has been impacted by TPH. In addition, noncarcinogenic PAHs, such as naphthalene, 2-methylnaphthalene, dibenzofuran, fluorene, and phenanthrene, were detected at elevated concentrations at the same location and depth as the highest TPH levels. Detected acetone was attributed to laboratory contamination. Slightly elevated concentrations of metals were detected in one soil boring. Maximum detected levels of lead and mercury are outside the upper background ranges. Measurable LNAPL product (0.65 feet in thickness) has been observed in one well. Contaminants that were detected in soil at levels that exceeded the PRGs at this site included arsenic and beryllium. These analytes were present at levels

within the site-specific background ranges, and are thus were not identified as site-related contaminants.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional Strataprobe® borings and microwells, respectively, installed during Phase II field activities are presented in the Phase II RI Report. This area is part of the free product plume being addressed in RAA-2. Construction of a low-permeability barrier wall with an interceptor/collection trench and a passive fuel oil recovery system was completed in October 2002 at Magazine Loch. Operation and maintenance/performance monitoring is being conducted with quarterly reports provided routinely.

D.6.18 Merry Point Old Diesel Purification Plant

The Merry Point Area is located west of the Middle Tank Farm (and Former Middle Tank Farm). This area includes the Merry Point Peninsula area (bounded to the west by Merry Loch, to the north by Quarry Loch, and to the south by North Road), the Former Merry Point Diesel Purification Plant, an existing lubrication oil storage facility, a former boiler and pumphouse building, and a portion of an area to the north of Quarry Loch.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional soil and Strataprobe® borings, monitoring wells, and microwells installed during Phase II field activities are presented in the Phase II RI Report. This area was not identified as an RAA so no further action is planned.

D.6.19 Millican Field (Quarry Loch)

The Millican Field Area is bordered to the west by Quarry Loch, to the east by the Former Upper Tank Farm, and to the south by the Middle Tank Farm. The area includes Millican Field, a portion of the Middle Tank Farm, the Environmental Preventive Maintenance Unit No. 6 (EPMU-6), a portion of the Former Upper Tank Farm, and a portion of Gabrunas Field.

A subsurface investigation was conducted in 1989 (Geolabs-Hawaii 1989) to delineate the extent of petroleum contamination in the vicinity of Quarry Loch. LNAPL product was observed in a deep gray silty sand at or near the depth of the water table in 35 of 52

borings. Traces of LNAPL product were observed in 14 of the borings from the same lithologic unit, but no LNAPL product was observed in the overlying fill unit.

As reported in the RI Report (Ogden 1994b), seven soil samples collected at Millican Field did not show significant contamination. Detected TPH concentrations ranged from 45 to 1,300 mg/kg. Only one PAH, fluorene, was detected in the soil samples, at a low concentration of 0.15 mg/kg. Other compounds found at low concentrations were attributed to laboratory contamination. In addition, no LNAPL product was detected in the existing monitoring well located at this site. The potential contaminants found in soil at levels that exceeded the PRGs at this site included arsenic and beryllium. These analytes were found at levels within their respective site-specific background ranges, however, and are not identified as site-related contaminants.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional soil and Strataprobe® borings, monitoring wells, and microwells installed during Phase II field activities are presented in the Phase II RI Report. The RI report identified this area as RAA-3 and recommended that removal actions be taken to prevent migration of free product through the storm drain system into Pearl Harbor. Final planning documents for a removal action were submitted in October 1997. Field work consisted of a geophysical survey to delineate the plume, and direct push confirmation sampling, and sampling for engineering design data. An EE/CA, Action Memorandum, and design documents have been completed in accordance with the schedule presented in Appendix A.

Millican Field is also where the EPA and Navy are in a partnership to demonstrate innovative technologies as part of the EPA Superfund Innovative Technology Evaluation (SITE) Program. Two product removal technologies, surfactant-enhanced and electroheating, were tested, evaluated, and compared to two conventional technologies, belt-skimming and vacuum enhanced belt-skimming. The demonstration began in September 1998 and ended in August 1999. Aquifer testing was performed in June 2000 in support of the electroheating demonstration. These technologies were considered in the EE/CA as secondary technologies. The EE/CA was finalized in March 2000 and recommended extraction sumps along existing storm drain lines with a barrier trench. Construction of a collection/barrier trench and product recovery system with sumps both within the trench and along the storm drain system was completed in August 2002. Operation and maintenance of the product recovery system was conducted from August 2002 to

December 2004. Operation was discontinued for reasons including, no free product has been observed in collection sumps and free phase product plumes have not shown movement towards the recovery systems or Quarry Loch since monitoring began in July 2002. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Performance monitoring is continuing to be conducted with quarterly reports provided routinely. The system will be returned to operation if cleanup objectives are no longer being achieved.

D.6.20 Fuel Corridor Pipelines (IAS-29)

As shown in Figure 4-1, the fuel corridor pipelines are located throughout the PHNC. Potential impacts from both inactive pipelines and historical spills from active pipelines will be addressed as part of this SMP group. The practice of in-place abandonment of inactive fuel pipelines was identified in the IAS (NEESA 1983). In the IAS, NEESA did not recommend further action for the pipeline system; however, this recommendation was based only upon the potential for the inactive pipelines to contribute significant risk to potential receptors. Because previous investigations identified fuel of unknown origin beneath many areas around the PHNC, the fuel corridor system is being assessed under SMP Group 6 activities.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional soil and Strataprobe® borings, monitoring wells, and microwells installed during Phase II field activities are presented in the Phase II RI Report. Product plumes have been isolated into remedial action areas in the Phase II RI Report and actions are being planned and undertaken within each RAA.

D.6.21 Environmental Preventive Medicine Unit No. 6

The area located on the corner of Makalapa Gate Road and North Road presently occupied by the EPMU-6 facility has been a part of a major complex of aboveground and underground fuel storage tanks since 1923. The EPMU-6 property was formerly occupied by Pumphouses (PH) 91 and 91A and a 20-foot by 15-foot unlined oily waste pit.

A PA was conducted in February 1990 (ERCE 1990). Results of the PA indicated the need for further investigation at the site to assess the potential for hazardous substance release at or near the site, the types of contaminants released, the potential risk to

receptors posed by identified contaminants, and potential contamination migration pathways.

An SI was conducted during November 1990 through February 1991 (ERCE 1991) which consisted of drilling and sampling nine shallow soil borings in the vicinity of the EPMU-6 facility and installation of four monitoring wells. Thick, viscous LNAPL product was observed during drilling and sampling activities in soil and groundwater underlying the EPMU-6 facility and neighboring Gabrunas Field. No product thickness measurements were possible due to the extremely viscous nature of the product. Elevated levels of TPH were detected in 18 of the 20 soil samples collected and measurable levels of TPH were present in six of nine borings. The PCB congener Aroclor 1260 was detected at concentrations near the analytical laboratory reporting limit. VOCs and SVOCs were also detected in soil samples collected from nearly every boring and in each of the four groundwater samples collected. Aroclor 1260 was detected in one groundwater sample and its duplicate. A conclusion of the SI was that LNAPL product present in the shallow subsurface was apparently being transported by groundwater movement to the areas where oil seepage has been observed. The SI included the recommendation that further investigation at the EPMU-6 site be conducted under the subsurface oil RI.

As reported in the Draft Subsurface Oil RI Report (Ogden 1994b), analytical data from five soil samples collected at this site showed TPH levels typical of Naval bases. All detected pesticides, such as 4,4'-DDE, endosulfan II, endosulfan sulfate, and endrin ketone were detected at low levels. Beryllium exceeded the soil PRG, but because this analyte was found within its respective site-specific background range, it was not considered a site-related contaminant.

Results obtained from groundwater sampling of Phase I monitoring wells along with soil and groundwater samples collected from additional Strataprobe® borings and microwells installed during Phase II field activities are presented in the Phase II RI Report. This report identified this area as part of RAA-3. An EE/CA, AM, and draft design documents have been prepared as part of removal action at Quarry Loch. Construction of a collection/barrier trench and product recovery system with sumps both within the trench and along the storm drain system was completed in August 2002. Operation and maintenance of the product recovery system was conducted from August 2002 to December 2004. Operation was discontinued for reasons including, no free product has been observed in collection sumps and free phase product plumes have not shown

movement towards the recovery systems or Quarry Loch since monitoring began in July 2002. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Performance monitoring is continuing to be conducted with quarterly reports provided routinely. The system will be returned to operation if cleanup objectives are no longer being achieved.

D.6.22 Hotel Pier

Hotel Pier was identified as Remedial Action Area -1 (RAA-1) in the RI Report.(Ogden 1997). The RI identified a subsurface product plume adjacent to the Hotel Pier and centered on Neosho Avenue crossing Oklahoma Street. The plume was estimated to be approximately 500 feet in length and 120 feet in width, with a thickness of 0.06 feet. The petroleum hydrocarbons present in the plume appear to be weathered diesel (naval distillate F-76) and residual oil. It is believed that the source of the plume may be from past product leakage at Valve Station 3 or subsurface product fuel lines centered on and parallel to Neosho Avenue. Continued monitoring of free product levels and a removal action were recommended in the Hotel Pier area.

Draft planning documents for a removal action were submitted in June 1998 and were finalized in October 1998. Field work for additional site characterization occurred from January to April 1999. An EE/CA was submitted in July 1999 and was finalized in November 1999. It recommended repairing the storm drainage system and installing collection sumps and skimming equipment for product removal. The design was completed in June 2000 and construction of the system was accomplished in 2001. Operation and maintenance of the product recovery system was conducted from July 2001 to September 2004. The product extraction system operation was discontinued because no significant product recovery was occurring. A passive product recovery approach using absorbent socks is being used to remove measurable free product in collection sumps and monitoring wells. Performance monitoring is continuing to be conducted with quarterly reports provided routinely.

D.6.23 SUBASE – Pierce Street Area (RAA-9)

As a result of the Subsurface Fuel RI, a soil plume was identified in the vicinity of Pierce Street, predominantly located to the north of Quarry Loch in the former SUBASE area. Total petroleum hydrocarbon constituents in soil are in the diesel range with some

lubrication oil range near the northwestern edge of the plume. Product monitoring between September 1997 and June 1998 resulted in the appearance of a highly viscous product in MW-106 during the last two quarters. Planning documents for a removal site evaluation was completed in October 2002 with field work completed in March 2003. A draft removal action report (RAR) was submitted in December 2003 and finalized in June 2004. The report recommended placement of oil-absorbent socks in wells where free product was observed since 1997 and collection of product thickness measurements in monitoring wells at RAA-9. Product thickness measurements will continue for a period of one year after socks no longer recover free product. Comments received on the final RAR are currently being addressed.

D.6.24 Ward Field (RAA-5)

A free product plume in the vicinity of Ward Field, to the southeast of Merry Loch, was identified in the Subsurface Fuel RI. The composition of the product plume varies from a mixture of lubrication oil and diesel to a mixture of diesel and kerosene. Planning documents for the removal site evaluation were completed in September 2005. Field work is anticipated for completion in November 2005. The draft RAR is scheduled for completion in 2006.

D.7 NAVAL SHIPYARD SITES

This SMP Group currently consists of five sites located within the Shipyard GSA as shown in Figure 4-1. These sites, referred to as the Building 394 Battery Acid Disposal Pit, Asbestos Contaminated Shoreline, Foundry Shop - Building No. 6, the Transportation Yard, and Oscar-1 Pier Shoreline are briefly described below. In addition, a draft final SSR, which may identify additional potential release locations (PRLs) or sites within the Naval Shipyard GSA (GSA) was completed in November 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.). The final SSR for the Shipyard GSA was completed in August 2003 based on regulatory comments received on the draft final. Comments on the final were addressed with EPA between 2004 and 2005. In March 2005, EPA provided a letter stating there were no further comments on the SSR. The revised final SSR was completed in April 2005.

A focused SI was performed at the former Building T25 and former Sump Underlying Plating Tanks at Building 67 sites, and the report (April 2005) recommended that further investigation is needed.

D.7.1 Building 394 Battery Acid Disposal Pit Site

This site is located southwest of the intersection of Central Avenue and Port Royal Street (formerly called Seventh Street) immediately west of Building 394 (see Figure 4-1). This site consisted of an open-air “battery shop” facility used to clean, disassemble, and restore lead-sulfuric acid submarine batteries. Between 1960 and 1980, an estimated 60,000 gallons of spent battery acid fluid were discharged to an unlined settling pit in the western portion of the site. While the pit was in operation, lead residues from battery disassembly operations were reportedly also disposed in the pit.

Previous investigations at Building 394 include the IAS, and an SI conducted by Argonne National Laboratories (ANL) in 1990. In the IAS report, NEESA indicated that the “site is not a threat to human health or to the environment,” and recommended against performing a confirmation study. However, in an effort to address renewed potential concerns about threats that the site may pose to human health and the environment, an Expanded SI (ESI) was conducted by ANL on behalf of the Navy. Lead was detected in every sample collected during the ESI, at concentrations ranging from 3.8 to 241,000 mg/kg.

In response to the results of the ESI, an RI was conducted that included collection of soil and groundwater samples and assessment of hydraulic aquifer characteristics. Lead was detected in 57 soil samples collected during the RI at concentrations ranging from 1.4 to 54,000 mg/kg. Lead was detected in only one groundwater sample at an estimated concentration of 7.7 µg/L. Chromium was also detected in an offsite monitoring well, but is believed to be associated with a former plating facility located northwest of Building 394.

A Removal Action was initiated to address lead contamination present at the Building 394 site. The Draft RSE planning documents were submitted in March 1995. Regulatory agency comments were received in September 1995 and the documents were finalized in October 1995. During this same period, a “time-critical” Removal Action to implement dust-control measures along with removal of the waste acid underground tank, two

aboveground tanks, and associated piping was performed. The site was covered with plastic sheeting over which 3 to 6 inches of gravel was placed. This work was completed on October 6, 1995.

Following approval of the RSE planning documents, field work was initiated in April 1996 and was completed the next month. Surface soil and subsurface soil samples were collected and analyzed onsite by x-ray fluorescence methods for lead. In addition, 20 percent of these samples were analyzed by CLP methods for lead and 5 other metals (requested by the EPA based on the indictment and conviction of the laboratory used during the RI). On June 28, 1996, the Navy participated in a conference call with the EPA and the DOH to agree upon a cleanup goal for the site. The EPA requested that the Navy use an industrial-scenario model distributed by EPA Headquarters for use at all CERCLA sites nationally for assessing blood lead levels in adults, resulting in a cleanup goal of 2,000 mg/kg. This level was accepted for the Building 394 Removal Action and was used to assess the lateral and vertical extent of contamination.

The Draft EE/CA Report was submitted in October 1996 and a notice of availability for public comment was published in November 1996. The EE/CA Report was finalized in February 1997. Approximately 1,500 cubic yards of lead-impacted soil must be addressed by a Removal Action. The EE/CA recommended an innovative technology, in situ electrokinetics, for the removal action alternative. The Navy is working with the U. S. EPA Superfund Innovative Technology Evaluation (SITE) Program for demonstration of this technology on site. During efforts to test and demonstrate the in-situ electrokinetics system it was determined that the in-situ system could not get adequate hydraulic control. Therefore, the demonstration of the in-situ system would not be performed and a pilot scale ex-situ system was proposed (January 2001). The pilot scale test for the ex-situ system is being evaluated by the Navy and SITE Program. The pilot scale test was completed in July 2002 and the draft evaluation report was completed in September 2002. The final evaluation report was completed in January 2004.

The alternate removal action recommended (i.e., soil stabilization) is being implemented due to limited success with the pilot scale electrokinetics system. Also, being investigated is chromium detected in an onsite monitoring well.

Based on additional information, a capping alternative is being evaluated in an addendum to the EE/CA. The removal action is scheduled for completion in 2006.

D.7.2 Asbestos-Contaminated Shoreline

This site is located northwest of Dry Dock No. 3 and consists of an area approximately 800 feet long and 8 feet wide. The site is unpaved and partially vegetated. On November 15, 1993 NAVSHIPYD workers discovered an unknown quantity of asbestos containing material (ACM) buried beneath the shoreline's soil embankment. Immediately following this discovery, the area was cordoned off and sprayed with asbestos encapsulation material.

The exact origin of the ACM at the site is unknown and asbestos-related work is not currently performed in this area. Additionally, there is no information indicating the disposal of other hazardous wastes or chemicals at the site. In June 1995, a Site Evaluation was conducted. Surface soil and debris samples were collected and analyzed for asbestos contamination. The results indicated that asbestos contamination was not present in this area; therefore no further action is required. The Draft Site Evaluation Report documenting these results was submitted in February 1996 (Ogden 1996). Regulatory review comments on the draft report were addressed, and the Draft Final Site Evaluation Report was submitted in August 1996.

The Shipyard performed additional sampling and detected ACM at the site. A Letter Report was generated in September 1997 based on additional sampling. The Letter Report recommended that no action was necessary for the site in its present condition (i.e., covered with tarp). The tarp was installed only as a temporary measure. Also due to U.S. EPA Region IX comments to the Building 6 portion of the Final Site Evaluation Report, a revised report was submitted in July 1998. A non-time-critical removal action was planned for the Shoreline site. However, based on the site visit (September 1999) in preparation for the removal action, a time-critical removal action was determined to be the most efficient way to address this site. The time-critical removal action that involved removal of ACM and soil was completed in August 2000. An Action Memorandum generated to document this removal action was completed in April 2001. The Draft Remediation Verification Report for the removal action was completed in March 2001. The Final Remediation Verification Report was completed in August 2001. The PP and Decision Document is being prepared along with close coordination with regulators and is scheduled for completion in 2006.

D.7.3 Foundry Shop, Building No. 6

The Foundry Shop is located in Building No. 6, approximately 1,000 feet to the south of Pearl Harbor as shown in Figure 4-1. This site consists of an excavated area of approximately 2,100 square feet located inside Building No. 6 and a small, sparsely vegetated area of approximately 200 square feet immediately adjacent to the Foundry Shop on the south side of the building. During excavation work for the installation of a new furnace and centrifugal casting machine, contaminated soil were discovered. The excavated area within the shop contains molding sands used in metal casting, and it is believed that approximately 1 to 2 feet of soil overlie a concrete slab. The vegetated area is sparsely covered by grass. Surface sampling (0 to 10 inches bgs) and analysis of soil samples from the excavated and vegetated areas revealed elevated lead concentrations up to 10,000 mg/kg. Subsurface sampling below 10 inches was prevented by what may be a concrete slab.

The space above the excavated area once contained a furnace that was removed many years ago. This furnace may have released metals and other contaminants to the soil in the excavated area. Possible contaminants in the surface and subsurface soil include lead and other heavy metals, PAHs from use of coke in the furnace, petroleum hydrocarbons from use of hydraulic fluids and fuel oils, and PCBs from the presence of an electrical and a power generation area.

In June 1995, a Site Evaluation was conducted. Surface soil, soil boring, trenching, and sediment samples collected in this area revealed the presence of PCBs (Aroclors 1254 and 1260), PAHs, TPH (diesel and lubricant oil), and metals. On the basis of these results and the potential impact to human receptors, the Draft Site Evaluation Report, submitted in February 1996, notes that no further action is required in this area unless it is redeveloped for commercial or residential use. It was recommended that a deed restricting residential land use be instituted to assure that further evaluation of the area is instigated prior to rezoning the land (Ogden 1996). The Site Evaluation Report was finalized in August 1996 and then revised in July 1998 due to U.S. EPA Region IX comments. Based on the EPA comments the report was revised to recommend that areas associated with elevated levels of lead concentrations in soil be remediated.

Also of concern in this area is the elevated level of lead detected in the storm drain system sediment. Because of this finding, it was recommended that lead levels in storm

water and sediment entering the harbor be monitored to evaluate the potential impact to offsite marine receptors. Because a National Pollution Discharge Elimination System (NPDES) storm water permit application requiring storm water monitoring has been submitted for the entire Pearl Harbor Naval Shipyard (including the storm drain system around the Foundry Shop, Bldg. 6), no further action to address this issue is deemed necessary (Ogden 1996). Subsequent to the Final Site Evaluation Report, it was found that the catch basins were outside of the scope of the NPDES permit. Therefore, a time-critical removal action of sediments from two catch basins and paving of an area adjacent to one of the catch basins was performed in June 1998. Investigation at Building 6 will be expanded to other areas of potential contamination due to the shutdown of the foundry.

Field work for expanded SI was completed in October 2001. The expanded SI Report was scheduled to be final in Fall 2002. However, due to regulatory comments made to the final expanded SI Work and Sampling Plans additional samples need to be taken. The expanded SI Report was completed in May 2004. No further action is recommended for groundwater. Under current building use, no immediate action is warranted for the site soil.

