



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION IX

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San Francisco, CA 94105

AUG 28 2009

Ms Theresa Morley, Remedial Project Manager  
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1220 Pacific Coast Highway  
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SUBJECT: FINAL FIVE-YEAR REVIEW REPORT, OU-1, CAMP PENDLETON  
MARINE CORP BASE, CALIFORNIA

Dear Ms. Morley:

The United States Environmental Protection Agency (EPA) has reviewed the Final Five-Year Review Report dated April 2009. Based upon this review, the EPA agrees with the overall conclusion, findings and recommendations in the document. However, we would like to clarify our position regarding the implementation of the Land Use Controls within the Base Master Plan.

As you are aware, EPA is concerned about the effectiveness of the Land-Use Controls as discussed in the Plan. Since the Base Master Plan has just recently been updated to include guidance concerning new and/or ongoing construction projects at Camp Pendleton, we are anticipating a meeting with NAVFAC personnel to explain how the Land Use Controls will be implemented. As discussed, a meeting will be held in San Francisco to review this issue.

Although not included in the Five-Year Review Summary Form, we concur with the protectiveness statement for Site 62 that indicates the remedy is protective in the short term, and in order for the remedy to be protective in the long term, additional investigation and response actions are necessary to address remaining contamination in AOC-1.

We appreciate the opportunity to work with you on this project and look forward to continued success at Camp Pendleton. If you have questions regarding this letter, please feel free to contact Martin Hausladen at (415) 972-3007 of this office.

Sincerely

A handwritten signature in black ink, appearing to be "Michael M. Montgomery", written over a horizontal line.

Michael M. Montgomery  
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**FINAL  
FIVE-YEAR REVIEW FOR OPERABLE UNITS 1 THROUGH 5,  
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA**

**Contract No. N62473-07-D-4013  
Task Order 0030  
DCN BATL-4013-0030-0007**

**Prepared for:**



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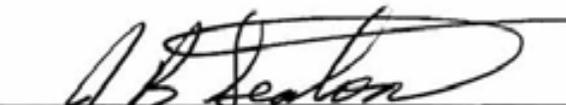
**April 2009**

# FIVE-YEAR REVIEW REPORT

OPERABLE UNITS 1 THROUGH 5  
MARINE CORPS BASE  
CAMP PENDLETON, CALIFORNIA

DEPARTMENT OF THE NAVY  
Naval Facilities Engineering Command Southwest  
1220 Pacific Highway, San Diego, California 92132-5190

APPROVED BY:

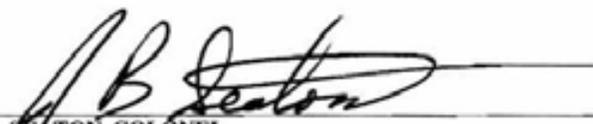


J.B. SEATON, COLONEL  
UNITED STATES MARINE CORPS  
COMMANDING OFFICER  
MARINE CORPS BASE CAMP PENDLETON

16 April 2009  
DATE

**DECLARATION OF ACCEPTANCE  
FOR THE  
FIVE-YEAR REVIEW  
FOR OPERABLE UNITS 1 THROUGH 5  
MARINE CORPS BASE  
CAMP PENDLETON, CALIFORNIA**

Pursuant to the delegation of the authority in Sections 2(d) and 11(g) of Executive Order 12580, and U.S. Department of Defense Instruction 4715.7 of 22 April 1996, the U.S. Department of the Navy is the approval authority for Comprehensive Environmental Response, Compensation, and Liability Act Five-Year Reviews conducted at sites under its jurisdiction, custody, or control.

  
\_\_\_\_\_  
J.B. SEATON, COLONEL  
UNITED STATES MARINE CORPS  
COMMANDING OFFICER  
MARINE CORPS BASE CAMP PENDLETON

16 April 2009  
Date

## EXECUTIVE SUMMARY

This Five-Year Review has been prepared by the United States Department of the Navy (DON) in support of the Installation Restoration (IR) Program at Marine Corps Base (MCB) Camp Pendleton, California (Base), pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9621(c), and the National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) Part 300.430(f)(4). The IR Program was developed by the Department of Defense (DoD) to remediate contamination at military facilities caused by past use, storage, handling, and disposal of hazardous and other potential toxic substances, as required by Section 121 of CERCLA. Soil and groundwater at MCB Camp Pendleton have been impacted by such substances and are currently being remediated pursuant to the IR Program. The DON is the lead DoD authority responsible for conducting remediation at the Base in conjunction with the United States Environmental Protection Agency (EPA), and with concurrence by the California Regional Water Quality Control Board (RWQCB), San Diego Region, and the State of California Department of Toxic Substances Control (DTSC). All of these agencies comprise the Federal Facilities Agreement (FFA) team.

This report is the second CERCLA Five-Year Review for MCB Camp Pendleton OU-3 but the first Five Year Review that presents the comprehensive review of remedies implemented as documented in Records of Decision (RODs) for IR sites belonging to one of the five Operable Units (OUs), as well as other sites not included in an OU. Table ES-1 summarizes the IR sites included in each of the five OUs and other sites not included in an OU. The FFA team members have signed RODs for five OUs: OU-1 (1995), OU-2 (1997), OU-3 (1999), OU-4 (2007), and OU-5 Sites 1A-1, 1H and 6A (2008) and Explanation of Significant Difference (ESD) for IR Site 9 (2004) and IR Site 1A (2007). All OU-1 and OU-2 sites have achieved No Further Action (NFA) status. IR Site 7 is the only OU-3 site that requires completion of a Five-Year Review under the CERCLA program. All other sites under OU-3 were considered NFA sites at the time the OU-3 ROD was signed.

**Table ES-1. IR Sites at MCB Camp Pendleton**

Operable Unit	IR Sites
1	4, 4A, 9, and 24
2	3, 5, 6, 8A, 19, 20, 22, 2B, 28, 31, 43, 44, and 45
3	7, 1E, 2A, 10, 16, 17, 27, 35, 1A, 1B, 1C, 1F, 1I, 2C, 2D, 2F, 2G, 18, 32, 34, 36, 37, 38, 39, 40, 41, and 42
4	1D, 1E-1, 30
5	1A-1, 1H, 6A, 1115, 12 Area Site 13, 21, 33, 62, 1111 and the 22/23 Area Groundwater site
Sites not Currently Incorporated in an Operable Unit	1114, 1116, 1117, and 1118

In accordance with U.S. EPA guidance on completing Five-Year Reviews, this report specifically evaluates the effectiveness of the remedial alternatives implemented by answering the following questions:

- Are the remedies functioning as intended by the ROD?

- Are the exposure assumptions used at the time of remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedies?

Based on the results of the Five-Year Review process, remedies that have not yet been completed, but are still in the construction phase for IR Sites 1A (OU-3), 1D and 30 (OU-4), and 1A-1 and 1H (OU-5), are expected to be protective upon completion and in the interim, exposure pathways that could result in unacceptable risks are being managed.

The remedy for IR Site 7 was found to be protective of both human health and the environment; however, there was a State compliance issue identified for IR Site 7 as listed below:

- (1) Methane levels in compliance gas monitoring probe GP-9 continue to be near the 5 percent by volume State criterion.

Discussion of this and other issues are provided as part of the Five-Year Review.

## FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
<b>Site name:</b> Marine Corps Base Camp Pendleton		
<b>EPA ID:</b> CA2170023533		
<b>Region:</b> 09	<b>State:</b> CA	<b>City/County:</b> Camp Pendleton, San Diego County
SITE STATUS		
<b>NPL status:</b> <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify) _____		
<b>Remediation status</b> (choose all that apply): <input checked="" type="checkbox"/> Under Construction <input checked="" type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
<b>Multiple OUs:</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction Complete date: Various dates	
<b>Has the site been put into reuse?</b> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>		
REVIEW STATUS		
<b>Reviewing Agency:</b> <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input checked="" type="checkbox"/> Other Federal Agency <u>Department of the Navy</u>		
<b>Author Name:</b> Theresa Morley, PE		
<b>Author Title:</b> Remedial Project Manager	<b>Author Affiliation:</b> Naval Facilities Engineering Command Southwest	
<b>Review period:</b> March 31, 2004 (date of last Five-Year Review) to March 31, 2009		
<b>Date(s) of inspection:</b> August 13, 2008		
<b>Type of Review:</b> <input checked="" type="checkbox"/> Statutory <input type="checkbox"/> Policy ( <input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion)		
<b>Review number:</b> <input type="checkbox"/> 1 (first) <input checked="" type="checkbox"/> 2 (second) <input type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
<b>Triggering action:</b> <input type="checkbox"/> Actual RA Onsite Construction at OU <input checked="" type="checkbox"/> Actual RA Start at OU #3, IR Site 7 <input type="checkbox"/> Construction Completion <input type="checkbox"/> Previous Five-Year Review Report <input type="checkbox"/> Other (specify) <u>_Remedy Complete and final Five-Year Review_____</u>		
<b>Triggering action date:</b> March 31, 2004		
<b>Due date (five years after triggering action date):</b> March 31, 2009		

## FIVE-YEAR REVIEW SUMMARY FORM (Continued)

### **Issues:**

- Methane levels in compliance gas monitoring probe GP-9 continue to be near the 5 percent by volume State compliance criterion. This compliance issue relates to a state regulation; the remedy at Site 7 is protective.
- Trichloroethene (TCE) and pesticides present in soil were removed during remedial activities at IR Site 1D. Groundwater samples collected from the excavation indicated the presence of TCE.

### **Recommendations and Follow-up Actions:**

- For IR Site 7, due to methane levels in GP-9 near the State compliance criterion level, routine monitoring of these probes and all other probes should continue. In addition, the Navy should continue with the installation of a gas extraction system. The work plan has already been sent to the regulatory agencies for concurrence.
- For IR Site 1D, the extent of impacts to groundwater, as well as a work plan to implement groundwater remediation activities, has been sent to the regulatory agencies for review.

### **Protectiveness Statement(s):**

Remedies that have not yet been completed, but are still in the construction phase for IR Sites 1A, 1A-1, 1D, 1H, and 30, are protective in the short term and will be protective in the long term.

The remedy for IR Site 7 was found to be protective of both human health and the environment. Methane levels have shown an increasing trend in the mid- to deep monitoring probes of GP-9.

The final IR Site 7 landfill cover and associated monitoring systems were found to be isolating waste from the environment; minimizing sediment loading to nearby surface waters; functioning with a minimum amount of maintenance; providing long-term performance; and protecting the public health and safety. The methane will continue to be monitored and the Navy is moving forward with installation of the extraction system. Site access is controlled and is off limits to any training per Section 2002.1.h of Base Order P3500.1K, Range and Training Regulations Areas Prohibited from Training. LUCs have also been included in the Final PCMMP (NAVFAC, 2008a).

### **Other Comments:**

- In the initial Five-Year Review for OU-3 dated March 2004, it was noted that the Base Master Plan had not been updated with the Land Use Controls for IR Site 7 outlined in the ROD. The Base Master Plan has since been updated with the Land Use Control provisions which are managed by the Site Approval process as described in Section 4.5.



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## ABBREVIATIONS AND ACRONYMS

amsl	above mean sea level
AOC	area of concern
ARARs	applicable or relevant and appropriate requirements
BAI	Barajas and Associates, Inc.
bgs	below ground surface
BMP	best management practice
CAMU	corrective action management unit
CATEX	Categorical Exclusion
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
cy	cubic yard
DCA	dichloroethane
DCE	dichloroethene
DoD	Department of Defense
DON	U.S. Department of the Navy
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
ET	evapotranspiration
FFA	Federal Facility Agreement
FS	feasibility study
GIS	geographic information system
GP	gas monitoring probe
HASP	health and safety plan
IAS	Initial Assessment Study
IR	Installation Restoration
LOAEL	lowest-observed-adverse-effect-level
LUC	land use control
MCB	Marine Corps Base
MCL	maximum contaminant level

## ACRONYMS AND ABBREVIATIONS (Continued)

NAVFAC SW	Naval Facilities Engineering Command Southwest
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NEPA	National Environmental Policy Act
NFA	No Further Action
NPL	National Priorities List
O&M	operation and maintenance
OU	Operable Unit
PA/SI	preliminary assessment/site inspection
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PCMMP	Post-Closure Monitoring and Maintenance Plan
PED	Preliminary Environmental Determination
POL	petroleum, oil, and lubricants
ppb	parts per billion
PRG	preliminary remediation goal
PWC	Public Works Center
RACR	Remedial Action Completion Report
RAO	Remedial Action Objective
RCRA	Resource Compensation and Recovery Act
RG	Remediation goals
RI	remedial investigation
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendment and Reauthorization Act
SI	site inspection
SSO	Site Safety Officer
SWDIV	Southwest Division Naval Facilities Engineering Command
TCE	trichloroethene
TPH	total petroleum hydrocarbons
UST	underground storage tank
VOC	volatile organic compound

## Section 1.0: INTRODUCTION

The United States Department of the Navy (DON) is conducting environmental restoration activities at Marine Corps Base (MCB) Camp Pendleton as part of the Installation Restoration (IR) Program. The IR Program was established by the Department of Defense (DoD) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 to identify, evaluate, and control the spread of contaminants from historical waste sites at military installations. MCB Camp Pendleton was placed on the National Priorities List (NPL) in 1989 (U.S. Environmental Protection Agency [EPA] No. CA2170023533) because groundwater and soils at various locations had become impacted with organic and inorganic constituents primarily as a result of past waste disposal practices related to vehicle maintenance and domestic and light commercial activities. The DON, acting on behalf of and in conjunction with the Base, has been conducting and implementing the IR Program at MCB Camp Pendleton since the early 1980s. The DON's cleanup efforts are being conducted in conjunction with the EPA, Region 9, the State of California Regional Water Quality Control Board (RWQCB), San Diego Region, and the State of California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) through a Federal Facility Agreement (FFA) signed in 1990 (EPA, 1990).

The DON is preparing this Five-Year Review report pursuant to Section 121(e) of CERCLA, 42 U.S.C. 9621(e), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) Part 300.430(f)(4). This review was conducted from June through September 2008 and this report presents the results of this review. Analysis for the Five-Year Review was conducted by the Naval Facilities Engineering Command Southwest (NAVFAC SW), with technical support from Battelle. This document was reviewed and finalized for compliance with DON *Policy for Conducting Five-Year Reviews Under the Installation Restoration Program* (DON, 2004a), *DON Environmental Restoration Program Manual* (DON, 2006), and EPA *Comprehensive Five-Year Review Guidance* (EPA, 2001).

This report is a comprehensive Five-Year Review for MCB Camp Pendleton that presents the results of a review of remedies implemented at MCB Camp Pendleton as documented in Records of Decision (RODs) and Explanations of Significant Difference (ESDs) for IR sites belonging to one of the five Operable Units (OUs), as well as other sites not included in an OU. The IR sites included in OUs 1 through 5 and additional sites not incorporated into an OU are summarized in Table 1-1. Appendix A of the document contains a table providing more detailed descriptions and remedial status of all of the IR sites and other investigative areas within MCB Camp Pendleton.

**Table 1-1. Summary of IR Sites at MCB Camp Pendleton**

Operable Unit	Open IR Sites	Closed IR Sites
1		4, 4A, 9, and 24
2		3, 5, 6, 8A, 19, 20, 22, 2B, 28, 31, 43, 44, and 45
3	7 and 1A,	10, 16, 17, 18, 27, 32, 34, 35, 36, 37, 38, 39, 40, 41, 42, 1B, 1C, 1E, 1F, 1I, 2A, 2C, 2D, 2F, and 2G
4	1D and 30	1E-1
5	1A-1, 1H, 1115, 12 Area Site 13, 21, 33, 62, 1111 and the 22/23 Area Groundwater site	6A soil
Sites not in OUs	1114, 1116, 1117, and 1118	

The OUs and specific IR sites that are the focus of this Five-Year Review are summarized below:

- Operable Unit 1
- Operable Unit 2
- Operable Unit 3
  - Site 1A
  - Site 7
- Operable Unit 4
  - Site 1D
  - Site 30
- Operable Unit 5
  - Site 1A-1
  - Site 1H
  - Site 6A
  - 22/23 area groundwater
  - Site 1111
  - Site 33
  - Site 1115, 12 Area Site 13
  - Site 62
  - Site 21
- IR sites not incorporated in an OU
  - Site 1114
  - Site 1116
  - Site 1117
  - Site 1118

### **1.1 Purpose**

Consistent with Executive Order 12580, the Secretary of Defense is responsible for ensuring that Five-Year Reviews are conducted at all qualifying DoD cleanup sites. According to the *Policy for Conducting Five-Year Reviews Under the Installation Restoration Program* (DON, 2004a), a statutory Five-Year Review is required when both the following conditions are met:

- Remedial actions at a site are completed, and hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unrestricted exposure.
- The ROD for the site was signed on or after October 17, 1986.

