



PROPOSED PLAN FOR OPERABLE UNIT 7 MARINE CORPS LOGISTICS BASE BARSTOW, CA



NAVY ANNOUNCES PUBLIC COMMENT PERIOD AND MEETING FOR PROPOSED PLAN

The U.S. Department of the Navy (Navy) presents to the public this Proposed Plan to clean up specific waste sites at the Marine Corps Logistics Base Barstow (MCLB Barstow). The waste sites, called Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Areas of Concern (CAOCs), are grouped into Operable Unit 7 (OU 7). The history and kinds of wastes found at the OU 7 CAOCs and the remedies evaluated to clean them up are discussed in this document. A proposed remedy, also called a preferred alternative, is discussed for each CAOC requiring cleanup, including a rationale for its selection. Justification is also presented for those CAOCs that require no cleanup. Definitions of all words or phrases underlined on their first occurrence in this document are included in the Glossary on page 25.

Your comments on this Proposed Plan are important and the MCLB Barstow (“the Base”) urges you to review and comment on the information contained in this document. A separate sheet is included for you to write in your comments and questions. The public comment period for the Proposed Plan and its supporting documentation extends from January 2, 2014 through February 3, 2014. A meeting will also be held on January 15, 2014 to provide the public with an opportunity to provide comments either orally or in writing on the proposed remedies in the Proposed Plan. Representatives from the Base, the Navy, and state and federal environmental regulatory agencies will be available at the meeting to answer questions.

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DCN: ATJV-2610-0005-0029

How You Can Comment

The Navy encourages the public to comment on this Proposed Plan for Operable Unit 7 at the MCLB Barstow. The public comment period is January 2, 2014 through February 3, 2014.

You can comment in person at the public meeting or in writing to the Navy’s remedial project manager:

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PUBLIC MEETING

Wednesday January 15, 2014 6:00pm

Barstow City Hall, City Council Chambers
220 East Mountain View Street
Barstow, CA 92311

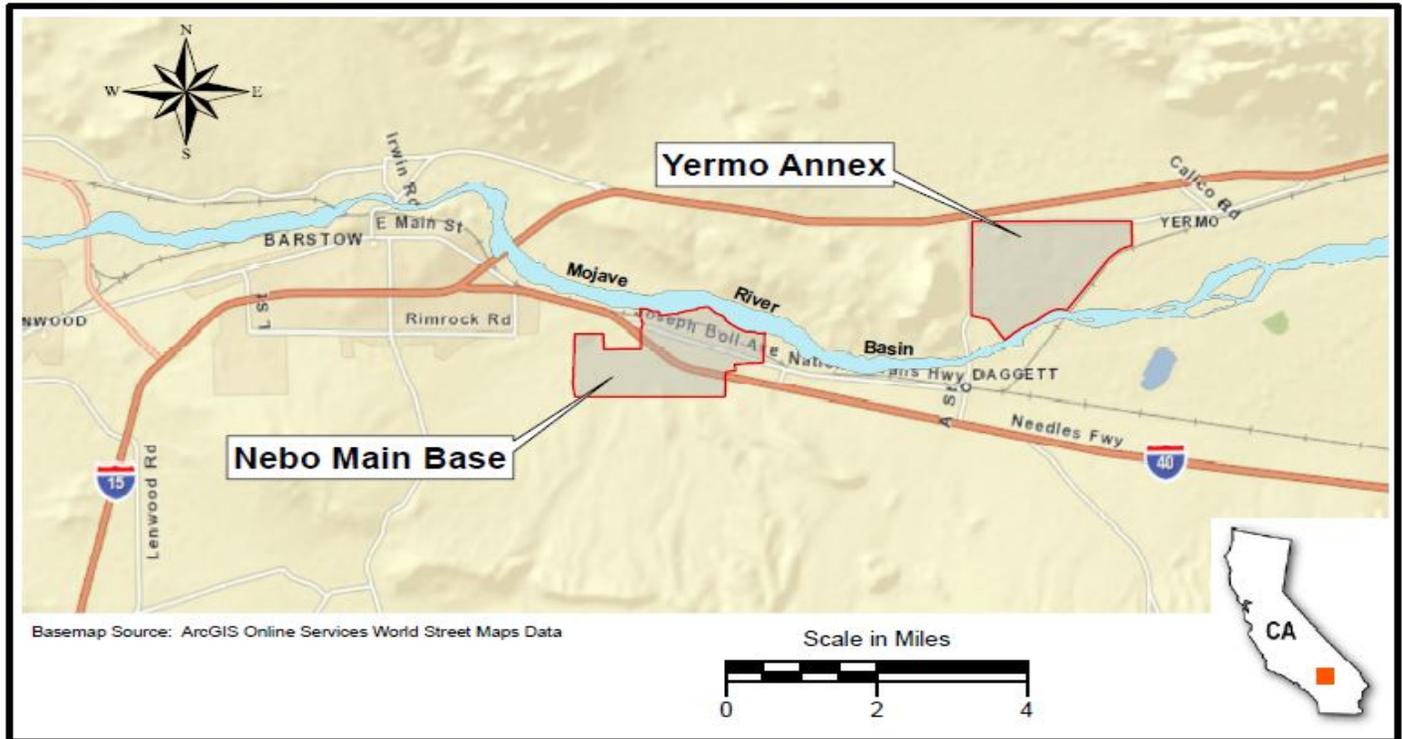


Figure 1 MCLB Barstow Location Map

INTRODUCTION

This Proposed Plan addresses the cleanup of contamination at OU 7 at the MCLB Barstow. The MCLB Barstow is located approximately 3.5 miles east of the city of Barstow, California and consists of the Nebo Main Base and Yermo Annex, as shown on [Figure 1](#).

OU 7 is comprised of 15 CAOCs and two sites with groundwater concerns. Three of the CAOCs are located at Yermo Annex and remaining CAOCs and two groundwater areas are located at Nebo Main Base as shown on [Figure 2](#) and [Figure 3](#), respectively.

This Proposed Plan provides information to the public about the alternatives considered for remedial actions at OU 7, identifies the preferred alternatives with the rationale for their selection, and seeks public input prior to the Navy's final decision-making. The final decision on the choice of OU 7 preferred alternatives will not be made until all public comments have been considered. All significant public comments received during the public comment period will receive a written response and will be included as part of the Record of Decision (ROD), which will officially state the specific remedial alternatives that will be implemented for OU 7.

The information contained in this Proposed Plan is based on detailed field investigation and engineering reports prepared for OU 7. The primary documents are the Remedial Investigation (RI) Report (October 2005), Supplemental RI Reports (September 2010 and March 2012), and the Feasibility Study (FS) Report (June 2013). These reports are part of the MCLB Barstow Administrative Record and are available for public review at the MCLB Barstow, Environmental Division library, located at the Nebo Main Base. Contact: Jim Bustamante, (760) 557-6523 to arrange a review of the documents. Further information is provided in Part IV Community Involvement (see page 24).