D.7.4 Transportation Yard

The Transportation Yard is located on the south side of Central Avenue, between Lake Erie (formerly called Sixth) and Port Royal Street (formerly called Seventh Street) directly adjacent to the Building 394 Battery Acid Pit site, as shown in Figure 4-1. This site consists of a completely fenced 120,000-square-foot parking lot for large motor vehicles. The lot is almost entirely paved, with the exception of a narrow vegetated and gravel filled strip located along the southeastern perimeter of the lot. Before becoming a parking lot, this site was reportedly used as a storage yard for sludge tankers and as a tank staging area. A 1993 subsurface investigation of the adjacent Battery Acid Pit identified elevated concentrations of chromium contamination in the groundwater underlying the site. The localized direction of groundwater flow was calculated to be to the northwest, toward Building 394 from the direction of the Transportation Yard.

In June 1995, a Site Evaluation was conducted. Soil boring and monitoring well samples collected in this area revealed the presence of PAHs, TPH (diesel, kerosene, and lubricant oil), metals and PCBs (Aroclor 1260) in subsurface soil and TPH and PAHs in groundwater. Chromium contamination of groundwater was not found to be a problem at

the site. On the basis of these results and their potential impact to human receptors, the Draft Site Evaluation Report, submitted in February 1996, notes that no further action is required in this area unless it is redeveloped for commercial or residential use. It was recommended that a deed restricting residential land use be instituted to assure that further evaluation of the area is instigated prior to rezoning the land (Ogden 1996). The Site Evaluation Report was finalized in August 1996 and then revised in July 1998 due to U.S. EPA Region IX comments to the Building 6 portion of the report.

D.7.5 O-1 Pier Shoreline Site

The site is located in an area between Lake Erie Street (formerly called Sixth Street) and Dry Dock No. 4. Former activities that occurred at this site include sandblasting of boats in the water, indicating the potential for heavy metals contamination at the shoreline (Earth Tech 2003). Also located at this site was former Building 1420, a sandblast and paint facility demolished in 2003. Releases of paint-related contaminants, including lead may have occurred at this building. In addition, two SWMUs were identified within this area, which were recommended for further investigation for the presence of lead and heavy metals in soil. An SI has been initiated for this site.

The SI field work was completed in October 2005 and the SI report is scheduled for completion in 2006.

D.8 RED HILL OILY WASTE DISPOSAL PIT SITE

This site was constructed in the early 1940s and is located within the Red Hill GSA, approximately 7 miles to the northwest of downtown Honolulu as shown in Figure 4-1. From 1943 to 1948, an unlined pit located within the central portion of the site was used to “treat,” via separation techniques, oily residue generated during periodic fuel-tank cleaning operations and oily waste generated by leaks and drips from the fuel piping systems associated with the Red Hill USTs. The Red Hill USTs are connected to the site via a series of pipelines located within a concrete lined tunnel (see Figure 4-1) referred to as an Adit. Operation of the unlined pit ceased in 1948, when the soil beneath the pit was reportedly excavated to below the point of visible contamination. No disposal activities were reported to have been conducted at the site from 1948 until 1972, when a Stilling Basin, composed of a gunite and asphaltic-concrete liner, was installed in approximately

the same location as the former unlined pit. From 1972 to 1987, the Stilling Basin was used to contain wastewater and bottom sludges from the Red Hill USTs.

In 1983, the Navy sampled the contents of the Stilling Basin as part of an effort to characterize oily sludges generated at Naval installations. The principal contributors to toxicity detected in these samples were PAHs, phenols, and heavy metals. A subsurface investigation was conducted in the vicinity of the Stilling Basin in 1986. Soil samples were collected from four borings to a maximum depth of 41 feet below ground surface. Analytical results indicated PAHs and other hydrocarbons were present in the soil surrounding the Stilling Basin. In addition, low levels of PAHs and other hydrocarbons were also detected in a shallow localized groundwater system underlying the Stilling Basin. Use of the Stilling Basin was discontinued in 1986 as a result of the findings of this initial subsurface investigation.

In 1991, the Navy initiated an RI focusing on the Stilling Basin contents, the Stilling Basin vicinity, and ten other areas of the site surrounding the Stilling Basin, to evaluate the nature and extent of soil and groundwater contamination; to quantify potential threats to human health and to the environment; and to identify actions necessary to minimize or eliminate these threats. During the RI it was found that the contents of the Stilling Basin were contaminating the surrounding soil and had the potential to threaten the underlying drinking water aquifer. In addition, the Stilling Basin presented potential hazard to birds in the area. Groundwater samples collected during the RI from the shallow groundwater system located directly below the Stilling Basin were found to contain detectable amounts of VOCs, and SVOCs, including PAHs. Although this system is not a source of drinking water, the findings indicate the potential for contaminants associated with the Stilling Basin to migrate through the subsurface to impact the underlying drinking water aquifer.

Fuel hydrocarbons were also detected in the shallow soil at nine of the ten outlying areas investigated. The remaining area was found to contain low concentrations of PCBs believed to be associated with a transformer that existed on the site in the late 1930s and early 1940s. Contamination in these outlying areas has been determined to be below health-based levels of concern for those exposed directly to the soil. However, some of these areas may need to be addressed further due to the potential impact that contaminants associated with them may have on the underlying drinking water aquifer.

On the basis of the results of the RI, a Removal Action was initiated to minimize immediate threats to human health and the environment posed by the Stilling Basin. Various alternatives were evaluated during the EE/CA and documented in the Draft EE/CA Report submitted in June 1994. Regulatory review comments on the Draft EE/CA Report were addressed, and the document was finalized in October 1994. The EE/CA recommended that the Stilling Basin and surrounding contaminated soil be removed. Design documents for the selected Removal Action alternative were finalized in August 1994. Construction activities were initiated in January 1995 and completed by August 1995. During the Removal Action, the contents and structure of the Stilling Basin, as well as the majority of grossly contaminated soil associated with them, was removed from the site. The soil was thermally treated on Oahu at a permitted treatment facility located in Campbell Industrial Park and returned to the site once it was confirmed that it had been remediated. The excavation was backfilled using the treated soil then capped with clean soil and a low permeability geosynthetic clay liner to help ensure that remnant contaminants in this area do not impact the underlying drinking water aquifer. The Draft RVR and RADD documenting these activities were submitted in March 1996. Regulatory review comments were addressed, and the Final RVR and RADD were submitted in October 1996.

The Removal Action has eliminated threats from direct contact with surface contaminants; however, contaminants may have migrated below the shallow, localized water system and impacted the source of drinking water. Or they may impact it in the future. To evaluate this threat, the RI report recommended that monitoring wells be installed into the underlying drinking water aquifer. Groundwater samples collected from these monitoring wells should indicate whether contaminants from the site are threatening this resource. A second phase of the RI was therefore initiated. The Revised Final RI planning documents of this phase of work were submitted in April 1997.

Phase II RI field investigation work began in March 1998 and was completed in July 1998. Results of the first round of groundwater sampling indicate that the drinking water aquifer is not impacted by the surface contaminants remediated by the removal action of the stilling basin. The second round of groundwater sampling was completed in September 1998.

The Draft Phase II RI report was submitted in January 1999. After an extended regulatory review period, a draft final Phase II RI report was submitted in September

1999. The report found that the drinking water aquifer is not impacted by the surface contaminants and recommended no further response action at the site. A revised draft final Phase II RI report was submitted in September 2000. Regulators did not concur with the report recommendations. Petroleum contamination and the definition of drinking water were the two major items of contention.

A partnering session with the regulators, their consultant, and the Navy's consultant was held in April 2001 to address these items of contention. The partnering session resulted in an agreement that although the EPA would no longer handle this site under CERCLA due to the petroleum exclusion clause, the petroleum contamination would be handled by DOH under the Hawaii Environmental Response Law (HERL) and the Navy would conduct their response actions under the State Contingency Plan (SCP) which is the state equivalent of the NCP and describes how HERL is implemented.

A draft work plan was submitted in October 2001 to address DOH concerns regarding proper characterization of TPH concentrations exceeding the DOH action level found at the AST area. A clarification meeting of the draft work plan was held in November 2001. A final work plan was submitted in June 2002. Field work was completed in August 2002. The discrepancies between field screening data and laboratory test data, alternatives were reviewed and it was determined that no further field work will be required to complete TPH characterization. The draft 8,000-Gallon AST Area Total Petroleum Hydrocarbon (TPH)-Diesel Characterization report was submitted in January 2003. The report concluded that the TPH-Diesel contamination is limited and there is little or no potential for contaminant transport and migration to groundwater. Accordingly, the report recommended a No Further Action status for the former AST Area and the overall Red Hill Oily Waste Disposal Facility. The DOH had no comments to the report.

As agreed upon for the Ewa Junction Fuel Drumming Facility Site, the Navy submitted a letter in December 2004 to DOH requesting a No Further Action (NFA) determination by DOH in accordance with criteria contained in the SCP. . DOH provided NFA concurrence letter in April 2005. Abandonment of all the groundwater monitoring wells is anticipated for late 2005 or first quarter 2006. In March 2005, a letter was sent to the EPA requesting concurrence that this site and the Ewa Junction site be de-listed from the PHNC National Priority List (NPL).

D.9 PEARL CITY PENINSULA

This SMP Group currently consists of three PHNC sites located within the Pearl City Peninsula GSA as shown in Figure 4-1. These sites include the Pearl City Peninsula Landfill, Pearl City Peninsula Burn Area, and the Pearl City Fuel Annex (PCFA). A draft final SSR, which identified additional potential release locations (PRLs) or sites within the Pearl City Peninsula GSA was completed in July 2001. (The draft SSR was completed in 1997. Based on regulatory review comments, individual SSRs are being prepared for each GSA.) A revised draft final SSR was completed for the Pearl City Peninsula GSA in January 2002. The SSR for the Pearl City Peninsula GSA was finalized in April 2003, based on regulatory comments received on the revised draft final. The draft SI Work Plan was prepared in October 2004 for the investigation of the areas recommended for further investigation by the SSR. The areas include the AVGAS/MOGAS pipeline and the area south of Building 992. The SI Work Plan was finalized in July 2005.

The final Focused SI Report for Various GSAs was completed in April 2005. The Focused SI evaluated the UST PCP1. A geographical survey was conducted during the field investigation, and a subsurface anomaly was identified. Two subsurface soil samples were collected adjacent to the anomaly at depths of 4 and 5.5 feet. During the sampling, no staining of the soil was observed. The Focused SI recommended no further action for UST PCP1.

A brief discussion on the status of each of the current sites is provided below.

D.9.1 Pearl City Peninsula Landfill

The Pearl City Peninsula Landfill is located within the Pearl City Peninsula GSA on the northeastern shore of Middle Loch (see Figure 4-1). This landfill was operated by PWC as an official sanitary landfill from 1965 until 1976. The site was also used unofficially for disposal of refuse from the mid-1940s. Waste disposal practices reportedly included burning, landfilling, and uncontrolled dumping. The site is currently capped with a 1-to-2-foot-thick layer of crushed basalt. Previous investigations indicated the presence of PCBs, SVOCs, TCE, and fuel products in the vicinity of a wash rack located in the southeastern portion of the site. Significant accumulations of these contaminants were observed in the drainage sumps. Deeper soil indicated burn dump operations had been

conducted there. Analysis of soil and gas samples suggests no imminent health hazard. In order to evaluate the nature and extent of contamination, an RI was conducted between December 1991 and March 1995. Between July 1996 and March 1997, and RSE was conducted to supplement the information in the RI. Draft RSE planning documents were submitted in June 1996. Regulatory review comments were addressed, and the Draft Final planning documents were submitted in October 1996. Field work associated with the RSE began in 1996 and was completed in 1997. Results of the RSE were used to conduct the EE/CA. The draft EE/CA was completed in May 1997. The draft final EE/CA was completed in January 1998. A revised draft final EE/CA was completed in May 1998. The EE/CA recommended repair, inspection, and maintenance for the landfill cover, with long-term monitoring for the berm; erosion control for the black sands area; long-term monitoring for Waiawa Unit; excavation of dioxin/furan impacted soil on City and County property; consolidation of contaminated soil on Navy property; and covering of contaminated soil on Navy property. In August 1998, additional comments on the EE/CA were received from EPA. In response to EPA comments, the Navy agreed to (1) include gas monitoring on the landfill perimeter as part of the monitoring program and (2) coordinate closely with EPA, FWS, and DOH to develop a long-term monitoring plan, additional ecological assessment at the Waiawa Unit, and evaluation of potential up-gradient or off-site contamination sources. A revised EE/CA was issued in October 1998. The October 1998 EE/CA recommendations were essentially the same as the May 1998 EE/CA recommendations.

The draft design for implementation of the removal action was completed in November 1997. The final design was completed in May 1998. The removal action planning was initiated in 1998.

In 1999, a second Action Memorandum (AM) was issued to document significant changes from the EE/CA. The AM proposed that the proposed removal action be designated as interim, since further ecological assessments at the Waiawa Unit, characterization, and long-term monitoring were planned after the interim removal action. The interim action included landfill cover repair, black sands area erosion control cover, soil cover at hot spot areas, a containment system at Waiawa Stream banks, and construction of a bridge for site access. The interim removal action was substantially completed, except for crack repairs, in February 2000. Crack repairs were completed in September 2000. A final RVR was completed in December 2000.

In 1999, additional ecological assessment for the Waiawa Unit was initiated. In February 2000, an abbreviated sampling and analysis plan (SAP) was completed to confirm that no imminent threat to human health or environment exists at the Waiawa Unit. This plan was prepared in response to a report of distressed vegetation and fish by FWS. This investigation was part of the on-going ecological assessment at the Waiawa Unit. In April 2000, the Waiawa Unit Sediment Sampling Report was completed. This report presented the results of the sampling and analysis effort conducted at the Waiawa Unit in response to reports of distressed vegetation and fish by FWS. The report concluded that there appeared to be no imminent threat to human health and environment as a result of a perceived contaminant release. The Waiawa Unit would continue to be monitored as part of an on-going ecological assessment and evaluation of the adjacent Pearl City Peninsula Landfill. In June 2000, a draft screening-level ecological risk assessment report for the Waiawa Unit was completed. The draft final screening-level risk assessment report was completed in April 2001. A draft baseline ecological risk assessment for the Waiawa Unit is in-progress. A draft Step 3a report for the ecological risk assessment of the Waiawa Unit was completed in December 2001.

In an effort to streamline the risk assessments currently being performed at adjacent sites including the Waiawa Unit, Pearl City Peninsula Landfill, and the Pearl City Peninsula Burn Area Site, an integrated draft Step 3a evaluation was prepared in October 2002. Based on regulatory comments received on the draft Step 3a document, a draft Baseline Risk Assessment Work Plan (Step 3b/4) for the Waiawa Unit, Pearl City Peninsula Landfill, and the Pearl City Peninsula Burn Area Site was prepared in July 2003. The draft final was prepared in July 2004.

A draft long-term monitoring plan for the landfill was completed in July 2001. A draft final long-term monitoring plan was completed in November 2001. Field work to implement the long-term monitoring plan was initiated in December 2001. Revision 1 of the long-term monitoring plan was prepared in June 2002, to incorporate regulatory comments received on the December 2001 plan. Revision 2 of the long-term monitoring plan was completed in October 2002, based on additional comments received on the long-term monitoring plan, Revision 1. The draft Addendum No. 3 to the long-term monitoring Plan was prepared in January 2005 to include the seep investigation. The final Addendum No. 3 to the LTM Plan was prepared in May 2005.

D.9.2 Pearl City Peninsula Burn Area

The Pearl City Peninsula Burn Area, formerly operated by PWC, is located due east of the Pearl City Peninsula Landfill within the Pearl City GSA. The NEESA IAS identified this site, which operated between 1945 and 1965. Because it may have received a variety of wastes generated at PHNC during that period, an RI was initiated.

The Draft RI project plans were submitted in December 1994. Comments on these documents were addressed, and the Draft Final project plans were submitted in January 1996. There has been no action on this project since Draft Final project plans were prepared. Because similar conditions to the adjacent Pearl City Peninsula Landfill are anticipated, the Navy has elected to proceed with an RSE. Planning for the RSE began in 1999.

A draft SAP for the RSE was completed in October 1999. The final SAP was completed in June 2000. The SAP was presented at the July 2000 Pearl Harbor RAB meeting. Field work to implement the RSE SAP began in July 2000 and was completed in September 2000. The draft RSE report was completed in June 2001. The draft final RSE report was completed in October 2001.

In an effort to streamline the risk assessments currently being performed at adjacent sites including the Waiawa Unit, Pearl City Peninsula Landfill, and the Pearl City Peninsula Burn Area Site, an integrated draft Step 3a evaluation was prepared in October 2002. Based on regulatory comments received on the draft Step 3a document, a draft Baseline Risk Assessment Work Plan (Step 3b/4) for the Waiawa Unit, Pearl City Peninsula Landfill, and the Pearl City Peninsula Burn Area Site was prepared in July 2003. The draft final was prepared in July 2004.

D.9.3 Pearl City Fuel Annex

The PCFA is located directly east of the Pearl City Peninsula Burn Area within the Pearl City Peninsula GSA. The PCFA, operated by FISC, consists of five aboveground storage tanks (a sixth tank, a 1,000 barrel tank, is owned and operated by a commercial company, BHP), three main pump houses, a truck loading rack, and support pipelines and structures for the storage and pumping of bulk aviation fuels. Facility records indicated that occasional tank/pipeline leaks and oil spills have occurred contaminating the subsurface soil with petroleum (fuel) products. The last major leak occurred in December 1980

releasing of approximately 10,000 gallons of JP-4 from a pipeline located in front of the tank farm directly to the west. A 2-foot diameter recovery well was installed near the tanks; however, no fuel was detected in the well. FISC employees decided the spill had dissipated and did not install a groundwater depression pump to recover the LNAPL product. Fuel has not been observed in the stream that borders the site to the west.

After heavy rains in March 1991, water entered the subsurface electrical junction boxes onsite and a subsurface switching station connected to the boxes by electrical cable conduits. As the water level dropped an explosion occurred. It appears that fuel (possibly gasoline) vapors from LNAPL product floating on the water table moved into the switching station via the conduits and was ignited, causing an explosion.

To address releases suspected to be associated with this site, a RSE was conducted in July 1995. The results of this initial investigation led to a second phase of study. The Draft RSE planning documents were submitted in November 1995 and finalized in March 1996. Field work on the second phase of the RSE was conducted in May and June 1996. The RSE Report was submitted in October 1996. The Draft Final RSE Report was submitted in May 1997. A Revised Final RSE Report was submitted in June 1997. The risk evaluation presented in the RSE indicates that lead in surface soil at the site may pose a human health risk to onsite workers. The RSE recommended an EE/CA to assess the remediation of surface soil hot spots.

A draft Pilot Study Work Plan was prepared in March 2005 for the implementation of the phytoextraction pilot study. The purpose of the pilot study is to assess the feasibility of using phytoextraction as a remedial alternative to treat lead, antimony and arsenic in surface soil. The final Pilot Study Work Plan was submitted in August 2005.

D.10 PHNC STORM DRAINS

The sites that currently comprise SMP Group 10 are part of the PHNC Storm Drain System, located throughout many of the GSAs within PHNC, as shown on Figure 4-1. The storm drain system was designed and constructed as a gravity-flow network in 1910. Capacity was expanded by constructing additional facilities up to World War II. The system consisted of as many as 20 trunk lines of 10- to 54-inch diameters, associated box culverts, and connecting feeder lines, all discharging to Pearl Harbor. Many point

sources, including a number of SWMUs recommended for additional response actions, are connected to the system and are, therefore, included within this SMP Group.

Site investigations have revealed elevated concentrations of arsenic, chromium, nickel, copper and lead in the sediment within the storm drains. PCBs, TPH, and PAHs were also detected in the soil surrounding the storm drains. Removal Actions are currently contemplated to address the PHNC Storm Drain System. This will include conduct of RSEs, followed by an EE/CA, and ultimately Removal Action implementation. The current Target Completion Dates for documents associated with this work are listed in Appendix A. The following sections provide brief descriptions of the PHNC storm drain sites and results of any site investigations that have occurred to date.

D.10.1 NAVSHIPYD Marine Machine Shop (SY-44)

This site adjoins NAVSHIPYD Building 215. It is used for submarine overhauls and testing, maintenance, and repair of ship pumps and motors. Prior to 1976, effluent from the machine cleaning pad was directed to the storm drain. Previous investigations conducted as part of an RFI at the site detected hydrocarbon odors from storm drain sediment, TPH concentrations in excess of 1,000 mg/kg, and detectable levels of PAHs, including benzo(a)pyrene. It was recommended in the RFI Report that further sampling of the storm drain sediments be conducted and significant contaminated sediment be removed, treated, and/or disposed (Ogden 1992a).