### **1.2 Five-Year Review Trigger Date**

According to the NCP, Five-Year Review reports are to be completed and signed within five years of the trigger date for a site, when, upon completion of the remedial action, hazardous substances, pollutants, or contaminants remain above levels that allow for unlimited use and unrestricted exposure.

This report is a comprehensive Five-Year Review for MCB Camp Pendleton that includes an overall evaluation of all five OUs, as well as other IR sites not included in an OU. The trigger date for the Five-Year Review process at Camp Pendleton was the date of the signing of the OU-3 ROD, because the land use controls required by the ROD became effective immediately upon implementation of the ROD (Southwest Division Naval Facilities Engineering Command [SWDIV], 1999). The first Five-Year Review for OU-3, specifically IR Site 7, was completed in March 2004, five years from March 31, 1999,

the signing of the OU-3 ROD. IR Site 7 and Site 1A were the only OU-3 sites that required the completion of the CERCLA Five-Year Review process due to the presence of residual contaminants above levels that allow for unlimited use and unrestricted exposure. This Five-Year Review includes a summary and evaluation of the remedial action progress at all sites closed with contamination in place, as well as those in the construction phase of remediation.

### **1.3 Document Organization**

This Five-Year Review report is organized as follows:

**Section 1.0 Introduction:** Provides an introduction to the report and includes the purpose and authority for conducting the Five-Year Review; identifies the lead agency, the review number, and the trigger date; and summarizes the organization of the report.

**Section 2.0 Site Chronology Table:** Presents a summary of the chronology of cleanup-related events at MCB Camp Pendleton.

**Section 3.0 MCB Camp Pendleton Background:** Describes the general physical characteristics and land uses; the history of contamination; initial responses to the presence of contamination; and the basis for actions taken to address the contamination.

**Section 4.0 Five-Year Review Process:** Summarizes the components of the second Five-Year Review process, including administrative and community involvement components; and data review, site inspection, and interview procedures.

**Section 5.0 Operable Unit 1:** Presents background information on OU-1, including a summary of remedial actions and technical assessment of the actions taken at the site.

**Section 6.0 Operable Unit 2:** Presents background information on OU-2, including a summary of remedial actions and technical assessment of the actions taken at the site.

**Section 7.0 Operable Unit 3:** Presents background information on OU-3, including a summary of remedial actions, a technical assessment of the actions taken at the site, and progress since the last Five-Year Review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

**Section 8.0 Operable Unit 4:** Presents background information on OU-4, including a summary of remedial actions, a technical assessment of the actions taken at the site, and progress since the last Five-Year Review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

**Section 9.0 Operable Unit 5:** Presents background information on OU-5, including a summary of remedial actions, a technical assessment of the actions taken at the site, and progress since the last Five-Year Review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

**Section 10.0 Status of Sites Not Included in an OU:** Presents background information on sites not included in an OU, including a summary of investigative activities and current status.

**Section 11.0 Next Review:** Provides the date for when the next Five-Year Review is planned.

**Section 12.0 References:** Lists all of the citations used throughout the report.

## Section 2.0: SITE CHRONOLOGY TABLE

The chronology of cleanup-related events at MCB Camp Pendleton is provided in Table 2-1. Additional detailed information on the history of the site is located in various historical documents included in the Administrative Record file.

**Table 2-1. Summary of the Chronology of Cleanup-Related Events at Camp Pendleton**

Date	Event
March 1942	Construction of MCB Camp Pendleton started
October 1944	Base was dedicated as a permanent Base
November 1989	MCB Camp Pendleton was added to the NPL
October 1990	Signing of the Federal Facilities Agreement
October 1993	Remedial Investigation (RI) report for Group A sites conducted. IR Site 9 only site requiring remedial action via a feasibility study (FS)
1994	IR Site 9 FS completed
March 1995	RI report for Group B sites completed
December 12, 1995	Signing of the OU-1 ROD
1996	Box Canyon Landfill was designated a Corrective Action Management Unit (CAMU) for purposes of consolidating waste from various IR sites. This was accomplished by two separate Action Memorandums, one for Site 3, dated August 1996, and one for Site 6, dated April 1996.
September 23, 1996	RI and FS for Operable Unit 2, Site 8 and 22/23 Area Sites
November 12, 1996	RI report for Group C sites completed
July 16, 1997	Draft Final RI Report for Group D sites completed
September 30, 1997	Signing of the OU-2 ROD
May 1, 1998	Draft Final RI and FS for OU-3
1999	A CAMU was built within the landfill to contain impacted soils excavated from IR Sites 1A, 1E, 1F, and 2A
March 31, 1999	Signing of the OU-3 ROD
May 20, 2002	First Five-Year Review Report Submitted for OU-1 (IR Site 9)
January 2003	Final closure of IR Site 7 (Box Canyon Landfill) complete
December 19, 2003	FS report for OU-4 (Sites 1D, 1E-1, 1H and 30) completed
March 2004	First Five-Year Review for OU-3 (IR Site 7 [Box Canyon Landfill]), MCB Camp Pendleton completed
July 21, 2004	Draft Final RI for OU-5 (Sites 1A-1, 6A, 21, 1111, and 12 Area) completed
October 5, 2004	ESD signed for IR Site 9
September 29, 2005	Draft Final FS for OU-5 (Sites 1A-1, 1111, and 12 Area, Site 13) completed
June 27, 2007	Signing of the OU-4 ROD
September 25, 2007	ESD for IR Site 1A completed
September 27, 2007	Final Five-Year Review report submitted for OU-1 (IR Site 9)
January 30, 2008	Signing of the ROD for OU-5 Sites 1A-1, 1H and 6A

## **Section 3.0: CAMP PENDLETON BACKGROUND**

### **3.1 General Site Description**

MCB Camp Pendleton is the primary Marine Corps amphibious training center on the west coast. In addition to amphibious training, training for many of the various Marine Corps missions also is accomplished at MCB Camp Pendleton. The Base, which occupies approximately 125,000 acres of land, is located almost entirely in northern San Diego County, California, approximately halfway between the cities of Los Angeles and San Diego (see Figure 3-1). Surrounding communities include San Clemente to the northwest, Oceanside to the south, and Fallbrook to the east. The Base is bordered on the west by the Pacific Ocean and encompasses 17 miles of relatively undisturbed coastline. Rolling hills and valleys range inland an average of 10 to 12 miles. Construction of MCB Camp Pendleton started in March 1942, and President Franklin D. Roosevelt dedicated the Base in September 1942. Although MCB Camp Pendleton has been an important training facility since its inception in 1942, it was not designated a permanent Base until October 1944. The Base currently supports more than 36,000 military personnel and employs approximately 4,600 civilians.

The regional topography at MCB Camp Pendleton is varied and includes sandy coastal beaches and dunes, sea cliffs, coastal plains, marine terraces, hills, canyons, river valleys, and mountains rising to nearly 2,700 ft above mean sea level (amsl).

MCB Camp Pendleton lies within the Peninsular Range Geomorphic Province of Southern California. The oldest rocks that underlie the Base are intrusive and extrusive igneous and metamorphic rocks of Cretaceous age, exposed at the surface on hills and mountains in the central and eastern portions of the Base. Overlying these highly consolidated igneous and metamorphic basement rocks are a series of unconsolidated to semiconsolidated sedimentary formations and alluvium of various thickness. Because development at the Base is largely on or near the alluvial valley floors, most developed areas are underlain by one or more of these sedimentary units.

Although groundwater is present in most sedimentary deposits throughout the Base, significant amounts of groundwater (capable of supporting domestic and agricultural needs) are restricted to the large alluvial river valleys, also called groundwater basins. These alluvial deposits are the water-bearing units, or aquifers, that supply most of the water used at MCB Camp Pendleton.

Four groundwater basins are located within the Base boundary: San Mateo Basin, San Onofre Basin, Las Flores Basin, and Santa Margarita Basin. The largest of these is the Santa Margarita Basin, which supplies the largest volume of groundwater to the Base.

### **3.2 Demography and Land Use**

Land use within the perimeter of the Base consists of airfield operations, maneuver, and impact areas; troop and family housing; recreation areas; and out-leased areas used by various entities (e.g., San Onofre Nuclear Generating Station and agriculture). Most of the land within MCB Camp Pendleton is open and undeveloped and directly supports the training mission of the Base. Developed areas of the Base are isolated from one another by large areas of essentially undeveloped land used for training and maneuvers.

The largest concentration of development is at the Headquarters Area in the southeastern corner of the Base. The second largest concentration is the housing areas in the southwestern corner of the Base, near the Oceanside Gate (Innis-Tennebaum Architects, Inc., 1990).

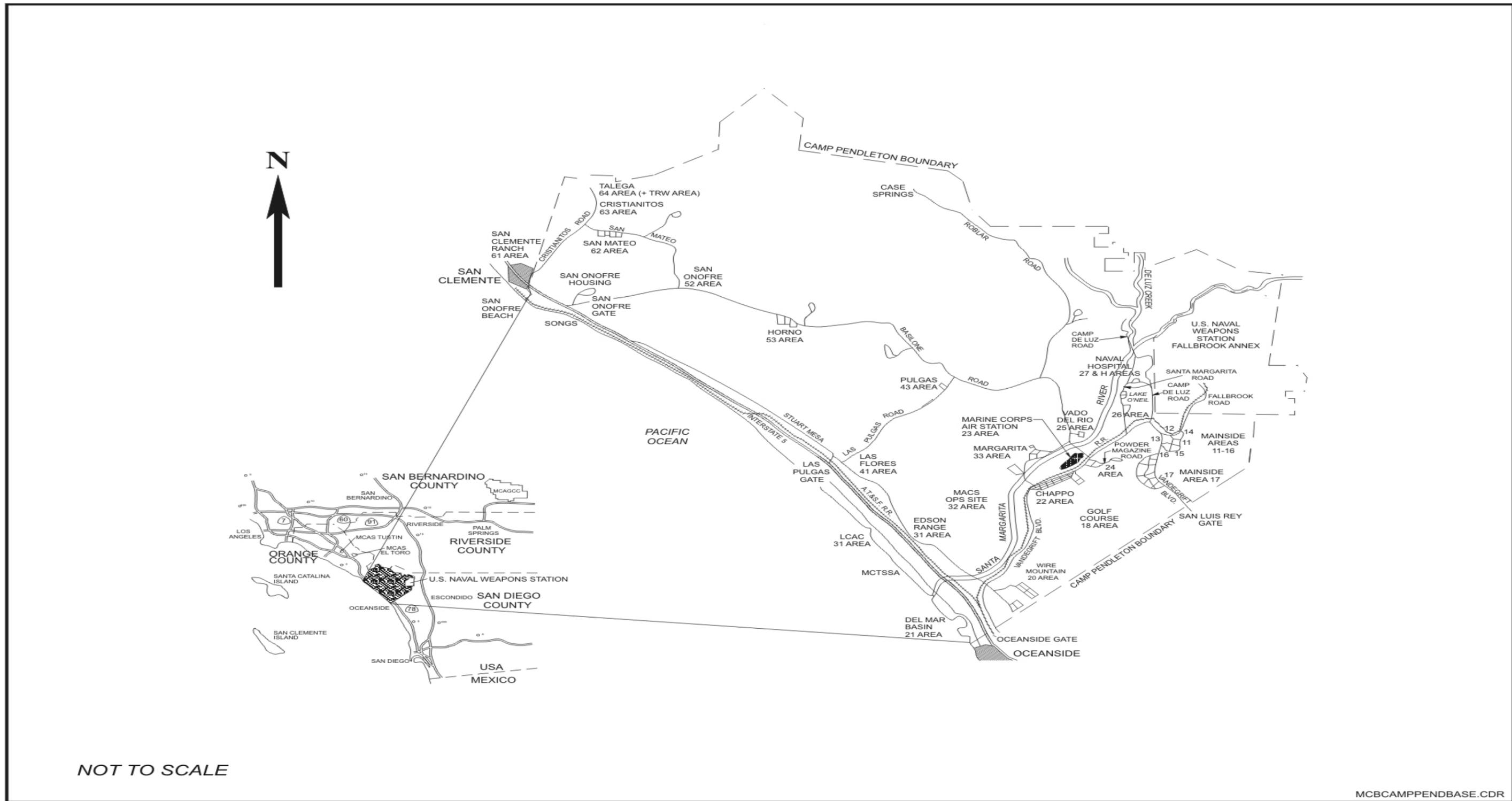


Figure 3-1. Location of MCB Camp Pendleton

### **3.3 History of Contamination**

The history of contamination is discussed on a site-by-site basis in Sections 5.0 through 10.0.

### **3.4 Initial Response**

In 1980, the DoD instructed each branch of the armed services to comply with the requirements of CERCLA (and later with Superfund Amendment and Reauthorization Act [SARA]). In response, the DON established its IR Program to investigate and clean up sites on Navy and Marine Corps Bases that had been contaminated by past waste disposal practices. Under the IR Program, sites can be cleaned up through either removal or remedial actions. A remedial action is conducted to control or clean up contamination not posing an immediate threat. A removal action is conducted to address immediate and significant dangers to the public or the environment. Removal actions may either be short-term or long-term solutions; remedial actions are long-term solutions. Both remedial and removal actions begin with a preliminary assessment/site inspection (PA/SI).

Naval Energy and Environmental Support Activity (NEESA) completed an Initial Assessment Study (IAS) of the Base in September 1984 (NEESA, 1984). The IAS fulfilled the requirements for a PA, and sites requiring further action were identified. In July 1988, SWDIV conducted a site inspection (SI) and identified 54 sites (MCB Camp Pendleton, 2002).

Based on the results of the SI, MCB Camp Pendleton was placed on the NPL of hazardous waste sites on November 15, 1989. Contamination at MCB Camp Pendleton was primarily the result of waste disposal practices occurring prior to the establishment of environmental regulatory guidance. Common practices at the Base that generated waste include maintenance and repair of trucks, tanks, and aircraft. Vehicular fluids and solvents have been the principal wastes generated on-Base. Other support operations, such as pest control and dry cleaning also have contributed to Base contamination.

In 1990, a FFA was entered into for MCB Camp Pendleton. The FFA is a legally binding document that outlines the schedule for completing the investigation and cleanup of contaminated sites. Parties to the FFA include the EPA, State of California Department of Health Services (this agency is now known as the DTSC), State of California RWQCB, the DON, and the Marine Corps. The FFA specifies the working relationship between the DON and agencies during the environmental restoration process. It also states the responsibilities of the DON and each agency, and provides a schedule for completing activities (MCB Camp Pendleton, 2002).

The parties to the FFA initially assigned the IR sites at the Base to four groups (Groups A, B, C, and D) based on each site's potential impact to human health and the environment. Those sites that potentially posed the most significant threat were placed into Group A and were investigated first (SWDIV, 1993), and those sites with the lowest potential for such impacts were placed into Group D and were investigated last (SWDIV, 1997).

To streamline the cleanup process, a majority of the IR sites then were incorporated into five OUs. RODs have been signed for all five OUs (Table 2-1). IR Program remedial activities and investigations are ongoing for OU-4 and OU-5 sites, as well as four other sites that are being addressed individually, without incorporation into an OU. Figure 3-2 is a map that presents the location of each IR site at MCB Camp Pendleton, and provides a reference location for the individual site maps that are provided in subsequent sections of this report.

### **3.5 Basis for Taking Remedial Action**

The basis for the action is discussed on a site-by-site basis in Sections 5.0 through 10.0.