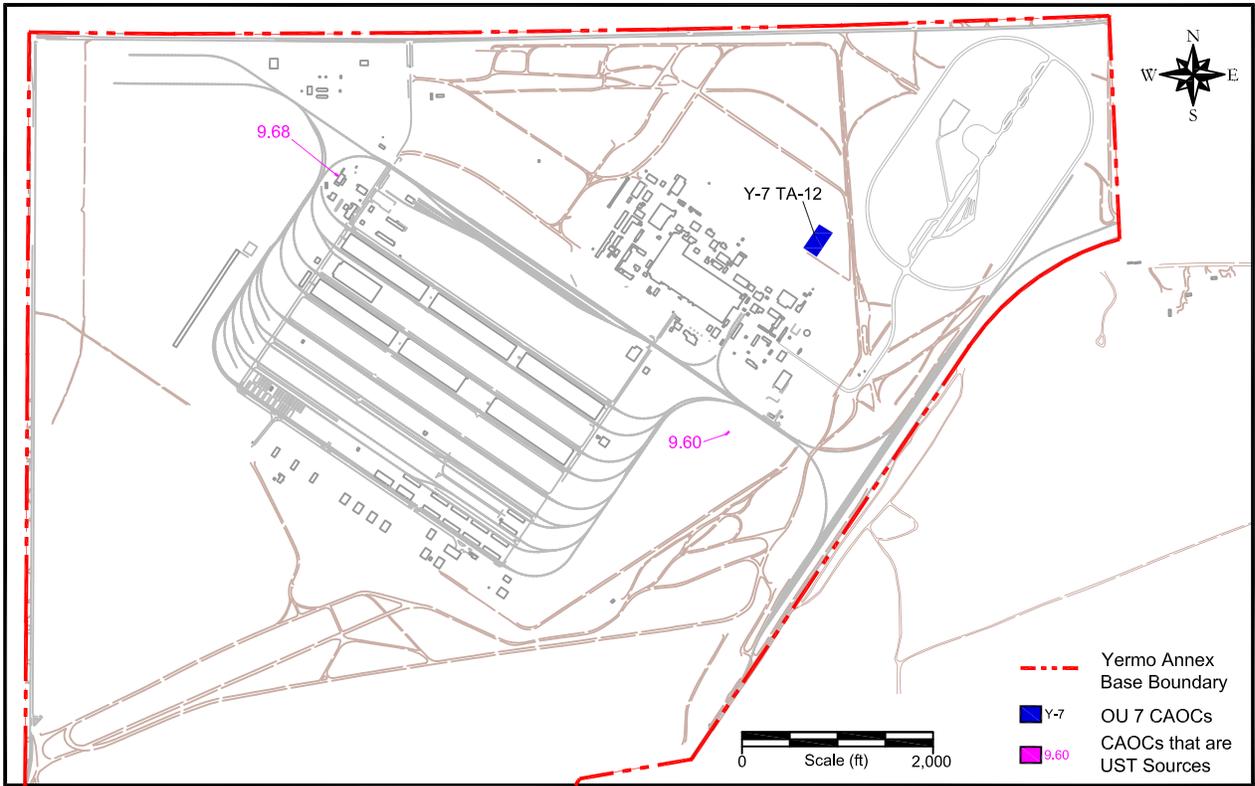


Figure 2 Yermo Annex CAOC Location Map

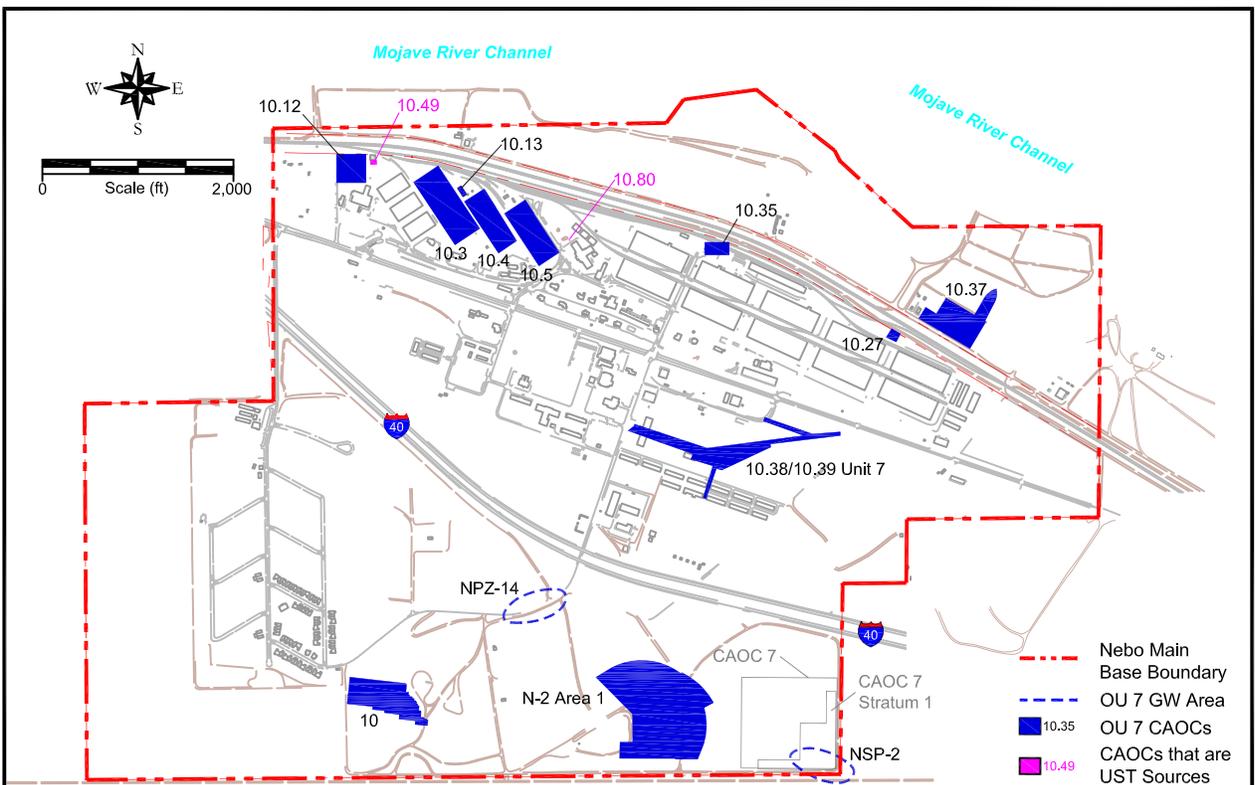


Figure 3 Nebo Main Base CAOC and Groundwater Areas Location Map

FACILITY DESCRIPTION

The MCLB Barstow is in San Bernardino County, California, in the central Mojave Desert approximately 135 miles northeast of Los Angeles.

The Base consists of two areas: the Nebo Main Base, which includes the Rifle Range, and the Yermo Annex. The 1,286-acre Nebo Main Base is 1 mile east of Barstow and intersected by Interstate 40. The 1,681-acre Yermo Annex is 7 miles east of Barstow, between Interstates 15 and 40, and is 6 miles east of the Nebo Main Base.

The MCLB Barstow was established in 1942 at the Nebo Main Base as a staging area for military supplies and equipment for forces deployed in the Pacific during World War II. The Yermo Annex was acquired in 1946, after the Base's original mission requirements grew to include providing logistical support to Marine Corps commands throughout the western United States and the Pacific. The Rifle Range was acquired in the mid-1950s and provides a secured area for marksmanship practice.

During its 50 years of operation, the MCLB Barstow has generated a variety of industrial wastes such as waste oil, fuel, solvents, and polychlorinated biphenyls (PCBs). In the early years, some of these wastes were disposed of in landfills, burn trenches, and other areas throughout the Base. Because of the presence of hazardous substances in soil and groundwater, the MCLB Barstow was placed on the National Priorities List (NPL) by EPA on November 15, 1989. The Department of the Navy is the lead agency for the cleanup and closure of contaminated sites through its Installation Restoration Program (IRP).

INSTALLATION RESTORATION PROGRAM

In October 1990, the U.S. Department of the Navy signed a Federal Facility Agreement (FFA) with the U.S. Environmental Protection Agency (EPA), the California Environmental Protection Agency Department of Toxic Substances Control (DTSC), and Regional Water Quality Control Board – Lahontan Region (Water Board). The FFA establishes a cooperative and participatory framework among the federal and state agency

members, defines their roles and responsibilities, and develops a process to resolve any disputes that may arise during the study and implementation phase of the environmental cleanup program at the MCLB Barstow.

The environmental investigation and cleanup of OU 7 is part of the MCLB Barstow's IRP. The purpose of the IRP is to protect human health and the environment by identifying and cleaning up environmental contamination resulting from past use and disposal practices.

The IRP follows the guidelines contained in CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA, passed by Congress in 1980 and modified in 1986 by the Superfund Amendments and Reauthorization Act (SARA), lists the steps necessary to evaluate and remediate any contaminated areas found on the Base.

OPERABLE UNITS SUMMARY

Hazardous waste sites present at the MCLB Barstow have been grouped into seven OUs developed to guide site investigations, cleanup decisions, and closure of all CAOCs. Six of the OUs have RODs and remedial actions in process:

- OU 1 and OU 2 address groundwater contamination at the Yermo Annex and the Nebo Main Base, respectively. The ROD for OUs 1 and 2 was completed in July 1998. A second ROD to implement a remedy for contaminated groundwater at Nebo Main Base was completed in June 2006.
- OUs 3, 4, 5, and 6 address soil contamination at the Yermo Annex and the Nebo Main Base. The ROD for OUs 3 and 4 was completed in June 1997. The ROD for OUs 5 and 6 was completed in January 1998.
- OU 7 consists of the remaining CAOCs plus two groundwater areas. This proposed plan presents the selected remedies for OU 7; the OU 7 ROD is scheduled to be completed by May 2014.

A summary of the 15 CAOCs and two groundwater areas comprising OU 7 is presented in the following tables. The sites requiring remedial action are summarized on Table 1 and those requiring no further action or land use controls (LUCs) are summarized on Table 2.

Table 1. Summary of Sites Requiring Remedial Action

Site	Past Use that Resulted in Contamination	Current Status	Exposure Pathway	Proposed Action
Nebo Main Base				
CAOC 10.38/10.39 Unit 7	Unit 7 consists of former surface drainage ditches that received industrial waste water. Soil contamination was not found, but groundwater downgradient of the site has VOCs above the MCLs.	The area is generally used for equipment storage. Groundwater is about 90 feet deep and is not used at Nebo Main Base. Monitoring wells in the area are sampled twice per year.	No current exposure to contaminated groundwater is suspected as groundwater is not tapped for drinking water at Nebo Main Base. During the remedial action phase, contamination will likely remain in groundwater above the MCLs. However, the plume does not appear to extend off site and does not pose a threat to current users of groundwater downgradient of the site.	No further action for soil; monitored natural attenuation of groundwater contaminants. Maintain LUCs of Unit 7 and ICs preventing groundwater use at Nebo Main Base under the Base Master Plan.
CAOC N-2 Area 1	Waste oil spreading for dust suppression in an equipment storage area (1950's – 1965) resulted in PCB contamination of some areas; operation of a skeet & trap range (1982-1999) resulted in lead shot and skeet target debris containing PAHs scattered across the site.	Unused land with desert vegetation; an unpaved access road is periodically graded. A portion of this site is covered by a landfill cap (CAOC 7 Stratum 2).	Industrial workers performing site maintenance activities and trespassers may be exposed to soil contaminants. Birds may ingest lead shot.	Remove lead shot and skeet debris (by vacuuming); excavate and properly dispose of the PCB-contaminated soil. LUCs for this site will be identified in the Base Master Plan.
CAOC 10	Metallic wastes and debris were buried at this hillside site; a limited area of surface soil with lead contamination was identified.	Soil covering the metallic debris is kept graded to prevent erosion; stormwater drainage through the site is controlled.	Industrial workers performing site maintenance activities and trespassers may be exposed to soil contaminants.	Excavate and properly dispose of lead-contaminated soils (about 30 cubic yards); continue soil cover maintenance and maintain LUCs.
NPZ-14	NPZ-14 is a monitoring well located in a former equipment storage area (1950's – 1965); this well has had persistent VOC concentrations. The DON is continuing investigations in the area but has accumulated sufficient data at this time to support remedy selection for groundwater in this PP.	A groundwater investigation has largely defined the extent of VOC contaminated groundwater around NPZ-14. Groundwater is monitored twice per year; soil vapor samples have also been collected. The area is unused.	No current exposure to contaminated groundwater is suspected as groundwater is not tapped for drinking water at Nebo Main Base. During the remedial action phase, contamination will likely remain in groundwater above the MCLs. However, the plume does not appear to extend offsite and does not pose a threat to current users of groundwater downgradient of the site.	Monitor natural attenuation of groundwater contaminants; maintain ICs preventing use of groundwater at Nebo Main Base under the Base Master Plan.