Field work for an SI was completed in Fall 2003. Sediments in the adjacent catchbasin, soil, and groundwater were sampled. The draft SI report is completed. The SI report is to be finalized in 2006. A clean out of the catchbasin sediment is also scheduled for 2006.

D.10.2 NAVSHIPYD Storm Drain System (SY-84)

This drainage system was used in the past for disposal of liquid industrial waste. Previous investigations conducted at the site under a 1992 RFI detected elevated concentrations of arsenic, chromium, nickel, copper, and lead in the sediment. PCBs, TPH, and PAHs were detected in the soil. It was recommended in the RFI Report that additional sampling be conducted to delineate areas of the storm drain containing significantly contaminated sediment and to remove, treat and/or dispose of the significantly contaminated sediment (Ogden 1992a). An SI has been initiated.

D.10.3 PWC Paint Storage Area (PWC-01)

The area consists of two sites used for paint supply storage and consolidation of paint wastes. One site is no longer in use. Both sites are located in the main PWC complex east of Makalapa Gate next to Paint Shop Building 35.

An initial investigation detected elevated concentrations of toluene, xylenes, lead, chromium, and beryllium above RCRA action levels for those compounds (KJC 1989). The concentrations were detected in soil samples collected near the old storage area. Borings and catch basin samples were collected as part of a subsequent RFI (Ogden 1992a). Concentrations of arsenic and beryllium above RCRA action levels detected in these samples, however, were attributed to high background concentrations characteristic in soil of Hawaiian volcanic origin (Ogden 1992a).

D.10.4 NAVSHIPYD Industrial Waste Treatment Plant Collection Sump and Unloading Area (PWC-10, PWC-13)

The NAVSHIPYD Industrial Waste Treatment Plant (IWTP) began operations in 1974 and was designed to treat acid, alkali, cyanide and heavy metal waste. The IWTP is located in NAVSHIPYD near the Lower Tank Farm. The collection sump itself was constructed in 1986 and collects wastewater for pretreatment prior to discharge to the PHNC Storm Drain System. The IWTP waste unloading area is an unpaved area adjoining the IWTP used for industrial waste material staging and storage operations.

Both site areas were sampled as part of an RFI investigation to determine if heavy metals or cyanide had been released as part of the activities for the IWTP. Concentrations of antimony and arsenic were detected above RCRA action levels in samples obtained near the collection sump. In addition, lead was detected at elevated concentrations. The patterns of contamination were indicative of a release near the collection sump; further investigation was recommended to determine if the collection sump was a contaminant release source (Ogden 1992a).

Surface soil samples were collected in the waste unloading area and an adjoining waste soil pile. Detected concentrations of arsenic and beryllium and a single estimated concentration for antimony were above RCRA action levels. Onsite and background concentrations within the waste unloading area samples were not significantly different for arsenic and beryllium and detected concentrations are probably indicative of

background concentrations (Ogden 1992a). The RFI report recommended further sampling in the vicinity of the sample site containing the estimated antimony concentration. An SI has been initiated.

D.10.5 NAVSTA Spent Battery Storage Yard (NAS-04)

This site is a former battery storage yard adjoining building 472, located on the Kuahua Peninsula near Magazine Loch. The yard stored empty battery casings from 1942 to 1987. Battery washing and acid neutralization occurred in the northeast corner of building 472, while effluent drained into the storm drain. Currently, effluent is rerouted to the sanitary sewer.

Lead concentrations between 251 to 2,490 mg/kg were detected in the sediment samples collected from the site as part of an RFI. Lead was also detected in the groundwater and soil, although not at elevated concentrations. It was recommended that an evaluation of the cost for additional sampling be compared against the complete removal of sediment in the trunk line before further action is taken (Ogden 1992a).

D.10.6 SUBASE General Engineering Service Yard - Hose Drain Area (SB-26)

The site adjoins Building 1320 on the Kuahua Peninsula near the inland end of Magazine Loch. The site was used to clean hoses for dockside filtration and flushing of contamination from ships. Cleaned hoses were formerly laid on a small hillside to drain or laid in the service yard adjacent to Building 1320 to dry. Hoses are now drained using compressed air and the effluent is collected in 55-gallon drums. Wastes managed include hydraulic oils and sulfamic acid.

Previous investigations detected elevated levels of arsenic in soil samples collected from the site. It was recommended in the RFI Report that data evaluation and background soil sampling, if necessary, be conducted to assess the potential for arsenic impacts (Ogden 1992a).

D.10.7 NAVSHIPYD Building 68 (IAS-13)

Building 68 is an electrical repair shop located in the northeast section of NAVSHIPYD, bounded to the north by Buildings 179, 1609, and 296; to the west by Building 72; and to the south and east by the Controlled Industrial Access (CIA) area. From approximately

1950 to 1979, the shop serviced electrical transformers containing PCB-dielectric fluid. During this period, PCB-containing dielectric fluid was reportedly disposed in catch basins located adjacent to Building 68. During the period 1950 to 1979, approximately 50 to 55 gallons of PCB-containing transformer fluid were discharged to these catch basins per year. The total quantity of PCB-containing fluid discharged to Pearl Harbor from Building 68 transformer repair operations is unknown; discharges between 1950 and 1965 have been estimated at 800 gallons.

The 1983 IAS of Building 68 concluded that PCBs may have reached sediments in Pearl Harbor through the storm drain system and that PCBs may have contaminated soil adjacent to the catch basins and storm drains. The IAS did not consider the site a threat to human health or the environment, however, and recommended against performance of a confirmation study at Building 68 (NEESA 1983a).

In 1990, an Expanded SI conducted at Building 68 involved the collection of catch basin sediment samples and soil borings adjacent to two catch basins. Laboratory analytical data revealed PCB concentrations in catch basin sediments ranging from of 21 mg/kg to 1,130 mg/kg. One soil boring sample contained PCBs, at a concentration of 0.38 mg/kg (Argonne National Laboratories (ANL) 1992).

In 1992, an RI at Building 68 included collection of catch basin sediments, soil samples, groundwater samples, and marine sediment samples, which were analyzed for VOCs and PCBs. Evaluation of these data revealed that VOCs were below ARAR and TBC action levels in all media sampled; PCBs were below action levels in all media except catch basin sediments. Recommendations included removal of sediments from Building 68 catch basins to address identification and remediation of the source of detected PCBs (Ogden 1994a).

In 1995, a "time-critical" Removal Action at a catch basin where elevated levels of PCB-contaminated sediment were detected as part of the RI sampling effort was done. Sediments were removed and a coating was applied to the interior surface of the catch basin.

In 1996, catch basin sediments, soil, and groundwater were resampled at the direction of EPA because the analytical laboratory used for the initial RI sampling effort was convicted of laboratory fraud.

In 1997, the Final RI Report that included the resampling results was completed. The RI Report recommended removal of accumulated sediment in catch basins, taking wipe samples of catch basin walls to determine source and transport of contaminated sediment in the storm drain system. It also recommended, if necessary, performing an EE/CA to recommend the best remedial alternative.

A “time-critical” removal action was also performed at two catch basins where elevated levels of PCB-contaminated sediment were detected. As part of this removal action, a concrete bottom was installed in one of the catch basins, which did not have a bottom.

D.10.8 SUBASE Machine, Plating, and Flex Hose Shops (SB-12 and-13)

Waste oils and plating wastes were once disposed of in two storm drains associated with Building 660 of SUBASE. One storm drain discharges into Quarry Loch and the second to the west between Quarry Loch and Magazine Loch. Elevated concentrations of barium and lead have been found in previous investigations. Current practices restrict the disposal of industrial waste into storm drains. The RFI Report recommended that the cost of additional sampling be compared with the cost of complete removal of sediment in the trunk line before further action is taken (Ogden 1992a).

D.10.9 NAVSHIPYD Building 155, Former Sandblast Area (New SWMU 07)

The site is a small former sandblasting structure attached to Boiler Shop Building 155 in NAVSHIPYD. The sandblasting operations were conducted from 1972 through 1983. The RCRA Facility Assessment (PACNAVFACENGCOM 1990) judged the potential for release as very low and recommended no further investigation for this site. However, the impact of wastewater that entered the PHNC Storm Drain System will be studied as part of this SMP Group.

D.10.10 NAVSHIPYD Building 4, Concrete Pad and Drain (New SWMU 09)

Pipe cleaning operations at NAVSHIPYD Building 4/4A were conducted from 1928 through 1971, and pipefitting operations were conducted from 1940 through 1984. Chemical cleaning tanks were removed from the site in 1975. The RCRA Facility Assessment (PACNAVFACENGCOM 1990) found that pipe shop waste may have entered the PHNC storm drain system outside the building.

D.10.11 NAVSHIPYD Building 4/4A Capped Storm Drains (New SWMU 10)

The site is an active refrigeration shop area located in NAVSHIPYD Building 4/4A. The refrigeration shop was started in the 1970s and the RCRA Facility Assessment (PACNAVFACENGCOM 1990) identified the possibility that liquid freon, oils, and shop rinse water have been released into the shop floor drain, which is connected to the PHNC storm drain system.

D.10.12 NAVSHIPYD Building 4/4A Pipe and Copper Shop Floor (New SWMU 15)

Pipe cleaning operations at PHNC Building 4/4A were conducted from 1928 through 1971, and pipefitting operations were conducted from 1940 through 1984. The chemical cleaning tanks were removed from the site in 1975. This building is connected to the same PHNC drain as the Building 4 concrete pad and drain, another SMP Group 10 site (listed above). This site was initially recommended for no further investigation in the RCRA facility assessment (PACNAVFACENGCOM 1990). However, it was later recommended for further action on the basis of its potential impact on the PHNC storm drain system and receiving waters.

D.10.13 Former Boiler Shop Storm Drain (New SWMU 17)

Building 4 has had a history of various activities, including a paint shop, pipefitting, pipe cleaning, and bicycle repair. Past operations may have caused the release of oils and acid wastes into the PHNC storm drain system (PACNAVFACENGCOM 1990).

D.10.14 FISC Building 449 Battery Charging Area Floor Drain (New SWMU 20)

This site, located in Building 449 of FISC, was used as a vehicle maintenance shop. Until the 1970s, part of the building was used for washing old batteries. Wastes generated by these activities may have been released into the PHNC storm drain system.

D.10.15 PWC Building 43 Electrical Shop Floor Drain (New SWMU 22)

The site is located in the PWC Building 43 electrical shop. The electrical shop operations included washing of electrical parts until the 1980s and the use of solvents or varnish.

Wastes may have been released to the PHNC storm drain system via the electrical shop central drain.

D.10.16 SUBASE Former Battery Acid Tanks and Pit (New SWMU 29)

The site is a former battery shop over which the present SUBASE buildings 651 and 674 were built in approximately 1975. No records are available for the actual operations and any potential releases to the ground. Potential discharges to the PHNC storm drain system will be evaluated as part of this SMP Group.

D.10.17 NAVSTA Building 472 Drum Storage (New SWMU 34)

The site has been used since the 1940s to store drummed solvents and oily wastes derived from activities of the adjoining NAVSTA Building 472. The site itself is unpaved and the drums are stored upon pallets for regular collection and disposal by the Navy PWC.

D.11 MAKALAPA PESTICIDE RINSATE PIT

The Makalapa Pesticide Rinsate Pit is located within the PWC Main Complex GSA as shown in Figure 4-1. Between 1974 and 1978 the site was used daily to wash pesticide and herbicide application equipment. The pit is currently backfilled with fill materials. Site investigations have revealed significant levels of pesticides, PCBs and other contaminants within and surrounding this site. A Draft RI report was submitted in September 1993. Regulatory agency review comments on the Draft RI Report were received in March 1995, and the Draft Final RI Report was submitted in May 1995. Follow-up sampling and analysis have been recommended to evaluate the source and distribution of the chlorinated pesticides identified at the site. The additional sampling was conducted in May 2005. The current Target Completion Dates for documents associated with the Removal Action are presented in Appendix A.

D.12 EWA JUNCTION FUEL DRUMMING FACILITY

This site comprises the Ewa Junction GSA and is located in the southern portion of Oahu, approximately 8 miles west of downtown Honolulu and about 250 feet north of the Middle Loch of Pearl Harbor as shown in Figure 4-1. The site was constructed in 1943 as a fuel drumming and transportation terminal. It is currently inactive. Significant structures at the site consisted of two USTs and several pump houses along with concrete

slabs used for drum storage. According to a 1972 Navy report, vandals activated a fuel pump associated with UST S-26, allowing approximately 315,000 gallons of motor gasoline (MOGAS) to be released on to the surrounding ground surface in March of 1971. The release created a pool of fuel about 1 to 2 feet deep and approximately 150 feet in diameter that was discovered the next day. Immediately following discovery of the spill, Navy personnel pumped the MOGAS that had pooled at the surface back into UST S-26. The volume of product recovered during the pumping was approximately 32,000 gallons, or 10 to 15 percent of the total volume of MOGAS spilled. The remaining fuel either evaporated or seeped into the ground.

An investigation of the site was initiated immediately following the spill. MOGAS was found floating on the shallow groundwater table. Several large (2-foot) diameter wells were installed to recover the MOGAS. An interceptor trench was later installed along the southern boundary of the site to increase MOGAS recovery and prevent southward movement of the MOGAS. The recovery wells and interceptor trench were operated for about a year. More than 100,000 gallons, or approximately 32 percent of the amount of MOGAS spilled, was collected. All together as much as 45 percent of the MOGAS has been recovered.

Additional investigations were conducted in 1974-1975 and in 1988-1990 to further assess the extent of soil and groundwater contamination associated with the MOGAS release. MOGAS was detected in soil and groundwater samples obtained from beneath the site. However, the presence of MOGAS floating on the water table was observed to have diminished markedly during the latter investigation, and was detected in only one area. As a result of these investigations, it was recommended that further work be conducted to characterize the nature and extent of MOGAS.

In 1991, the Navy initiated an RI to evaluate the nature and extent of soil and groundwater contamination; to quantify potential threats to human health and the environment; and, if necessary, to identify actions necessary to minimize or eliminate these threats. Surface and subsurface soil samples collected during the RI were found to contain detectable concentrations of compounds commonly associated with MOGAS. All concentrations of these compounds were found to be below guidelines recommended by the DOH and EPA. A series of groundwater samples collected over a 2-year period from the shallow groundwater system located directly below the site (referred to as the caprock water-bearing zone) were found to contain VOCs and SVOCs (i.e., MOGAS

components) at concentrations exceeding the DOH and EPA recommended guidelines. None of these contaminants were detected in groundwater samples collected from a series of artesian wells located to the south of the site that supply water from the deeper basal aquifer to adjacent watercress farms. No MOGAS was detected floating on top of the shallow groundwater beneath the site during the same two year period that the groundwater samples were collected.

Water from the caprock is not currently being used for human consumption in the vicinity of the site. In addition, caprock groundwater in this area is not considered a viable source of potable water because of the low hydraulic conductivity associated with the water-bearing zone and the relatively high concentrations of total dissolved solids (TDS). Data gathered during the RI indicates an overall decrease in the concentrations of fuel components over time. This may be attributed, in part, to biological breakdown of the MOGAS by bacteria and fungi present in the subsurface underlying the site.

The Draft RI Report was completed and submitted in August 1995. Regulatory review comments (received in January 1996) were addressed, and the Draft Final RI Report was submitted in April 1996. EPA and DOH accepted the RI Report as final in May 1996. As indicated in the report, fate and transport calculations performed in support of the RI suggest no potential for future offsite migration of contaminants dissolved in the caprock water from the vicinity of the MOGAS source. However, it is uncertain whether contaminants related to the 1971 spill could have migrated offsite in the past. As a result, the RI Report recommended that additional groundwater monitoring wells be installed to the south of the site within the caprock water-bearing zone. Installation of these wells will help to close the identified data gaps related to defining the limits of contamination. It was further recommended that long-term monitoring of all the onsite and offsite (i.e., existing and proposed) monitoring wells be conducted. In response to these recommendations, a second phase of the RI was initiated. The Draft Final RI project plans was submitted in October 1996. Regulators accepted the Draft Final RI project plans in December 1996. Due to comments received from the Navy's QC/QA consultant in January 1997, the Final SAP was revised. The Draft Revised SAP was submitted in April 1998. The Draft Final Revised SAP was submitted in July 1998.

The field investigation was substantially completed in July 1998 with the completion of four off-site groundwater monitoring wells. The first round of groundwater sampling was also completed at that time and was considered the "dry" period sampling. The second

round of groundwater sampling was to occur during the “wet” period, which was not determined due to the unusually dry weather conditions. The “wet” period did not materialize. Per conference call with regulators in April 1999, a second round of groundwater sampling was performed at that time.

The Draft Phase II RI Report was submitted in November 1999. The report found contaminants related to the 1971 spill remained on site and did not migrate offsite. Since the contaminants are undergoing biodegradation, natural attenuation is occurring at the site. The report recommended that no further response action is required at the site. Regulatory comments were received in September 2000. The regulators did not concur with the report recommendations and submitted their comments with a substantial portion (25 pages) focused on the ecological risk assessment. A draft final Phase II RI report was submitted in November 2000 addressing their comments but did not change the recommendations. The regulators continued not to concur with the report recommendations. The duration of groundwater monitoring and the definition of drinking water were the two major items of contention.

A partnering session with the regulators, their consultant, and the Navy's consultant was held in April 2001 to address these items of contention. The partnering session resulted in an agreement that although the EPA would no longer handle this site under CERCLA due to the petroleum exclusion clause, the petroleum contamination would be handled by DOH under the Hawaii Environmental Response Law (HERL) and the Navy would conduct their response actions under the State Contingency Plan (SCP) which is the state equivalent of the NCP and describes how HERL is implemented.

After a meeting with DOH in July 2001, it was agreed that the Navy will submit a letter to DOH requesting a No Further Action (NFA) determination by DOH in accordance with criteria contained in the SCP. The NFA letter to DOH was submitted in October 2001. DOH provided NFA concurrence letter in March 2002. All groundwater monitoring wells were properly abandoned in July 2002. In March 2005, a letter was sent to the EPA requesting concurrence that this site and the Pearl City Junction site be delisted from the PHNC NPL.

D.13 FLETRAGRU FIRE FIGHTING TRAINING AREA

The Fleet Training Group (FLETRAGRU) Fire Fighting Training Area is located within the Richardson GSA. Gasoline, diesel fuel, waste oil, and paints were reported to have been ignited and used for fire fighting training purposes at this site from 1940 until 1976. After each training exercise, spent water and ignited materials were washed into pits and drains; from these locations the training wastes were reported to have been released to Aiea Bay (i.e., the East Loch of Pearl Harbor). Catch basins, oil-water separators, and pipelines located at the site all discharged directly into Aiea Bay. Site investigations indicated elevated levels of VOCs in soil gas and minor amounts of VOCs and PAHs in the soil. TPH was also detected in soil and groundwater beneath the site. On the basis of these findings, a Removal Action is proposed for this area to address detected contaminant hotspots.

Final planning documents (Work Plan and SAP) for a RSE at the Fire Fighting Training Area were completed in April 2005. A Final Work Plan and SAP Technical Addendum was completed in August 2005. Field work is anticipated to begin in October 2005. The target completion dates for documents associated with this Removal Action are presented in Appendix A.

D.14 MAKALAPA CRATER

This SMP Group comprises the Makalapa Crater GSA and is located to the south of Halawa Stream as shown in Figure 4-1. The target completion dates for documents associated with this GSA are presented in Appendix A.

Prior to the 1940s, Makalapa Crater was a depression containing a small lake. It was used for disposal of dredge spoils and other Navy wastes, until the lake was eventually drained and filled. Results from previous environmental investigations of the site indicate elevated levels of TPH and selected metals in soil samples collected from within the crater. On the basis of the recommendations of previous investigations, a Removal Action is proposed to address the identified contamination.

A draft final SSR, which may identify additional potential release locations (PRLs) or sites within Makalapa Crater GSA, was completed in August 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs are being prepared for each GSA.) A revised draft final SSR was completed for the Makalapa Crater GSA in

February 2002. The SSR for the Makalapa Crater GSA was finalized in November 2002, based on regulatory comments received on the revised draft final.