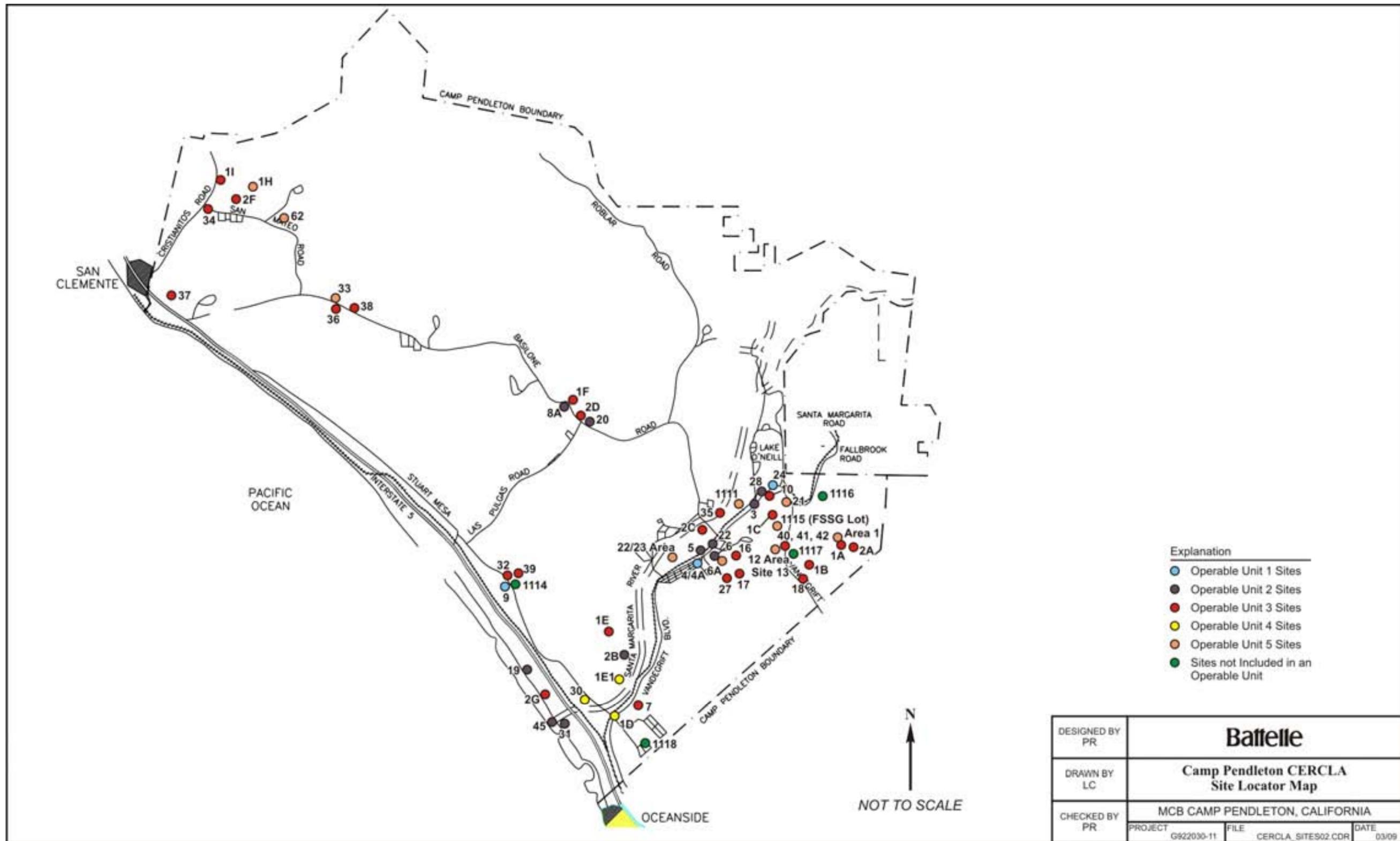


Figure 3-2. MCB Camp Pendleton CERCLA Site Locator Map

## **Section 4.0: FIVE-YEAR REVIEW PROCESS**

EPA's *Comprehensive Five-Year Review Guidance* (EPA, 2001) and DON *Policy for Conducting CERCLA Statutory Five-Year Reviews* (DON, 2004a) outline the Five-Year Review process and the elements required. This section describes the review process and presents the data reviewed as part of this Five-Year Review for MCB Camp Pendleton.

### **4.1 Administrative Components**

This section provides the identification of review team members and outlines components and the schedule of the Five-Year Review.

From June to September 2008, DON Remedial Project Manager, Ms. Theresa Morley, PE, of NAVFAC SW, led this Five-Year Review process, with participation from the following team members:

- Dr. Richard Bottoms, MCB Camp Pendleton Assistant Chief of Staff/Environmental Security
- Mr. Anthony Ford, Project Manager (Insight [NAVFAC contractor])
- Dr. Heather Rectanus and Ms. Pamela Rodgers (Battelle [NAVFAC contractor])

Ms. Morley was supported by NAVFAC SW technical, legal, and managerial staff.

The Five-Year Review consisted of the general tasks:

- Community notification
- Document review
- Data review
- Site inspection
- Interviews and questionnaires
- Five-Year Review report development

### **4.2 Community Notification**

Public notices that the Five-Year Review was being conducted for the Base and that a final report will be made available to the public for review and comment were published in the MCB Camp Pendleton *Scout* newspaper on October 16, 2008, and the *North County Times* newspaper on October 10, 2008. A contact telephone number was provided in each publication for interested parties requiring additional information. The public notice was reviewed and approved by the Public Participation Specialist for DTSC.

### **4.3 Data Review**

This second Five-Year Review consisted of a review of relevant documents including operation and maintenance (O&M) records and monitoring data; RODs; ESD to the RODs, where appropriate; confirmation reports; closure reports; applicable soil and groundwater cleanup standards; and other reports listed in Section 12.0 (References) and referenced herein. Appendix A presents a summary of the status of all IR sites at MCB Camp Pendleton.

#### 4.4 Site Inspection

Inspections at the 16 IR sites that are the focus of this Five-Year Review were conducted on August 13 and August 14, 2008, for the purpose of assessing the protectiveness of the remedies. The Navy and its contractors conducted the site inspections. Appendix B contains photographs of the current conditions of the sites.

Where text indicates best management practices (BMPs) are used to control erosion and dust suppression, the following practices are employed:

For dust suppression:

- Release of dust during the soil excavation activities will be minimized as necessary with the use of water as a dust suppressant. Dust generation will be controlled by spraying water prior to daily work activities, during excavation/stockpiling/loading/movement activities. Watering equipment will be continuously available to provide proper dust control.
- The Site Safety Officer (SSO) will monitor dust levels in the locations outlined in the plan. The SSO will have the authority to stop work in the event that on-site activities generate dust levels in excess of the on-site or community/fence line action levels.
- Excavated soil stockpiles will be covered with plastic sheeting and labeled during nonexcavation hours.
- Track-out from vehicles will be controlled and mitigated through the use of track-out plates placed at the site entrance/exit points. A vehicle decon area will be placed on site to mitigate track-out as well.

Erosion controls include practices such as preserving vegetation, hydroseeding, geotextiles and mats, and earth dikes and drainage swales.

**4.4.1 OU-3 IR Sites.** Both Site 1A and Site 7 were inspected. For Site 7 (Box Canyon Landfill), detailed site inspections were conducted in July, October, and December 2008 by Lithgow Environmental in accordance with the final Post-Closure Monitoring and Maintenance Plan (PCMMP) (NAVFAC, 2008a) and a site visit was conducted in August 2008 by Battelle. Maintenance and inspection activities for 2008 are documented in a 2008 Annual Report of Site Maintenance (Lithgow Environmental, 2009). Maintenance and inspection activities for 2008 included weed control, well/gas probe labeling, inspection of landfill cover and ancillary structures prior to and after the rainy season, and surveying of two settlement monuments, SM-1 and SM-2, every six months by a licensed surveyor.

Findings as reported in the 2008 Annual Site Maintenance Report (Lithgow Environmental, 2009) were:

- The ancillary structures in relation to the cover (e.g., drainage channels and erosion control structures) were free from damages that would otherwise impact their functionality.
- Overgrown vegetation was removed from the drainage structures and from areas adjacent to wells and gas probes to improve access for monitoring and sampling activities.

- Broad areas of vegetation across the site were cleared in July 2008 in preparation for the aerial photography “flyover” which is conducted every 5 years at the site to collect data to prepare the isosettlement topographic map.
- Areas of standing water were not observed nor were visible signs of erosion present after a November rain event, although some siltation was observed in drainage structures.

Site inspection activities conducted during the previous Five-Year Review were revisited during Battelle’s August 2008 site visit and included inspection of the landfill cap, access roads, drainage ditches and outfalls, fencing, signs, and monitoring points.

The landfill cap was covered with vegetation across the majority of the cap (Photo 1, Appendix B). Straw and plastic netting were observed covering areas with less vegetation (Photo 2, Appendix B).

Landfill access roads are all-weather accessible, well maintained, and in good operable condition, and drainage ditches and outfalls observed during the site inspection appeared to be well maintained and in good working condition (Photos 4 and 5, Appendix B). Surface drainage at IR Site 7 was optimized in 2005 in accordance with a work plan by Barajas and Associates, Inc. (BAI, 2004). The main objective of drainage optimization was to reduce the generation of landfill gas by eliminating places where surface water could pond and infiltrate the landfill. A summary report for the optimization activities is included as Appendix I to the PCMMP (NAVFAC, 2008a).

The site is secured by a chain-link perimeter fence along the top deck. Gates allowing access to the landfill are locked. In general, the perimeter fence was in good condition and areas of disrepair were not observed. A “no trespassing” sign was placed on the main entrance to the landfill (Photo 6, Appendix B). No safety concerns were noted.

For Site 1A, excavation has been initiated and the site has been prepared to stockpile soil from Site 1A-1. Best management practices (BMPs) to control erosion and dust suppression have been incorporated (Photo 7, Appendix B). No safety concerns were noted.

**4.4.2 OU-4 IR Sites.** Sites 1D and 30 are still in the construction phase of the remediation process. Site 1D (Photo 8, Appendix B) contains an open excavation surrounded by orange plastic netting. Site 30 excavation and regrading activities have been completed. Excavation around existing trees was performed with a mini excavator in order to keep the trees intact (Photo 9, Appendix B). No safety concerns were noted.

**4.4.3 OU-5 IR Sites.** Sites 1A-1 and 1H are still in the construction phase of the remediation process. At the time of the site inspection, soil was being excavated and stockpiled for off-Base removal. BMPs were employed for dust suppression and erosion control (Photos 10 and 11, Appendix B). No safety concerns were noted. Site 1111 is undergoing four quarters of groundwater monitoring following the completion of the removal action at the site. No concerns were noted.

The other sites included in OU-5 were not undergoing any active remediation. Site 6/6A/22/23 Area Groundwater, Site 1111, Site 33, Site 1115, and 12 Area Site 13 were areas of the Base that were used for industrial purposes, such as parking lots, office buildings, and equipment storage. Photos 12 through 15 in Appendix B show the current conditions of these sites. No concerns were noted.

Sites 62 and 21 were not located in commercial areas of the Base, but rather vegetated, desolate areas as shown in Photos 16 and 17 in Appendix B. No concerns were noted.

**4.4.4 Sites Not Incorporated into an OU.** Sites 1114, 1116, 1117, and 1118 were not undergoing any active remediation. These sites also were located on areas of the Base used for non-residential purposes (e.g., office buildings, parking lots) and no concerns were noted (Photos 18 through 21 in Appendix B).

#### **4.5 Land Use Controls**

At MCB Camp Pendleton, the Site Approval process is used to manage land use controls (LUCs) and open IR sites instead of the Base Master Plan (Innis-Tennebaum Architects, Inc., 1990). The Base created the Site Approval process wherein a Preliminary Environmental Determination (PED) must be filled out by the project proponent before any projects on base are initiated. The PED describes the project, including timeframe, location and proposed invasive activity, and is routed through Environmental Security to identify potential issues before allowing the project. The IR Manager, located in the Environmental Security office at MCB Camp Pendleton, compares the PED against the geographic information system (GIS) layer of IR sites and makes a determination on whether the project may proceed or not. This determination is then forwarded to the planning branch of Environmental Security. If the project has no potential IR or other environmental issues (as determined by other environmental departments), a categorical exclusion (CATEX) or other appropriate National Environmental Policy Act (NEPA) document is issued and the project is approved. If there are potential issues, the PED is rejected and sent back to the initiator unapproved and with a written explanation of why the project was not approved. In this way, LUCs are managed for open IR sites and IR Site 7.

#### **4.6 Interviews**

Interviews or questionnaire forms regarding remedy performance and remedy functions were conducted or filled out in August and December 2008 by the following individuals:

- Ms. Theresa Morley, NAVFAC Project Manager
- Dr. Rick Bottoms, IR Branch Head, MCB Camp Pendleton

Interview summaries and completed questionnaire forms are provided in Appendix C. The interviews and questionnaires augmented the assessment of remedy implementation and identification of issues or concerns.

## Section 5.0: OPERABLE UNIT 1

Seven IR sites (3, 4, 4A, 5, 6, 9, and 24) were originally included in the Group A RI (SWDIV, 1993). Currently, OU-1 includes four of these seven sites (IR Sites 4, 4A, 9, and 24). The OU-1 RI indicated that soil contamination at IR Sites 4, 4A, 9 and soil and groundwater contamination at IR Site 24 were acceptable for unrestricted land use. Monitored natural attenuation was the selected remedy for groundwater at IR Site 9, which is discussed below. Further evaluation of the groundwater at IR Sites 4 and 4A was transferred for inclusion in the 22/23 Area Groundwater site (now a part of OU-5 [see Section 9.3]). Removal actions were performed for Sites 3, 5, and 6, and these sites were subsequently placed in OU-2.

### 5.1 IR Site 9

IR Site 9 is a former waste stabilization pond located in the 41 Area that primarily consisted of an approximate 400-ft by 500-ft lagoon used for the oxidation and percolation of raw sewage. An area immediately northeast of the lagoon was used for disposal of mess hall grease, a practice that began after sewage treatment operations at IR Site 9 ceased. During the RI at IR Site 9, trichloroethene (TCE) and tetrachloroethene (PCE) were detected in groundwater at concentrations above federal and state Maximum Contaminant Levels (MCLs). An FS was completed (SWDIV, 1994) and a remedial action for IR Site 9 groundwater was recommended, although the presence of TCE and PCE in groundwater did not pose a significant risk to human health or the environment under the current industrial land-use scenario.

Remedial action for groundwater at IR Site 9 was established through signing of the OU-1 ROD on December 12, 1995. IR Site 9 soils did not require remediation, and monitored natural attenuation was selected as the remedy for groundwater. Based on the results of a subsequent risk evaluation conducted for supplemental soil and groundwater data collected in 2003 (as provided in a Technical Memorandum prepared by the Public Works Center [PWC], [SWDIV, 2003a]), concentrations of contaminants remaining in soil and groundwater (excluding monitoring well 9W-07A) were protective of human health and the environment under a residential land use scenario.

Conclusions provided in the Tech Memo (SWDIV, 2003a) identified a separate point source release for well 9W-07A that was not associated with IR Site 9. Therefore, the recommendations section proposed that a new site be established to investigate the source of volatile organic compounds (VOCs) in groundwater around well 9W-07A. This site is now designated as IR Site 1114. The monitoring well network associated with IR Site 9 has been retained as part of Site 1114 for possible future monitoring needs. Site 1114 is not incorporated into an OU and is discussed further in Section 10.0.

DON issued an ESD on May 10, 2004, documenting the early attainment of remedial action objectives (RAOs), the conclusion of long-term groundwater monitoring, and the initiation of site closeout for IR Site 9. The ESD (PWC, 2004a) notes that monitoring well 9W-07A remains the single location where groundwater RAOs were not met at IR Site 9. The VOCs in monitoring well 9W-07A were identified as new IR Site 1114, designated the 41 Area Arroyo Site, and the subject of the 2004 investigation. The ESD was signed by EPA, RWQCB, and DTSC on October 5, 2004.

IR Site 9 was the only OU-1 site that required completion of a Five-Year Review under the CERCLA program. The final CERCLA Five-Year Review for IR Site 9 in OU-1 was issued in 2007 (NAVFAC, 2007a), and in accordance with EPA guidance on completing Five-Year Reviews, a final five-year report is prepared once a site has attained a “No Further Action” (NFA) status under CERCLA. This 2007 report ends the requirement to produce any more Five-Year Reviews for OU-1. The remedy has been shown to be protective of both human health and the environment.

The requirement for Five-Year Reviews has been completed or was not required for any of the OU-1 IR sites; thus, no further discussions for these sites will be included in this report.

## **Section 6.0: OPERABLE UNIT 2**

OU-2 is comprised of 13 IR sites: 3, 5, 6, 8A, 19, 20, 22, 2B, 28, 31, 43, 44, and 45. “No Action” was the remedy stipulated in the OU-2 ROD (EPA, 1997) for sites 8A, 19, 20, 22, 2B, 28, 31, 43, 44, and 45. Removal actions (soil excavation) were completed at Sites 3, 5, and 6 and resulted in clean closures for all three sites as documented in the Draft Site Closeout Report for Site 3 (OHM, 1997a), the Draft Final Site Closeout Report for Site 5 (OHM, 1996) and the Draft Final Removal Action Site Closure Report for Site 6 (OHM, 1997b). The “No Action” remedy for Sites 3, 5, and 6 was specified in the OU-2 ROD (EPA, 1997). All 13 OU-2 sites have been closed with unrestricted land use. The remedies are protective in the long-term of both human health and the environment. Therefore, Five-Year Reviews are not required for any of the OU-2 IR sites and no further discussions for these sites will be included in this report.