Table 1. Summary of Sites Requiring Remedial Action, Continued

Site	Past Use that Resulted in Contamination	Current Status	Exposure Pathway	Proposed Action
CAOC NSP-2	NSP-2 is a groundwater monitoring well for landfill CAOC 7 Stratum 1, a capped hazardous waste disposal area. Groundwater at NSP-2 is contaminated with TCE; no other contaminants have been found. Additionally, soil vapor in two wells installed through the CAOC 7 cap are contaminated with VOCs.	The CAOC 7 landfill cap is maintained and controlled by the Navy. NSP-2 is sampled twice per year. Soil vapor is also sampled twice per year.	Groundwater at NSP-2 is approximately 180 feet deep and flows southeast toward the Nebo Main Base Rifle Range. During the remedial action phase, contamination will likely remain in groundwater above the MCLs. However, the plume does not appear to extend off site and does not pose a threat to current users of groundwater downgradient of the site.	Soil vapor extraction (SVE) of TCE from soils above the groundwater table (vadose zone); install additional monitoring wells off-base and monitor natural attenuation of groundwater contaminants. Maintain LUCs and ICs preventing groundwater use at Nebo Main Base under the Base Master Plan.

Definitions:

- DON – Department of the Navy
- CAOC – CERCLA area of concern
- CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
- MCL – maximum contaminant level
- IC – institutional controls
- LUC – land use controls
- PAHs – polycyclic aromatic hydrocarbons
- PCB – polychlorinated biphenyls
- PP – proposed plan
- ROD – record of decision
- TCE – trichloroethene
- VOC – volatile organic compound

Table 2. Summary of CAOCs with No Further Action or Land Use Controls

CAOC	Past Use that Resulted in Contamination	Current Status	Exposure Pathway	Proposed Action
Yermo Annex				
9.60	Former waste oil/solvent USTs T-530A and T-530B; tanks leaked to soil. T-530A was investigated but never found; T-530B was removed along with some soil in 1992.	Investigations found some soil and soil vapor contamination at depth; groundwater is about 173 feet deep. Groundwater VOCs in the area of 9.60 are below the MCLs.	No completed exposure pathways were identified.	LUCs ¹
9.68	Former oil/water separator and french drain that received waste oil. The oil/water separator and french drain were removed.	Area is paved and used for equipment storage.	No completed exposure pathways were identified.	LUCs ¹
Y-7 TA-12	Suspected waste burial area identified during thermal anomaly (TA) aerial survey of base.	No buried waste was found by subsurface investigations. No soil contamination found.	No completed exposure pathways were identified.	No further action
Nebo Main Base				
10.38/10.39 Units 1 – 6	Industrial and domestic wastewater pipelines. Suspected leaks were investigated.	Industrial wastewater lines are no longer in use; domestic wastewater lines continue to be used.	No completed exposure pathways were identified.	LUCs ¹
10.27	Building S-338 (Old Fire Fighting Training Facility).	Building was demolished; Unused partially paved area near railroad right-of-way.	Human residential and industrial receptors may be present. No completed ecological exposure pathways are suspected.	LUCs ¹
10.35	Former Domestic Wastewater Treatment Plant.	Building was demolished; land is used for some equipment storage.	Human residential and industrial receptors may be present. No completed ecological exposure pathways are suspected.	LUCs ¹
10.37	Former Industrial Wastewater Treatment Plant.	Plant decommissioned; area mostly paved and fenced. No current land use.	No completed exposure pathways were identified.	LUCs ¹
10.3	Warehouse 2 – old vehicle repair facility (1942 to 1961), used for general storage since 1961.	Storage of aircraft parts and equipment.	No completed exposure pathways were identified.	LUCs ¹
10.4	Warehouse 3 general storage and vehicle repair.	Used for storage of field equipment and other miscellaneous items (e.g. non-hazardous fire-fighting equipment).	No completed exposure pathways were identified.	LUCs ¹

Table 2. Summary of CAOCs with No Further Action or Land Use Controls, Continued

CAOC	Past Use that Resulted in Contamination	Current Status	Exposure Pathway	Proposed Action
10.5	Warehouse 4 general warehouse, vehicle repair.	Storage facility used for recreation and storage of aircraft parts and equipment.	No completed exposure pathways were identified.	LUCs ¹
10.12	Former Building 50 used for cleaning, minor repair, painting, preservation, and packaging operations; includes wash pad area, drainage area, and solvent still area.	Building 50 demolished. Contaminated soil and groundwater at this site are being treated under OU 2.	No completed exposure pathways were identified.	LUCs ¹
10.49	Suspected USTs T-27A, T-27B, and T-27C south of existing Building 27 at Nebo Main Base, east of CAOC 10.12. USTs were not found during subsurface investigations.	AS/SVE of area performed as part of OU 2 Nebo North plume cleanup action (2008 – 2012); area is under pavement for parking in front of Building 27.	No completed exposure pathways were identified.	LUCs ¹
10.80	Former UST T-354 south of Building 354 (demolished); tank removed in 1992, suspected to be boiler blow-down tank.	Area under pavement in warehouse area.	No completed exposure pathways were identified.	LUCs ¹

Note:

- LUCs will be implemented for each site by adding site use restrictions in the Base Master Plan; the Base Master Plan will note that additional risk evaluation will be required prior to any type of development at each location.

Definitions:

- AS/SVE – air sparging/soil vapor extraction
- CAOC – CERCLA area of concern
- CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
- MCL – maximum contaminant level
- LUC – land use controls
- OU – operable unit
- TA – thermal anomaly
- TCE – trichloroethene
- UST – underground storage tank
- VOC – volatile organic compound

PART I: RISK ASSESSMENT AND REMEDIAL GOALS

Several elements of this Proposed Plan are of a general nature. These elements include general approaches, methodologies, and assumptions that are common to all of the OU 7 sites.

ASSESSMENT OF SITE RISKS

As part of the RIs of OU 7, baseline human health risk assessments (HHRAs) were conducted and reported in the 2005 and 2010 RI Reports, and are summarized in the FS Report. The risk assessments were performed in accordance with the EPA's *Risk Assessment Guidance for Superfund* and consistent with State of California guidance.

Key assumptions for the baseline HHRA included:

- Major contaminants of concern (COCs) are lead, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and PCBs.
- Land and groundwater use assumptions include:
 - Current industrial and future possible residential land uses,
 - Groundwater is used at Yermo Annex as drinking water, and
 - Groundwater use is restricted at the Nebo Main Base, per the ROD for OUs 1 and 2 (1998).
- Potentially exposed populations considered included site workers, trespassers, and adults and/or children living on the site in the future.
- Exposure pathways considered included direct contact with contaminated soil, ingestion or inhalation of fugitive dust, inhalation of volatilized contaminants.
- Exposure to contaminated groundwater was assessed as the potential for contaminants to migrate to groundwater and cause dissolved-phase concentrations to increase above maximum contaminant levels (MCLs).

The results of the human health risk characterization are described for each site that requires remedial action in Part II.

A baseline ecological risk assessment (BERA) was also conducted at CAOCs with significant habitat and was reported in the 2010 Supplemental RI Report and BERA Report (2012). The results of the ecological risk characterization are also described for each site that requires remedial action in Part II. For other sites, no ecological risks were identified.

REMEDIAL ACTION GOALS

This Proposed Plan recommends actions to address: 1) surface soil contamination that poses a risk to human health and the environment, 2) subsurface soil vapor contamination that may pose a threat to groundwater, and 3) groundwater contamination above safe drinking water standards.

The cleanup levels for the primary COCs at OU 7 are listed in Table 3. Final soil and soil vapor cleanup levels will be established during the remediation design phase based on actual site conditions.

Although direct exposure to groundwater is not currently suspected, the Navy intends to address existing groundwater contamination at Nebo Main Base consistent with federal and state regulations.

LUCs will be identified in the Base Master Plan, which will note that additional risk evaluation will be required prior to any type of development at this location.

Table 3. Cleanup Levels for COCs

COC	Cleanup Level ^{1,2,3,4}	Basis
Soil		
Lead	320 mg/kg	Risk-based (CA)
Benzo(a)pyrene Dibenz(a,h)anthracene	210 µg/kg	Risk-based (EPA)
PCB (Aroclor-1061) PCB (Aroclor-1254)	41 mg/kg 0.74 mg/kg	Risk-based (EPA)
Groundwater		
TCE	5 µg/L	Drinking water standards
PCE	5 µg/L	
Soil Vapor		
TCE	1,000 to 150 µg/L	Protection of groundwater

Notes:

1. Risk-based cleanup levels for soil are based on an assumed continued industrial land use.
2. The lower of available California or federal (EPA) goals were selected
3. Federal MCLs for TCE and PCE in drinking water as promulgated by EPA under the Safe Drinking Water Act and consistent with California drinking water levels.
4. Based on modeling of soil vapor migration through 170 feet of soil to groundwater.