D.15 PEARL HARBOR REGIONAL SEDIMENT STUDY

This site comprises the Pearl Harbor GSA and is located in the south-central region of the island of Oahu, Hawaii as shown in Figure 4-1. The site is a large complex estuary comprised of approximately 5,000 acres of surface water area and 36 miles of lineal shoreline. It encompasses the entrance channel to the estuary, West Loch, Middle Loch, East Loch, and Southeast Loch. West and Middle Lochs are separated by the Waipio Peninsula, and Middle and East Lochs are separated by the Pearl City Peninsula. Ford Island is located in the middle of the site. Naval operations conducted adjacent to the site have been multi-faceted and have included fuel storage, handling, transfer, and recycling facilities as well as operation, maintenance, and support facilities and military landfills. Past waste handling and disposal methods, although acceptable at the time, may have caused unexpected long-term problems at some locations through release of toxic and hazardous substances into soil and groundwater at sites surrounding the estuary as well as into the estuary itself. Construction of a sewage treatment plant in 1970 and an industrial wastewater treatment plant in 1974 have helped to reduce further discharges; however, significant concentrations of contaminants may still be present in the harbor sediments. To address potential concerns related to this site, an RI is currently being implemented.

The Draft RI/FS planning documents were submitted in September 1995. Regulatory review comments on the draft documents were addressed, and the Draft Final RI/FS planning documents were submitted in February 1996. The Final RI/FS planning documents were submitted in August 1996, once additional comments in the Draft Final documents were addressed.

Field sampling activities, which included collection of 219 sediment samples and 15 tissue samples from designated locations throughout the harbor, were conducted between July and November 1996. Several in-progress technical review meetings between the Navy, regulatory agencies, and natural resource trustees were held to discuss the preliminary findings and methodologies to be used in the human health and ecological risk assessments. During an in-progress meeting, held in July 1998, human health concerns regarding consumption of fish and shellfish from Pearl Harbor were discussed with EPA Region IX and the State DOH. Based on the available data and conservative

human health risk assumptions, it was determined that a harbor-wide fish/shellfish advisory was warranted. On August 27, 1998, the State DOH issued a public health advisory warning against the consumption of all fish and shellfish in Pearl Harbor. The correlation between identified areas of contaminated sediments, elevated tissue samples, food web models, and ecological and human health risks have yet to be determined.

Based on a technical in-progress meeting held in October 1999 at EPA Region IX, the Draft RI/FS Report will include a full baseline ecological risk assessment (BERA) in strict accordance with EPA's 8-step method. A series of SMDP deliverables, technical data submittals, and meetings are planned to complete a BERA (i.e., through EPA Step 7 – Risk Characterization). A technical meeting between the Navy, regulatory agencies, and natural resource trustees was held in May 2000 to discuss Step 3 of EPA's 8-Step Method. A revised Step 3a document was completed in October 2000. Based on subsequent comments and meetings, a final revised Step 3a document was completed in March 2001. A draft Step 3b/4 SMDP document for the ecological risk assessment was completed in October 2001. A revised Step 3b/4 document incorporating U.S. EPA Region IX comments was completed in June 2002. Proposed ecotoxicity reference values were submitted in April 2002 as Appendix A to the Step 3b/4 document. The Baseline Ecological Risk Assessment was completed in March 2005. The draft RI report is scheduled for completion in October 2005. The target completion dates for the Draft RI/FS Report and other documents associated with the RI/FS are listed in Appendix A.

D.16 DRMR PEARL CITY JUNCTION

The Defense Reutilization and Marketing Region (DRMR) Pearl City Junction Site comprises the Pearl City Junction GSA, as shown in Figure 4-1. This site was used as a temporary storage area for miscellaneous DOD property from 1944 to 1984. From 1962 to 1984, an unpaved area at the site was reportedly used for storage of deteriorated and leaking materials, including transformers containing PCB-contaminated dielectric fluid. As the result of an SI conducted by the Navy in 1990, PCBs and the pesticide Dieldrin were identified as contaminants of concern in two different areas of the site.

To address identified site contamination, two separate Removal Actions were conducted. The results of the SI and the subsequent Removal Action verification sampling revealed that the PCB and Dieldrin contamination was restricted to the surface and near surface soil

The City and County of Honolulu offered to sell the property to a private party in July 1997. The prospective buyer conducted an Environmental Site Assessment (ESA) at the site to verify the effectiveness of the Navy's previous removal actions at the site. The ESA found an area of PCB contaminated soil that was above the site cleanup goal. The ESA was submitted in September 1997.

A removal action was conducted at the PCB contaminated soil area to remove soil above the site cleanup goal. This cleanup action was completed in April 1998. The removal action is documented in the RVR. A Draft RADD, which summarizes the findings and includes the RVR as an enclosure, was submitted in September 1998. RVR and RADD have been finalized and were submitted in November 1999.

In 1996, the Navy and EPA agreed that a separate groundwater investigation would be conducted after the property was transferred to the State of Hawaii/City and County of Honolulu. Final planning documents were submitted in October 1998 for a regional groundwater assessment covering the Manana Storage Area and Pearl City Junction.

Assessment field work began in November 2001 and was completed in February 2002. The second round (dry season) of groundwater sampling was completed in August 2002. Preliminary results indicate the contaminant of concern is not in the groundwater beneath the site. The draft Regional Groundwater Assessment report was submitted in May 2003. The report recommended no further action for the primary contaminants of potential concern, dieldrin and PCBs the Pearl City Junction site. However, report also recommends characterization of fuel-related impacts in soil and groundwater at the site. There were no regulatory comments objecting to the draft report recommendations. The DOH, however, has requested the Navy provide written verification that the Air Force will be addressing the fuel-related impacts in soil and groundwater at the site under their Installation Restoration program. The Air Force has written directly to the DOH confirming that they will address fuel-related impacts at the site under their Installation Restoration program. The draft final Regional Groundwater Assessment report submitted in October 2003 included the above recommendations and indicated that the Air Force will address fuel-related contamination under their IR program.

In August 2005, a draft PP for No Further Action at this site and the Manana Storage Area site was submitted to the regulators for review. Target completion dates for future actions are presented in the SMP Schedule in Appendix A.

D.17 WAIPIO PENINSULA

An SSR for the Waipio Peninsula GSA was completed in October 1999. Per the FFA, the document was finalized in November 1999. However, comments were received from EPA in April 2000, thus the document was revised in August 2000. The SSR identified five pad-mounted transformers that require further evaluation of potential PCB releases.

D.17.1 Site Inspection

An SI was conducted to investigate the presence of contamination at the pad-mounted transformers, which were identified in the SSR for the Waipio Peninsula GSA. The SI Work Plans were completed in January 2003 and field work was conducted in January to February 2003. The final SI report was completed in June 2004. Three transformers found to have PCB soil contamination were remediated by the Thermal Desorption project discussed in D.25. Target completion dates for documents pertaining to the SI are listed in Appendix A.

D.18 WEST LOCH

A draft final SSR for the West Loch GSA was completed in August 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) A final SSR was completed for the West Loch GSA in March 2002. The final SSR for the West Loch GSA was amended on July 2003 based on regulatory comments received on the final.

D.18.1 Site Inspection

An SI was conducted to investigate the presence of contamination at the various sites, which were identified in the SSR for the West Loch GSA. The SI Work Plans were completed in January 2002 and field work accomplished January to February 2003. The draft SI was prepared in May 2003 with recommendations for further evaluation of transformer locations, former vehicle maintenance areas, and former fuel storage facilities. The final SI report was completed in June 2004. Target completion dates for documents pertaining to the expanded site evaluation are listed in Appendix A.

D.18.2 Iroquois Point and Puuloa Housing Areas

A draft Site Investigation report for Iroquois Point and Puuloa Housing areas was completed in May 2001. A draft final Site Investigation Report was completed in August 2004. The draft Site Investigation report recommended a Removal Action for transformer I-4. The Site Investigation Report was finalized in August 2004. The interim removal action at this site was part of the consolidated thermal desorption project to treat PCB contaminated soil that is described in Section D.25.

D.18.3 Auxiliary Power Facility, Building 49

Building 49 was used to house an auxiliary generator and transformer. Prior to 1977, transformers were filled with dielectric fluid containing PCBs. Past maintenance practice of the transformer was reported to include periodic sampling of the oil to test its dielectric properties. The sample of oil was then disposed of on the ground adjacent to the building housing the transformer. In November 1998, surface soil samples taken adjacent to the building indicated elevated levels of PCB.

A removal action was initiated to determine the extent of contamination and excavate and dispose of the PCB contaminated soil. An Action Memorandum which documents the removal action decision was finalized in July 1999. To implement the removal action activities, a Final Work Plan was completed in July 1999.

Pre-excavation concrete wipe sampling and analysis conducted in July 1999, did not indicate PCB contamination greater than the established cleanup level. Therefore, no further concrete remediation activities were implemented.

Removal of the PCB contaminated soil at the front of Building 49 was completed in August 1999. Removal of the PCB contaminated soil associated with the drain pit at the back of Building 49 was completed in June 2000, including removal off the drain pit and associated piping. However, during the removal of the sediment from the drain pit's dry well, a half-inch layer of oil on the groundwater was revealed.

A monitoring well was installed at the former drain pit location in August 2000. The well was bailed dry during development and a week later revealed an oil sheen. Further monitoring of the well did not indicate an oil sheen. Groundwater sample results did not indicate groundwater has been impacted. Based on the findings, no further response is

required. The draft RVR was completed in January 2002. The final RVR was completed in May 2003 and amended in December 2003. Target completion dates for finalization of documents pertaining to the removal action are listed in Appendix A.

D.19 BISHOP POINT

The draft final SSR for the Bishop Point GSA was completed in August 2000. A second draft-final SSR for the Bishop Point GSA was completed in June 2001, which was accepted as final by EPA and DOH in August to September 2001. The SSR identified 6 pad-mounted transformers that require further evaluation of potential PCB releases. An abandoned UST (UST BP1) was also identified for further evaluation of potential petroleum releases. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.)

A focused SI was performed at the abandoned UST (UST BP1) site and the report (April 2005) recommended that further investigation is needed.

D.20 NAVAL HOUSING

The draft final SSR for the Naval Housing GSA was submitted in September 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) The revised final SSR was completed in March 2002. The final SSR for the Naval Housing GSA was amended on December 2002 based on regulatory comments received on the final.

Draft planning documents (Work Plan and SAP) for an SI at the Housing GSA sites identified in the SSR were submitted in June 2004. Final planning documents incorporating review comments from EPA, DOH and others on the draft was completed in October 2004.

D.21 NAVAL SEA SYSTEMS COMMAND INACTIVE SHIPS ON-SITE MAINTENANCE OFFICE (NISMO)

The Naval Sea Systems Command Inactive Ships On-Site Maintenance Office (NISMO) was formerly known as Naval Inactive Ship Maintenance Facility (NISMF). A draft final SSR for the NISMO GSA was completed in July 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) A

final SSR was completed for the NISMO GSA in November 2001. The final SSR for the NISMO GSA was amended on October 2002 based on regulatory comments received on the final.

D.22 PWC COMPOUND

The draft final Site Summary Report (SSR) for the Public Works Center (PWC) Main Complex Geographic Study Area (GSA) was completed in August 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) The final SSR was completed for the PWC Main Complex GSA in March 2002. The SSR for the PWC Main Complex GSA was amended in December 2002, based on regulatory comments received on the final. A final Focused SI Report for Various GSAs was completed in April 2005. The Focused SI evaluated Buildings 38, 40, X20, X21, X24, X29, and Wash Rack X6. The report recommended NFA for Building 40. The report also recommended NFA for Buildings 38, X20 and X29 contingent upon confirmation of the background metals. The report also recommended NFA for Building X21 based on an incomplete pathway. However, if the future use of Building X21 changes, further evaluation for the soil beneath the foundation is recommended. For the Wash Rack X6 and Building 24, further action is required to characterize possible release of contaminants.

D.23 HALAWA-MAIN GATE

A draft final SSR, which may identify additional potential release locations (PRLs) or sites within the Halawa-Main Gate GSA, was completed in October 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) The final SSR for the Halawa-Main Gate GSA was amended on March 2003 based on regulatory comments received on the final.

A final Focused SI Report for Various GSAs was completed in April 2005. The Focused SI Report evaluated aboveground storage tank (AST) 1649, Buildings 427, 449, 450 and 644. AST 1649 was identified for further investigation in the Halawa Main Gate SSR, however, it was not included in the Focused SI because the AST is still active. AST 1649 will be addressed by the ongoing installation operations.

The Focused SI Report recommended no further action for Building 427 and further evaluation for Building 449, 450 and 644. Further evaluation is recommended for:

Building 449 to characterize the extent of lead in the sediment and soil around the floor drain in the battery storage area and corresponding drain line system; Building 450 to characterize the extent of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in surface soil; and Building 644 to characterize the lateral extent of arsenic, lead, TPH-LRO, and benzo(a)pyrene beneath the steel plates and the plywood adjacent to the steel plates, and near the concrete patches on the south side of the building.

D.24 RICHARDSON

A draft final SSR for the Richardson GSA was completed in September 2001. (The draft SSR was completed in 1997. Based on regulatory comments, individual SSRs were prepared for each GSA.) The final SSR was completed in April 2002. The final SSR for the Richardson GSA was amended on December 2002 based on regulatory comments received on the final.

A final Focused SI Report for Various GSA was completed in April 2005. The focused SI found no COPCs concentrations above their screening criteria at the Former Rainbow Marina Fuel Pipeline site. No further action is recommended for this site.

Final planning documents (Work Plan and Sampling & Analysis Plan) for a RSE at the Fire Fighting Training Area were completed in April 2005. A Final Work Plan and SAP Technical Addendum was completed in August 2005. Field work is anticipated to begin in October 2005.

D.25 VARIOUS TRANSFORMER SITES

A draft SI Work Plan for the Various Transformer Sites on Oahu was completed in August 2001. Transformer sites are located in the Bishop Point, Halawa-Main Gate, Makalapa Crater, Naval Housing, PWC Main Complex, Richardson, Shipyard, Waipio Peninsula, and West Loch GSAs, which are based on the findings of the various SSR for each of the GSAs. In addition, transformers are located in the outlying areas including NCTAMS PAC Wahiawa, NRTF Lualualei and NAVMAG PH Lualualei Branch.

A final Work Plan was completed in October 2001 and field sampling work accomplished in November-December 2001. The draft SI Various Transformer Sites NCTAMS was completed in May 2002 and the final SI Report on December 2002. The

draft SI PHNC was completed in June 2002 and the final SI Report on January 2003. Target completion dates for finalization documents pertaining to the SI are listed in Appendix A.

Various transformer sites on Ford Island identified in Section D.3.2, transformer I-4 at Iroquois Point identified in Section D.18.2, and some of the sites identified in the draft SI Various Transformer Sites PHNC as requiring further evaluation or action has been added to a project to thermally treat contaminated soil. Section D.4 makes note of the EE/CA (September 2000) and Action Memorandum (October 2000), which recommends treatment of PCB-contaminated soil by thermal desorption and the consolidation of contaminated soil at one location at the former NAS Barbers Point for the purpose of this treatment. The soil would be treated to 1 mg/kg PCB as total Aroclor, which would allow the treated soil to be available for unrestricted use. An addendum to the Action Memorandum was done in 2002 to add the Group B sites (Ford Island and Iroquois Point transformers) to the treatment project. An Attachment 2 was added to the Action Memorandum addendum to include Group C sites (SI of Various Transformer Sites PHNC) in the treatment project in 2003.

Sites that are recommended for further evaluation or action in the SI but not addressed in the thermal desorption treatment project will be addressed in separate projects.

The final Basis of Design for the Thermal Desorption Treatment Unit, referred to in Section D.4, for the NCTAMS, the former NAS Barbers Point, and PHNC has been amended to include the Ford Island transformer sites discussed in Section D.3.2, I-4 discussed in Section 18.2, and some of the transformer sites recommended for further action in the draft SI Various Transformers Sites PHNC. The Ford Island sites and I-4 were sampled to delineate the area of contamination in January 2002. The data has been incorporated into the amended design. The PHNC sites from the draft SI underwent delineation efforts in early 2003. The data was subsequently incorporated into another amendment to the treatment projects design in 2003.

The stockpiled soil and soil from 46 transformers within the PHNC (this includes the 23 transformer discussed in Section D.3.2) were treated at a temporary thermal desorption treatment facility from November 2003 to August 2004. All except three of the sites were remediated to 1 ppm PCBs. Structural obstacles prevented the three sites from reaching the 1 ppm goal. Institutional controls or land-use controls will be placed on

these sites where 1 ppm PCB cleanup could not be achieved. An RVR will document the excavation and treatment of soil from sites excavated in 2004. A consolidated RVR will be prepared to document all of the sites excavated prior to 2004 from which soil were provided for treatment.

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
1	Aiea Laundry	Aiea Laundry Facility	1989	HLA	SI - Soil sampling in drainage swale area.	<p>Measurable amounts of Stoddard solvent and evidence of dichloroethylene. Recommend removing contaminated soil.</p> <p>PCE detected. Investigate further.</p> <p>Additional site characterization. Recommend removing solvent USTs and impacted soils.</p> <p>Removal/disposal alternatives evaluated.</p> <p>Five solvent/diesel USTs, drainline, and heavily impacted soils excavated and disposed.</p> <p>Oversight and confirmation samples/report. Residual chlorinated solvents, including VC detected.</p> <p>Confirm onsite/offsite migration of contaminated soil gas. No immediate health threat determined.</p> <p>Extent of subsurface soil/soil gas (chlorinated VOCs) determined. SVE pilot study performed.</p> <p>Concurrent work on RI/FS planning documents.</p> <p>Potential GW contamination, remainder of site, other potential contaminants (e.g., diesel, PCBs, etc.). SVE system and treatment alternatives evaluated.</p> <p>Construction documents for SVE system, Soil Gas Monitoring Plan, and SVE O&M plan.</p> <p>SVE system installed. 3-year soil gas monitoring program planned and VTU O&M plan implemented.</p> <p>Quarterly reports submitted.</p> <p>Field work completed with installation of GW monitoring wells, additional surface/subsurface soil samples, and soil gas survey. Backyard area investigated.</p> <p>Monitoring of natural attenuation/dilution of DNAPL plume recommended vice active GW remediation.</p> <p>Isolated free diesel product discovered floating on underlying GW below former diesel UST. Recommend removal action. No further action recommended for backyard area. No further action recommended upon completion of 3 yr. operation of SVE system.</p> <p>EPA/DOH required further GW delineation of DNAPL plume to prove natural attenuation/dilution models. Also required investigation under building concrete slabs.</p> <p>One additional onsite well to basal aquifer and 3 offsite wells to caprock aquifer. Surface/subsurface soil samples beneath concrete slabs upon building</p>
			1990	ESE	UST - Soil borings	
			1991	PRC	Removal Action - RSE	
			1991	PRC	EE/CA and AM	
			1991	PRC	Removal Design Docs	
			1992	Alfred & Sons	Removal Action	
			1992	PRC	Removal Action PCAS	
			1993	Ogden	Onsite/offsite soil gas/ambient air survey	
			1995	Ogden	Removal Action RSE	
			1995	Ogden	RI/FS Planning Docs	
			1996	Ogden	EE/CA and AM	
			1996	Ogden	Design documents	
			1996	Ogden	Construct SVE system	
			1996	Ogden	RI/FS field activities	
1997	Ogden	Draft RI/FS Report				
1998	Ogden	Addendum to RI/FS planning docs for additional GW and soil				

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PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
1	Aiea Laundry	Aiea Laundry Facility	1998	Ogden	investigation.	demolition. EPA and DOH comments incorporated. Install additional GW wells to delineate diesel plume. Evaluate diesel product extraction alternatives. EE/CA finalized based on EPA and DOH review comments. AM finalized. Install additional onsite/offsite GW monitoring wells and soil and soil gas sampling beneath building slabs. Complete design of diesel IRA Install well socks in surrounding GW wells and extract diesel free product from well near source of plume. Product extraction, periodic replacement of well socks, and monitoring for 2 year period. Submit Revised Draft RI/FS Report. Report recommends focusing FS on continued operation of SVE and diesel extraction system. Also recommends NFA for DNAPL GW plume. EPA and DOH comment that offsite diesel and chlorinated VOC GW contamination, as well as, some onsite source areas requires further characterization. Quarterly SVE/soil vapor monitoring reports submitted. SVE system in operation from 1996-1998 and reactivated in 2000. Approx. 105 gallons of diesel extracted since May 99. Quarterly monitoring reports submitted. Soil gas survey conducted at the adjacent St. Eliz Church and School (SECS). All but one sample ND at 7.5' and 22.5' below grade. One detection near front of church at detection level. FSP Addendum currently being prepared for additional offsite GW MWs and further onsite sampling based on EPA/DOH comments to the 1999 Revised RI Report.
			1998	Ogden	Removal Action – RSE EE/CA and AM	
			1999	Ogden	Add'l RI/FS field work	
			1999	Ogden	Diesel Interim RA Design	
			1999	Ogden	Implement Diesel IRA	
			1999	Ogden	Revised Draft RI/FS Report	
			1996-2001	Ogden/AMEC	SVE Monitoring Reports	
			1999-2001	Ogden/AMEC	Diesel Removal Action and monitoring	
			2000	Ogden	Soil Gas Survey at SECS	
			2000	Ogden	FSP Addendum for additional offsite wells. Install additional wells.	
			2001-2002	AMEC	Install additional wells.	
			2001-2002	AMEC	Draft final RI/FS Report	
			2001-2002	AMEC	Quarterly GW monitoring of onsite and offsite wells.	
2004-2005	Dawson	Quarterly GW monitoring of onsite and offsite wells.				
2004-2005	Dawson	Quarterly SVE Monitoring Reports				
2004-2005	Dawson	Diesel Removal Action and monitoring				
					Quarterly monitoring reports submitted.	
					Quarterly SVE/soil vapor monitoring reports submitted. Approx. 675 gallons of diesel extracted since May 1999 Quarterly monitoring reports submitted.	