## Section 7.0: OPERABLE UNIT 3

The ROD for OU-3 was signed in March 1999 and addressed 28 IR sites: 7, 1D, 1E, 2A, 10, 16, 17, 27, 35, 1A, 1B, 1C, 1F, 1I, 2C, 2D, 2F, 2G, 18, 32, 34, 36, 37, 38, 39, 40, 41, and 42. In addition, as described in the OU-3 ROD (SWDIV, 1999), five sites originally included in OU-3 (1G, 1H, 2E, 29, and 30), either were removed from the CERCLA process (1G and 29), could not be found (2E), or were transferred to another OU for further evaluation (1H [OU-5] and 30 [OU-4]). The OU-3 ROD (SWDIV, 1999) presented the selected remedial actions for six sites (1A, 1D, 1E, 1F, 2A, and 7). IR Sites 1A, 1D, 1E, and 1F are all former refuse burning grounds, IR Site 2A is a former grease disposal pit, and IR Site 7 is a landfill (Box Canyon Landfill). In 2000, Site 1D was transferred out of OU-3 and is being addressed in OU-4. The OU-3 ROD stipulated “No Action” was necessary for the remaining 22 IR sites included in OU-3.

The selected remedy for IR Sites 1E, 1F, and 2A included excavation with disposal of the excavated soil at a waste disposal unit located at the Base (i.e., IR Site 7 was designated as CAMU 2). Groundwater was not impacted by the contaminated soil at each of these sites, and thus was not included as a medium of concern. Remedial actions were completed for Sites 1E, 1F, and 2A and the three sites were closed. All three sites were remediated to achieve cleanup standards stated in the OU-3 ROD as documented in Remedial Action Site Closure Reports (IT Corporation, 2003a; IT Corporation, 2003b; IT Corporation, 2003c). Because exposure to residual contamination at IR Sites 1E, 1F, and 2A was acceptable for unrestricted land use, a Five-Year Review is not required. Therefore, these IR sites are not discussed further in this report.

A description of the current status of the two remaining IR Sites that required remedial action (Site 1A and Site 7), are provided below. Evaluations of the effectiveness of the remedial alternatives implemented are also provided.

### 7.1 IR Site 1A

**7.1.1 Background.** IR Site 1A is located in a densely vegetated, undeveloped training region in the 14 Area, immediately northeast of Base sewage treatment plant No. 1 (see Figure 3-2). The 14 Area burning ground is no longer in operation and land surrounding the site is covered with natural vegetation. The nearest troop housing is approximately 0.25 miles west of the site and the nearest family housing, De Luz Housing, is approximately two miles north of the site. IR Site 1A was originally one of nine refuse burning grounds for MCB Camp Pendleton, and was used between the Base opening in 1942 and the early 1970s. No information is available for specific years the refuse burning ground was used or the specific composition and total volume of the refuse burned.

As reported in the RI/FS (SWDIV, 1997 and 1998), no organic compounds were detected at concentrations exceeding risk-based preliminary remediation goals (PRGs) in soil samples collected from IR Site 1A except for benzo(a)pyrene. Five metals were detected at concentrations exceeding either a PRG or natural background value: manganese, mercury, thallium, vanadium and zinc. For groundwater, no organic compounds exceeded MCLs or tap water PRGs. With the exception of manganese, no inorganics were detected in groundwater at concentrations exceeding the evaluation criteria. Manganese has been detected in groundwater throughout MCB Camp Pendleton and is naturally occurring (SWDIV, 1999).

**7.1.2 Remedial Actions.** Excavation with on-site disposal was chosen as the remedial action in the 1999 ROD (SWDIV, 1999). Remedial action at Site 1A was initiated in August 1999 in accordance with an approved work plan (SWDIV, 1999) with the excavation, transportation, and disposal of

approximately 93,000 cubic yards (cy) of soil to the IR Site 7 CAMU (Box Canyon Landfill). The volume of waste was larger than initially estimated due to the detection of several items including: (1) a large mound of soil discovered during initial site clearing and grubbing activities; (2) four previously unidentified buried burn pits, or cells; and, (3) after clearing and grubbing, the presence of visible debris beyond the initially estimated limits of excavation.

During the excavation, it was discovered that wastes potentially extended 2 to 4 ft below the groundwater table on the eastern side of Site 1A; however, no wastes from below the groundwater were removed. The excavation continued until groundwater began to impact excavation activities and dewatering would have been required to continue. Based on the site conditions, the parties to the FFA decided to discontinue the excavation and prepare the site for winter rains. Based on confirmation sample results and limited trenching, it was estimated that approximately 50,000 cy of impacted soil remained at the site. An Interim Confirmation Report (IT Corporation, 2000) and an Addendum to the Interim Confirmation Report (IT Corporation, 2001) were prepared describing the status and results of the remediation to date.

In April 2000, the IR Site 7 CAMU was closed to receiving additional material, requiring either a new disposal alternative or a new remedial alternative for the remaining impacted soil at IR Site 1A. A groundwater monitoring program was initiated to evaluate whether contaminants in soil were impacting groundwater. Four groundwater monitoring wells were installed in July 2000, one upgradient and three downgradient of the excavation limits. Groundwater sampling began in July 2000 and, as of June 2003, a total of 10 sampling events had been completed.

Results from the first two groundwater sampling events showed the sporadic presence of low levels of TCE and two metals (iron and manganese) above primary and secondary MCLs. During the last five groundwater sampling events completed before March 2003, the groundwater table was below the level of the waste, and TCE was not detected. The elevated levels of metals reported early in the groundwater monitoring program also were not detected during the last three sampling events completed before March 2003 (except for manganese, which is naturally occurring at elevated levels) (PWC, 2003).

In light of the fact that disposal to IR Site 7 CAMU is no longer feasible, as well as the fact that source material for contamination still exists at IR Site 1A, an ESD, as required by CERCLA, was prepared by NAVFAC (2007b) because significant changes to the remedy specified in the OU-3 ROD were planned. A summary of the significant differences between the previous remedy proposed in the ROD (SWDIV, 1999) and the modified remedy (NAVFAC, 2007b) is presented in Table 7-1.

Phased excavation to remove soil with concentrations of contaminants of concern above revised remediation goals (RGs) as specified in the ESD (NAVFAC, 2007b) and the remedial design work plan (NAVFAC, 2008a) is almost complete.

Site maintenance will include maintaining established erosion controls and minor grading, if required. Information regarding extent of excavation, as well as monitoring and site closure will be provided in a Remedial Action Completion Report (RACR) that will be prepared following completion of remediation activities. The site is protective in the short-term through proper management of the remedial action and will be protective in the long-term by achieving unrestricted land use.

**Table 7-1. Differences between 1999 ROD Remedial Solution and 2007 Solution**

Original Remedy	Modified Remedy
Excavation of ~31,700 cy of contaminated material containing contaminants of concern (COCs) to depth of 5 feet below ground surface (bgs) to mitigate ecological risk and to 10 feet bgs to mitigate human health risk. On-Base disposal of excavated material at Box Canyon Landfill CAMU.	93,000 cy of contaminated material were excavated and disposed of on-Base at the Box Canyon Landfill CAMU. Additional excavation and off-Base disposal of an estimated 21,800 cy of remaining contaminated material is planned.
RGs based on the 1998 OU3 RI/FS Remedial Action Standards for IR Site 1A.	Revised RGs based on the 2005 OU-5 RI RGs for unrestricted land use at IR Site 1A-1, as agreed in the May 24, 2007 FFA meeting.
Replacement with clean backfill, regrading and restoration of site to original contours, and revegetating.	Replacement with clean backfill, regrading to an elevation that will prevent flooding across the site, and revegetating.
\$1.3M cost; 9 week duration. Response complete in 1999.	Additional costs of ~\$5.7 M; Response complete in 2008.

**7.1.3 Technical Assessment**

**7.1.3.1 Question A. Is the remedy functioning as intended by the decision document?** The remedy, when completed, will function as intended in the 1999 ROD (SWDIV, 1999). The contaminants at the site are being addressed by removing the contaminated soils.

**7.1.3.2 Question B. Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?** There have been no changes that impact the validity of technical assumptions for the site since the OU-3 ROD was approved and signed in March 1999 or the ESD (NAVFAC, 2007b). There are no changes to state or federal MCLs, applicable or relevant and appropriate requirements (ARARs) for constituents detected at the site since the ESD, nor have land uses and site conditions changed since the ROD was signed. However, as explained in Appendix D, it is suggested that a lowest-observed-adverse-effect-level (LOAEL) of 93.6 mg/kg bw/d be used to calculate the RG for boron. Appendix D provides information evaluated in answering this question on the basis of human-health and ecological risk assessment, and federal and state regulations evaluated as potential ARARs for the remedial action.

**7.1.3.3 Question C. Has any information come to light that could call into question the protectiveness of the remedy?** No. The plan to excavate soil with concentrations of COCs above the revised RGs as specified in the ESD (NAVFAC, 2007b) is still appropriate. Although TCE and metals were at one time detected in groundwater collected from monitoring wells installed near the excavation, during the last five groundwater sampling events completed before March 2003, the groundwater table was below the level of the waste, and TCE was not detected. As stated in the ESD, additional soil excavation is planned which would remove all impacted soil and therefore eliminate the impact to groundwater.

**7.1.4 Issues.** No issues associated with the planned modified remedy were identified.

**7.1.5 Recommendations and Follow up Actions.** A review of the information regarding extent of excavation, as well as monitoring and site closure, will be provided in a RACR that will be prepared following the completion of remediation activities.

**7.1.6 Protectiveness Statement.** The remedy at Site 1A is expected to be protective of human health and the environment upon completion. In the interim, the site is protective because exposure pathways that could result in unacceptable risks are being managed by preventing access to the site for the general population and by requirements of the Health and Safety Plan (HASP) for environmental workers.

## **7.2 IR Site 7**

**7.2.1 Background.** IR Site 7, Box Canyon Landfill, is located near the southwestern corner of the Base in the 20 Area, east of Vandegrift Boulevard and less than one mile northeast of Stuart Mesa Road (see Figure 3-2). The inactive landfill covers an area of approximately 28 acres. The majority of Box Canyon in which landfilling activities were conducted has been filled with landfill material to the surface of the surrounding marine terrace, which is approximately 140 ft above the Santa Margarita riverbed. Near the canyon entrance, the landfill slopes steeply down to the north and terminates approximately 1,000 ft from the Santa Margarita River.

The site was used for quarry operations from approximately 1946 to 1970. The site began Class III landfill operations in May 1974, and ended operations in 1984. The landfill has been inactive since 1984. Typical wastes accepted for landfilling reportedly included household and construction refuse consisting of tree and lawn clippings, scrap lumber and metal, appliances, furniture, paper, fill, dirt, asphalt, concrete, tile, cans, containers, magazines, and boxes. The site also reportedly received dry-cleaning sludges containing stoddard solvent; contaminated soil and dumpster waste containing fuels, petroleum, oil, and lubricants (POLs), solvents, thinners, strippers, epoxies, sealants, paint wastes, and chemical cleaners.

In 1996, IR Site 7 was designated a CAMU for purposes of consolidating remediation wastes from various MCB Camp Pendleton IR sites. IR Site 7 contains wastes (approximately 406,000 tons of treated [stabilized] and untreated soil) from two CERCLA removal actions conducted in 1996 at IR Sites 3 and 6 (CAMU 1) and a CERCLA remedial action conducted in 1999 at IR Sites 1A, 1E, 1F, and 2A (CAMU 2). In general, CAMU 1 contains pesticide-impacted soil and CAMU 2 contains metal-impacted soil. Figure 7-1 shows the locations of the CAMUs within the landfill. After emplacement of the waste and soils in the landfill, the site was covered with clean soil and the upper surface was contoured and seeded with native plant species.

The landfill material is known to be contaminated; however, sampling of the fill material was not conducted as recommended in the EPA Presumptive Remedy Guidance (EPA, 1993). The site was investigated to determine the potential for off site gas migration and the potential impact to groundwater during the RI. The potential for gas migration was determined not to be a concern. However, remedial action (engineered cap) was recommended in the OU-3 ROD (SWDIV, 1999) for long-term protection of groundwater in the vicinity of Site 7.

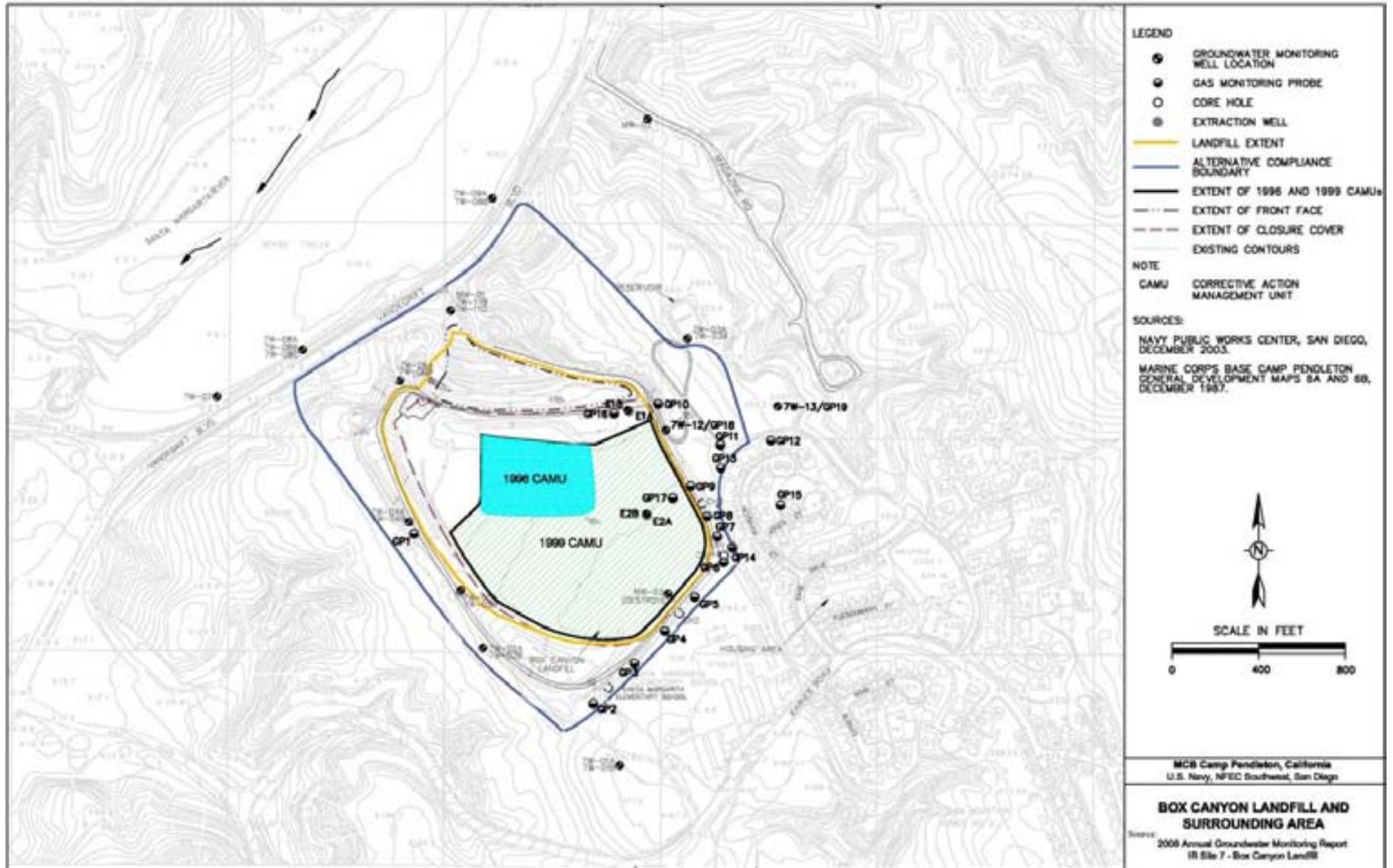


Figure 7-1. Box Canyon Landfill Layout

**7.2.2 Remedial Actions.** The selected remedy for IR Site 7 (Box Canyon Landfill) addressed the low-level threats posed by the landfill. This remedy required containment of the wastes, elimination of exposure pathways, and long-term monitoring and maintenance of the containment system. Because the remedy for IR Site 7 allowed contaminants to remain on site above levels that allow for unlimited use and unrestricted exposure, a Five-Year Review is required. The OU-3 ROD (SWDIV, 1999) stipulated the following as the necessary remedial action at the landfill:

- Installation of an evapotranspiration (ET) cover consisting of a vegetated topsoil layer (minimum thickness of 12 inches), a minimally compacted middle soil layer (minimum thickness of 48 inches), and a compacted low-permeability bottom layer (minimum thickness of 12 inches).
- Installation of lined surface water drainage structures and erosion control measures.
- Construction of an access road.
- Implementation of a post-construction monitoring and maintenance plan.
- Documentation of the remedial action process, quality control confirmation test data, and final as-built conditions.

The final remedy and associated LUC requirements for IR Site 7 were issued under the ROD for OU-3 in January 1999. The site began closure construction in July 2001. A 6-foot-thick (minimum) earthen closure cover was completed and the site was revegetated in December 2002. Final closure of the landfill was completed by the installation of the permanent perimeter fence, and post-closure monitoring activities were initiated in February 2003.