Definitions:

- CA – California
- EPA – Environmental Protection Agency
- MCL - maximum contaminant levels
- mg/kg – milligrams per kilogram
- µg/kg – micrograms per kilogram
- µg/L - micrograms per liter
- TCE – trichloroethene
- PCE - tetrachloroethene

SELECTING REMEDIAL ALTERNATIVES

Remedial alternatives reviewed for each CAOC and the two groundwater areas are presented in Part II. The proposed remedial alternatives were evaluated against the EPA’s nine evaluation criteria. The criteria are described on the following page.

For more information on groundwater cleanup levels, please go to:
<http://water.epa.gov/drink/contaminants/index.cfm#List>
<http://www.cdph.ca.gov/certlic/drinkingwater/Pages/MCLsandPHGs.aspx> :
click on the link to MCLs, DLRs, and PHGs – January 30, 2013.

NINE EPA CRITERIA

1 Overall Protection of Public Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.



the risks the alternative poses to workers, residents, and the environment during implementation and the potential impact on human health and the environment during the remedial action.



2 Compliance with Applicable or Relevant and Appropriate Laws and Regulations (ARARs) evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3 Long-Term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment.

4 Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.



6 Implementability considers the technical and administrative feasibility of implementing the alternative, including such factors as the relative availability of services and materials needed to implement the alternative.

7 Cost includes estimated capital and annual operations and maintenance costs, which are expressed in terms of present worth. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8 State Acceptance considers whether the state agrees with the Navy's analysis and recommendations, as described in the Remedial Investigation, Feasibility Study and Proposed Plan.



5 Short Term Effectiveness considers the length of time needed to implement an alternative and

9 Community Acceptance considers whether the local community agrees with the Navy's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

The Final Remedy is selected based on meeting all nine criteria. The ninth criteria (community acceptance) will be evaluated after the public has commented on this Proposed Plan.

PART II: SITES REQUIRING REMEDIAL ACTION

Based on the RI/FS, remedial action is required for surface/shallow soils at CAOCs N-2 Area 1 and 10 and for groundwater at CAOCs 10.38/10.39 Unit 7, NPZ-14, and NSP-2. The sections below discuss site history, contaminants of concern, risks, remedial alternatives, and evaluation and selection of alternatives for each CAOC.

The no further action alternative (Alternative 1) for each CAOC was used as a baseline against which to compare the other alternatives. Under Alternative 1, no remedial action or monitoring would be conducted and contaminants would remain in place. No costs are associated with Alternative 1. Alternative 1 will not be discussed further in this section.

The selected remedies for remedial action and their present worth are summarized in Table 4.

Table 4. Selected Remedy and Present Worth

Site/ Alternative	Description	Present Worth	Selected
CAOC 10.38/10.39 Unit 7			
Alternative 2	MNA	\$843,302	Selected
Alternative 3	AS/SVE	\$3,299,171	Contingency
CAOC N-2 Area 1			
Alternative 2	Institutional Controls	\$1,883,260	
Alternative 3	Surface Vacuuming & Hot-Spot Removal	\$795,463	Selected
CAOC 10			
Alternative 2	Institutional Controls	\$1,883,260	
Alternative 3	Hot-Spot Removal	\$197,904	Selected
NPZ-14			
Alternative 2	MNA	\$751,388	Selected
Alternative 3	AS/SVE	\$3,108,725	Contingency
NSP-2 (CAOC 7 Area)			
Soil vapor			
Alternative 2	Soil Vapor Monitoring	\$1,329,235	
Alternative 3	SVE, Vadose Zone Soil	\$2,775,175	Selected
Alternative 4	SVE, Vadose Zone Soil and Landfill Waste	\$7,463,130	Contingency
Groundwater			
Alternative 2	MNA	\$832,196	Selected
Alternative 3	Air Sparge Curtain	\$4,161,937	Contingency

Definitions:

AS/SVE – air sparging/soil vapor extraction

MNA - monitored natural attenuation

SVE – soil vapor extraction

CAOC 10.38/10.39, UNIT 7

CAOC 10.38/10.39 consists of the domestic wastewater collection (DWC) and industrial wastewater collection (IWC) lines, respectively. Because the same concerns are associated with the DWC and IWC lines, CAOCs 10.38 and 10.39 were addressed together during the RI/FS. Historical activities, including conveyance of wastewater, suggested that soil and groundwater near the DWC and IWC lines may be contaminated with VOCs, semivolatile organic compounds (SVOCs), pesticides, PAHs, petroleum hydrocarbons, and metals.

The DWC lines are still active and currently operate under permit. The IWC lines conveyed industrial waste from buildings at Nebo Main Base into the Industrial Wastewater Treatment Plant (IWTP) from approximately 1978 to 1990, after which industrial wastewater has been collected and disposed of off base. During the RI, CAOC 10.38/10.39 was subdivided into 7 units for the purposes of organizing the investigation effort. The Final RI Report (2005) recommended LUCs for Units 1 through 6, and no further action for soils at Unit 7, with further investigation of groundwater at this unit.

CAOC 10.38/10.39 Units 1-6 are included in Part III of this Proposed Plan, which includes sites that are proposed for no further action or LUCs.

CAOC 10.38/10.39 Unit 7 consists of former drainage ditches (not buried lines) located east of Iwo Jima Avenue and south of Joseph Boll Avenue. The drainage ditches were used from the 1940s through the 1970s, but have been filled in and are no longer visible on the ground surface. The Unit 7 ditches received industrial waste water flows from industrial operations in the Unit 7 area, but did not receive upgradient flow from any other collection lines and did not appear to connect to any other collection line downgradient. Currently, no industrial operations occur in the DS17 area.

Summary of Risks - CAOC 10.38/10.39, Unit 7

A baseline HHRA was performed using the soil and groundwater data collected from the site. The sole risk associated with this site is the potential

migration of contaminants in groundwater to drinking water supply wells at concentrations exceeding EPA or State of California MCLs. However, the nearest water supply well is located several thousand feet northeast of CAOC 10.38/10.39 Unit 7. The Nebo Main Base relies on a private water supplier for its water supply. Institutional controls (ICs) incorporated into the Base Master Plan per the ROD for OUs 1 and 2 (1998) prevent installation of drinking water wells within the plume areas at Nebo Main Base. Hence, no current receptors for the Unit 7 contaminated groundwater were identified. The lateral extent of the contaminated groundwater at Unit 7 is not yet fully defined; however, available groundwater monitoring well data from the northeastern portion of the Nebo Main Base show the plume has not migrated off-base.

During the ecological risk assessment (ERA) process, CAOC 10.38/10.39 Unit 7 was determined to offer minimal potential habitat.

Summary of Alternatives – CAOC 10.38/10.39 Unit 7

The alternatives for treatment of groundwater include no action, monitored natural attenuation (MNA), and air sparging/soil vapor extraction (AS/SVE).

Alternative 2 – Monitored Natural Attenuation

Under this alternative, natural attenuation (NA) mechanisms would be relied on to reduce the groundwater contamination to below cleanup levels. NA mechanisms include biodegradation (by naturally occurring microbial populations in the groundwater), sorption, dilution, volatilization, and dispersion. As part of this alternative, a comprehensive monitoring program would be implemented to verify the geochemical environment is conducive to NA and that contaminant concentrations are decreasing. Two new monitoring wells would be installed. Six wells would be sampled semiannually for 10 years to monitor NA progress.

Alternative 3 – Air Sparging/Soil Vapor Extraction

AS pushes air through special wells installed in contaminated groundwater; the sparging action

strips VOCs out of the water as vapor. The VOC vapor is then extracted from above the groundwater table through SVE wells. The extracted vapor would either be routed through granular activated carbon or discharged to the atmosphere, depending on mass removal rates and local air quality regulations. The SVE wells will also serve as soil vapor sampling and monitoring locations. The costs associated with this alternative include construction, operation and maintenance, and reporting.

Evaluation of Alternatives and Preferred Alternative – CAOC 10.38/10.39, Unit 7

The preferred alternative for addressing conditions at CAOC 10.38/10.39, Unit 7 is Alternative 2 – Monitored Natural Attenuation with Alternative 3, Air Sparging/Soil Vapor Extraction, as a contingency. Based on current information, Alternative 2 appears to provide the best balance of effectiveness and cost with respect to the EPA evaluation criteria used to evaluate alternatives. The proposed action for each site is also summarized on Table 1. The ROD will define the process for evaluating remedy performance and the need for active remediation. The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives considered for CAOC 10.38/10.39, Unit 7. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives.

Overall Protection of Human Health and the Environment

Alternative 2 is rated moderate for overall protection of human health and the environment because NA mechanisms likely would result in some contaminant removal and monitoring would be conducted. Alternative 3 is considered more protective because active treatment would occur, leading to enhanced contaminant removal.

Long-Term Effectiveness and Permanence

NA mechanisms would potentially remove some contamination under Alternative 2, which is rated moderate. Alternative 3, which involves active treatment, would result in greater

contaminant removal and is rated higher than Alternative 2.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 would decrease concentrations naturally, but not through active treatment. Therefore, it is rated low for this criterion. Alternative 3 includes treatment, and is considered preferable to Alternative 2.