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ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
2	Manana Storage	DRMO Manana Storage Area	1985	EPA	RCRA Inspection	RCRA §3007 Inspection- No violation. RCRA §3007 Inspection - Two 55-gallon drums leaking RCRA §3007 Inspection - One 55-gallon drum leaking (containing pentachlorophenol). No further action.
			1986	EPA	RCRA Inspection	
			1987	EPA	RCRA Inspection	
			1988	NEESA	PA	Based upon new data, SI conducted. Metals and minor amounts of VOCs detected, data needs identified to determine extent of contamination.
			1992	Ogden	SI (Draft)	
			1994	Ogden	SI (Final)	Additional data needs identified to determine potential migration path.
			1995/6	Ogden	RI (Final)	
			1996	Ogden	EE/CA (Final)	Three arsenic hot spots identified; one lead hot spot identified; no further investigation necessary; removal action in hot spot areas proposed.
			1996	Ogden	Design Package (Final)	
			1996	OHM	Removal Action	Final extent of Removal Action determined; recommend limited Removal Action at 13 locations spread throughout six 5,000 square foot exposure areas. Documents finalized.
			1996	OHM	RVR (Final)	
			1996	Ogden	RADD (Final)	272 tons of arsenic-impacted soils were excavated from 13 sample locations located in six exposure areas. Documentation of construction activities.
			1998	Ogden	Regional Groundwater (GW) SAP (Draft)	
			1998	Ogden	Regional GW SAP (Final)	Draft planning documents to conduct regional groundwater assessment at Manana Storage and Pearl City Junction submitted
2002	Earth Tech	Regional Groundwater Assessment				
2003	Earth Tech	Regional Groundwater Assessment Report (Draft)	Final planning documents submitted. Completed field work for groundwater assessment. Draft report to be submitted at the end of first quarter of 2003.			
2003	Earth Tech	Regional Groundwater Assessment Report (Final)				
2005	Earth Tech	Proposed Plan (Draft)	Draft report submitted. No further no action recommended for site.			
3	Ford Island Landfill	Ford Island Landfill (IAS-08)	1983	NEESA	IAS	No further action necessary because "this site is not a threat to human health or to the environment." Per EPA direction, further investigation was required. No significant levels of contamination, however, EPA presumptive remedy (i.e., cap) recommended to mitigate surface exposure and hazards due to cavities and debris.
			1992	Ogden	SI	

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1994 1994	Ogden Ogden	Removal Action – RSE EE/CA and AM	Further delineation of extent of landfill and hotspots. Landfill cap alternatives evaluated. Vegetated permeable soil cap w/GW monitoring recommended. Permeable cap design and GW Monitoring Plan. Landfill cap, surface drainage system, shoreline rip-rap protection, and additional GW monitoring wells installed. Construction oversight, implement GW monitoring plan, and prepare O&M Plan. Five-year GW monitoring and landfill O&M program completed in June 2002. Two year baseline established for GW quality. Semi-annual GW reports and quarterly O&M submitted. Prepared a draft LTM plan for an additional 5 years of GW monitoring and O&M. Annual LTM field event completed in Sep 2003. Revising LTM plan. Plan involves collecting ground/surface water in baseline and monitoring phases.
			1996 1996	Ogden OHM	Design documents Construct landfill cap	
			1996	Ogden	Removal Action – PCAS	
			1997- 2002	Ogden/AMEC	Removal Action GW monitoring and O&M	
			2003	Dawson	GW monitoring/ O&M	
			2005	Earth Tech	GW monitoring/ O&M	
3	Ford Island Removal Actions	Ford Island Removal Actions	1998	Earth Tech	SSR for Ford Island GSA	71 potential release locations (PRLs) identified for further investigation and potential cleanup. PRLs do not include ongoing IR or UST activities. Newly identified sites include: island-wide AVGAS distribution system, 58 transformer sites, former small arms range, former camel refurbishing area, and a former HW/HM storage area. Based on PRLs identified in the SSR, RI/FS initiated for Phase 1a development areas of Ford Island. Draft GSA-wide WP, QAPjP, and HSP, as well as phase-specific FSP for Phase 1a areas submitted in June. Review comments received and incorporated in to Draft Final RI/FS planning documents which were submitted in October. RI planning documents were revised in accordance with the most current Ford Island development plan. Phasing by geographic areas eliminated, thus, revised planning documents reflect an island-wide RI. RI field activities completed in July 2000. Preliminary data submitted to EPA and DOH as Preliminary RI Data Package in Sep 00. Recommended further action at 23 transformer sites, 5 hazardous substance sites, and an inactive AVGAS pipeline.
			1999	Earth Tech	Ford Island GSA RI/FS planning documents	
			2000	Earth Tech	Revised Ford Island RI planning documents	
			2000	Earth Tech	RI field activities	
			2001 2002	Earth Tech Earth Tech	Draft RI Report Draft Final RI Report	

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ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			2002	Earth Tech	Draft EE/CA	Draft EECA prepared for planned Removal Actions at the 5 hazardous substance sites.
			2002	Earth Tech	Removal Action Memorandum	Removal Action Memorandum prepared in accordance with Hawaii State Contingency Plan-for insitu closure of AVGAS pipeline.
			2003	Earth Tech	RI (Final)	Final RI for Ford Island
			2003	Earth Tech	EE/CA (Final)	Final EE/CA for Ford Island Hazardous Substance Sites
			2003	Earth Tech	AM (Final)	Final AM for Ford Island Hazardous Substance Sites
			2003	Shaw	Site Work Plan and Addendum No. 1	Work plan for removal action at Ford Island Hazardous Substance Sites
			2004	Shaw	RVR (Draft)	RVR for removal action at Ford Island Hazardous Substance Sites
			2004	Shaw	RVR (Draft)	RVR for Ford Island AVGAS pipeline
			2005	Earth Tech	Time Critical AM	Time Critical AM signed for a portion of Building 80/02 site for soil removal and land-use controls.
4	PWC Transformer Sites	PWC Transformer Sites, Vaults M-14 and D-02	1991	Navy, PWC	Assess site for the presence of PCB contamination and define potential threat to human health or environment.	PCBs detected. Removal Action recommended.
4	PWC Transformer Sites	PWC Transformer Sites, Vaults TC-01, TD-10, FR-06, FF-10, TG-04, -E-09, and J-16	1991	ERCE	SI(Final) – Assess sites for the presence of PCB contamination and define potential threat to human health or environment.	Samples detected Aroclor 1260.
			1994	Ogden	Site Evaluation – FSP (Draft)	Characterize contamination; evaluate various alternatives; assess human health threat; evaluate response alternatives and propose most appropriate removal action alternative.
			1996	Ogden	RSE(Final)	Field work initiated.
			1996	Ogden	RSE Report (Draft)	PCBs detected.
			1996	Ogden	EE/CA (Final)	Removal Action recommended.
						Recommended landfill soil w/ concentrations of PCB < 50 ppm on-island & either incinerate or landfill off-island soil w/ concentrations > 50 ppm.
			1997	EPA SITE program	Demo/Eval for EET, Inc. TechXtract Technology	Vault TG-04 was used to demonstrate/evaluate technology for extracting PCBs from concrete.
			1997	Earth Tech	Design (Final)	Removal action design finalized.
			1998	Ogden	Treatability Study Planning	On-island landfilling not an option since no CERCLA-approved on-island landfills available. Navy worked with EPA to find cost-effective on-island treatment

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1998	Navy fact sheet/ RAB meeting	Revised cleanup goals and changes in EE/CA recommendation	technology. Navy announces change in cleanup goals, and plans to pursue cost-effective on-island treatment rather than EE/CA recommended disposal options. Results not yet published.
			1999	EPA SITE program	Demo/Eval for solvated electron technology (Commodore Advanced Sciences, Inc.)	Concluded that solvated electron technology (Commodore Advanced Sciences, Inc.) and thermal desorption (Terra Therm Environmental Services, Inc.) may achieve cleanup goal of 1 ppm (PCB) and be considered a viable remediation method for PHNC transformer sites.
			1999	Ogden	Treatability Study (Final)	
			2000	Earth Tech	Treatment/Disposal EE/CA (Draft)	Evaluated treatment/disposal options for contaminated soil. Recommended on-island treatment by thermal desorption. Also recommended soil from PHNC, NCTAMS PAC, and former NAS Barbers Point be consolidated at one location at the former NAS Barbers Point for the purpose of treatment.
			2000	Navy fact sheet/RAB meeting	Removal Action Update, including changes to 1996 EE/CA	Explains status of removal action, including revised cleanup goals, and changes from 1996 EE/CA recommendations. Fate of excavated soil to be determined by 2000 Final Treatment/Disposal EE/CA. Announced that the draft Treatment/Disposal EE/CA recommended treatment by thermal desorption, and consolidation of the soil at the former NAS Barbers Point for purpose of treatment. The fact sheet was distributed for public review and a notice of availability was advertised in the local newspaper.
			2000	Earth Tech	Treatment/Disposal EE/CA (Draft Final)	Recommended: <ul style="list-style-type: none"> - Treatment of contaminated soil by thermal desorption. - Treated soil will not be subject to use restrictions once the soil has been treated to concentrations below the designated regulatory action levels. Since EPA and DOH guidance indicates soil less than or equal to 1 mg/kg PCB as total Aroclor is acceptable for unrestricted use, the soil will be used accordingly.

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			2000	Earth Tech	Action Memorandum for PHNC Removal Action	Recommended: <ul style="list-style-type: none"> - Soil excavated at all PHNC transformer sites to cleanup goal of 1 mg/kg as total Aroclor. - Concrete cleaning at all PHNC transformer sites to cleanup goal of 10 micrograms/100 square cm. - Sampling of drainage structures and utility manholes to verify potential contamination and encapsulation of concrete surfaces if PCBs are detected above cleanup levels. - Temporary storage of contaminated soil at a stockpile staging area at former NAS Barbers Point for on-island treatment by thermal desorption.
			2000 - 2001	Earth Tech/ Navy PWC	Removal Action	Excavation completed at six sites. Excavation not yet completed at three sites (TC-01, E-09, and D-02). Excavation for these three sites are to be completed as part of a separate project that will include excavation and treatment of PCB contaminated soil from various transformer sites.
			2003	Earth Tech	RVR (Draft)	Draft RVR prepared to document removal action activities completed to date. Remaining removal action efforts will be documented upon completion of the PCB soil treatment project.
5	Shipyards Subsurface Oil	Building No. 8 (New SWMU 18)	1990	Navy (PACDIV)	RFA	Former power plant pits were identified as a new SWMU.
			1993	Ogden	Removal of 2 USTs	No fuel hydrocarbons detected in soil under USTs.
			1993	Ogden	Removal Action	Finalized planning documents to further characterize site; work initiated and completed. Low-level VOCs and semi-VOCs detected throughout site.
			1995	Ogden	EE/CA (Final)	Recommend modification to the NSY storm drain system and installation of an active extraction trench system.
			1996	Ogden	Design Package	Extraction system trench design.
			1996	OHM	Removal Action	Fuel extraction system construction.
			1997 - present	Ogden/AMEC	O&M/Performance Monitoring	System began operation in August. Quarterly reports are provided.
			1998	OHM	RVR	Documentation of construction activities.
5	Shipyards Subsurface Oil	O-2 Pier	1995	Ogden	Removal Action	Planning documents to further characterize site finalized and field work initiated and completed.
			1996	Ogden	EE/CA (Final)	Recommend installation of a passive trench system.
			1996	Ogden	Design Package (Draft)	Submitted and awaiting finalization prior to the start of construction activities.
			1997	Earth Tech	Design Package (Final)	Completed.

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1997/8 1998 1998 – present 2004	OHM OHM Earth Tech/ Tetra Tech URS	Removal Action RVR (Final) O&M/Performance Monitoring RAO Optimization	Interceptor/collection trench with seawall construction. Documentation of construction activities. System began operation in March. Quarterly reports are provided. Recommendation is to continue operation of system.
5	Shipyards Subsurface Oil	Past Sludge Disposal Area, Lower Tank Farm (IAS -21c)	1983 1990 2002 2003 2005	NEESA HLA Earth Tech Earth Tech Earth Tech	IAS SI Planning Documents for SC (Draft) Planning Documents for SC (Final) Planning Documents Addendum for SC (Draft)	IAS reports oil seepage along shipyard shoreline in spite of the use of oil extraction wells. Excavations around active tanks encountered no sludge. SI recommended no further action for the active tanks. Planning documents for site characterization of subsurface fuel. Completed. Updated field work approach.
6	NAVBASE Subsurface Oil	Upper Tank Farm - Tanks 46-48, 53 – 55 (RAA-2)	1983 1990 1994 1995 1996/7 1997 – present 1999	NEESA HLA Ogden Ogden Ogden Ogden/AMEC Ogden	IAS SI RI Phase II RI/FS (Final) RI/FS (Final) O&M/performance monitoring for NEX Gas Stn fuel recovery system Groundwater and product level monitoring	No further action necessary “because this site is not a threat to human health or to the environment.” However, EPA review disagreed with IAS findings. Petroleum-related contamination found at Tanks 47, 48. Recommended further investigation. Recommended sampling of groundwater and/or LNAPL product, and a survey of water level elevations. Planning documents finalized and field work initiated. Recommended removal action for free product in Remedial Action Area (RAA-2). Quarterly reports document product levels in monitoring wells in the Upper Tank Farm. Recommended removal action as part of RAA-2. See NEX Gas Station site.
6	NAVBASE Subsurface Oil	Former Upper Tank Farm - Tanks 39-41 (RAA-2)	1983 1994 1995 1996/7 1997- present	NEESA Ogden Ogden Ogden Ogden/AMEC	IAS RI Phase II RI/FS (Final) RI/FS (Final) O&M/performance monitoring for NEX Gas	No further action necessary “because this site is not a threat to human health or to the environment.” However, EPA review disagreed with IAS findings. Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2. Quarterly reports document product levels in monitoring wells in the former UTF Tank 39-41 area.

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1999	Ogden	Station removal action Groundwater and product level monitoring	Recommended removal action as part of RAA-2. See NEX Gas Station site.
6	NAVBASE Subsurface Oil	Former Upper Tank Farm - Tanks 42-45 and 49-52 (RAA-3 & RAA-10)	1983	NEESA	IAS	No further action necessary "because this site is not a threat to human health or to the environment." However, EPA review disagreed with IAS findings. Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-3 and continued monitoring at RAA-10. Recommended quarterly monitoring for VOCs in groundwater for one year in RAA-13. Quarterly monitoring for free product (4 qtrs - 9/97, 12/97, 3/98, 6/98) in Remedial Action areas 1,6-10 were conducted. Recommended removal action for RAA-3 (See Millican Field/Quarry Loch site.) Quarterly monitoring for VOCs (4 qtrs - 9/97, 12/97, 3/98, 6/98) in RAAs 11-13 were conducted. VOCs were found in MW-43 at RAA-13. Monitoring of VOCs in MW-43 near former Tank 45. Found similar level as last year. Recommend continued annual monitoring. Recommend continued annual monitoring until further characterization is performed. Found similar levels of VOCs. Continue monitoring until further characterization is performed. Found similar levels of VOCs. Continue monitoring until further characterization is performed. Found similar levels of VOCs. Continue monitoring until further characterization is performed.
			1994	Ogden	RI	
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	
6	NAVBASE Subsurface Oil	Former Upper Tank Farm - Tanks 42-45 and 49-52 (RAA-3, RAA-10)	1999	Ogden	Groundwater and product level monitoring	
			1999	Ogden	Groundwater monitoring	
			2000	Ogden	Groundwater monitoring	
			2001	AMEC	Groundwater monitoring	
			2002	AMEC	Groundwater monitoring	
			2004	Earth Tech	Groundwater monitoring	
6	NAVBASE Subsurface Oil	Upper Tank Farm Canyon Disposal Area (IAS-23, NSC-13) (RAA-2)	1983	NEESA	IAS	No further action necessary "because this site is not a threat to human health or to the environment." Release potential to soil and groundwater is considered high. Recommended an evaluation of the types and amounts of materials present at site. Recommended further investigations. Recommended installing monitoring wells and treatment of the soil during excavation.
			1987	A. T. Kearney	RFA	
			1989	KJC	RFI WP	
			1990	HLA	SI	
			1992	Ogden	RFI (Draft)	

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ACTIVE SITE BACKGROUND SUMMARY
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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1994	Ogden	RI	Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2. Recommended removal action for free product as part of RAA-2. See NEX Gas Station site.
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	
			1999 – present	Ogden/AMEC	Groundwater and product level monitoring	
6	NAVBASE Subsurface Oil	Past Sludge Disposal Area, Upper Tank Farm (IAS-21a) (RAA-2)	1983	NEESA	IAS	No further action necessary because “the sludges contained only a small amount of lead and the sludges are buried. This site is not a threat to human health or to the environment.” However, EPA review disagreed with findings of the IAS. Recommended sampling of groundwater and/or LNAPL product, and a survey of water level elevations. Planning documents finalized and field work initiated. Geotextile lining installation; excavation of sludge pits and surrounding soil and disposal in Waimanalo Gulch Landfill. No further investigation necessary as pits no longer exist. Recommended removal action for free product in RAA-2. Recommended removal action for free product as part of RAA-2. See NEX Gas Station site.
			1994	Ogden	RI	
			1995 1995	Ogden Navy/Ogden	Phase II RI/FS (Final) Geotextile lining of area around tanks	
			1996/7	Ogden	RI/FS (Final)	
			1999	Ogden	Groundwater and product level monitoring	
6	NAVBASE Subsurface Oil	Middle Tank Farm - Tanks 29-38 (RAA-4)	1983 1990	NEESA HLA	IAS SI	Identified sludge in shallow pits within the tank berms. No sampling of tanks 29-33, no sludge encountered around tanks 34-38. Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. COCs are TFH, PAHs and lead. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-4. No conclusive data linking plume at the Middle Tank Farm to oil seepage at Quarry Loch. Quarterly reports document product levels in monitoring wells at the Middle Tank Farm as part of the Quarry Loch Removal Action.
			1994	Ogden	RI	
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	
			2000 2002 - present	Earth Tech/ Tetra Tech Dawson	EE/CA for Quarry Loch removal action O&M/Performance Monitoring for Quarry Loch Removal Action	
6	NAVBASE Subsurface Oil	Abandoned Underground Tank (IAS-24, NSC-14)	1983	NEESA	IAS	No further action recommended “because oil stored in the tank was very thick and non-hazardous. This site is