**7.2.3 System Operation and Maintenance.** A gas extraction system is being planned for the site to reduce the methane levels in the landfill. The levels have been near the compliance limit. A work plan to install the system has been forwarded to the regulatory agencies for review, and the Navy is currently responding to comments. There continues to be post-closure monitoring of groundwater and landfill gas, as well as maintenance of the landfill cover and associated drainage ditches and access roads. The Final PCMMP was issued on April 25, 2008 (NAVFAC, 2008b). This document establishes uniform procedures for conducting long-term post-closure maintenance and monitoring activities required by the ROD. Detailed plans have been developed for controlling erosion and sedimentation, monitoring groundwater, monitoring landfill gas, and conducting cover, drainage, and vegetation maintenance. In addition, a detailed contingency plan was included that outlines possible courses of action should monitoring indicate chemical concentrations in landfill gas monitoring locations exceed their respective action limits. Table 7-2 summarizes the post-closure monitoring frequency requirements for the tasks. Estimated costs for post-closure maintenance and monitoring are provided in Table 7-3.

**7.2.3.1 Groundwater Monitoring.** A total of 24 groundwater wells are installed at or near the site (on April 28 through May 6, 2008, two multiphase monitoring wells were constructed in the eastern portion of the site [wells 7W-12/GP18 and 7W-13/GP19]). Groundwater in select wells is monitored annually in accordance with the Baseline Groundwater Quality Sampling and Analysis Plan (IT Corporation, 2003), as amended and the Final PCMMP (NAVFAC, 2008a). The ROD provided for semi-annual sampling at IR Site 7 for five years; however, a review of data collected through 2005 supported a conclusion agreed to by the regulatory community that a less frequent sampling schedule would provide adequate data density (General Dynamics Information Technology, 2007; NAVFAC, 2008a). The objective of groundwater monitoring is to monitor groundwater quality both upgradient and downgradient of the site to assess whether contaminants associated with the landfill are potentially affecting local groundwater.

**Table 7-2. Post-Closure Monitoring Frequency (NAVFAC, 2008b)**

Task	Frequency of Task	General Reporting Requirements
Post-Closure Landfill Gas Monitoring	Quarterly – for sampling locations with reported methane concentrations less than 1.25%	Within 90 days of sampling
	Monthly – for sampling locations with reported methane concentrations greater than 1.25% but less than 4%	
	Bi-weekly – for sampling locations with reported methane concentrations greater than 4%	
Water Quality Monitoring Program	Annually	Annually
Surface Vegetation (check for coverage and ponding)	Semi-annually	Annually
Earthen Cover	Same as surface vegetation	Annually
Settlement Monument Surveys	Semi-annually	Annually
Drainage Structures	Same as surface vegetation	Annually

**Table 7-3. Post-Closure Maintenance and Monitoring Cost Estimate (NAVFAC, 2008b)**

Task	Cost <sup>(1)</sup>
Post-Closure Landfill Gas Monitoring	\$115,000 per year
Water Quality Monitoring Program	\$64,000 per year
Five-Year Review	\$150,000 every 5 years
Site Maintenance	\$68,000 per year
Topographic Map	\$16,000 every 5 years

(1) Post-closure maintenance and monitoring costs for 30 years were estimated allowing for inflation at a rate of 3% per year. Cost for 30 years of maintenance and monitoring is estimated at \$13,311,000.

The most recent groundwater monitoring event occurred in June 2008. Results from this event as reported in the draft 2008 annual groundwater monitoring report (ChaduxTt, 2008) are summarized below.

In 2008, groundwater levels and analyte concentrations were consistent with results from previous sampling events (1991, 1994, 1995, 2001, 2003, 2004, 2005, 2006, and 2007). Low concentrations of VOCs and methane exist in groundwater. VOC results have not shown seasonal variations. The presence and concentrations of chemicals have varied slightly through time. Only one VOC (1,2-DCA at 0.61J and 1.3 µg/L) exceeded its MCL of 0.5 µg/L in downgradient wells (7W-11A [MW-01] and 7W-11B). Groundwater samples from newly installed wells 7W-12 and 7W-13 were analyzed for dissolved methane. Methane was detected at 2.1 µg/L and 530 µg/L in 7W-13 and 7W-12, respectively. These results fall within the ranges detected in downgradient wells 7W-11A, 7W-11B, and 7W-11C from previous sampling events.

**7.2.3.2 Perimeter Landfill Gas Monitoring Results.** The current landfill gas monitoring network consists of 32 gas monitoring probes (GPs) installed at various depths in 15 wells along the site boundary. These landfill GPs have been monitored as per the Final PCMMP (NAVFAC, 2008a).

In July 2005, a pre-design pilot study (SulTech, 2005) was conducted to: (1) determine if gas extraction within the landfill would effectively prevent subsurface gas concentrations above 5 percent at the compliance points; and (2) determine the appropriate design parameters to be used for designing a landfill gas control system. The following field activities were performed to complete the pre-design pilot study:

- Installed landfill gas extraction wells and GPs
- Performed field extraction tests in wells E1A and E2A at various flow rates
- Performed field monitoring, sampling, and laboratory analysis
- Performed extraction well and GPs location surveying.

The potential for landfill gas migration has been monitored at 10 locations installed along the perimeter of Site 7 since August 2001. Each monitoring point contains one, two, or three depth-discrete probes per location. A total of 24 probes were installed in the most likely gas migration pathways (the coarsest, most permeable soils) surrounding the landfill. Probe spacing was reduced near the Santa Margarita Elementary School (250-ft spacing) and military housing areas (125-ft spacing) to ensure protectiveness of human health. The current landfill gas monitoring network consists of 32 GPs installed at various depths in 15 wells: 11 along the site boundary and four located outside the IR Site 7 compliance boundary. These landfill GPs have been monitored at least bimonthly since they were installed during the cover construction and continue to be monitored as per the Final PCMMP (NAVFAC, 2008b).

Concentrations of methane in shallow perimeter landfill GPs located at the property boundary nearest the Wire Mountain Military Housing development (GP-8 and GP-11) have remained below detection limits since monitoring began in 2005. The other perimeter monitoring well near the boundary by the Wire Mountain Military Housing development, GP-9, continues to be near the 5 percent by volume State compliance criterion. There is a monitoring probe, GP-10, which has been at or above State compliance levels; however, the agencies agreed that since the probe was so close to the waste, it did not qualify as a compliance probe.

### **7.3 Progress Since Last Review**

According to the last Five-Year Review (NAVFAC, 2004), the remedial action at OU-3 IR Site 7 was found to be protective of human health and the environment because potential exposure pathways that could result in unacceptable risks were being controlled and monitored.

Potential issues identified during the last Five-Year Review (NAVFAC, 2004) and follow-up actions taken within the last five years to address them are summarized in Table 7-4.

### **7.4 Technical Assessment**

**7.4.1 Is the Remedy Functioning as Intended by the Decision Document?** The remedy selected for IR Site 7 in the OU-3 ROD (SWDIV, 1999) has been implemented successfully. As described in Section 7.2.2, actions at IR Site 7 included installation of an ET cover to close the CAMU and the landfill, installation of lined drainage structures and erosion control devices, construction of access roads, initiation of a routine groundwater and landfill gas monitoring program, initiation of post-closure site monitoring and maintenance, and initiation of the documentation of the remedial action process. The components of the remedial action appear to be performing per the ROD. Based on the site inspection,

interviews, and review of available information, the landfill cover, drainage structures and erosion control devices, access roads, and other controls are properly constructed.

**Table 7-4. Potential Issues Identified and Follow-up Actions**

Issue Identified in 2004 Five-Year Review	Issue Resolution Since 2004
A post-closure plan was not developed.	A PCMMP (NAVFAC, 2008b) for the Box Canyon Landfill was finalized in April 2008.
Drainage control systems designed to be less stringent than the ARAR identified in the OU-3 ROD (SWDIV, 1999).	Surface drainage was optimized in 2005 in accordance with a work plan by BAI (2004) as reported in the PCMMP (NAVFAC, 2008a).
The Base Master Plan had not been amended to incorporate the IR Site LUCs.	The Base Master Plan (Innis-Tennebaum Architects, Inc., 1990) has since been amended to include the LUC language and requirements from the OU-3 ROD.
Several areas of less than 50 percent grass coverage were identified on the top deck of the cap and small areas of erosion were observed on the east side of the cape near the access road. Straw mulch was placed over the bare areas and the areas of minor erosion were repaired.	The PCMMP (NAVFAC, 2008b), calls for annual inspection surveys during October of each year to look for excessive erosion, settlement, and other damages from animal burrowing or other causes. Repairs are to be made through regrading, backfilling, and revegetation processes.
Trespassing signage was not present around the perimeter of the site.	Trespassing signage was added to the entry gate of the landfill as identified during a site visit in August 2008.

There are no operating systems associated with IR Site 7 at this time; however, a landfill gas extraction system will be installed shortly. A description of the PCMMP was provided in Section 7.2.3 along with a schedule and estimated O&M costs. The O&M costs for IR Site 7 include groundwater and landfill gas monitoring and maintenance of the cover, vegetation, drainage structures and access roads.

**7.4.1.2 Institutional Controls.** At MCB Camp Pendleton, the Site Approval process is used to manage LUCs and open IR sites instead of the Base Master Plan (Innis-Tennebaum Architects, Inc., 1990). The Base created the Site Approval process wherein a PED must be filled out by the project proponent before any projects on base are initiated. The PED describes the project, including timeframe, location and proposed invasive activity, and is routed through Environmental Security to identify potential issues before allowing the project. The IR Manager, located at Environmental Security at MCB Camp Pendleton, compares the PED against the GIS layer of IR sites and makes a determination on whether the project may proceed or not. This determination is then forwarded to the planning branch of Environmental Security. If the project has no potential IR or other environmental issues (as determined by other environmental departments), a CATEX or other appropriate NEPA document is issued and the project is approved. If there are potential issues, the PED is rejected and sent back to the initiator unapproved and with a written explanation of why the project was not approved. In this way, LUCs are managed for open IR sites and IR Site 7.

The LUCs for IR Site 7 were identified in the ROD for OU-3 (SWDIV, 1999) and are required to ensure that human health and the environment are protected in the future. In general, the LUCs for IR Site 7 stipulate that no breaching of the soil cap through trenching, excavation, or any other similar activity may occur unless prior approval of the FFA signatories is obtained; however, this restriction does not apply to maintenance activities for purposes of preservation or restoration of the physical integrity of the cap. The ROD also stipulates that if major land use changes are planned that may disrupt the effectiveness of the remedy, or that might alter or negate the need for the land use restriction, the FFA signatories must be provided with written notification of such a proposed action at least 60 days prior to the beginning of the implementation of the proposed action. MCB Camp Pendleton must also

notify the FFA signatories of any plan to lease or transfer IR Site 7 to a non-Federal or another Federal entity.

The landfill cap is intact and there are no plans for land use changes or property transfer. The LUCs and notice requirements have been provided in Section 6.7 of the PCMMP (NAVFAC, 2008a). The LUCs are also included in Section 6.7 of the PCMMP for IR Site 7 which is managed by the Navy and the Marine Corps (NAVFAC, 2008a). The PCMMP states that LUCs are implemented at the site by fencing and signage and are maintained through regular site inspection and maintenance activities described in Section 6.6. The section also describes the Site Approval process.

During site inspections, interviews, and review of questionnaires, no activities that could violate the LUCs as described in the ROD were identified. The landfill cap is intact and there are no plans for land use changes or property transfer.

**7.4.1.3 Monitoring Activities.** As discussed in Section 7.2.3, monitoring activities at IR Site 7 consist of cap inspections, including settlement marker surveying, groundwater monitoring, and landfill gas monitoring. The number of settlement monitoring points and gas probes appear to be sufficient for monitoring purposes. Newly installed groundwater monitoring wells, 7W-12 and 7W-13, fill previously identified data gaps in the upgradient portion of the tertiary sand and gravel. These wells were sampled during the 2008 annual groundwater monitoring event and the data do not present any concerns.

**7.4.2 Are the Assumptions Used at the Time of the Remedy Selection Still Valid?** There have been no changes that impact the validity of technical assumptions for the site since the OU-3 ROD was approved and signed in March 1999. There are no changes to state or Federal MCLs, ARARs, or toxicity values for constituents detected at the site, nor have land uses and site conditions changed since the ROD was signed; therefore, there are no new standards that could affect the protectiveness of the remedy. Appendix D provides information evaluated in answering this question on the basis of human-health and ecological risk assessment, and Federal and state regulations evaluated as potential ARARs for the remedial action.

**7.4.3 Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?** Although the selected remedy is still considered protective, continued monitoring of methane levels in the mid to deep level probes of GP-9 is conducted to meet State compliance regulations. These levels have been exhibiting an increasing trend since 2005 and have increased to near the 5 percent by volume criterion. However, methane levels in shallow compliance probes at the property boundary continue to be below the detection limit.

## **7.5 Technical Assessment Summary**

Based on the results of the Five-Year Review process, the remedy for IR Site 7 was found to be protective of both human health and the environment. Potential exposure pathways that could result in unacceptable risks have been, and are currently being controlled and monitored.

## **7.6 Issues Identified**

The potential issues identified during this review are:

- Methane levels in compliance GP-9 continue to be near the 5 percent by volume criterion.

## **7.7 Recommendation and Follow-up Actions for Issues Identified**

Recommendations for issues identified are:

- Due to methane levels in GP-9 nearing the 5 percent by volume State compliance criterion, monitoring of this probe and all other probes will continue. In addition, courses of action found in the Landfill Gas Contingency Action Plan (NAVFAC, 2008b) may need to be implemented if concentrations begin to exceed the 5 percent by volume criterion.

## **7.8 Protectiveness Statement**

Based on the results of the Five-Year Review process, the remedy for IR Site 7 was found to continue to be protective of both human health and the environment. Methane levels near 5 percent by volume continue to be present in the mid to deep monitoring probes of GP-9. However, samples from the gas probes and the monitoring wells do not indicate the presence of VOCs over action levels. Although methane is not a health hazard, it is a compliance issue. As such, methane and VOCs will continue to be monitored.

The final IR Site 7 landfill cover and associated monitoring systems were found to be isolating waste from the environment; minimizing sediment loading to nearby surface waters; functioning with an appropriate amount of maintenance; providing long-term performance; and protecting the public's health and safety. The elevated levels of landfill gas will continue to be closely monitored, and if necessary, additional actions in accordance with the PCMMP will be implemented. Measures have been in place to restrict access to the site since the date of the ROD implementation. Site access is controlled and is off limits to any training per Section 2002.1.h of Base Order P3500.1K, Range and Training Regulations Areas Prohibited from Training. LUCs have also been included in the PCMMP (NAVFAC, 2008b).

## Section 8.0: OPERABLE UNIT 4

OU-4 originally was comprised of four sites (1D, 1E-1, 1H, 30) as well as the 22/23 Area Groundwater site, which is a composite of the groundwater beneath six separate sites. Each of the OU-4 sites was initially included in another OU, but subsequently was moved into OU-4 for further evaluation and remedy selection.

The OU-4 ROD was completed in June 2007 (NAVFAC, 2007c). The selected remedial activities for Sites 1D and 30 were soil excavation, backfill, pretreatment of soil, and off-Base disposal; Site 1E-1 was recommended for NFA. Potential alternatives for Site 1H were still under evaluation by the FFA Team during the completion of the OU-4 ROD; therefore, in order not to delay action on Sites 1D, 1E-1, and 30, a decision was made to move Site 1H to OU-5 (refer to Section 9.0).

The selected remedy for Sites 1D and 30 consists of soil excavation and off-Base disposal; hazardous substances, pollutants, or contaminants will not remain on site above levels that allow for unlimited uses and unrestricted exposure. The current site status for Site 1D and Site 30 is provided below. Evaluations of the effectiveness of the remedial alternatives implemented are also provided.

### 8.1 IR Site 1D

**8.1.1 Background.** IR Site 1D, originally one of nine refuse burning grounds for MCB Camp Pendleton used between the Base opening in 1942 and the early 1970s, encompasses approximately 23 acres north of the intersection of Vandegrift Boulevard and Stuart Mesa Road in the 20 Area (Figure 3-2). COCs that have been historically detected above their respective RGs are antimony, arsenic, chromium, copper, iron, lead, zinc and dioxins/furans. The original estimate of volume of soils impacted at the site was 31,300 cy (lateral extent 5 acres).

**8.1.2 Remedial Actions.** The selected remedial action for IR Site 1D is soil excavation, backfill, pretreatment and disposal off-Base as provided in the ROD (NAVFAC, 2007c) because it effectively prevents human and ecological exposure to the site COCs. All contaminated soil exceeding chemical-specific RGs would be removed and replaced with clean fill from other locations within the Base.

Excavation was performed on a grid pattern and as of January 2009, over 60,000 tons of soil had been excavated from IR Site 1D. This represents all contaminated grids that were identified in the 2007 ROD (NAVFAC, 2007c). The soil has been manifested and disposed of at off-base facilities. Clean fill has been continuously transported from on-base sources and the site has been backfilled.