Short-Term Effectiveness

The preferred alternative has moderate short-term effectiveness. Alternative 2 is rated moderate for short-term effectiveness, because other than installation of 2 wells, there are no short-term risks from construction or earthwork. Alternative 3 is less favorable because construction is required.

Implementability

The preferred alternative would be easily implemented because other than monitoring and installation of two wells, no other actions would be taken. Alternative 3 is less favorable for this criterion because system construction is required, which has a higher degree of difficulty.

Compliance with ARARs

Groundwater Alternatives 2 and 3 both are expected to comply with ARARs, and both are rated high for this criterion.

Cost

The cost of the preferred alternative, Alternative 2, \$843,302, is the least expensive of Alternatives 2 and 3, and is rated moderate compared to the cost for Alternative 3, \$3,299,171.

State Acceptance

The State has conditionally accepted the preferred alternative, Alternative 2, based on review and approval of the FS Report. The State recognizes that the DON is conducting additional groundwater investigations as well as additional modeling to further support the conclusions in the final FS. These data will be presented in a technical memorandum to assist

the State agencies in documenting cleanup goals consistent with State law and past Navy/State remedial approaches.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

[Rationale for Preferred Alternative – CAOC 10.38/10.39, Unit 7](#)

Based on the EPA evaluation criteria, the rationale for selecting Alternative 2 includes the following factors: natural attenuation of contaminants over time is considered likely, meets ARARs, easy to implement, and has similar effectiveness to Alternative 3 for a much lower cost. The estimated cost for the proposed approach is moderate and because groundwater would be monitored semiannually, state and community acceptance is likely. Alternative 3, Air Sparging/Soil Vapor Extraction, will be retained as a contingency.

The DON is conducting additional groundwater investigations as well as additional modeling to further support the conclusions in the final FS. These data will be presented in a technical memorandum to assist the State agencies in documenting cleanup goals consistent with State law and past Navy/State remedial approaches.

[CAOC N-2 AREA 1](#)

CAOC N-2 Area 1 is located in a relatively isolated area in the south-central portion of the Nebo Main Base. CAOC N-2 Area 1 originally consisted of a 400-by 400-foot area where equipment was stored from the early 1950's until 1966. Waste oil containing PCBs was spread for dust suppression in the area. From 1982 to 1999, the Marine Corps operated a skeet and trap range for Base personnel in the area overlapping the former equipment storage area. The CAOC N-2 Area 1 boundaries were expanded to incorporate the skeet and trap range in 2008. Concrete walkways that were part of the shooting range remain in place. Clay target fragments and lead shot are present on the ground surface at the site. A closed and capped landfill (part of CAOC 7) overlies a portion of the shooting range. With the exception of the concrete walkways and landfill cap, the site is unpaved, vegetated open space.

Summary of Risks – CAOC N-2 Area 1

A baseline HHRA was conducted as part of the RI and Supplemental RI considering Base personnel, adult and child trespassers, and potential future residents. The primary exposure pathway CAOC N-2 Area 1 is ingestion of soil or inhalation of air-borne dust containing site contaminants. Primary contaminants of concern are lead (from lead shot), PAHs, and PCBs.

Ecological risk assessments concluded that ecological risk is unlikely from normal food-chain ingestion models. However, some birds may ingest lead shot pellets which would poison them.

Summary of Alternatives – CAOC N-2 Area 1

The alternatives for treatment of soil include no action, ICs, surface vacuuming of skeet and trap range materials (lead shot, clay target fragments), and PCB-contaminated soil “hot-spot” removal.

Soil Alternative 2 – Institutional Controls

Under this alternative, lead in soil would be left in place and access to and use of the site would be restricted through ICs. ICs would include construction of physical barriers (i.e. fences), dust and erosion control, implementation of an operation and maintenance (O&M) Plan, and LUCs.

Alternative 3: Surface Vacuuming and Hot-Spot Removal

Under Alternative 3, lead shot and clay target fragments would be vacuumed off the ground surface, leaving the underlying surface significantly intact. The lead shot and PAH-containing clay fragments would be separated from other materials and disposed off-site. Soil vacuuming can be performed with strict dust control and is permitted by the Air Pollution Control District (APCD). The lead shot would be recycled.

Soil “hot spots” within CAOC N-2 Area 1 containing PCBs above the action level would be excavated to a depth of 0.5 foot below ground surface (bgs) using a bucket loader, and excavated soil would be loaded directly into end-dump trucks for transport and disposal. A total of 176 cubic yards (100 tons) of soil is expected to be excavated. Prior to backfilling, confirmation samples would be collected to confirm the excavation of soils with contamination above the action level is complete. The excavations would

be backfilled with clean imported fill and the surface would be graded and restored to match surrounding conditions. No material would be excavated from or beneath the CAOC 7 landfill cap. LUCs for this site will be identified in the Base Master Plan.

Evaluation of Alternatives and Preferred Alternative – CAOC N-2 Area 1

The preferred alternative for addressing conditions at CAOC N-2 Area 1 is Alternative 3 - Surface Vacuuming and PCB Soil Hot-Spot Removal. LUCs for this site will be identified in the Base Master Plan. The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives considered for CAOC N-2 Area 1. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives. The proposed action for each site is also summarized on Table 1.

Based on current information, this alternative appears to provide the best balance of effectiveness and cost with respect to the EPA evaluation criteria used to evaluate alternatives.

Overall Protection of Human Health and the Environment

The preferred alternative (Alternative 3) is the most protective because active treatment is expected to bring contaminant concentrations within levels considered protective of human health and the environment. Alternative 2 is rated low for this criterion because no treatment would be conducted and contaminants would remain in place.

Long-Term Effectiveness and Permanence

The preferred alternative (Alternative 3) has high long-term effectiveness because it involves active treatment, resulting in permanent removal of contaminants to below risk-based concentrations. Alternative 2 does not include active treatment. Alternative 2 would provide some degree of long term effectiveness and permanence as long as the ICs remain in place. However, potential ecological receptors

(grit-ingesting birds) would not be protected by Alternative 2.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 3 involves contaminant removal; however, the contaminants are not actually treated but are instead transferred to another controlled location (landfill or recycling facility). Accordingly, Alternative 3 is more favorable than the other alternative for this criterion. Alternative 2 does not involve active treatment and site contaminants would be left in place. Therefore, this alternative would not reduce the toxicity, mobility, or volume.

Short-Term Effectiveness

The preferred alternative (Alternative 3) has the highest short-term effectiveness, because contamination would be removed rapidly. Alternative 2 was rated slightly higher because this criterion is evaluated with respect to human receptors.

Implementability

The preferred alternative (Alternative 3) is less favorable for this criterion because field activities that would be conducted have a higher degree of difficulty. Alternative 2, which includes construction of physical barriers (i.e. fences), is relatively easy to implement and is, therefore, rated high for this criterion.

Compliance with ARARs

Alternative 2 is rated low because access to COCs by most ecological receptors would not be restricted by the physical barriers. Alternative 3 is expected to comply with ARARs and is rated high.

Cost

The preferred alternative (Alternative 3) is rated moderate for cost, with an estimated cost of \$795,463. Alternative 2 has the highest cost (\$1,883,260) due to ongoing O&M and is, therefore, rated lowest for this criterion.

State Acceptance

The State has accepted the preferred alternative based on review and approval of the FS Report.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

Rationale for Preferred Alternative – CAOC N-2 Area 1

Based on the EPA evaluation criteria, the rationale for selecting Alternative 3 include the ability to meet cleanup goals in a short time-frame, high overall protection of human health and the environment, high long-term effectiveness, high short-term effectiveness, compliance with ARARs, good implementability, and moderate cost. Since contaminants of concern would be removed, community acceptance is anticipated.

CAOC 10

CAOC 10 consists of approximately 5 acres of land sloping north-northwest in the southwest corner of Nebo Main Base near the Base residential area.

In 2000, metal debris was discovered in a soil borrow area at Nebo Main Base. The borrow area has been subsequently designated as CAOC 10. CAOC 10 was historically used for disposal of metallic debris and sodium-filled valves.

Summary of Risks – CAOC 10

Soil sampling results indicated five metals (arsenic, iron, selenium, sodium, zinc, and lead) were detected at concentrations above background levels or EPA regional screening levels (RSLs). Soil sampling results also identified low levels of VOCs, SVOCs, herbicides, dioxins and dibenzofurans, PCBs, and pesticides that were below RSLs. Results of the human health and ecological risk assessment indicated that contaminants detected in soil and soil vapor at CAOC 10 do not pose significant risk, with the exception of lead in surface soil in a relatively small surface hot-spot area.

The BERA concluded that ecological risk is unlikely based on exposure estimates and available

toxicity data. Therefore, no further action for plants or animals is needed to address chemicals in soil.

Summary of Alternatives – CAOC 10

Alternatives developed to address shallow soil impacted with metals (primarily lead) include no action, ICs, and hot-spot removal. At the concentrations measured, these contaminants pose potential risk to human receptors and require remedial action. Groundwater and soil vapor require no further action.

Soil Alternative 2 – Institutional Controls

Under this alternative, lead in soil would be left in place and access to and use of the site would be restricted through ICs. ICs would include construction of physical barriers, dust and erosion control, implementation of an O&M Plan, and LUCs.