**TABLE D-3
ACTIVE SITE BACKGROUND SUMMARY
PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
		(RAA-4)	1987 1988/89 1990 1994 1995 1996/7 2000 2002 - present	A.T. Kearney Navy/EPA HLA Ogden Ogden Earth Tech/ Tetra Tech Dawson	RFA RFA SI RI Phase II RI/FS (Final) RI/FS (Final) EE/CA for Quarry Loch removal action O&M/Performance Monitoring for Quarry Loch Removal Action	not a threat to human health or to the environment." However, EPA review disagreed with findings of the IAS. Believed to be a contributor to the subsurface oils in the areas. Because this site is being studied by the IRP, no further action is required as a SWMU. Sludge encountered in excavations around active tanks. Recommended further investigations. Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. COCs are TFH and PAHs. Planning documents finalized and field work initiated. Recommended removal action for free product in 5 areas in RAA-4. No conclusive evidence that contamination at the AUT is contributing to oil seepage at Quarry Loch. Quarterly reports document product levels in monitoring wells at the Abandoned Underground Tank as part of the Quarry Loch Removal Action.
6	NAVBASE Subsurface Oil	Valve Chambers No. 2, 3 (RAA-1), 4, and 7 (RAA-2)	1994 1995 1996/7 1997 - present 1999	Ogden Ogden Ogden Ogden/AMEC Ogden	RI Phase II RI/FS (Final) RI/FS (Final) O&M/performance monitoring for NEX Gas Station Removal Action Groundwater and product level monitoring	Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. COCs based on soil results are TFH and PAHs. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2. No further action planned for Valve Chambers Nos. 2 and 4. Quarterly reports document product levels in monitoring wells in the Valve Chamber No. 7 area, adjacent to the NEX Gas Station. See NEX Gas Station site. Recommended removal action as part of RAA-2 for Valve Chamber No. 7 and RAA-1 for Valve Chamber No. 3. See Hotel Pier site.
6	NAVBASE Subsurface Oil	ADIT No. 1 (RAA-6 & RAA-11)	1994 1995 1996/7	Ogden Ogden Ogden	RI Phase II RI/FS (Final) RI/FS (Final)	Surface soils and water should be sampled with additional borings and monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-6. Recommended quarterly monitoring of free product in RAA-6 and VOCs in groundwater for one year in RAA-

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1999	Ogden	Groundwater and product level monitoring	<p>11. Negative results at RAA-6 so recommendation was to discontinue monitoring. VOCs detected at RAA-11 in MW-13. EPA asked for annual monitoring to help prioritize future site characterization. VOCs detected at RAA-11 in MW-13.</p> <p>VOCs detected at RAA-11 in MW-13</p> <p>Found similar VOC levels. Continue monitoring until further characterization is performed.</p> <p>Found similar VOC levels. Continue monitoring until further characterization is performed.</p> <p>Found similar VOC levels. Discontinue monitoring until further characterization is performed.</p>
			1999	Ogden	Annual groundwater monitoring for VOCs	
			2000	Ogden	Annual groundwater monitoring for VOCs	
			2001	AMEC	Annual groundwater monitoring for VOCs	
			2002	AMEC	Annual groundwater monitoring for VOCs	
			2004	Earth Tech	Annual groundwater monitoring for VOCs	
6	NAVBASE Subsurface Oil	Waste Oil Reclamation Facility (formerly known as Fuel Reclamation Facility) (IAS-20, NSC-[01-10]) (RAA-2)	1983	NEESA	IAS	<p>No further action necessary because "although non-toxic oily waste could have contaminated the soil under the pit, the pit is now lined and is not a threat to human health or to the environment." However, EPA review disagreed with findings of the IAS.</p> <p>Release potential to soil and groundwater is considered high.</p> <p>No further action required under RFI program because plant recycles waste oil for use in boilers and used oil is not a hazardous waste.</p> <p>Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2.</p> <p>Quarterly reports document product levels in monitoring wells at the Waste Oil Reclamation Facility, as part of the NEX Gas Station Removal Action. See NEX Gas Station site.</p> <p>Quarterly reports document product levels in monitoring wells at the Waste Oil Reclamation Facility, as part of the NEX Gas Station Removal Action. See NEX Gas Station site.</p>
			1987	A. T. Kearney	RFA	
			1989	Navy/EPA	RFA	
			1994	Ogden	RI	
			1995	Ogden	Phase II RI/FS (Final)	
			1996/7	Ogden	RI/FS (Final)	
			1997 - 2002	Ogden/AMEC	O&M/Performance monitoring for NEX Gas Station Removal Action	
			2002 - present	DAWSON	O&M/Performance monitoring for NEX Gas Station Removal Action	
6	NAVBASE Subsurface Oil	NEX Gas Station (formerly known as PWC Gas	1988	Unitek - BOA	Subsurface investigation	<p>Presence of LNAPL. Investigate further.</p>
			1990	PRC	Subsurface investigation	

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
		Station) (RAA-2)	1992 1994	Ogden Ogden	Removal Action pilot test RI	Removal of LNAPL using well extraction system. Recommended sampling of ground water and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Also recommend a removal action.
			1995 1996	Ogden Ogden	Phase II RI/FS (Final) Ogden Design Package (Final)	Planning documents finalized and field work initiated. Extraction system design.
			1996/7 1997 1997	Ogden OHM OHM	RI/FS (Final) Removal Action RVR	Recommended removal action for free product in RAA-2 Fuel extraction system construction. Documentation of construction activities.
			1997- present 1999	Ogden/AMEC Ogden	O&M/performance monitoring Groundwater and product level monitoring	System began operations in February. Quarterly reports are provided. Recommended a removal action in addition to the existing NEX Gas Station removal action.
			2000	Ogden	EE/CA	For the plume beyond the influence of the existing fuel extraction system, recommended the installation of a low permeability barrier wall with an interceptor/collection trench and a passive fuel oil recovery system. This system is adjacent to Magazine Loch.
			2000	Ogden	AM	Documents selected alternative.
			2000	Ogden	Design Documents	Completed.
			2001	IT	Final Site Work Plans	Work plans for construction; construction began.
			2002	IT/Dawson	O&M/performance monitoring	Construction completed. Began O&M/performance monitoring
			2003 - present	Dawson	O&M/performance monitoring	Quarterly reports are provided.

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
6	NAVBASE Subsurface Oil	SUBASE Gas Station (RAA-2 and RAA-8)	1994 1994 1995 1996/7 1997 – present 1999	Ogden Ogden Ogden Ogden Ogden/AMEC Ogden	UST removal RI Phase II RI/FS (Final) RI/FS (Final) O&M/Performance monitoring for NEX Gas Station Removal Action Groundwater and product level monitoring	Completed. Surface soils and water should be sampled with additional borings and monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2. Recommended quarterly monitoring for free product in RAA-2 and RAA-8 for one year. Quarterly reports document product levels in the monitoring wells in the vicinity of the SUBASE Gas Station adjacent to Magazine Loch. Recommends removal action at RAA-2 in addition to the NEX Gas Station Removal Action (see NEX Gas Station site) and discontinuance of monitoring in RAA-8 due to negative results.
6	NAVBASE Subsurface Oil	Halawa Service Station	1990 1994 1995 1996 1996/7	ESE Ogden Ogden Navy (PWC) Ogden	UST investigation RI Phase II RI/FS (Final) UST Removal RI/FS (Final)	Recommended removal. Recommend sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Also recommend groundwater sampling and analysis be conducted subsequent to UST removal. Planning documents finalized and field work initiated. Two underground storage tanks were removed. Recommended removal action for free product in 5 areas in the PHNC. Recommended quarterly monitoring for free product and VOCs in groundwater for one year. This site is not included in these areas and no further action is planned.
6	NAVBASE Subsurface Oil	Bldg. No. 60, Sludge Disposal Pit - Diesel Purification Plant	1983 1987 1988/89 1994 1995 1996/7	NEESA A. T. Kearney Navy/EPA Ogden Ogden Ogden	IAS RFA RFA RI Phase II RI/FS (Final) RI/FS (Final)	No further action necessary "because this site is not a threat to human health or to the environment." However, EPA review disagreed with findings of the IAS. Release potential to soil and groundwater is considered high. No further action is required under the RFI program because it is not used for diesel purification but for waste oil which is pumped to the fuel reclamation plant. Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-2.

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1997 - present 1998	Ogden/AMEC	O&M/Performance monitoring for NEX Gas Station Removal Action	<p>Quarterly reports document product levels in monitoring wells in the vicinity of the Diesel Purification Plant adjacent to Magazine Loch.</p> <p>Recommended a removal action in addition to the existing NEX Gas Station removal action.</p> <p>For the plume beyond the influence of the existing fuel extraction system, recommended the installation of a low permeability barrier wall with an interceptor/collection trench and a passive fuel oil recovery system. This system is adjacent to Magazine Loch.</p> <p>Documents selected alternative.</p> <p>Completed.</p> <p>Work plans for construction; construction began.</p> <p>Construction completed. Began O&M/performance monitoring.</p> <p>Quarterly reports are provided.</p>
			2000	Ogden	Groundwater and product level monitoring EE/CA	
			2000	Ogden	AM	
			2000	Ogden	Design Documents	
			2001	IT	Final Site Work Plans	
			2002	IT/Dawson	O&M/performance monitoring	
			2003 - present	Dawson	O&M/performance monitoring	
6	NAVBASE Subsurface Oil	Merry Point Old Diesel Purification Plant Area (IAS-26, SIMA-09)	1983	NEESA	IAS	<p>No further action necessary "because this site is not a threat to human health or to the environment." However, EPA disagreed with findings of the IAS.</p> <p>Release potential to soil and groundwater is considered high.</p> <p>Not regulated by RCRA.</p> <p>Recommended sampling via additional borings and monitoring wells.</p> <p>Planning documents finalized and field work initiated.</p> <p>Recommended removal action for free product in 5 areas in the PHNC. Recommended quarterly monitoring for free product and VOCs in 5 areas. This site is not included in these areas. Therefore, no further action is planned.</p>
			1987	A. T. Kearney	RFA	
			1989	Navy/EPA	RFA	
			1994	Ogden	RI	
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	
6	NAVBASE Subsurface Oil	Millican Field (Quarry Loch) (RAA-3)	1989	Geolabs-Hawaii	Subsurface investigation	<p>Petroleum product discovered at 5 to 7 feet below the surface.</p> <p>Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells.</p> <p>Recommended sampling via additional borings and monitoring wells.</p> <p>Planning documents finalized and field work initiated.</p> <p>Recommended removal action for free product in RAA-3.</p> <p>Recommended free product monitoring in RAA-10.</p>
			1994	Ogden	RI	
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1998	Ogden	Product level monitoring	Recommended removal action for RAA-3 and RAA-10 as part of Quarry Loch removal action.
			1998-1999	EPA SITE Program	Product recovery demonstrations	Electroheating and surfactant enhanced aquifer remediation were demonstrated.
			2000	Earth Tech/Tetra Tech	EE/CA	Recommended extraction sumps along existing storm drain lines with a barrier trench.
			2000	Earth Tech/Tetra Tech	AM	Documents selected alternative.
			2001	Earth Tech/Tetra Tech	Final Design Documents	Completed.
			2001	IT	Final Site Work Plan	Work plans for construction; construction began.
			2002	IT/Dawson	O&M/performance monitoring	Construction completed. Began O&M/performance monitoring.
			2003 – present	Dawson	O&M/performance monitoring	Quarterly reports are provided.
			2004	Dawson	Eighth Quarterly Report	Recommended shutdown of the system with continued long-term monitoring.
			2004	Dawson	Tenth Quarterly Report	Documented shutdown of the extraction system. Absorbent socks being used to remove free product.
6	NAVBASE Subsurface Oil	Fuel Corridor Pipelines (IAS-29)	1983	NEESA	IAS	No further action necessary "because this site is not a threat to human health or to the environment." However, the IAS did not investigate potential past releases from underground pipelines.
			1994	Ogden	RI	Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and installation of additional groundwater monitoring wells.
			1995	Ogden	Phase II RI/FS (Final)	Planning documents finalized and field work initiated.
			1996/7	Ogden	RI/FS (Final)	Recommended removal action for free product in 5 areas in the PHNC. Recommended quarterly monitoring for free product and VOCs in groundwater for one year.
			1999	Ogden	Groundwater and product level monitoring	Quarterly monitoring for free product (4 qtrs – 9/97, 12/97, 3/98, 6/98) in Remedial Action areas 1,6-10 were conducted. Quarterly monitoring for VOCs (4 qtrs – 9/97, 12/97, 3/98, 6/98) in RAAs 11-13 were conducted.
			1999	Ogden	Groundwater and product level monitoring	All follow-on work is being conducted as part of separate removal actions at specific RAAs.
6	NAVBASE Subsurface Oil	Former Oily Waste Pit, EPMU-6, Bldg. 1535 (RAA-3)	1990	ERCE	Preliminary Assessment	Investigate further - SI.
			1991	ERCE	SI	Petroleum hydrocarbons identified in soil and groundwater. Investigate further - RI/FS.
			1994	Ogden	RI	Recommended sampling of groundwater and/or LNAPL product, a survey of water level elevations, and

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ACTIVE SITE BACKGROUND SUMMARY
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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1995 1996/7	Ogden Ogden	Phase II RI/FS (Final) RI/FS (Final)	installation of additional groundwater monitoring wells. Planning documents finalized and field work initiated. Recommended removal action for free product in RAA-3 in the PHNC and quarterly monitoring for free product at RAA-10.
			1999	Ogden	Groundwater and product level monitoring	Recommended removal action as part of RAA-3. (See Millican Field (Quarry Loch) site.)
6	NAVBASE Subsurface Oil	Hotel Pier (RAA-1)	1998	Earth Tech/ Tetra Tech	RSE	Planning documents completed.
			1999	Earth Tech/ Tetra Tech	EE/CA	Recommended lining storm drain pipes, installing cut-off walls at the storm drain exit pipes, and installing product recovery system.
			2000	Earth Tech/ Tetra Tech	AM	Documents the selected alternative.
			2000	Earth Tech/ Tetra Tech	Design documents	Finalized design.
			2001	IT	Final Site Work Plans, O&M/performance monitoring	Work plans for construction; construction completed. Began O&M/performance monitoring.
			2002 – present	Dawson	O&M/performance monitoring	Quarterly reports are provided.
			2004	URS	RAO Optimization	Recommended to discontinue operation of recovery system. Replace with a passive recovery approach using absorbent socks.
			2004	Dawson	Fourteenth Quarterly Report	Documented shutdown of the extraction system. Absorbent socks being used to remove free product.
6	NAVBASE Subsurface Oil	SUBASE – Pierce Street Area (RAA-9)	1994	Ogden	RI	Recommended installation of additional groundwater monitoring wells.
			1996/7	Ogden	RI/FS (Final)	Recommended periodic monitoring to observe possible mobilization of free product in this area.
			1999	Ogden	Groundwater and product level monitoring	Recommended quarterly monitoring be continued for a period of one year.
			2002	Earth Tech	Removal Site Evaluation planning documents	Planning documents finalized and field work initiated.
			2004	Earth Tech	Removal Action Report	Recommended placing absorbent socks into wells with observable free product and perform quarterly monitoring. Addressing comments on the Final RAR with DOH.
6	NAVBASE Subsurface Oil	Ward Field (RAA-5)	1994	Ogden	RI	Recommended borings and monitoring wells be installed to further characterize subsurface contamination.
			1995	Ogden	Phase II RI/FS (Final)	Planning documents finalized and field work initiated.

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1996/7 1999	Ogden Ogden	RI/FS (Final) Groundwater and product level monitoring	Recommended removal action for free product in RAA-5. Recommended quarterly monitoring on select wells and installation of two additional microwells to the west of the mapped plume.
			2005	Earth Tech	Removal Site Evaluation planning documents	Planning documents finalized and field work initiated.
7	Naval Shipyard Sites	Former Battery Acid Pit Adjacent to Bldg. 394, Shop 51 (IAS-10, SY-47)	1983	NEESA	IAS	No further action necessary because "the amount of lead in the ground at this site is probably small and dispersed. This site is not a threat to human health or to the environment." However, EPA review disagreed with findings of the IAS.
			1987	A. T. Kearney	RFA	Release potential to of lead to soil and groundwater is considered low.
			1989	Navy/EPA	RFA	Site is covered under the IR Program.
			1990	ANL	SI	Detected lead in soils.
			1993	Ogden	RI	Detected lead in soils and groundwater.
			1995	Ogden	RSE (Final)	Planning documents submitted.
			1995	Navy	Removal of waste acid UST, two ASTs, and associated piping and "time-critical" Removal Action	Site covered with plastic sheeting over which 3 to 6 inches of gravel was placed in order to maintain dust control of the area.
			1996	Ogden	RSE	Field work initiated and completed.
			1997	Ogden	RSE/EE/CA (Final), Plan and Implement In-Situ Electrokinetics Demonstration	Results indicate approx. 1500 cubic yards of lead- impacted soil be addressed by Removal Action. In situ electrokinetics recommended for removal alternative. Navy working with EPA SITE Program to perform an electrokinetic demonstration.
			2000	AMEC (Ogden)/GII	Perform preliminary test on In-Situ System	Test indicated adequate hydraulic control cannot be achieved. Pilot scale test of ex-situ electrokinetic system proposed.
			2001	AMEC (Ogden)/GII	Pilot Scale Test of Ex- Situ Electrokinetic System	Navy working with EPA SITE Program to perform and evaluate the ex-situ electrokinetic system pilot scale test.
			2002	AMEC/GII	Pilot Scale Test of Ex- Situ Electrokinetic System	Pilot scale test completed and evaluation report being written by EPA SITE Program.
			2003	AMEC/GII	Pilot Scale Test of Ex- Situ Electrokinetic System	Evaluation report being written and finalized by EPA SITE Program.
			2004	EPA	Pilot Scale Test of Ex-	Evaluation report finalized by EPA SITE Program.

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PEARL HARBOR NAVAL COMPLEX**

SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
					Situ Electrokinetic System	
7	Naval Shipyard Sites	Asbestos Contaminated Shoreline	1994	Ogden	Site Evaluation WP	No evidence of hazardous wastes other than asbestos. Recommended posting hazardous warning signs and further remedial action and sampling.
			1995	Ogden	Site Evaluation Field work	Asbestos potential contaminant onsite.
			1996	Ogden	Site Evaluation Report (Final)	Asbestos not present / no further action required.
			1997	Ogden	Letter Report	At Shipyard's request, shoreline resampled. Asbestos containing material found.
			1998	Ogden	Revised Site Evaluation Report	Due to U.S. EPA Region IX comments to Building 6 section of report.
			1999	Earth Tech	Prepare documents for removal action	Samples collected during site visit contained asbestos containing material (ACM). Time-critical removal action to be done.
			2000	Navy, PWC	Time-critical Removal Action	Removed asbestos containing material/soil and backfill.
			2000	Earth Tech	AM, RVR/RADD	Preparation of documents for removal action.
			2001	Earth Tech	AM (Final)	Documents Time-Critical Removal Action.
			2001	Earth Tech	RVR (Final)	Documents Removal Action Objectives met.
			2002	Earth Tech	PP/ROD	Draft PP and ROD being prepared.
7	Naval Shipyard Sites	Foundry Shop, Bldg. No. 6 SY-7,8	1987	T. Kearney	RFA	10 tons of metals and dies cast each week. PAHs, petroleum, and PCBs are possible contaminants based on past history.
			1988/9	Navy/EPA	RFA	Hydroblast and Drainage Area (SY-7) is a closed system which recycles sand and is surrounded by cement. Liquid discharges to sanitary sewer based on a NPDES permit. Air Cleaning System (SY-8) removes sand from a wheelabrator machine cyclonically. Sand is placed into the ground and there is a low potential to release to the air. Both SWMUs were determined to have no further action.
			1993	Navy, PWC	Surface sampling	Elevated lead concentrations detected.
			1994	Ogden	Site Evaluation WP	Recommended additional sampling and assessment of potential contaminant transport.
			1995	Ogden	Site Evaluation Field work	Metals, PCBs, PAHs, and TFH potential contaminants.
			1997	Ogden	Site Evaluation Report (Final)	PCBs (Aroclor 1254 & 1260), PAHs, TFH (diesel and lubricant oil), and metals were detected. Elevated lead in sediment in storm drain system. Recommend no further

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			1998	Ogden	Sediment removal from two catch basins and paving an unpaved area adjacent to one catch basin.	action other than obtaining a deed restricting residential land use and monitoring lead levels (as part of the NPDES permit for NSY) in storm water entering the harbor. Due to this storm drain system not being part of NPDES permit, a time-critical removal action was performed.
			1998	Earth Tech	Revised Site Evaluation Report	Due to US. EPA Region IX comments, report was changed to recommend removal action be taken on soil with elevated levels of lead.
			2000	Earth Tech	Expanded Site Inspection	Site Visit.
			2001	Earth Tech	Expanded Site Inspection WP and Field work	Plans completed. Field work completed.
			2002	Earth Tech	Expanded SI	Address regulatory comments to final WP, take additional samples.
			2003	Earth Tech	Expanded SI	Draft report completed.
			2004	Earth Tech	Expanded SI	Final report completed. No further action is recommended for groundwater. Under current building use no immediate action is warranted for the site soil.
7	Naval Shipyard Sites	Transportation Yard	1983	NEESA	IAS	Subsurface chromic acid contamination may exist.
			1990	ANL	SI	Elevated levels of chromium, lead, and zinc. No further remedial action recommended.
			1993	Ogden	RI (Bldg. 394)	Chromium contamination detected in groundwater from a monitoring well on the transportation yard site.
			1994	Ogden	Site Evaluation WP	Proposed sampling program to confirm or deny presence of subsurface contamination in soils and groundwater.
			1995	Ogden	Site Evaluation Field work	Metals, PCBs, PAHs, and TFH potential contaminants. PCBs (Aroclor 1260), PAHs, TFH (diesel, kerosene, and lubricant oil), and metals in soil and PFH and PAHs in groundwater.
			1997	Ogden	Site Evaluation Report (Final)	Chromium contamination detected in groundwater in two monitoring wells. Recommend no further action other than obtaining a deed restricting residential land use.
			1998	Ogden	Revised Site Evaluation Report	Due to U.S. EPA Region IX comments to Building 6 section of report.
7	Naval Shipyard Sites	SSR Identified Sites	2001	Earth Tech	SSR (Draft Final)	Completed November 2001. Total of 1,120 sites were evaluated. 916 were recommended for no further action. 58 sites have current ongoing response actions. 146 sites recommended for further action investigation.