In late 2008, groundwater containing VOCs was discovered during confirmation sampling of the last grid, G9. All of the contaminated soil from G9 has been excavated. Approximately 12,000 gallons of groundwater have been removed from the G9 grid excavation area and placed in Baker tanks. A work plan has been forwarded to the regulatory agencies describing the proposed treatment method for the groundwater. The DON proposed to continue to extract groundwater from a 100 ft trench based on the results of a hydropunch investigation. The groundwater will be stored in baker tanks and treated with a granular ferric hydroxide/granular activated carbon system to remediate the groundwater to discharge standards. An amendment to the ROD is being developed to address groundwater.

Weekly biological monitoring of natural resources has been ongoing with no adverse impacts reported. In addition, dust suppression and air monitoring have been ongoing.

### 8.1.3 Technical Assessment

**8.1.3.1 Question A. *Is the remedy functioning as intended by the decision document?*** The remedy, when completed, will function as intended in the ROD (NAVFAC, 2007c). The risks posed by the contaminants at the site are addressed by removing the contaminated soils and/or eliminating the exposure pathway.

**8.1.3.2 Question B. *Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?*** State or Federal MCLs, ARARs, or toxicity values for constituents originally detected at the site have not changed, nor have land uses changed since the ROD was signed. However, recently discovered VOC contamination in groundwater is being addressed by a ROD Amendment and extraction of the groundwater for treatment.

**8.1.3.3 Question C. *Has any information come to light that could call into question the protectiveness of the remedy?*** The plan to excavate soil with concentrations of COCs above the revised RGs as specified in the ROD (NAVFAC, 2007b) is still appropriate. However, extraction and treatment of VOC contaminated groundwater that was recently discovered is warranted.

**8.1.4 Issues.** Soil containing TCE and pesticides were discovered during remediation in early 2008. Groundwater samples indicated the presence of TCE.

**8.1.5 Recommendations and Follow up Actions.** It is recommended that the extent of impacts to groundwater be determined and the need for additional groundwater remediation assessed. No recommendations are necessary for soil as all contaminated soil has been removed.

**8.1.6 Protectiveness Statement.** The remedy at Site 1D for soil will be protective of human health and the environment in the long term due to removal of all contaminated soil, leading to unrestricted land use. The remedy at Site 1D for groundwater will be protective upon completion. In the interim, the site is protective because exposure pathways that could result in unacceptable risks are being managed by preventing access to the site for the general population and by requirements of the HASP for environmental worker. Additionally, VOC contamination is being remediated immediately, further ensuring short-term protectiveness.

## 8.2 IR Site 30

**8.2.1 Background.** IR Site 30 is located approximately 1,300 feet west of the intersection of Stuart Mesa Road and MACS Road in the San Margarita Basin (Figure 3-2). The site lies partially within marshes that drain to the San Margarita watershed and is 11 acres in size. The site consists of interbedded, fine to coarse-graded alluvial sand, silt and minor clay. Groundwater is located 20 to 50 ft bgs. The site consists of fill soil that was transported in the mid- to late-1960s or early 1970s that contains bullets and bullet fragments from a 31 Area small arms firing range (Kleinfelder, 1997). Several metals in soil have been identified as COCs, but lead is the primary COC. Groundwater sampling at Site 30 was documented in the Draft Final RI Report for Group C Sites (SWDIV, 1996). Three Hydropunch samples were collected and analyzed for metals. Based on the results of a risk assessment, no further action was recommended for groundwater.

**8.2.2 Remedial Actions.** Originally, the recommended action for Site 30 was “hot spot” excavation/removal to remove significantly contaminated soil, for an estimated volume of about 25,000 cy (IT Corporation, 1998). It was later determined that the extent of contamination was only 15,600 cy.

Excavation was performed on a grid pattern and as of January 2009, over 20,000 tons of soil had been excavated from IR Site 30. This represents all contaminated grids that were identified in the 2007 ROD (NAVFAC, 2007c). The soil has been manifested and disposed of at off-base facilities. Clean fill has been continuously transported from on-base sources and the site has been backfilled.

Dust suppression and air monitoring occurred simultaneously with all excavation and soil loading activities. Furthermore, archeological monitoring occurred simultaneously with excavation and no cultural resources were identified during construction. Finally, no natural resources were injured as noted during biological monitoring.

### **8.2.3 Technical Assessment**

**8.2.3.1 Question A. *Is the remedy functioning as intended by the decision document?*** The remedy has been completed and will function as intended in the ROD (NAVFAC, 2007c). The completed remedy will be documented in a RACR.

**8.2.3.2 Question B. *Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?*** There have been no changes that impact the validity of technical assumptions for the site since the OU-4 ROD was approved and signed in 2007. There are no changes to state or Federal MCLs, ARARs, or toxicity values for constituents detected at the site, nor have land uses and site conditions changed since the ROD was signed; therefore, there are no new standards that could affect the protectiveness of the remedy. Appendix D provides information evaluated in answering this question on the basis of human health and ecological risk assessment and Federal and state regulations evaluated as potential ARARs for the remedial action.

**8.2.3.3 Question C. *Has any information come to light that could call into question the protectiveness of the remedy?*** No. The plan to excavate soil with concentrations of COCs above the revised RGs as specified in the ROD is still appropriate.

**8.2.4 Issues.** No issues associated with the planned remedy were identified.

**8.2.5 Recommendations and Follow up Actions.** A review of the information regarding extent of excavation, as well as monitoring and site closure, will be provided in a RACR, which will be generated at the completion of remediation.

**8.2.6 Protectiveness Statement.** The remedy at Site 30 is complete and protective of human health and the environment in the long term due to its acceptability for unrestricted land use.

## Section 9.0: OPERABLE UNIT 5

OU-5 was initially comprised of nine sites (1A-1, 6A, 1115, 12 Area Site 13, 21, 33, 62, 1111, the 13 Area FSSG Lot, and the 22/23 Area Groundwater site). The OU-5 ROD, which was completed in January 2008 (NAVFAC, 2008c) includes IR Sites 1A-1, 1H, and 6A. The selected remedy for Sites 1A-1 and 1H are soil excavation and off-Base treatment. No Further Action is the remedy for Site 6A. Because these remedies do not result in contamination remaining on-site above levels that allow for unlimited uses and unrestricted exposure, Five-Year Reviews will not be required. These sites are included in this Five-Year Review document to provide the status of the remedial actions to date. Evaluations of the effectiveness of the remedial alternatives currently being implemented are also provided where applicable.

### 9.1 IR Site 1A-1

**9.1.1 Background.** Site 1A-1 is an ash and debris disposal area of approximately 1.5 acres. It is located approximately 750 ft north-northeast of Site 1A (Figure 3-2) and disposal activities at Site 1A-1 are associated with Site 1A. Pilgrim Creek Trail runs along the eastern boundary of the site while Pilgrim Creek is located east and south of the site. Site 1A-1 is no longer in operation (closure sometime between late 1960s and 1970) and military and civilian personnel cross the site infrequently due to thick vegetation. However, the site is within a designated troop maneuver area.

Based on visual evidence, Site 1A-1 soil contaminants likely originated from the disposal of waste materials onto an accessible open area near Site 1A. The soil at Site 1A-1 is contaminated with metals, dioxins/furans and pesticides. The volume of impacted soils is approximately 20,000 cy with a maximum thickness of 10 ft and a spatial extent of 1.5 acres. Some metals (specifically lead, iron, and arsenic), dioxins/furans and organochlorine pesticides are present in the contaminated soils above their respective industrial soil PRGs, with the highest concentrations of pesticides in the southern portion of the site. These soil RGs are based on the results of previously performed human and ecological risk assessments (Parsons, 2004).

Groundwater is not present directly beneath the majority of waste soils. The nearest groundwater is in the Pilgrim Creek streambed. One groundwater monitoring well was installed in the Pilgrim Creek streambed and sampled in January 2003. VOCs, SVOCs, pesticides, PCBs, chlorinated herbicides, 1,4-dioxane, and dioxins/furans were not detected in the groundwater sample. Metals results in the groundwater sample collected from this monitoring well were generally estimated or below detection limits. None of the detected metals exceed MCLs or PRGs. Fate and transport modeling results suggest that residual pesticides and other COCs detected in soil are not likely to impact groundwater. This conclusion is consistent with the general low mobility of most of the COCs (i.e., pesticides, dioxins/furans, and lead), and their limited vertical extent in soils given the relatively long timeframe since the original release occurred (Parsons, 2004). Based on these results, no action for groundwater was required.

**9.1.2 Remedial Actions.** The selected remedial alternative was soil excavation, pretreatment of excavated soil and off-Base disposal. Excavation was performed on a grid pattern and as of January 2009, over 28,000 tons of soil had been excavated from IR Site 1A-1. This represents all contaminated grids that were identified in the 2008 ROD (NAVFAC, 2008c) to achieve unrestricted land use. The soil has been manifested and disposed of at off-base facilities. Clean fill has been continuously transported from on-base sources and the site has been backfilled and the vegetation restored.

Dust suppression and air monitoring occurred simultaneously with all excavation and soil loading activities. No biological issues were noted during biological monitoring.

### **9.1.3 Technical Assessment**

**9.1.3.1 Question A. *Is the remedy functioning as intended by the decision document?*** The remedy is complete as intended in the 2008 ROD (NAVFAC, 2008c). The contaminants at the site were addressed by removing the contaminated soils and eliminating the exposure pathway to contaminated soil.

**9.1.3.2 Question B. *Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?*** There have been no changes that impact the validity of technical assumptions for the site since the OU-5 ROD was approved and signed in 2008. There are no changes to state or Federal MCLs, ARARs, or toxicity values for constituents detected at the site, nor have land uses and site conditions changed since the ROD was signed; therefore, there are no new standards that could affect the protectiveness of the remedy. Appendix D provides information evaluated in answering this question on the basis of human health and ecological risk assessment and Federal and state regulations evaluated as potential ARARs for the remedial action.

**9.1.3.3 Question C. *Has any information come to light that could call into question the protectiveness of the remedy?*** No. The plan to excavate soil with concentrations of COCs above the revised RGs as specified in the ROD is complete.

**9.1.3.4 Issues.** No issues associated with the planned remedy were identified.

**9.1.4 Recommendations and Follow up Actions.** A review of the information regarding extent of excavation, as well as monitoring and site closure, will be provided in a RACR, which will be generated in the near future.

**9.1.5 Protectiveness Statement.** The remedy at Site 1A-1 is protective of human health and the environment because no contamination was left on site above levels that allow for unlimited use and unrestricted exposure.

## **9.2 Site 1H**

**9.2.1 Background.** Site 1H is located approximately 1,200 feet north of San Mateo Road in the 62 Area, near the western perimeter of the Base (Figure 3-2). Site 1H was one of nine refuse burning grounds used from 1942 through the early 1970s to burn refuse generated by Base operations. The Base refuse burning areas were closed between the late 1960s and 1971. The site is currently used as a military training area.

The site covers approximately 1.3 acres of densely vegetated land with a grade ranging from 2 to 7 percent. A stream-cut canyon is located east of the site and the site drains to the southeast.

The source of soil contamination is buried waste and ash that came from refuse-burning operations. Investigations in 1998 and 2003 indicated elevated levels of metals and dioxins/furans. A FS was initiated to determine appropriate remedial action. It is estimated that there are approximately 10,800 cy of contaminated soil with a lateral extent of 0.7 acre and depth extending five to 15 ft bgs.

**9.2.2 Remedial Actions.** The ROD (NAVFAC, 2008c) identifies the selected remedy for Site 1H as soil excavation and off-Base disposal. This remedy protects human health and ecological receptors by excavating contaminated soil exceeding chemical-specific residential PRGs and transporting it off Base

for disposal. The site would then be backfilled as needed with clean imported soil, and the vegetation would be restored.

The estimated volume of soil to be removed and transported is 10,800 cy. The final limits of excavation will be determined by confirmation samples verifying that RGs have been met. Waste characterization testing will be conducted to classify the soil for proper off-site disposal. Sampling and analysis of excavated areas to make sure they are clean, bringing in clean backfill (as compared to RGs), and restoring site vegetation are the final stages of the remediation.

As of January 2009, over 12,500 cy of non-Resource Conservation and Recovery Act (RCRA) soil have been removed from the site and transported to Copper Mountain Facility in Wellton, Arizona. In addition, 11 total soil waste characterization samples have been collected and analyzed, indicating the waste soil from Site 1H is non-hazardous. Six confirmation samples have also been collected and analyzed indicating that no over-excavation is necessary. Dust suppression, air monitoring, and biological monitoring have all been ongoing during the excavation. An additional 2,500 cy of soil still needs to be excavated to ensure unrestricted land use.

### **9.2.3 Technical Assessment**

**9.2.3.1 Question A. *Is the remedy functioning as intended by the decision document?*** The remedy, when completed, will function as intended in the ROD (NAVFAC, 2008c). The contaminants at the site are addressed by removing the contaminated soils and/or eliminating the exposure pathway to soil contamination.

**9.2.3.2 Question B. *Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?*** There have been no changes that impact the validity of technical assumptions for the site since the OU-5 ROD was approved and signed in 2008. There are no changes to state or Federal MCLs, ARARs, or toxicity values for constituents detected at the site, nor have land uses and site conditions changed since the ROD was signed; therefore, there are no new standards that could affect the protectiveness of the remedy. Appendix D provides information evaluated in answering this question on the basis of human health and ecological risk assessment and Federal and state regulations evaluated as potential ARARs for the remedial action. A Memo to Site File will be prepared to document the slight increase in contaminated soil to be removed.

**9.2.3.3 Question C. *Has any information come to light that could call into question the protectiveness of the remedy?*** No. The plan to excavate soil with concentrations of COCs above the revised RGs as specified in the ROD is still appropriate.

**9.2.3.4 Issues.** No issues associated with the planned remedy were identified.

**9.2.4 Recommendations and Follow up Actions.** A review of the information regarding extent of excavation, as well as monitoring and site closure, will be provided in a RACR, which will be generated at the completion of remediation.

**9.2.5 Protectiveness Statement.** The remedy at Site 1-H for soil will be protective of human health and the environment in the long term due to unrestricted land use. In the interim, the site is protective because exposure pathways that could result in unacceptable risks are being managed by preventing access to the site for the general population and by requirements of the HASP for environmental worker.

### 9.3 6A and 22/23 Area Groundwater

**9.3.1 Background.** Site 6A is a former scrap metal and recycling storage area in the 22 Area of the Base. Site 6A is approximately 7.2 acres in size and is located south of Building 2241, which houses the Defense Reutilization and Marketing Office (DRMO). The site is underlain by alluvium consisting of unconsolidated sand and silt with lesser amounts of clay and gravel. Groundwater is present at a depth of approximately 10 ft bgs. Because Site 6A is completely paved and used for industrial purposes, the site is considered poor quality habitat and does not support significant plant or animal communities.

Groundwater beneath Site 6A is part of the 22/23 Area Groundwater Remedial Investigation and addressed separately; however, groundwater beneath Site 6A is not significantly impacted. There are no groundwater detections above Federal or state MCLs in the two on-site wells, which supports the conclusion in the OU5 ROD for Sites 1A-1, 1H and 6A that no further action for soil is necessary.

The 22 and 23 Areas are located near the southern boundary of the Base, approximately six miles north of the southwestern Base entrance. The term "22/23 Area Groundwater" is used to denote the groundwater underlying an industrial area, which is located in the Santa Margarita River basin. Seven Base water supply wells are located within 2,500 ft of the site. Facilities present within the 22 and 23 Areas include an airfield, air Base complex, warehouses, and various industrial and office buildings. 22/23 Area Groundwater includes approximately 425 acres.

**9.3.2 Remedial Actions.** Site 6A is a paved area where scrap metal was temporarily stored for resale. As stated in the ROD for OU-5 (NAVFAC, 2008c), results of investigative activities concluded that no unacceptable risks to human health or the environment were present due to exposure to site soil; therefore, no further action is necessary to protect public health or welfare or the environment from the former releases of hazardous substances into the soil at Site 6A. Because hazardous substances, pollutants, or contaminants will not remain on site above levels that allow for unrestricted land use, a Five-Year Review will not be required for the soil. No Further Action for this site was documented in the OU5 ROD for Sites 1A-1, 1H and 6A (January 2008).

For the 22/23 Area Groundwater, primary contaminants are associated with solvents present in groundwater, particularly chlorinated aliphatic hydrocarbons, at relatively low concentrations. Several chlorinated compounds were historically detected above MCLs and/or tap water RGs. No specific source or release point has been identified to account for the observed chlorinated contamination in groundwater. It is possible that past chronic releases from IR sites in the vicinity could be responsible for the current groundwater contamination. It is also possible that groundwater contamination may have been caused by small isolated releases to the ground surface in the past. Regardless, the size of the plume and the declining concentrations seen in the plume indicate that the presence of an ongoing vadose zone source of VOCs is not likely. An RI/FS is currently in progress to determine the source of the 1,2,3-trichloropropane detected in groundwater.