Alternative 3: Hot-Spot Removal

Under this alternative, 30 cubic yards of soil would be excavated from the soil lead hot spot area, with separation of metals, off-site recycling and disposal, disposal of soil at a permitted treatment and disposal facility, and backfilling with imported clean backfill, followed by LUCs implemented under the Base Master Plan. The excavation would extend to a maximum depth of 5 feet bgs. Samples would be collected from each sidewall and the floor of the excavation to verify that excavation is complete; any areas of remaining significant lead impact would be excavated and verification sampling repeated. The excavation will be backfilled with clean imported fill and compacted. The surface will be graded and restored to match surrounding conditions.

Evaluation of Alternatives and Preferred Alternative – CAOC 10

The preferred alternative for addressing conditions at CAOC 10 is Alternative 3 - Hot-Spot Removal followed by LUCs to be documented in the Base Master Plan. Based on current information, this alternative appears to provide the best balance of effectiveness and cost with respect to the EPA evaluation criteria used to evaluate alternatives. The proposed action for each site is also summarized on Table 1.

The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives considered for CAOC 10. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives.

Overall Protection of Human Health and the Environment

Alternative 3 is the most protective because contaminant removal is expected to bring contaminant concentrations within levels considered protective of human health and the environment. Alternative 2 is moderately protective because it reduces exposure to contaminants on site.

Long-Term Effectiveness and Permanence

Alternative 3 has high long-term effectiveness because contaminants would be removed. Alternative 2 would leave waste in place, but would have moderate effectiveness because it would limit the potential for exposure to contaminants.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 3 involves removal of contaminants through excavation and off-site disposal. Alternative 2 does not involve active treatment. Alternatives 2 and 3 are equally effective at reducing toxicity, mobility, and volume through treatment.

Short-Term Effectiveness

Alternative 2 is rated moderate because although people would be protected, plants and animals would likely not be. Alternative 3 is rated high because protection of human health and the environment would be accomplished rapidly. Short term risks associated with remedial activities Alternatives 2 and 3 either are insignificant or could be controlled.

Implementability

Alternative 2 does not involve field activities and is ranked high for implementability. Alternative 3 is less easily implemented because field activities have a higher degree of difficulty.

Compliance with ARARs

Soil Alternatives 2 and 3 both are expected to comply with ARARs and both are rated high.

Cost

The cost associated with Alternative 2 is \$722,336. Alternative 3 has an estimated cost of approximately \$197,904; it is less costly than Alternative 2.

State Acceptance

The State has accepted the preferred alternative, Alternative 3, based on review and approval of the FS Report.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

Rationale for Preferred Alternative – CAOC 10

The rationale for selecting Alternative 3, Hot Spot Removal, as the preferred remedy is based on the highest overall rating for the EPA evaluation criteria including the ability to meet cleanup goals in a short time-frame. This alternative has good overall protection of human health and the environment, long term effectiveness, short term effectiveness, compliance with ARARs, and implementability. The estimated cost is relatively low. The Base Master Plan will be revised to indicate that if land use changes, additional remediation may be necessary.

NPZ-14 (GROUNDWATER AREA)

NPZ-14 is a monitoring well located in a relatively isolated area in the southern part of Nebo Main Base; the area was formerly used to store military equipment. Well NPZ-14 was installed in 1992 to monitor groundwater levels in the central portion of Nebo Main Base. The well was later added to the OU 2 groundwater monitoring program in 1998. Groundwater monitoring results indicate trichloroethene (TCE) concentrations above the EPA and State of California MCL from 1999 to the present. TCE concentrations have varied from 10 to 35 µg/L (the MCL is 5 µg/L). Only trace levels of other VOCs have been detected at this well. Groundwater generally flows in a northeasterly direction. It was concluded (with DTSC concurrence)

that soil and soil vapor contamination is not significant and that TCE in groundwater is localized to the NPZ-14 area. Six monitoring wells were installed by the Navy during 2012 to define the extent of groundwater contamination in the NPZ-14 area. Two more will be installed in 2014 to further define the lateral and vertical extent of contamination to the northwest; additional wells will be installed if needed.

Summary of Risks – NPZ-14

Contamination at NPZ-14 currently has no known receptors or exposure pathways. Human health or ecological risk assessments have not been conducted for the NPZ-14 groundwater contamination. The depth to groundwater is approximately 137 to 143 feet at NPZ-14; therefore no risk to ecological receptors is suspected. There is a potential risk for human ingestion if contaminated water were to migrate to drinking water wells. However, no downgradient drinking water wells are currently present on Base or within the anticipated flow path of the NPZ-14 groundwater plume. The Nebo Main Base relies on a private water supplier for its water supply and use of groundwater is restricted under prior RODs. The groundwater contamination from NPZ-14 is not suspected to be migrating off the Base.

Because TCE has been consistently detected above the MCL, remedial alternatives were developed for groundwater at NPZ 14.

Summary of Alternatives – NPZ-14

The alternatives for treatment of groundwater include no action, MNA, and AS/SVE. The presumptive remedy, pump and treat, was not considered.

Alternative 2 – Monitored Natural Attenuation

Under this alternative, NA mechanisms would be relied on to reduce the groundwater contamination to below cleanup levels. NA mechanisms include biodegradation, sorption, dilution, volatilization, and dispersion. As part of this alternative, a comprehensive monitoring program would be implemented to verify the geochemical environment is conducive to NA and that contaminant concentrations are decreasing.

Nine wells would be sampled semiannually for 10 years to monitor NA progress. Data will be evaluated annually and at Five-Year Reviews. Additional groundwater monitoring wells will be installed, as necessary, to adequately characterize the vertical and lateral extent of the VOC plume. The ROD will define the process for evaluating remedy performance and the need for active remediation.

Alternative 3: Air Sparging/Soil Vapor Extraction

Under Alternative 3, an AS/SVE system with 13 air sparging wells would be designed to treat a 1 acre area. Groundwater depth is approximately 137 to 143 feet. Air would be injected into the air sparging wells and the soil vapor would be extracted from SVE wells constructed in the same borehole as the sparging wells. A quarterly monitoring program would sample groundwater. Extracted soil vapor would be monitored monthly for VOCs; soil vapor would be treated through granular activated carbon. The system would be operated until mass removal rates indicate the technical limits of the remedial system had been reached. The ROD will define the process for evaluating remedy performance and making the system shutdown decision. The SVE wells would also serve as soil vapor sampling and monitoring locations.

Evaluation of Alternatives and Preferred Alternative – NPZ-14

The preferred alternative for addressing conditions at NPZ-14 is Alternative 2, MNA, with Alternative 3, AS/SVE as a contingency. Based on current information, Alternative 2 appears to provide the best balance of effectiveness and cost with respect to the EPA criteria used to evaluate alternatives. The proposed action for each site is also summarized on Table 1.

The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives considered for NPZ-14. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives.

Overall Protection of Human Health and the Environment

Alternative 2 does not involve active treatment, but relies on natural attenuation of contaminants and provides long-term monitoring to assure NA is working. Alternative 3 is considered more protective than Alternative 2 because it involves active treatment.

Long-Term Effectiveness and Permanence

The preferred alternative, Alternative 2, would have moderate long-term effectiveness due to NA. Alternative 3 involves active treatment and would result in greater contaminant removal and moderate to high long-term effectiveness.

Reduction of Toxicity, Mobility, or Volume through Treatment

Alternative 2 (the preferred alternative) is rated low because no treatment would be performed. Alternative 3 is rated higher than Alternative 2 because it includes treatment.

Short-Term Effectiveness

Alternative 2 is rated moderate for short-term effectiveness because the only construction would be well installation. Alternative 3 is less favorable because construction or earthwork required for remediation system installation could cause short-term risk to construction workers.

Implementability

Alternative 2 is readily implementable because it involves performing groundwater monitoring. Alternative 3 was rated moderate because system construction, which has a higher degree of difficulty.

Compliance with ARARs

The preferred, Alternatives 2, and Alternative 3 are expected to comply with ARARs.

Cost

The preferred alternative (Alternative 2) is moderately expensive, with an estimated cost of approximately \$751,388 compared to the cost of Alternative 3 of approximately \$3,108,725.

State Acceptance

The State has conditionally accepted the preferred alternative, Alternative 2, based on review and approval of the FS Report. The State recognizes that the DON is conducting additional groundwater investigations as well as additional modeling to further support the conclusions in the final FS. These data will be presented in a technical memorandum to assist the State agencies in documenting cleanup goals consistent with State law and past Navy/State remedial approaches.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

Rationale for Preferred Alternative – NPZ-14

Alternative 2, MNA, is the preferred alternative because Alternatives 2 and 3 have similar ratings for the performance criteria but Alternative 2 has a much lower cost than Alternative 3. Alternative 3, AS/SVE, will be retained as a contingency. The ROD will define the process for evaluating remedy performance and the need for active remediation.

NSP-2 (SOIL VAPOR AND GROUNDWATER)

NSP-2 is a groundwater monitoring well located at CAOC 7 Stratum 1, a capped waste disposal area in the southeastern corner of Nebo Main Base. This area was a disposal facility for the MCLB Barstow from the early 1950s to 1964 and consists of Stratum 1, a former burn dump/disposal area, and Stratum 3, a former drum storage and spillage area. A soil cap was constructed over CAOC 7 Stratum 1 in 2000 in accordance with the OUs 5 and 6 ROD (1998). Groundwater monitoring well NSP-2 is located downgradient from the CAOC 7 Stratum 1 cap and is sampled semi-annually. From 2001 through 2011, TCE was detected in NSP-2 at concentrations ranging from 6.4 to 27 µg/L, which is greater than the MCL of 5 µg/L. No other VOCs were detected in groundwater at NSP-2 or other monitoring wells associated with CAOC 7.