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			2003		SSR (Final)	Final SSR completed August 2003.
			2005	Earth Tech	SSR (Revised Final)	June 2004 - Navy responds to U.S. EPA Region IX comments on Final. Navy received U.S. EPA Region IX comments Sept 2004. Navy in review of comments. March 2005 - U.S. EPA Region IX provided a letter stating they had no further comments on SSR. Revised Final issued April 2005.
8	Red Hill Fuel Facility	Red Hill Oily Waste Disposal Pit (IAS-22)	1983	NEESA	IAS	Further investigations recommended due to "proximity of the site to the water supply aquifer and the quantities of sludge burned at the site."
			1983	Rockwell Int'l	Investigation to characterize oily sludges	Samples detected oil, organic solids, PAHs, heavy metals, phenols, and volatile hydrocarbons.
			1983	ATT	Verification Study	Subsurface soil and groundwater sampling confirmed the previous investigations' findings.
			1992	Hirata & Assoc.	Evaluation of slope stability	Data used to construct a spill retaining wall around 40,000 gallon above ground tank.
			1994	Ogden	EE/CA	Recommended removal of the Stilling Basin and contents.
			1994	Ogden	Closure Plans/ Specs	Completed EE/CA removal recommendations.
			1995/6	Ogden	Phase I RI (Final)	Recommended characterization of potential impacts to basal drinking water aquifer.
			1995	OHM	Removal Action	Field work was completed and Remediation Verification Report (RVR) was generated.
			1996	Ogden	RVR/RADD (Final)	Completed.
			1997	Earth Tech	Phase II RI Planning Documents	Addressed all regulatory review comments.
			1998	Earth Tech	Phase II RI field investigation	Completed field investigation. First round of groundwater sampling indicates no impact to drinking water aquifer. Mutually agreed to complete second round of groundwater sampling before submitting draft Phase II RI report. Completed second round in September 1998.
			1999	Earth Tech	Phase II RI Report (Draft)	Submitted draft Phase II RI report in January 1999. Report found no impact to drinking water aquifer. Recommended abandonment of all investigation monitoring wells and no further response action.
			1999	Earth Tech	Phase II RI Report (Draft Final)	Submitted draft final Phase II RI report in September 1999. Awaiting regulators' response before considering report to be final.
			2000	Earth Tech	Phase II RI Report (Revised Draft Final)	Submitted revised draft final Phase II RI report in September 2000. Regulators did not concur with report recommendations.

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			2001	PACDIV	Partnering Session	<p>Site not under CERCLA due to petroleum exclusion. Agreement reached with EPA and DOH to address petroleum contamination with DOH. DOH requested a delineation of 25 ppm for TPH vice 5000 ppm presented in SAP. Incorporated 25 ppm for delineation of TPH and other DOH comments. Completed field investigation. Submitted draft report in January 2003. EPA and DOH had no comments. Submitted final report in December 2003. DOH had no further comments and concurred with report recommendation of no further action (NFA) for site. Submitted letters request for NFA concurrence in March, April, May, and December 2004. DOH requested additional information/clarification to support the request for March, April, and May letters. DOH concurred with NFA. Well abandonment anticipated to be performed in late 2005 or early 2006. Letter to EPA requesting to delist site from PHNC NPL.</p>
			2001	Earth Tech	TPH Characterization SAP (Draft)	
			2002	Earth Tech	TPH Characterization SAP (Final)	
			2002	Earth Tech	TPH Characterization	
			2003	Earth Tech	TPH Characterization Report (Draft)	
			2003	Earth Tech	TPH Characterization Report (Final)	
			2004	PACDIV	Ltr Request for NFA concurrence	
			2005	DOH	NFA Concurrence Letter	
			2005	NAVFAC HI	Ltr Request for NPL delisting	
9	Pearl City Peninsula	Pearl City Peninsula Landfill (IAS-04)	1939	Stearns	Geologic mapping	<p>Depicts location of fill area. Map of soil types. Study of contaminated groundwater. Long range solid waste study for PWC. Concluded "contamination is not a problem." Confirmatory study on findings recommended. Further investigations are recommended because "large quantities of hazardous waste may have been disposed of in the landfill." Recommend additional testing be conducted to address potential impacts. No contamination found. Recommend additional soil sampling and analysis. Recommended additional sampling, removal action consisting of capping black sands. Sampling and Analysis Plan and Health and Safety Plan completed. Field work initiated. Field work completed. Recommended cover repair, inspection, and maintenance;</p>
			1972	Foote	Mapping	
			1973	NEPDB	Groundwater study	
			1976	ES	Solid waste disposal plan	
			1981	PWC (Konno)	Multimedia sampling	
			1982	E&E	EPA Field investigation	
			1983	NEESA	IAS	
			1988	ATT	Field investigation	
			1990	IT / ANL	RI	
			1995	Ogden	RI (Final)	
			1996	Earth Tech	RSE Planning Docs.	
			1996	Earth Tech	RSE	
			1997	Earth Tech	RSE	
			1997	Earth Tech	EE/CA (Draft)	

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			1998	Earth Tech	EE/CA (Draft Final)	<p>no action with long-term monitoring for the berm; erosion control for black sands area; no action with long-term monitoring for Waiawa Unit; and excavation of dioxin/furan impacted soil on City and County property, consolidation of contaminated soil on Navy property, and covering of contaminated soil on Navy property. Same recommendation as draft EE/CA. The draft final EE/CA was revised in response to comments.</p> <p>Completed.</p> <p>Design of removal action recommended in EE/CA.</p> <p>Removal action initiated.</p> <p>AM issued to document significant change from EE/CA. Interim removal action is proposed since for the ecological assessments at Waiawa Unit, characterization, and long-term monitoring to be conducted following interim removal action construction activities. Interim action includes landfill cover repair, black sands area erosion control, soil cover at hot spot areas, containment system at Waiawa Stream, and construction of a bridge for site access.</p> <p>Initiation of additional ecological assessment.</p> <p>Plan prepared in response to FWS report of distressed vegetation and fish.</p> <p>Concluded that there appeared to be no imminent threat to human health and environment as a result of a perceived contaminant release. The Waiawa Unit would continue to be monitored as part of an on-going ecological assessment and evaluation of the adjacent landfill.</p> <p>Recommended a baseline ecological risk assessment.</p> <p>Interim removal action completed.</p> <p>Draft RVR documented completion of interim removal action and identifies future site activities to include:</p> <ul style="list-style-type: none"> - Bridge maintenance - Continued inspection and repair of additional
			1998	Earth Tech	Action Memo (Draft)	
			1998	Earth Tech	Design (Final)	
			1998	IT	Removal Action	
			1999	IT	Action Memorandum	
			1999	IT	Additional Ecological Assessment at Waiawa Unit	
			2000	IT	Abbreviated Sampling & Analysis Plan for Waiawa Unit	
			2000	IT	Waiawa Unit Sediment Sampling Report	
			2000	IT	Draft screening level ecological risk assessment report for Waiawa Unit	
			1999-2000	IT	Interim Removal Action RVR (Draft)	

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			2001	IT	Draft final screening level ecological risk assessment for the Waiawa Unit	cracks - Long-term monitoring - Waiawa Unit risk assessment - Capping of the Burn Disposal Area following risk assessment activities at the adjacent Burn Area Site Institutional controls Completed.
			2001	IT	Long-term monitoring plan (draft)	Completed.
			2001	IT	Field work to implement long-term monitoring plan (planned)	Field work to initiated in December 2001 (year 1 of current LTM plan).
			2002	IT/Shaw	Revisions 01 and 02 to LTM plan	LTM plan revised to address additional regulatory comments.
			2001-2003	IT/Shaw	Baseline Ecological Risk Assessment WP (Draft)	The draft baseline ecological risk assessment Work Plan for the Waiawa Unit/Landfill/Burn Disposal Area/Burn Area Site was prepared in July 2003.
			2004	IT/Shaw	Baseline Ecological Risk Assessment Work Plan (Draft Final)	The draft final Baseline Ecological Risk Assessment Work Plan for Pearl City Peninsula Landfill, Burn Area Site and Waiawa Unit was prepared in July 2004.
			2005	Shaw	Addendum 3 to LTM Plan (Draft)	LTM plan revised to include seep investigation. (Jan 2005)
			2005	Shaw	Addendum 3 to LTM Plan (Final)	LTM plan revised to include seep investigation. (May 2005)
9	Pearl City Peninsula	Burn Area Adjacent to Pearl City Peninsula Landfill	1983	NEESA	IAS	Further investigations are recommended because "large quantities of hazardous waste may have been disposed of in the landfill."
			1996	Ogden	RI (Draft)	Planning documents submitted.
			1999	IT	RSE	Initiated RSE Planning. SAP, HSP QAPP prepared.
			2000	IT	RSE planning documents (SAP, HSP, QAPP) (Final)	Final RSE planning documents completed.
			2000	IT	RSE Field Work	RSE field work completed.
			2001	IT	RSE report (Draft)	RSE draft report completed.
			2001	IT	RSE report (Draft Final)	RSE draft final report completed in October 2001
			2002-2003	IT/Shaw	Baseline Ecological Risk Assessment Work Plan (Draft)	The draft baseline ecological risk assessment was prepared for the Waiawa Unit/Landfill/Burn Disposal Area/Burn Area Site.

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
			2004	IT/Shaw	Baseline Ecological Risk Assessment Work Plan (Draft Final)	The draft final Baseline Ecological Risk Assessment Work Plan for Pearl City Peninsula Landfill, Burn Area Site and Waiawa Unit was prepared in July 2004.
9	Pearl City Peninsula	Pearl City Fuel Annex	1995	Ogden	PA	Collect and evaluate existing data to evaluate if hazardous substance release has occurred. Based on HRS, recommend further action in DQO. Planning document for future SI. Field work initiated and completed; additional characterization recommended. Planning documents finalized and field work initiated and completed. Only lead poses a risk to future construction workers. Recommend EE/CA to remediate lead. Conduct Phytoextraction Pilot Study to assess the feasibility of using phytoextraction as a remedial alternative to treat lead, antimony and arsenic in surface soil (Mar 2005). Conduct Phytoextraction Pilot Study to assess the feasibility of using phytoextraction as a remedial alternative to treat lead, antimony and arsenic in surface soil (Aug 2005).
			1995	Ogden	DQO	
			1995	Ogden	Phase I RSE	
			1996	Ogden	Phase II RSE (Final)	
			1997	Ogden	RSE Report (Final)	
			2005	AMEC	Pilot Study Work Plan (Draft)	
2005	AMEC	Pilot Study Work Plan (Final)				
9	Pearl City Peninsula	SSR Identified Sites	2000	Earth Tech	SSR (Draft Final)	Draft Final Site Summary Report (SSR) submitted to regulators/trustees in Sep 00. SSR identified 3 pad-mounted transformers that require further evaluation of potential PCB releases. An abandoned fuel corridor and 3 docks were also identified for further evaluation of potential petroleum releases. (The Draft SSR of 1997 encompassed the entire PHNC. Based on review comments by EPA/DOH, individual SSRs are being prepared for 10 GSAs.) Based on the level of detail for the Bishop Point SSR, the Pearl City Peninsula GSA August 2000 draft-final SSR was revised and completed in July 2001. SSR finalized in January 2002. April 2003 SSR Final amendment revisions based on agreement with EPA Region IX through phone conference correspondence. Investigate the abandoned AVGAS/MOGAS pipeline and the area south of Bldg 992 (Oct 2004). Investigate the abandoned AVGAS/MOGAS pipeline and the area south of Bldg 992 (July 2005).
			2001	Earth Tech	SSR (Revised Draft Final)	
			2002	Earth Tech	SSR (Final)	
			2003	Earth Tech	SSR (Revised Final)	
			2004	ESI	SI Work Plan (Draft)	
2005	ESI	SI Work Plan (Final)				

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
10	Storm Drains	Bldg. No. 215, Shop 38, Storm Drain Disposal Areas (SY-44)	1987 1989 1992 2005	A. T. Kearney KJC Ogden Earth Tech	RFA RFI WP RFI (Draft) SI (Draft)	Release potential to soil and groundwater is minimal. Recommended additional soils investigation. COCs consist of TFH and PAHs. Recommended that additional sampling and analyses of storm drains be conducted upgradient and downgradient and a removal action for contaminated sediment be performed. Recommends that subsurface soil and groundwater warrant no further action. However, interim removal action for sediment in the adjacent storm drain catchbasin is recommended.
10	Storm Drains	NAVSHIPYD Storm Drains (SY-84)	1987 1989 1992	A. T. Kearney KJC Ogden	RFA RFI WP RFI (Draft)	Release potential to soil and groundwater is considered high. Recommended the collection of sediment samples from storm drain trunk lines. COCs are PCBs, TFH, and PAHs. Recommended sampling/analyses of storm drains upgradient and downgradient and a Removal Action.
10	Storm Drains	Paint Shop Storage Area (PWC-01)	1987 1989 1992	A. T. Kearney KJC Ogden	RFA RFI WP RFI (Draft)	Release potential to soil and groundwater is considered possible. Recommended additional investigations be conducted to further delineate chemical constituents in soils and storm drain sediments. COCs were toluene, xylene, and metals. Recommend that the catch basin be resampled.
10	Storm Drains	Industrial Waste Treatment Plant Collection Sump (PWC-10)	1987 1989 1992	A. T. Kearney KJC Ogden	RFA RFI WP RFI (Draft)	Release potential to soil and groundwater is considered low. Recommended a limited soils investigation to determine if releases of RCRA wastes have occurred. COCs were antimony, lead, and arsenic. Recommend further sampling of soils in the immediate vicinity of the collection sump to determine vertical and lateral extent of contamination.
10	Storm Drains	Industrial Waste Treatment Plant Waste Unloading Area (PWC-13)	1987 1989 1992	A. T. Kearney KJC Ogden	RFA RFI WP RFI (Draft)	Release potential to soil and groundwater is considered low. Recommended a limited soils investigation to determine if releases of RCRA wastes have occurred. COCs are arsenic and beryllium. Recommended additional sampling be performed in the vicinity of composite soil samples to supplement uncertain analyses which may be above RCRA levels for soil.

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10	Storm Drains	Bldg. No. 472, Spent Battery Storage Area (NAS-04)	1987	A. T. Kearney	RFA	Release potential to soil and groundwater is considered low. Recommended a soils investigation be conducted in the battery locker and along the storm drain. Detected COC is lead. Recommended a removal action of the sediment from onsite catch basins to mitigate potential human health and environment.
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	
10	Storm Drains	Hose Draining Area (SB-26)	1987	A. T. Kearney	RFA	Release potential to soil and groundwater is considered possible. No recommendations due to inconclusive results. Detected COC is arsenic. Recommend further research regarding arsenic background concentrations as well as additional soil sampling.
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	
10	Storm Drains	Former PCB Disposal Storm Drains Near Bldg. No. 68 (IAS-13)	1983	NEESA	IAS	No further action necessary because even if the storm drain pipe leaked and soil near the pipe may be PCB-contaminated, this site was not judged to be a threat to human health or to the environment. However, EPA review disagreed with findings of the IAS. Several scattered detections of PCB. Detected PCBs in sediments. Recommended sediment removal from catch basins; and periodic resampling to reassess conditions. Removed sediments from catch basins. RI Report addendum. Time-critical removal action of sediments from catch basins. Recommended removal of sediments, conduct sampling, and if contaminated, determine source of contaminated sediments and a long term remedy.
			1992	ANL	SI	
			1994	Ogden	RI (Draft)	
			1995/6	Navy, PWC	Removal Action	
			1996	Ogden	RI Report	
1997	Navy, PWC	Removal Action				
1997	Ogden	RI Report (Final)				
10	Storm Drains	Past Waste Plating Solution Disposal, Storm Drain System (SB-12)	1987	A. T. Kearney	RFA	Release potential to soil and groundwater could not be determined. Recommended a collection of sediment samples from the catch basins. COCs are barium and lead. The RFI recommended a removal action.
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	
10	Storm Drains	Spent Flash Acid Disposal, Storm Drain System (SB-13)	1987	A. T. Kearney	RFA	Release potential to soil and groundwater could not be determined. Recommended a collection of sediment samples from the catch basins. COCs are barium and lead. The RFI recommended a
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	

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						removal action.
10	Storm Drains	Bldg. 155, Shop 41, Former Sandblast Area (New SWMU 07)	1990	Navy, PACDIV	RFA	Wastewater entered storm drain and will be addressed as part this SMP group.
10	Storm Drains	Bldg. 4, Shop 56, Concrete Pad and Drain (New SWMU 09)	1990	Navy, PACDIV	RFA	Any past release will be addressed as part of this SMP group.
10	Storm Drains	Bldg. 4, Shop 56, Capped Storm Drains (New SWMU 10)	1990	Navy, PACDIV	RFA	Any past release will be addressed as part of this SMP group.
10	Storm Drains	Bldg. 4A, Shop 56, Pipe and Copper Shop Floor (New SWMU 15)	1990	Navy, PACDIV	RFA	Currently being studied as part of this SMP group.
10	Storm Drains	Bldg. 4, Shop 41, Former Boiler Shop Storm Drain (New SWMU 17)	1990	Navy, PACDIV	RFA	Currently being studied as part of this SMP group.
10	Storm Drains	Bldg. 449, Battery Charging Area Floor Drain (New SWMU 20)	1990	Navy, PACDIV	RFA	Currently being studied as part of this SMP group.
10	Storm Drains	Bldg. 43, Electrical Shop Floor Drain (New SWMU 22)	1990	Navy, PACDIV	RFA	Currently being studied as part of this SMP group.
10	Storm Drains	Bldg. 651/674, Former Battery Acid Tanks and Pit (New SWMU 29)	1990	Navy, PACDIV	RFA	Storm drains will be investigated as part of this SMP group.
10	Storm Drains	Bldg. 472, Drum Storage (New SWMU 34)	1990	Navy, PACDIV	RFA	Storm drains will be investigated as part of this SMP group.
11	Makalapa Pesticide Rinsate Pit	Makalapa Pesticide Rinsate Pit (IAS-02, PWC-07)	1983 1989 1995 2004	NEESA Navy/EPA Ogden ESI	IAS RFA RI (Final) RSE (Draft)	No further action necessary since pesticides are "probably not sorbed onto soils in the pit and the area is fenced. This site is not a threat to human health or to the environment." Site is covered under IR Program. Recommend follow-up sampling and analysis to evaluate the distribution of chlorinated pesticides. The RI also recommended capping as a feasible remedial option. Planning documents for the additional sampling as recommended by the RI. Field sampling began in May 05. The draft RSE expected in Nov 05.
12	Ewa Junction Fuel Drumming Facility	Ewa Junction Fuel Drumming Facility MOGAS Spill (IAS-27)	1972 1975 1983 1989 1990	Navy (Mau) SLTH NEESA ESE HLA	Recovery wells Soil borings IAS Drilling and soil sampling program Investigation/Soil borings	LNAPL spill; trench built; partial recovery. MOGAS detected in soil samples; presence of LNAPL; Trench filled. No further study recommended. However, EPA requested further investigation. Presence of fuel hydrocarbons, toluene, ethylbenzene, and total xylenes in soil. Elevated levels of fuel hydrocarbons and organic compounds. Recommended modifications to trench and performance of a risk assessment.