**9.3.3 Technical Assessment.** A technical assessment has not been performed as the 22/23 Area groundwater site is still undergoing investigation.

### 9.4 Site 1111

**9.4.1 Background.** Site 1111 is located in the 26 Area in the northeastern portion of MCB Camp Pendleton, approximately 8 miles northeast of the main gate and 200 ft northwest of Vandergrift Boulevard (see Figure 3-2). Site 1111 is not currently used for any military or civilian activity. Given that Site 1111 is located in an ecologically sensitive area that supports diverse wildlife and plant species, future land use for the site will likely remain the same.

**9.4.2 Remedial Actions.** Past IR sites located in the vicinity of Site 1111 include Sites 3 (pest control wash rack), 10 (sewage sludge composting yard), 24 (area Morale, Welfare, and Recreation Maintenance Facility), and 28 (trash haulers maintenance area).

Soil excavation, treatment, and disposal were conducted adjacent to Site 3 from May 1996 to January 1997. During removal of contaminated soils at Site 3, a subsurface layer of ash and burn material was exposed. Excavation was continued up to the sensitive habitat boundary, but was discontinued before all visible waste was removed. The remaining contaminated burn and debris layer has been designated as Site 1111 and was included as an IR Program site in 1997.

An interim removal action was conducted at Site 1111 in November 2006 that removed soil above human-health, ecological and groundwater based RGs as determined in the Removal Action Work Plan (June 2008). Groundwater monitoring wells were installed in 2008 and three quarters of monitoring have been completed. It is anticipated that after the fourth quarter, the site will most likely be eligible for NFA with unrestricted land use.

**9.4.3 Technical Assessment.** A technical assessment has not been performed as the site is still undergoing investigation.

## **9.5 Site 33**

**9.5.1 Background.** Site 33 is located in the 52 Area in the northwestern portion of MCB Camp Pendleton (see Figure 3-2). The site is approximately 900 ft northeast of the intersection of Basilone Road and San Juan Road.

Site 33 consists of the area south of Building 520452 (52 Area Armory), where chlorinated chemicals are present in site groundwater, likely originating from a gun cleaning area. The gun cleaning area is located south of Building 520452 and consists of a concrete pad surrounded by a block wall, with a surface drainage outlet on the south end of the pad. This gun cleaning area also is known as the former solvent storage/usage area. A chain-link fence, with a gate on the eastern side, surrounds the armory. Active military operations are conducted at the site.

Several solvent spills have been reported at Site 33. The former solvent storage and usage area south of Building 520452 has historically been used for cleaning weapons. Several other buildings also are located south of Building 520452 and the former solvent storage/usage area. One underground storage tank (UST), used to store diesel fuel located near Building 52652, has been removed from an area south of the site (Ninyo and Moore, 1998).

**9.5.2 Remedial Actions.** A RI/FS was recently completed describing remedial alternatives.

**9.5.3 Technical Assessment.** A technical assessment has not been performed as the site is still undergoing investigation and a remedy has not been selected.

## **9.6 Site 1115 and 12 Area Site 13**

**9.6.1 Background.** Site 1115, the 13 Area FSSG Lot, is an approximate 14.5-acre asphalt-paved lot located on the southwestern portion of MCB Camp Pendleton within the Mainside Area (11-16 Areas). It is situated at the southwestern corner of Vandegrift Boulevard and 16<sup>th</sup> Street (see Figure 3-2). Site 1115 consists of a series of buildings where various historical activities were conducted that collectively served as the 13 Area Motor Pool. A majority of the site buildings had associated USTs that

were used to either store diesel heating fuel for boilers, oil, waste oil, solvents, or gasoline. Nine of the USTs and associated piping from two of the USTs were suspected of leaking petroleum hydrocarbons to the subsurface in significant enough concentrations to warrant environmental investigations.

12 Area Site 13 is located in the 12 Area in the eastern portion of MCB Camp Pendleton, approximately three miles southwest of the northeastern Base entrance, and approximately 500 ft west-southwest of the intersection of Vandergrift Boulevard and 19<sup>th</sup> Street (see Figure 3-2). Site 13 is located at the former location of Buildings 1280 and 1283. Former Building 1283 was a mess hall and former Building 1280 was a Quonset hut used for food storage. These buildings were demolished in November 1992, which is the same year Building 12052 was built. UST 13, which was associated with Building 1283 and removed prior to 1994, was a 1,500-gallon concrete tank used to store diesel fuel for heating.

A total of 27 samples were collected from site groundwater monitoring wells, including three newly installed groundwater monitoring wells. Based on historical site data, there is no evidence of a significant residual source of soil contamination at the site. Contaminants were detected in site groundwater, including TCE at concentrations up to 10 µg/L and benzene at concentrations up to 10 µg/L.

Groundwater data and fate and transport modeling indicate that groundwater contaminants are not declining over time; as a result, 12 Area Site 13 was included in the OU-5 RI to determine nature and extent of contamination.

An optimization work plan and pilot study will be completed in 2009. Results will be documented in an FS.

**9.6.2 Technical Assessment.** A technical assessment has not been performed as the site is still undergoing investigation.

## **9.7 Site 62**

**9.7.1 Background.** Site 62 is the location of a former asphalt batch plant located east of the intersection of San Mateo Canyon and San Mateo Road in the 62 Area of MCB Camp Pendleton (see Figure 3-2). The site includes two areas of concern (AOCs); AOC-1 and AOC-2, which were identified during investigation of suitable habitat for the arroyo toad (PWC, 2000). The lateral boundary of the site is defined by a 40-ft radius around each AOC.

Based on historical records, a transformer supporting a batch plant was undermined during a heavy rain event and fell, releasing polychlorinated biphenyls (PCBs) in the immediate area. The site and site vicinity are currently underdeveloped, sparsely vegetated land, with isolated chunks of residual asphalt pavement.

In 2000, a limited soil assessment was conducted to verify asphalt removal and to evaluate the presence of potential contaminants in AOC-1 and AOC-2 (PWC, 2000). The primary contaminants identified in AOC-1 were PCBs. The primary contaminants identified in AOC-2 were total petroleum hydrocarbons (TPH). In 2002, further investigations of AOC-1 and AOC-2 were performed in support of a Site Evaluation Report (SWDIV, 2003b). Between October and November 2002, 15 test pits were excavated (eight in AOC-1 and seven in AOC-2) and samples were taken.

**9.7.2 Remedial Actions.** Excavation activities were conducted in January 2003 to remove the limits of contaminated soil identified during the 2002 investigation. Once the removal was complete, 17 confirmation samples were collected from the excavation floor and sidewalls. The results of the test pit confirmation samples collected from the excavation floor and sidewalls of the AOC-2 test pit excavations

indicated that all of the contaminated soil had been removed (SWDIV, 2003b). Roughly 200 yd<sup>3</sup> of material was removed from AOC-2 and disposed of as nonhazardous waste at the Candelaria Environmental Biotreatment Facility. The results of the test pit confirmation samples collected from the excavation floor and sidewalls of the AOC-1 test pit excavations indicated PCBs were still present in the upper 2 ft of soil in the northwestern, southeastern, and eastern portions of the excavation. A total of 1,076 tons of PCB-impacted soil were excavated and disposed of as hazardous waste at the Kettleman Hills Landfill. The regulatory agencies decided to make this an IR site and the site was added to the program. Currently, a site investigation is underway to determine the lateral extent of impacted soil remaining in AOC-1.

**9.7.3 Technical Assessment.** A technical assessment has not been performed as the site is still undergoing investigation. The remedy at Site 62 is protective of human health and the environment in the short term because exposure pathways that could result in unacceptable risks are being controlled. However, in order for the remedy to be protective in the long term, additional investigation and response actions are necessary to address remaining contamination in AOC-1.

## **9.8 Site 21**

**9.8.1 Background.** Site 21 is a former fuel dock facility that included an unlined surface impoundment, three 100,000-gallon concrete diesel fuel USTs and a storage area for solvents and cleaning compounds. The fuel dock was used from the early 1940s until 1993. Site 21 is bordered on the north by a pond that was formerly used as an oxidation pond for effluent from Sewage Treatment Plant 1. Discharge of wastewater to the oxidation pond was reportedly discontinued in mid-2000. The former oxidation pond discharges into an artificial channel that reconnects with natural drainage approximately 400 ft downgradient from the pond, which leads eventually to Lake O'Neill, approximately 3,600 ft down-canyon from the pond.

Although the risk associated with current receptors at the site appears to be minimal and area groundwater is an unlikely source for potable water, field work was conducted at Site 21 to determine if TCE in the pond was a source for groundwater and to develop a better understanding of site hydrogeology. The results of the field work were documented in a Technical Memorandum that confirmed the pond was not the source of TCE in groundwater.

**9.8.2 Remedial Actions.** A pilot study to determine the feasibility of implementing biological treatment was awarded and is expected to be performed in 2009.

**9.8.3 Technical Assessment.** A technical assessment has not been performed as the site is still undergoing investigation.

**Section 10.0: SITES NOT CURRENTLY INCORPORATED IN AN OPERABLE UNIT**

The following sites currently are not incorporated in an OU, and are being addressed individually:

- Site 1114, formerly IR Site 9 – The PA/SI field investigation has been performed and was submitted to the regulatory agencies in December 2008.
- Site 1116, 14 Area GW – The site was recently transferred from the UST program to CERCLA. Plans for conducting a PA/SI are currently in progress.
- Site 1117, 15/16 Area GW – The site was recently transferred from the UST program to CERCLA. Plans for conducting a PA/SI are currently in progress.
- Site 1118, Area 21/26/52 GW – The site was recently transferred from the UST program to CERCLA. A PA/SI will be conducted; however, funding for the investigation will not be available until 2012.

Three of these IR Sites (1116, 1117, and 1118) consist of a group of petroleum UST sites that have either received regulatory closure from the RWQCB, San Diego Region or have ongoing assessments with RWQCB oversight. Those closures and ongoing assessments have been occurring under the MCB Camp Pendleton petroleum UST compliance program, outside of the Navy’s IR and CERCLA process. Based on detections of non-petroleum-related VOCs at many of these UST Sites, the Navy has created IR Sites 1116, 1117, and 1118 to allow for their investigation and assessment under the CERCLA process. Based on a review of available data, the primary VOCs of potential concern include TCE and PCE and their degradation products. The names and numbers of the UST or structure located within these IR sites are summarized in Table 10-1. Locations of these sites are shown on Figure 3-2. Although, no remedy has been selected yet for Sites 1116, 1117, and 1118, they are protective because they are mostly paved, there are no drinking water wells nearby and the site approval process is in place to prevent access to the sites.

**Table 10-1. Names and Numbers of the Structures Located in the IR Site**

<b>IR Site</b>	<b>UST/BLDG #</b>	<b>Site Name</b>
1116	1441	Office Building
	1491	FSSG HQ
	14112	14 Area Pool
	14121	Admin Building
	14125	Admin Building
	14127	Office Building
	14131	Former Building
	14137	Administration Building
	140008	Bachelor/Base Enlisted Quarters
	14151-14157	One well only (MW-3)
1117	1536	Housing Office Building
	1575	Office Supply Shop
	1655	Former Building
1118	21565	Power Plant Boiler Room
	2666	Former Dry Cleaners
	520400	Former Gas Station

IR Sites 1116, 1117, and 1118 have entered the IR Program at the SI phase of the CERCLA response action process. The SI phase typically includes focused field sampling and chemical analysis to confirm a suspected release, confirm theories regarding releases, identify hazardous substances released and support human health and ecological risk screening. All sites are currently in the site investigation phase; therefore, the requirement for Five-Year Reviews is not required and a technical assessment is not provided. However, a brief summary of each site and its respective investigation status is provided in the subsections below.

## **10.1 Site 1114**

Site 1114 is located in the southwestern portion of MCB Camp Pendleton in the 41 Area. The site is located approximately one mile south of Las Flores Creek and one half mile east of the Pacific Ocean. The area is primarily used for military training. Site 1114 is adjacent to Site 9, the Former Waste Stabilization Pond in the 41 Area. The VOCs in groundwater are designated as Site 1114, the 41 Area Arroyo. The boundaries of Site 1114 were defined based on the extent of VOCs exceeding MCLs in groundwater.

PCE concentrations have increased in monitoring well 9W-7A. PWC performed a PA/SI of IR Site 1114 in March 2004. Based on the results of all data collected, it was determined that PCE concentrations were greatest at or near the water table. The highest VOC concentration detected in groundwater was 61 parts per billion (ppb) from a grab sample collected from a temporary well located adjacent to well 9W-07A. Dense, non-aqueous phase liquid conditions and product-level concentrations were not encountered.

Preliminary results from the IR Site 1114 investigation were presented to the FFA team at a meeting in April 2004. The FFA team generally concurred that no further investigation action was warranted; however, DTSC raised concerns about potential risk to hypothetical receptors from VOCs in soil gas if the site were redeveloped in the future. The DON agreed to conduct a soil-gas survey to quantify VOCs present and assess related risk to human health. At an August 2007 meeting, the FFA team discussed the technical approach for the proposed soil-vapor investigation and in April 2008, an addendum to the *Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan)* (PWC, 2004b) was prepared by Richard Brady & Associates (2008) on behalf of the DON, describing the rationale and methods for implementation of a soil-vapor sampling survey at IR Site 1114.

The purpose of the soil-vapor sampling survey was to determine the areal extent and evaluate associated concentrations of vapor-phase chlorinated hydrocarbons in the vicinity of the groundwater plume. Data from the soil-vapor assessment will be used to evaluate human health risk associated with vapor intrusion into a hypothetical building.

Soil vapor sampling was conducted in June 2008. Based on the laboratory analytical results (NAVFAC, 2008d), several VOCs were reported in soil gas samples collected across the site. PCE was detected in eight of the 20 site samples collected. Several petroleum hydrocarbon-related VOCs, including benzene, toluene, ethylbenzene, and xylenes and other VOCs, including 1,2,4-trimethylbenzene, 1,3-butadiene, 2,2,4-trimethylpentane, 2-butanone, 4-ethyltoluene, acetone, cyclohexane, ethanol, and heptane also were detected. With the exception of PCE, all detected VOC concentrations in soil gas appear to exhibit a good spatial correlation, with the greatest concentrations reported in the 5 ft bgs samples collected near the western border of the former waste stabilization pond (IR Site 9). This site will progress to the Remedial Investigation phase.

## **10.2 Site 1116**

Site 1116 was added to the IR Program in response to CERCLA contaminants (primarily TCE) detected during investigations of various UST sites (see Table 10-1 for UST sites) in the 14 Area. Based on the available data, it is speculated that TCE contamination is unrelated to the UST leaks. Accordingly, Site 1116, 14 Area Groundwater, has been established to further investigate the extent and potential sources of VOCs in groundwater.

## **10.3 Site 1117**

Site 1117 was added to the IR Program in response to CERCLA contaminants (primarily TCE and vinyl chloride) detected during investigations of UST Sites 1536, 1575, and 1655. Based on the available data, it is speculated that VOC contamination is unrelated to the UST leaks. Accordingly, Site 1117, 15/16 Area Groundwater, has been established to further investigate the extent and potential sources of VOCs in groundwater.

## **10.4 Site 1118**

Site 1118 was added to the IR Program in response to CERCLA contaminants (PCE, TCE, and dichlorethene [DCE]) detected during investigations of various UST sites (21565, 2666, and 520400) in the 21 and 26 Areas. Based on the available data, it is speculated that VOC contamination is unrelated to the UST leaks. Accordingly, Site 1118, 21/26 Area Groundwater, has been established to further investigate the extent and potential sources of VOCs in groundwater.

## **Section 11.0: NEXT REVIEW**

The next Five-Year Review for MCB Camp Pendleton OUs 1 through 5 is due on March 31, 2014, which is five years from the due date of this review.