In response to the increased level of TCE at NSP-2, the Navy conducted an investigation and found TCE and tetrachloroethene (PCE) contamination in soil

vapor below the CAOC 7 Stratum 1 landfill cap and disposal material. VOCs were also detected in the waste material. The vapor contamination extends to approximately 170 feet bgs and is believed to be related to the increase in TCE concentrations to above the MCL.

The Navy will continue to maintain and monitor the CAOC 7 Stratum 1 cap in accordance with the OUs 5 and 6 ROD, and will address the related soil vapor and groundwater contamination under the OU 7 ROD. The Navy will use data collected during clean-up of the subsurface contamination to continue evaluation of the CAOC 7 Stratum 1 cap performance.

Summary of Risks – NSP-2

VOCs in groundwater at NSP-2 and soil vapor beneath CAOC 7 Stratum 1 currently have no known receptors or exposure pathways. Therefore, no HHRA has been conducted for this area. A potential risk associated with this site is the downgradient migration of contaminants (specifically TCE) in groundwater at concentrations exceeding safe drinking water standards. However, no current downgradient drinking water wells have been identified. The MCLB Barstow Rifle Range is located downgradient of NSP-2.

Soil and soil vapor contamination poses no human health risk under the current land-use scenario based on land-use controls enacted under the OUs 5 and 6 ROD. However, VOCs in soil and soil vapor (especially TCE) are present at concentrations that currently pose a risk to groundwater.

No ERA has been completed. However, based on the depth of contaminated groundwater (approximately 180 feet bgs), risks to potential ecological receptors are not anticipated.

Soil Vapor

Summary of Soil Vapor Alternatives – NSP-2

The alternatives for treatment of soil vapor include no action, soil vapor monitoring, SVE in vadose zone soils (above the groundwater table), and SVE in both vadose zone soils and landfill wastes.

[Soil Vapor Alternatives NSP-2](#)

Soil Vapor Alternative 2 – Soil Vapor Monitoring

Alternative 2 involves soil vapor monitoring. Eleven soil vapor monitoring probes would be installed: seven shallow probes in the waste material and four deeper multilevel probes in the vadose zone below the waste. VOCs would be monitored semiannually for up to 10 years. Data will be evaluated annually and during Five-Year Reviews.

Soil Vapor Alternative 3 –SVE, Vadose Zone Soil Only

Alternative 3 would involve SVE in vadose zone soils and vapor monitoring for VOCs semiannually until mass removal rates indicate the technical limits of the remedial system had been reached. The ROD will define the process for evaluating remedy performance and making the system shutdown decision.

Soil Vapor Alternative 4 – SVE, Vadose Zone Soil and Landfill Waste

Alternative 4 would involve SVE in vadose zone soils and SVE of landfill waste. Up to 11 vapor probes would be monitored for VOCs semiannually. The system would be operated until mass removal rates indicate the technical limits of the remedial system had been reached. The ROD will define the process for evaluating remedy performance and making the system shutdown decision.

[Evaluation of Soil Vapor Alternatives and Preferred Alternative – NSP-2](#)

The preferred alternative for addressing soil vapor contamination beneath CAOC 7 Stratum 1 is Alternative 3, SVE Vadose Zone Soil Only, with Soil Vapor Alternative 4, SVE Vadose Zone Soil and Landfill Waste, as a contingency. The proposed action for each site is also summarized on Table 1.

Based on current information, the selected alternative appears to provide the best balance of effectiveness and cost with respect to the EPA criteria used to evaluate alternatives.

The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives

considered for NSP-2. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives.

[Overall Protection of Human Health and the Environment](#)

The preferred alternative (Alternative 3), and Alternative 4, are rated moderate to high for overall protectiveness because contaminants above action levels would be treated. Alternative 2 is rated low for overall protectiveness because no treatment would be conducted.

[Long-Term Effectiveness and Permanence](#)

The preferred alternative (Alternative 3), as well as Alternative 4, are rated moderate to high for these criteria because contaminants above the action level would be permanently removed, enhancing long-term effectiveness. Alternative 2 is rated low because no treatment would be conducted and there is no contingency for treatment.

[Reduction of Toxicity, Mobility, or Volume through Treatment](#)

Alternatives 3 and 4 are rated high because they treat VOCs in the vadose zone soil and landfill waste. Alternative 2 is rated low because no treatment would be conducted.

[Short-Term Effectiveness](#)

Alternatives 2, 3, and 4 are rated low to moderate because remediation construction workers would have minor short-term exposure to VOCs in soil vapor.

[Implementability](#)

Alternatives 2 and 3 are rated moderate to high because they involve installation of soil vapor probes or SVE systems. Alternative 4 is rated moderate because it involves installation of SVE wells within vadose zone soil and landfill waste.

[Compliance with ARARs](#)

Alternatives 2, 3, and 4 are expected to comply with ARARs.

[Cost](#)

The costs for Alternatives 2, 3 (the preferred alternative), and 4 are \$1,329,235 (moderate),

\$2,775,175 (low to moderate), and \$7,463,130 (low), respectively.

State Acceptance

The State has accepted the preferred alternative based on review and approval of the FS Report.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

[Rationale for Preferred Soil Vapor Alternative – NSP-2](#)

The selected remedy, Alternative 3, SVE Vadose Zone Soil Only, is the most favorable among the four alternatives. This alternative is the more cost-effective of the two alternatives providing active treatment. Alternative 2 is not acceptable because contaminants are above the action level and this alternative provides no active treatment. Soil Vapor Alternative 4, SVE Vadose Zone Soil and Landfill Waste, will be retained as a contingency.

[Groundwater](#)

The alternatives for treatment of groundwater include no action, MNA, and air sparge curtain.

[Groundwater Alternatives NSP-2](#)

Groundwater Alternative 2 – Monitored Natural Attenuation

Alternative 2 relies on NA mechanisms to address all of the groundwater contamination. NA mechanisms may include a combination of biodegradation, sorption, dilution, volatilization, and dispersion. One well exists on site. Four new monitoring wells would be installed. Groundwater monitoring would be conducted at 5 wells on a semiannual basis for a period of 10 years. The ROD will define the process for evaluating remedy performance and making the system shutdown decision.

Groundwater Alternative 3 – Air Sparge Curtain

Alternative 3 would involve an AS/SVE system designed with an AS curtain that injects air into the groundwater through wells along the southeastern boundary of the CAOC 7 site to mitigate off-site

migration of TCE in groundwater. Each air sparge well would incorporate an SVE well to extract soil vapors from just above the water table. Soil vapor would be monitored for VOCs monthly during operation (estimated at 5 years). Groundwater monitoring for VOCs would be conducted quarterly at 5 wells for a period of 5 years followed by semiannual monitoring for 5 years.

[Evaluation of Groundwater Alternatives and Preferred Alternative – NSP-2](#)

The preferred alternative for addressing groundwater conditions at NSP-2 is Alternative 2, MNA, with groundwater Alternative 3, Air Sparge Curtain, as a contingency. The proposed action for each site is also summarized on Table 1.

Based on current information, the selected alternative appears to provide the best balance of effectiveness and cost with respect to the EPA criteria used to evaluate alternatives.

The remainder of this section discusses the performance of the preferred alternative against eight of these EPA evaluation criteria and notes how it compares to the other alternatives considered for NSP-2. The ninth criteria (community acceptance) will be evaluated after the public has commented on the alternatives.

[Overall Protection of Human Health and the Environment](#)

No active treatment is associated with Alternative 2 (the preferred alternative); however, NA would account for some degree of contaminant removal and, therefore, this Alternative 2 is rated moderate. Alternative 3 is considered more protective than Alternative 2 because active treatment would occur.

[Long-Term Effectiveness and Permanence](#)

Alternative 3 has greater long-term effectiveness than Alternative 2, because it involves active treatment. Under Alternative 2, there is no active treatment of groundwater contaminants.

[Reduction of Toxicity, Mobility, or Volume through Treatment](#)

Alternative 3 is rated higher and considered preferable because sparging would treat

groundwater even though such treatment may not be highly efficient. Alternative 2 is rated low because no treatment would be performed.

Short-Term Effectiveness

Alternatives 2, 3, and 4 are rated low to moderate for this criterion because they do not mitigate minor short-term risks to groundwater posed by TCE in soil vapor and construction work is involved, causing risk to site remediation workers.

Implementability

Implementability is highest for Alternative 2 (the preferred alternative) because, other than installation of four monitoring wells and groundwater monitoring, no other action would be taken. Groundwater Alternative 3 is less favorable for implementability because system construction has a higher degree of difficulty.

Compliance with ARARs

Alternative 2 (the preferred alternative) and 3 both are expected to comply with ARARs.

Cost

The cost of the preferred alternative is \$832,196, which is much less than the cost of Alternative 3, \$4,161,937.

State Acceptance

The State has conditionally accepted the preferred alternative, Alternative 2, based on review and approval of the FS Report. The State recognizes that the DON is conducting additional groundwater investigations as well as additional modeling to further support the conclusions in the final FS. These data will be presented in a technical memorandum to assist the State agencies in documenting cleanup goals consistent with State law and past Navy/State remedial approaches.