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			1992 1996	MFA Ogden	Field investigation Phase I RI Report (Final)	Soil and groundwater contamination observed. Data indicate an overall decrease in fuel component concentrations. Low potential for future offsite contaminant migration. Recommended additional groundwater monitoring wells be installed south of the Site within the caprock water-bearing zone to close data gaps related to the limits of contamination. Also recommend long-term monitoring of all the onsite and offsite monitoring wells.
			1996	Earth Tech	Phase II RI Planning Documents (Final)	Concentrate on off-site areas downgradient of interceptor trench, especially near area where petroleum contamination found in trench for sewer line. Will attempt to prove natural attenuation occurring on-site.
			1998	Earth Tech	Phase II RI Revised SAP	Addressed QC/QA consultant's comments. Focused on off-site areas. Deleted soil gas probes.
			1998-9	Earth Tech	Phase II RI Field Investigation	Generally found no COCs above action levels. Completed first round of groundwater monitoring and sampling during the dry period. Due to unusually dry weather conditions, the second round of groundwater monitoring and sampling was not performed until April 1999.
			1999	Earth Tech	Phase II RI Report (Draft)	Submitted draft Phase II RI report in November 1999. Received regulators' comments in September 2000.
			2000	Earth Tech	Phase II RI Report (Draft Final)	Submitted draft final Phase II RI report in November 2000. Regulators did not concur with report recommendations.
			2001	PACDIV	Partnering Session	Site not under CERCLA due to petroleum exclusion. Agreement reached with EPA and DOH to address petroleum contamination with DOH.
			2001	PACDIV	Letter requesting NFA concurrence from DOH	Site conditions comply with State Contingency Plan (SCP) criteria for NFA.
			2002	DOH	NFA Concurrence Letter	Site closed. All site monitoring wells abandoned.
			2005	NAVFAC HI	Ltr Request for NPL delisting	Letter to EPA requesting to delist site from PHNC NPL.
13	Richardson	FLETRAGRU Fire Fighting Training Area (NAS-06)	1987 1989 1992	A. T. Kearney KJC Ogden	RFA RFI WP RFI (Draft)	Release potential to soil and groundwater is considered possible. Recommended investigation to determine the presence and extent of fuel and fuel by-product contamination. Detected COCs were TFH, and sporadic VOC and SVOCs in soil samples. The RFI recommended a preliminary risk assessment be conducted in association

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			2004	ESI	RSE Planning Documents (Draft)	<p>with an evaluation of the hydraulic connection of the site with the harbor. Recommended removal action to address detected contaminated hot spots. Objective is to complete the characterization of COPCs at the site that been previously identified, to characterize features that have not yet been investigated, to evaluate the degree of risk represented by the detected COPCs, and to determine if the site requires investigation. Incorporated regulators comments on draft.</p> <p>Identified project-specific planning information in response to regulators' comments to planning documents and incorporate personnel and subcontractor specific information (drilling services, testing laboratory, etc.) Incorporated regulators comments on draft.</p>
			2005	ESI	RSE Planning Documents (Final)	
			2005	ESI	RSE Technical Addendum to Planning Documents (Draft)	
			2005	ESI	RSE Technical Addendum to Planning Documents (Final)	
14	Makalapa Crater	Early Disposal Area (IAS-01, PWC-16)	1983	NEESA	IAS	<p>No further action necessary. This site is not a threat to human health or to the environment." IAS did not identify wastes or the extent of fill, and further investigations were warranted. Release potential to soil and GW is considered low. Recommended soils investigation to determine nature and extent chemicals present. COCs detected are beryllium, arsenic, lead, and mercury. Recommended further evaluation consisting of additional soil sampling and a removal action.</p>
			1987	A.T. Kearney	RFA	
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	
14	Makalapa Crater	Makalapa Crater Clean Fill Area (IAS-01, PWC-17)	1983	NEESA	IAS	<p>No further action necessary because "this site is not a threat to human health or to the environment." IAS did not identify wastes, or the extent of fill, and further investigations were warranted. Release potential to soil and groundwater was considered relatively low. Recommended soils investigation to determine nature and extent of chemicals present. COCs detected are beryllium, arsenic, lead, and mercury. Recommended further evaluation consisting of additional soil sampling and a removal action.</p>
			1987	A. T. Kearney	RFA	
			1989	KJC	RFI WP	
			1992	Ogden	RFI (Draft)	

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SMP Group #	SMP Group	Site(s)	Year	Source	Scope of Work	Finding(s) / Recommendation(s)
14	Makalapa Crater	Makalapa Crater Clean Landfill Area (IAS-01, PWC-18)	1983	NEESA	IAS	No further action necessary. "This site is not a threat to human health or to the environment." IAS did not identify wastes or the extent of fill, and further investigations were warranted. Release potential to soil and groundwater was considered low. COCs detected are beryllium, arsenic, lead, and mercury. Recommended a further evaluation consisting of additional soil sampling. Recommended removal action.
			1987	A. T. Kearney	RFA	
			1992	Ogden	RFI (Draft)	
14	Makalapa Crater	SSR Identified Sites	2000	Earth Tech	Site Summary Evaluation field work completed in July 2000	Visual site inspections and research of facilities within the Makalapa Crater GSA in preparation of the SSR.
			2001	Earth Tech	SSR (Draft Final)	Draft final SSR completed in August 2001.
			2002	Earth Tech	SSR (Revised Draft Final)	Revised draft final completed February 2002
			2002	Earth Tech	SSR (Revised Final)	November 2002 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence.
15	Pearl Harbor Regional Sediment Study	Pearl Harbor Sediments (IAS-19)	1983	NEESA	IAS	No further action necessary because "many of the contaminants discharged to the harbor in the past have dispersed or have been removed with the sediments by maintenance dredging. This site is not a threat to human health or to the environment." However, EPA review disagreed with the IAS findings. Navy Technical Report found overall environmental risks to be moderately low. Recommended sediment characterization and minimization of nonpoint releases to Pearl Harbor. COCs are silver, PCBs, and fuel hydrocarbons. No sampling or preliminary risk evaluations conducted. Effects-based harbor-wide sediments study including ecological and human health risk assessments. Development of RI/FS planning documents coordinated with regulators and natural resource trustees. Conducted between July and November. Sediment, water, and tissue samples (infauna, fish, crab) collected. In-progress technical meeting held with Navy activities, regulators, and natural resource trustees to discuss preliminary results and screening methods to reduce COPCs and CPECs. Prelim. fish and crab tissue results sent to EPA, DOH, ATSDR, and NEHC for input on
			1992	Naval Command, Control and Ocean Surveillance Center	Technical Report (literature search)	
			1996	Ogden	RI/FS Planning Docs	
			1996	Ogden	RI/FS Field Sampling Activities	
			1997	Ogden	RI/FS In-progress mtgs.	

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			1998	DOH/EPA	Fish Advisory	<p>potential human consumption concerns and fish advisory. Based on data collected during the RI/FS, DOH w/ EPA concurrence issued a public health advisory on 8/27/98 warning against the consumption of fish and shellfish from Pearl Harbor via press conference. Navy posted DOH warning signs along coastline. COCs for fish consumption are pesticides, herbicides, and PCBs. Ecological and human health risk assessment methodologies and prelim. results presented/discussed. Project GIS and Website capabilities demonstrated. NFESC ERTAT (incl. Dave Charters of EPA) advised Navy to strictly adhere to EPA 8-Step Method for conducting eco risk assessments. October 1999 meeting at EPA Region IX set sequence of deliverables including SMDPs and technical data. EPA/DOH concurred that Draft RI/FS Report must include a BERA and schedule should be determined pending identification of potential data gaps in EPA Step 4. Project being "re-tooled" to conform to the EPA 8-Step Method since the original planning documents were completed in 1996 prior to issuance of EPA policy in 1997 and CNO policy in 1999. Draft Step 7 document completed. Document identifies ecological COPCs and PRGs for the harbor. Incorporated comments from regulators.</p>
			1998-2002	Ogden/AMEC	<p>RI/FS In-progress mtgs. (Including ERTAT team from May 1999)</p> <p>SERA Step 1 and 2 SMDP document</p> <p>BERA Step 3a document</p> <p>BERA Step 3b/4 SMDP document</p>	
			2004	Earth Tech	BERA Step 7 (Draft)	
			2005	Earth Tech	BERA Step 7 (Final)	
16	Pearl City Junction	DRMR Pearl City Junction	1990 1993 1994	ERCE Ogden OHM	SI Removal Action Removal Action	<p>PCBs and Dieldrin detected in shallow soils. PCB contaminated soils removed. Dieldrin contaminated soils removed. EPA has indicated that they consider the potential for groundwater contamination at this site an issue. Analysis of sample split with prospective buyer indicates that concentrations of PCB and dieldrin below site-specific goals at previous removal action areas. PCB contaminated soils removed at area found by prospective buyer. Removal action complete and project will be closed out following finalization of RADD. Final RADD submitted in November 1999. Draft planning documents to conduct regional groundwater assessment at site and Manana Storage Area. Completed in October 1998. Completed field work for assessment.</p>
			1997	Ogden	Letter Report – Soil Verification Sampling	
			1998	OHM	Removal Action	
			1998	Ogden	RADD (Draft)	
			1998	Ogden	Regional Groundwater SAP (Draft)	
			1998 2002	Ogden Earth Tech	Earth Tech SAP (Final) Regional Groundwater	

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			2003	Earth Tech	Assessment Regional Groundwater Assessment Report (Draft)	Draft report submitted. No further no action recommended for site.
			2003	Earth Tech	Regional Groundwater Assessment Report (Final)	Final report submitted. No further action recommended for site.
			2005	Earth Tech	Proposed Plan (Draft)	Proposed Plan for NFA at site.
17	Waipio Peninsula	SSR Identified Sites	2000	Earth Tech	Final Site Summary Report (SSR)	SSR for the Waipio Peninsula GSA completed in October 1999. Per Federal Facilities Agreement, document finalized in November 1999. However, comments were received from EPA in April 2000, thus document was revised in August 2000. SSR identified 5 pad-mounted transformers that require further evaluation of potential PCB releases.
			2003	Earth Tech	SI Report	Sites recommended for further evaluation sampled in 2003 to determine if further investigation is warranted. Final SI report December 2003.
			2004	Earth Tech	SI Report	Finalized the SI report June 2004
18	West Loch	SSR Identified Sites	2000	Earth Tech	SSR (Draft Final)	Draft Final Site Summary Report (SSR) submitted to regulators/trustees in September 2000. (The Draft SSR of 1997 encompassed the entire PHNC. Based on review comments by EPA/DOH, individual SSRs are being prepared for 10 GSAs.)
			2001	Earth Tech	SSR (Revised Draft-Final)	Based on the level of detail for the Bishop Point SSR, the West Loch GSA August 2000 draft-final SSR was revised and completed in August 2001.
			2002	Earth Tech	SSR-revised draft final	Revised draft final completed March 2002.
			2003	Earth Tech	SSR Revised Final	July 2003 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence.
			2003	Earth Tech	SI Report	Sites recommended for further evaluation sampled in 2003 to determine if further investigation is warranted. Final SI report December 2003.
			2004	Earth Tech	SI Report	Finalized the SI report June 2004
18	West Loch	Auxiliary Power Facility, Building 49	1999	IT	Action Memorandum	AM which documents the removal action decision was finalized 25 July 1999.
			1999	IT	Work Plan	The removal action Work Plan, including a field sampling plan, quality assurance project plan, and health and safety plan was completed July 1999.
			1999	IT	Removal Action	Removal and disposal of PCB contaminated soil at the

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			2000	IT	Removal Action	front of the Building 49 was completed in August 1999. Removal of drain pit and disposal of PCB contaminated soil at the back of Building 49 was completed June 2000. Further monitoring of the well did not indicate an oil sheen. Groundwater sample results did not indicate groundwater has been impacted. Based on findings , no further response is required. The draft RVR was completed in January 2002. Finalized the RVR May 2003 and amended December 2003. Navy in review of U.S. EPA Region IX comments.
			2001	IT	Removal Action	
			2002	IT	RVR (Draft)	
			2003/ 2004	IT	RVR (Final)	
18	West Loch	Iroquois Point and Puuloa Housing	2001	Earth Tech	Site Investigation (Draft)	Site Investigation covered Iroquois Point and Puuloa Housing Areas and recommended a removal action at transformer 1-4.
19	Bishop Point	SSR Identified Sites	2000	Earth Tech	SSR (Draft Final)	Draft Final Site Summary Report (SSR) submitted to regulators/trustees in Sep 00. (The Draft SSR of 1997 encompassed the entire PHNC. Based on review comments by EPA/DOH, individual SSRs are being prepared for 10 GSAs.) Based on review comments, the level of detail for the Bishop Point GSA was revised and the SSR completed in June 2001. EPA and DOH accepted this revision as final in August-September 2001.
			2001	Earth Tech	SSR (Revised Draft-Final)	
20	Naval Housing	SSR Identified Sites	2000	Earth Tech	Site Summary Evaluation field work completed in July 2000	Visual site inspections and research of facilities within the Naval Housing GSA in preparation of the SSR. Draft Final completed in September 2001. Based on review comments by the regulators, the draft final was revised and completed in April 2002. The SSR finalized based on additional comments received by the regulators and scheduled for completion in December 2002. December 2003 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence June 2004 Draft Work Plan and Sampling & Analysis Plan prepared for housing sites identified in the SSR requiring further investigation to determine whether further environmental action is required. Incorporated regulators comments.
			2001	Earth Tech	SSR (Draft Final)	
			2002	Earth Tech	SSR (Revised Draft-Final)	
			2003	Earth Tech	SSR (Final)	
			2003	Earth Tech	SSR (Revised Final)	
			2004	Earth Tech	Site Inspection planning docs (Draft)	
2004	Earth Tech	Site Inspection planning docs (Final)				
21	NISMO	SSR Identified Sites	2000	Earth Tech	SSR (Draft Final)	Draft Final Site Summary Report (SSR) submitted to

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	(Formerly NISMF)		2001	Earth Tech	SSR (Revised Draft-Final)	regulators/trustees in Sep 00. (The Draft SSR of 1997 encompassed the entire PHNC. Based on review comments by EPA/DOH, individual SSRs are being prepared for 10 GSAs.)
			2001	Earth Tech	SSR (Revised Draft Final)	Based on the level of detail for the Bishop Point SSR, the NISMO GSA August 2000 draft-final SSR was revised and completed in July 2001.
			2002	Earth Tech	SSR (Revised Final)	Revisions to the revised draft final were completed in November 2001. October 2002 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence
22	PWC Compound	SSR Identified Sites	2000	Earth Tech	Site Summary Evaluation field work completed in July 2000	Visual site inspections and research of facilities within the PWC Compound GSA in preparation of the SSR.
			2001	Earth Tech	SSR (Draft Final)	Draft Final SSR completed in August 2001.
			2002	Earth Tech	SSR-(Revised Draft Final)	The revised draft final was completed in March 2002.
			2002	Earth Tech	SSR (Revised Final)	December 2002 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence
23	Halawa-Main Gate	SSR Identified Sites	2001	Earth Tech	SSR (Draft Final)	Draft Final SSR completed in October 2001.
			2002	Earth Tech	SSR (Revised Draft Final)	The revised draft final was completed in May 2002.
			2003	Earth Tech	SSR (Revised Final)	March 2003 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence
24	Richardson	SSR Identified Sites	2000	Earth Tech	Site Summary Evaluation field work completed in July 2000	Visual site inspections and research of facilities within the Richardson GSA in preparation of the SSR.
			2001	Earth Tech	SSR (Draft Final)	Draft Final SSR completed in September 2001.
			2002	Earth Tech	SSR (Revised Draft Final)	The revised draft final was completed in March 2002.
			2002	Earth Tech	SSR (Revised Final)	December 2002 SSR Final revisions based on agreement with EPA Region IX through phone conference correspondence
			2003	Earth Tech	Site Inspection (Final)	Transformer R-4 addressed by Various Transformer Sites SI. No further action recommended.
			2003	Earth Tech	Supplemental RI (Final)	Former Building 593, Storage Maintenance Shop by addressed by Supplemental RI. No further action recommended.

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			2003	Earth Tech	Phase II EBS (Final)	AST 593 addressed by Phase II EBS. No further action recommended.
			2005	Dawson	RVR (Final)	Inactive Fuel and Diesel Oil Pipeline addressed by RVR Removal action removed COCs from site.
25	Various Transformer Sites	Various Transformer Sites on Oahu	2001	Earth Tech	Site Inspection	Draft SI Work Plan completed in August 2001. Final SI Work Plan completed October 2001. Field sampling work completed November-December 2001.
			2001	Earth Tech	Removal Action	The Sampling and Analysis Plan, Removal Action Design Support and Confirmation Sampling for Ford Island, PHNC, Waikale, Iroquois Point, NRTF LLL, Former NAS Barbers Point was completed in December 2001. Field work was to support the design for the thermal desorption treatment project at the various sites.
			2002	Earth Tech	SI (Draft SI)	The draft SI for Various Transformers Sites in the PHNC was completed in June 2002. There were 167 sites where PCBs were either not detected or below screening criteria. 128 sites were found to exceed TSCA screening criteria in either the soil or concrete. Submitted Finalized in 2004.
			2002	Earth Tech	Design Package (Group B sites) (Draft)	
			2002	Earth Tech	AM addendum	Action Memorandum for various transformer sites at Ford Island, Waikale, Iroquois Point and NRTF LLL
			2003	Earth Tech	SI (Final)	Final SI was prepared in Jan 2003.
			2003	Earth Tech	AM addendum	Action Memorandum for various transformer sites at PHNC, NAVMAG, former NAS Barbers Point

NOTES:

AM	Action Memorandum	CPEC	Contaminants of Potential Ecological Concern	ERTAT	Ecological Risk Technical Assistance Team	IRP	Installation Restoration Program
AMEC	AMEC, formerly Ogden Environmental and Energy Services	DOH	Department of Health	ESE	Engineering Science and Engineering	IT	IT Corp, formerly OHM, now Shaw
ANL	Argonne National Laboratories	DQO	Data Quality Objectives	FSP	Field Sampling Plan	KJC	Kennedy, Jenks, Chilton
ATSDR	Agency for Toxic Substances and Disease Registry	DNAPL	Dense Non-Aqueous Phase Liquid	GII	Geokinetics International, Inc.	LNAPL	Light, Non-Aqueous Phase Liquid
ATT	Aqua Terra Technologies	DRMO	Defense Reutilization Marketing Office	GIS	Geographic Information System	MFA	Masa Fujioka and Associates
AVGAS	Aviation Gasoline	DRMR	Defense Reutilization Marketing Region	GSA	Geographical Study Area	MW	Monitoring Well
BERA	Baseline Ecological Risk Assessment	E&E	Ecology and Environment	GW	Groundwater	NAS	Naval Air Station
BOA	Basic Ordering Agreement	EE/CA	Engineering Evaluation/Cost Analysis	HLA	Harding Lawson & Associates	NAVBASE	Naval Base
COCs	Contaminants of Concern	EPA	Environmental Protection Agency	HRS	Hazard Ranking System	NEESA	Naval Energy and Environmental Support Activity
COPC	Contaminants of Potential Concern	ERCE	ERC Environmental and Energy Services, Co.	HSP	Health and Safety Plan	NEHC	Navy Environmental Health Center
CNO	Chief of Naval Operations			HW/HM	Hazardous Waste/Hazardous Material	NEX	Navy Exchange
				IAS	Initial Assessment Study	NFA	No Further Action

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NFESC	Navy Facilities Engineering Service Center	PCE			RI/FS	Remedial Investigation/Feasibility Study	SMDP	Scientific Management Decision Point	
NISMO	Naval Sea Systems Inactive Ships On-Site Maintenance Office	PHNC					SSR	Site Summary Report	
		PRC				ROD	Record of Decision		
NPDES	National Pollutant Discharge Elimination System	PRG				RSE	Removal Site Evaluation	SUBASE	Submarine Base
		PP				RVR	Remediation Verification Report	SVE	Soil Vapor Extraction
NSY	Naval Ship Yard	PRL				SAP	Sampling and Analysis Plan	SWMU	Solid Waste Management Unit
		PWC				SC	Site Closeout	TFH	Total Fuel Hydrocarbons
Ogden	Ogden Environmental and Energy Services, now called AMEC	QAPJP				SERA	Screening Ecological Risk Assessment	UST	Underground Storage Tank
		RAA						VC	Vinyl Chloride
O&M	Operations and Maintenance	RADD				SHAW	Shaw Environmental and Infrastructure, formerly IT Corp.	VTU	Vapor Transfer Unit
OHM	OHM Remediation Services Corp., now called Shaw.	RCRA				SI	Site Inspection	UTF	Upper Tank Farm
PA	Preliminary Assessment					SITE	Superfund Innovative Technology Evaluation	VOCs	Volatile Organic Compounds
PAHs	Polycyclic Aromatic Hydrocarbons	RFA						WP	Work Plan
PCAS	Post-Construction Award Services	RFI				SLTH	Sunn, Low, Tom and Hara		
PCB	Polychlorinated Biphenyls	RI							