Community Acceptance

To be assessed based on the input received during the public comment period on this Proposed Plan.

Rationale for Preferred Groundwater Alternative – NSP-2

The selected remedy is Alternative 2, MNA. This alternative offers the greatest cost-effectiveness based on higher implementability and lower cost and both Alternatives 2 and 3 meet ARARs. Alternative 3, Air Sparge Curtain, will be retained as a contingency.

PART III: SITES WITH LAND USE CONTROLS ONLY OR NO FURTHER ACTION

No further action or LUCs implemented under the Base Master Plan are proposed for the following CAOCs: Y-7 TA-12, 9.60, and 9.68 at the Yermo Annex and 10.38/10.39 Units 1-6, 10.27, 10.35, 10.37, 10.3, 10.4, 10.5, 10.12, 10.49, and 10.80 at the Nebo Main Base. A detailed discussion of risk assessment for these sites is included in the *Final Feasibility Study Report for OU 7* (June 2013). Site information is provided on Table 2.

The Navy has selected LUCs for CAOCs 10.38/10.39 Units 1-6, 9.60, 9.68, 10.27, 10.35, 10.37, 10.3, 10.4, 10.5, 10.12, 10.49, and 10.80 because the sites pose no current or potential threat to human health and the environment or a previous removal action has cleaned up or reduced the threat under the current land use scenario. However, because some site contaminants or wastes are left in place, the Base Master Plan will incorporate information about each CAOC and will require coordination with the MCLB Barstow Environmental Division for any changes to land use.

No further action is proposed for CAOC Y-7 TA-12 because no waste was found and no risks are present.

PART IV - COMMUNITY INVOLVEMENT

The Navy maintains a Community Involvement program to inform the community about the environmental cleanup at the MCLB Barstow and to provide the public with opportunities to participate in the decision-making process. Public comment periods and community meetings are conducted at critical decision points in the IRP process. Concerns expressed by the community will be considered by the Navy in its cleanup decisions.

ADDITIONAL INFORMATION ON OU 7

Documents and reports related to Operable Unit 7 and this Proposed Plan have been placed in the MCLB Barstow Information Repository for public review and comment. The repository houses a copy of the Administrative Record, which contains all of the materials the Navy relies upon in selecting cleanup alternatives. The public may review the OU 7 related documents at the following location:

INFORMATION REPOSITORY
MCLB Barstow, Environmental Division Nebo Main Base Contact: Jim Bustamante, (760) 557-6523 Please call to make an appointment Monday through Friday between 8:30 a.m. and 4:30 p.m.

PUBLIC COMMENT PERIOD

The **public comment period** for this Proposed Plan is January 2 through February 3, 2014, during which the public may submit comments to the Navy's Remedial Project Manager:

Ralph Pearce

Office: (619) 532-3768

Email: Ralph.Pearce@Navy.mil

Mailing Address (or use attached Mailer)

Naval Facilities Engineering Command Southwest

Attention: Ralph Pearce (ROPCE.RP)

1220 Pacific Highway

San Diego, CA 92132

PUBLIC MEETING

A public meeting will be held on January 15, 2014 at 6:00 – 8:00 PM at the Barstow City Hall so that members of the community may personally submit written and oral comments.

Barstow City Hall, City Council Chambers

220 East Mountain View Street

Barstow, CA 92311

NEXT STEPS

At the end of the public comment period, the Navy will review and consider all comments and make a final decision on the selected remedies for the CAOCs comprising OU 7. The Navy will document the selected remedies in a Record of Decision (ROD) that will include a responsiveness summary addressing comment submitted by the public. The ROD will be placed in the information repository located at the Nebo Main Base and the Administrative Record. A notice of the availability of the ROD will be announced in the local newspaper.

GLOSSARY

Administrative Record – A collection of all documents used to select and justify the cleanup of sites at the MCLB Barstow. These documents are available for public review at the Information Repository.

ARARs – Applicable or Relevant and Appropriate Requirements – The federal and state laws and regulations that must be followed for the selected clean up remedy.

AS/SVE – Air Sparging/Soil Vapor Extraction – These are methods of removing VOCs from contaminated groundwater and soil. Air sparging is the injection of air into the saturated zone to volatilize and strip VOCs from groundwater. Soil vapor extraction is the application of a vacuum in subsurface soils in order to strip VOCs from the soil. At the MCLB Barstow, the two systems are being used together to remove contaminants.

Background – Naturally occurring levels of a contaminant in groundwater.

Base Master Plan – Provides site (CAOC) descriptions, locations and maps, states the restrictions on changes to land use within the CAOC boundaries, and specifies when the Base Environmental Division must be contacted for proposed land use changes.

BERA – Baseline Ecological Risk Assessment - A tiered or phased ERA performed during the remedial investigation.

CAOC – CERCLA Area of Concern - Title used to identify each individual site at the MCLB Barstow, for example, CAOC 26.

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act of 1980 – Commonly referred to as Superfund, authorizes federal action to respond to the release, or threat of release, into the environment of hazardous substances, pollutants, or contaminants that may present imminent or substantial danger to public health or welfare.

Downgradient – A term used to refer to the location of a well downstream from a waste site (i.e., where groundwater flows away from the waste site).

Five-Year Review – Five-Year Reviews are generally required by CERCLA and provide an opportunity to evaluate the implementation and performance of a remedy to determine whether it remains protective of human health and the environment. They are performed every five years.

French Drain – a trench filled with gravel or rock or containing a perforated pipe that redirects surface water and groundwater away from an area.

FS – Feasibility Study – An engineering evaluation of technologies that may be used to clean up a site. The study looks at site conditions, potential technical problems, costs, and human and ecological impacts to determine

how effective the technologies may be.

Groundwater – Water beneath the ground surface that fills spaces between soil particles. Groundwater is often used as a source of drinking water through municipal or domestic wells.

ICs – Institutional Controls – Actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use. ICs are used when contamination is first discovered, when remedies are ongoing, and when residual contamination remains onsite at a level that does not allow for unrestricted use and unlimited exposure after cleanup.

IRP – Installation Restoration Program – A program that addresses the release of hazardous substances, pollutants, and contaminants on installations and former properties resulting from past practices that may pose a risk to human health and the environment.

HHRA – Human Health Risk Assessment – A scientific evaluation that use facts and assumptions to estimate the potential adverse effects on human health from exposure to chemicals.

MCL – Maximum Contaminant Level – The highest level of a contaminant that is allowed in drinking water established by the *Safe Drinking Water Act*

below which water is considered safe to drink.

MCLB Barstow – Marine Corps Logistics Base Barstow, near the city of Barstow, California.

NA – Natural Attenuation – The reduction of contaminant toxicity, mobility, or volume through natural processes.

LUCs – Land Use Controls – Control of activities on the land through regulatory methods (such as resource consents) or non-regulatory methods (such as voluntary agreements between land owners and resource managers).

MNA – Monitored Natural Attenuation – Periodic monitoring of groundwater contaminants to track NA.

NCP – National Oil and Hazardous Substances Pollution Contingency Plan – A regulation issued by the U.S. EPA to implement the requirements of CERCLA.

NPL – National Priorities List – A list of hazardous waste sites that have been evaluated according to the Hazard Ranking System by the U.S. EPA. The evaluation results in a score derived by comparing the relative hazards for different sites, considering the site's impact on groundwater, surface water, and air, as well as the number of people potentially affected by contamination.

OU – Operable Unit – A group of sites that may be based on similar characteristics such as type of wastes, location, or anticipated type of cleanup.

PCBs – Polychlorinated Biphenyls – PCBs are hazardous substances typically found in fluids in electrical transformers.

PAHs – Polycyclic Aromatic Hydrocarbons – hazardous substances found in substances such as asphalt and in buried materials

PCE – Tetrachloroethene (also called perchloroethylene) – A colorless hazardous liquid used as a solvent.

Plume - A defined volume of groundwater in an aquifer containing chemical contamination.

Present Worth Cost – Equivalent dollars now of future expenditures. The present worth cost is always less than the future worth cost in terms of dollars.

Proposed Plan – A document presenting the preferred alternative for a site to the public that briefly summarizes the alternatives studied in the detailed analysis phase of the RI/FS.

Receptors – A population (human or ecological) that is environmentally exposed or potentially exposed to contaminants.

Removal Action – Cleanup that generally focuses on the mitigation of near-term threats from a release of hazardous substances or threat of release.

RI – Remedial Investigation – Field study that includes collecting soil and groundwater samples to evaluate what type of and how much

contamination is present at a site.

ROD – Record of Decision – A report that documents how a site will be cleaned up and why the cleanup method was selected.

SARA – Superfund Amendments and Reauthorization Act – Regulation amending CERCLA that incorporate important changes and additions to the Superfund program, including increased focus on human health, citizen participation, State involvement, and enforcement authority.

Supplemental RI – RI activities conducted after the initial RI phase to obtain information need to complete site characterization or risk assessment.

TCE – Trichloroethene – A colorless hazardous liquid used as a solvent.

Upgradient – The term used to describe the location of a well upstream of a waste site (i.e., where groundwater flows toward the waste site).

Vadose Zone – Rock or soils between the ground surface and the groundwater table. Also known as the unsaturated zone.

VOCs – Volatile Organic Compounds - Chemical compounds that contain the element carbon, evaporate easily into air at room temperature, and can dissolve into water.

Please check the box if you would like to be added to the Navy's Environmental Mailing List for MCLB Barstow OU 7

Additional comments on a separate piece of paper may be included.

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