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**APPENDIX A**

**Summary of Sites Included in Operable Units 1 through 5 and Additional Sites not  
Incorporated into an Operable Unit**

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
1A	14 Area Refuse Burning Ground	Yes	X		X		Refuse burning ground in training region in the 14 Area	3	The ROD previously issued for this site calls for excavation of contaminated soils and on-site disposal in IR Site 7 (Box Canyon Landfill), and this remedy was partially completed. However, IR Site 7 was closed during the course of excavating soil at Site 1A, resulting in incomplete removal of impacted soils. Excavation of remaining soils is almost complete.
1A-1	Ash and Debris Disposal Area (14 Area)	Yes	X		X		Disposal area for refuse burning ground 1A in the 14 Area	5	OU-5 ROD finalizing RD/RA alternative signed in January 2008
1B	11 Area Refuse Burning Ground	No	X		X		Refuse burning ground in the 11 Area	3	Documented NFA in OU-3 ROD
1C	13 Area Refuse Burning Ground	No	X		X		Refuse burning ground in the 13 Area	3	Documented NFA in OU-3 ROD
1D	20 Area Refuse Burning Ground	Yes	X		X		Refuse burning ground in the 20 Area	4	Remedial action (excavation) began on November 8, 2007
1E	32 Area Refuse Burning Ground	No	X		X		Refuse burning ground in the 32 Area	3	Letter finalizing Remedial Action Closure Report dated September 23, 2003
1E-1	Former Burn Pits	No	X				Site 1E-1 is a former refuse burning area located in 32 Area along MACS Road, approximately 3,000 feet from the Santa Margarita River. The site is a series of burn pits adjacent to Site 1E.	4	Documented NFA in OU-4 ROD
1F	43 Area Refuse Burning Ground	No	X		X		Refuse burning ground in the 43 Area	3	Letter finalizing Remedial Action Closure Report dated October 2, 2003
1G	52 Area Refuse Burning Ground (at San Onofre landfill)	No	X				Refuse burning ground that is a part of Site 14, the San Onofre Landfill	N/A	Removed from CERCLA, part of Site 14 - San Onofre Landfill.
1H	62 Area Refuse Burning Ground	Yes	X	X	X		Refuse burning ground in the 62 Area	5	Remedial action (excavation) began in May 2008
1I	64 Area Refuse Burning Ground	No	X		X		Refuse burning ground in the 63 Area	3	Documented NFA in OU-3 ROD
1111	Ash and Debris Disposal Area (26 Area)	Yes	X				Burn layer in the 26 Area adjacent to OU-2, Site 3 (pest control wash rack). The site was exposed during excavation activities at Site 3.	5	Interim Removal Action conducted in November 2006. Groundwater monitoring ongoing.
2A	14 Area Grease Disposal Pit	No	X	X	X		Grease disposal pit in the 14 Area	3	Letter finalizing Remedial Action Closure Report dated October 2, 2003

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
2B	32 Area Grease Disposal Pit	No	X				Site 2B - Grease Disposal Pit in 32 Area is located along MACS Road, approximately 0.75 mile northwest of Stuart Mesa Road. The grease pit boundary is approximately 80 feet long and 60 feet wide, as delineated through field reconnaissance and aerial photographs.	2	Document NFA in OU-2 ROD
2C	33 Area Grease Disposal Pit	No	X		X		Grease disposal pit in the 33 Area	3	Documented NFA in OU-3 ROD
2D	43 Area Grease Disposal Pit	No	X		X		Grease disposal pit in the 43 Area	3	Documented NFA in OU-3 ROD
2E	53 Area Grease Disposal Pit	No	X		X		Grease disposal pit in the 53 Area. Site could not be located during surveying, photographs or field reconnaissance.	3, N/A	Site was originally included in OU-3, but this site could not be located. If the site is located, it will be addressed as a new site.
2F	62 Area Grease Disposal Pit	No	X		X		Grease disposal pit in the 62 Area	3	Documented NFA in OU-3 ROD
2G	31 Area (MCTSSA) Grease Disposal Pit	No	X		X		Grease disposal pit in the 31 Area	3	Documented NFA in OU-3 ROD
3	26 Area Pest Control Washrack	No	X	X	X		Site 3 included a pest control wash rack, unlined drainage ditches in the vicinity of and downstream from the wash rack, and surrounding areas used to mix and dispose of pesticide solutions.	2	Removal Action Completed.NFA for soil, sediment and groundwater in OU-2 ROD.
4/4A	MCAS Drainage Ditch & Concrete Lined Surface Impoundment	No	X		X		Site 4 included a drainage ditch ( 5 feet deep and 20 feet wide) along vandegrift Boulevard, 23 Area MCAS. Site 4a extended Site 4 to include a concrete lined surface impoundment located between the drainage ditch and MCAS operations near Bulding 2378.	1 (for soil), 2 (for gw)	Soil only, NFA in OU-1 ROD. Groundwater transferred to Site 6.
5	Fire Fighter Drill Field	No	X		X		Site 5 is located in the middle of the MCAS in the 23 Area. The site includes a grassy, unlined circular burn pit, 60 to 70 feet in diameter, surrounded by a 1-foot-high earthen berm.	2	Removal Action completed in 1995. NFA in OU2 ROD
6/6A/22/23 Area Groundwater	Site 6/6A - DRMO Scrap Yard/Bldg 2241 NORM Site 6 - 22/23 Area Groundwater (sites 4/4A, 6, 16, 17, 27)	Yes	X	X	X	X	The Site 6 is located at the extreme southwestern end of the 22 Area in the Santa Margarita Basin. The site includes the current paved scrap yard operated by the DRMO (formerly DPDO), an unpaved, low-lying area approximately 300 feet south of Building 2241, drainage ditches running along and through the site, and an area near the Building 2243 railroad tracks. The site is within the 100-year floodplain.	2,5 (for Site 6 soil) 4,5 (for Site 6A soil and 22/23 area groundwater)	NFA for Site 6 soil in OU2 ROD. Removal Action completed,for Site 6A. NFA for soil at this site was documented in the OU-5 ROD. Groundwater for both is part of 22/23 Area groundwater. Site is in RI/FS to determine source of 1,2,3-TCP.
7	20 Area Box Canyon Landfill	Yes	X		X		Box Canyon Landfill in the 20 Area. Inactive landfill that covers approximately 28 acres.	3	In accordance with the ROD, continue groundwater and soil vapor monitoring and semi-annual site maintenance (Nov. winterization and May restoration, SWPPP inspections and maintenance after significant rain events). Work plan being prepared to install flare unit to reduce methane concentrations. Perform five-year reviews.

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
8	Las Pulgas Landfill	No	X		X		Site 8 is the Las Pulgas Landfill which is currently active	2	Landfill removed from CERCLA and moved to State of California Landfill program
8A	Las Pulgas Landfill	No	X		X		Portion of the ephemeral Las Flores stream channel to the east of the Las Pulgas Landfill	2	No Action
9	41 Area Stuart Mesa Waste Stabilization Pond	No	X		X		Site 9 was the 41 Area Stuart Mesa waste stabilization pond located approximately 1 mile south of Las Flores Creek and 0.5 miles east of the Pacific Ocean. Operated as a sewage lagoon for the percolation and oxidation of raw sewage.	1	ESD for NFA signed October 5, 2004
10	26 Area Sewage Sludge Composting Yard	No	X		X		Sewage sludge composting yard in the 26 Area	3	Documented NFA in OU-3 ROD
11	22/23 Area JP-5 Fuel Spill	No	X	X	X	X	The Site 6 is located at the extreme southwestern end of the 22 Area in the Santa Margarita Basin. The site includes the current paved scrap yard operated by the DRMO (formerly DPDO), an unpaved, low-lying area approximately 300 feet south of Building 2241, drainage ditches running along and through the site, and an area near the Building 2243 railroad tracks. The site is within the 100-year floodplain.	2,5 (for Site 6 soil) 4,5 (for Site 6A soil and 22/23 area groundwater)	Now under 22/23 Area groundwater.
12	14 Area Assault Vehicle Fueling Area	No	X		X		IR Site 1116 consists of nine UST sites in the 14 Area	N/A	Now under Site 1116 - 14 Area Groundwater.
13	12 Area Asphalt Plant	No	X				The asphalt plant is located north of the Naval Regional Medical Center. Soil contamination was reported at this plant in 1985.	N/A	Excluded from CERCLA under petroleum exclusion in January 25, 1995. Remediated by base under ACOE contract.
14	Las Pulgas Landfill	No	X		X		Site 14 is the San Onofre Landfill. Landfill is currently active.	2	Landfill removed from CERCLA and moved to State of California Landfill program
15	Nearby Groundwater to Site 3	No			X		Groundwater near Site 3	3	OU-3 NFA ROD completed March 31, 1999
16	22 Area Building 22151 & 22187 Ditch Confluence & Ditch	No	X		X		Buildings 22151 and 22187 ditch confluence and ditch in the 22 Area.	2 (for groundwater), 3 (for soil, sediment and surface water)	OU-3 NFA for soil ROD completed March 31, 1999. Groundwater under 22/23 Area Groundwater.
17	22 Area Building 22187 Marsh and Ditch	No	X	X	X	X	Building 22187 marsh and ditch in the 22 Area. Only petroleum hydrocarbons were detected in soil.	2 (for groundwater), 3 (for soil, sediment and surface water)	Petroleum exclusion site for soil only (9-12-96). Documented NFA for soil in OU-3. Groundwater under 22/23 Area Groundwater.
18	13/16 Area Bldg Spill & Ditch	No	X		X		Buildings 1687 spill and ditch in the 13 and 16 Areas.	3	Documented NFA in OU-3 ROD

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
19	31 Area ACU-5 LCAC Two Surface Impoundments	No	X	X	X	X	Site 19, ACU-5 (LCAC) Two Surface Impoundments, is located in the 31 Area, between Interstate 5 and the Pacific Ocean. This complex provides training and maintenance facilities for LCAC amphibious vehicles. The impoundments are lined and receive water from a concrete area used for vehicle washing and minor maintenance.	2	Documented NFA in OU-2 ROD
20	43 Area Las Pulgas Vehicle Wash Rack	No	X	X	X	X	Site 20, 43 Area Las Pulgas Vehicle Wash Rack, is located approximately 100 feet north of Basilone Road, immediately east of its intersection with Las Pulgas Road. The impoundment is approximately 106 feet long and 36 feet wide and receives runoff from the vehicle washing area. Wash water from the impoundment drains into the oil/water separator before discharging to a shallow ephemeral drainage ditch that intersects Las Flores Creek. The site is bordered on the northeast side by a concrete and asphalt paved area, on the southeast by moderate to dense vegetation, on the west by light vegetation and Basilone Road, and on the north by light vegetation and an unpaved access road.	2	Documented NFA in OU-2 ROD
21	14 Area Surface Impoundment	No			X		Unlined ditch near the 14 Area fuel dock previously used to contain fuel spills	5 (both for groundwater only)	Pilot study to determine feasibility of bioremediation awarded.
22	23 Area Unlined Surface Impoundment	No	X	X	X	X	Site 22 - 23 Area Unlined Surface Impoundment, is located at the MCAS, approximately 60 feet southeast of Papa Taxiway. This site is noted as Building 2388 on MCB Camp Pendleton general development maps.	2	Documented NFA in OU-2 ROD
24	26 Area MRW Maintenance Facilities	No	X			X	Site 24 included the 26 Area, Morale, Welfare and Recreation Maintenance facility. This site included a welding shop, paint shop, and a former hazardous waste storage area.	1	Documented NFA in OU-1 ROD
27	22 Area Ditches Behind Bldg 22210	No	X		X		Ditches behind Building 22210 in the 22 Area	2 (for groundwater), 3 (for soil, sediment and surfacewater)	Documented NFA for soil in OU-3 ROD. Groundwater under 22/23 Area Groundwater.
28	26 Area Trash Haulers Maintenance Area	No	X			X	Site 28 - 26 Area Trash Haulers Maintenance Area, is located in 26 Area, approximately 1,800 feet southwest of the intersection of Vandegrift Boulevard and Santa Margarita Road. The site is surrounded by a chain-link fence, with an entryway on the east. The unpaved area is graded and contains a small concrete pad, 55 feet long by 15 feet wide, and no natural vegetation. The area west of the fence contains natural vegetation and native soil.	2 (for groundwater)	Petroleum exclusion site for soil only (9-12-96). Documented NFA for groundwater in OU-2 ROD.

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
29	25 Area Skeet Range	No	X		X		Active skeet range in the 25 Area. There are no current plans to close or stop using the range for training purposes.	N/A	Removed from IR Program - active range
30	30 Firing Range Soil Fill in 31 Area	Yes	X				Firing range soil fill in the 31 Area. Soil fill material reportedly containing lead from a firing range was used as fill material along a dirt road.	4	Remedial action began early 2008
31	Building 210801 Transformer	No	X				Site 31 - Building 210801 Transformer, is located in 21 Area, at the intersection of 13th Street and 'C' Street. The transformer previously held fluid containing PCBs.	2	Documented NFA in OU-2 ROD
32	Drum Storage Area and Drainage Between Bldgs 41303 & 41366	No	X				Drum storage and drainage area between Buildings 41303 and 41366 in the 41 Area	3	Documented NFA in OU-3 ROD
33	52 Area Armory (Bldg 520452) and Drainage to Southeast	Yes	X				Armory (Building 520452) and drainage to the southwest in the 52 Area	5	RI/FS recommended alternatives. Will likely select excavation of source area and placement of subsurface bioreactor .
34	Combat Engineers Maintenance Facility Bldgs 62580-62583	No	X				Combat engineer's maintenance facility, Buildings 62580-83, in the 62 Area	3	Documented NFA in OU-3 ROD
35	25 Area Former Sewage Treatment Plant	No	X		X		Former sewage treatment plant in the 25 Area	3	Documented NFA in OU-3 ROD
36	Debris Pile behind STP 11	No	X		X		Debris pile area behind the ponds at the Sewage Treatment Plant II	3	Documented NFA in OU-3 ROD
37	Pesticide POL Handling Area at San Clemente Ranch	No	X				Pesticide and petroleum, oils, and lubricant handling areas, San Clement Ranch	3	Documented NFA in OU-3 ROD
38	52 Area Sewer Line Bldg 52188	No	X	X	X		Building 52188 sewer line, 52 Area	3	Documented NFA in OU-3 ROD
39	41 Area Sewer Line Bldg 41300 & 41346	No	X		X		Buildings 41300 and 41346 sewer line, 41 Area	3	Documented NFA in OU-3 ROD
40	13 Area Sewer Line Bldg 13103	No	X		X		Building 13103 sewer line, 13 Area	3	Documented NFA in OU-3 ROD
41	13 Area Sewer Line Bldg 13128	No	X		X		Building 13128 sewer line, 13 Area	3	Documented NFA in OU-3 ROD
42	13 Area Sewer Line Bldg 13129	No	X		X		Building 13129 sewer line, 13 Area	3	Documented NFA in OU-3 ROD
43	SMB Groundwater Study	No			X		The objectives of the Santa Margarita Basin groundwater study were to determine whether groundwater quality throughout the Santa Margarita Basin has been affected by developed areas	2	Documented NFA in OU-2 ROD.
44	SMB Surface Water & Sediment Study	No		X		X	The objectives of the Santa Margarita Basin surface-water and sediment study were to evaluate surface-water and sediment quality upstream and downstream from developed areas along the Santa Margarita River	2	Documented NFA in OU-2 ROD.

IR Site	Site Name	Five-Year Review	Impacted Medium				Description	OU	Status
			Soil	Sediment	Groundwater	Surface Water			
45	Santa Margarita Coastal Wetland Study	No	X	X	X		The objectives of the Site 45 study were to evaluate whether developed areas upstream/upgradient from the site have contaminated coastal wetlands.	2	Documented NFA in OU-2 ROD. Closed all media.
46	Gronwater Study Outside SMB	No			X		Unknown	N/A	Areas under investigation were studied as individual sites.
47	Surface Water & Sediment Study Outside SMB	No		X		X	Unknown	N/A	Areas under investigation were studied as individual sites.
48	Coastal Wetland Study Outside SMB	No		X		X	Unknown	N/A	Areas under investigation were studied as individual sites.
62	Asphalt Batch Plant	Yes	X		X		Former asphalt batch plant in the 62 Area	5	A Site Investigation is underway
1114	41 Area TCE Plume	Yes			X		IR Site 1114 is located in the southwestern portion of MCB Camp Pendleton in the 41 Area. The site is southwest of Stuart Mesa Road approximately one mile south of Las Flores Creek and one-half mile east of the Pacific Ocean.	N/A	Site Inspection Report in agency review.
1115 and 12 Area, Site 13	13 Area FSSG Lot/Former Mess Hall	Yes	X				Former vehicle maintenance facility (FSSG lot) in the 13 Area	5	Pilot study in agency review for Site 1115. Results will be documented in an FS.
1116	14 Area Groundwater	Yes		X	X		IR Site 1116 consists of nine UST sites in the 14 Area	N/A	Currently in the Site Investigation stage
1117	15/16 Area Groundwater	Yes			X		IR Site 1117 contains three UST sites, two in 15 Area and one in 16 Area	N/A	Currently in the Site Investigation stage
1118	21/26 Area Groundwater	Yes			X		IR Site 1118 consists of three USTs: one in the 21 Area, one in the 26 Area and one in the 52 Area. Due to the nature of the Site 1118 facilities it is likely they were the source of the VOC contamination.	N/A	Currently in the Site Investigation stage

N/A - not applicable

**APPENDIX B**

**IR Site 7 Inspection Photographs**



**Photograph B-1. Top Deck of Box Canyon Landfill Looking Northeast**



**Photograph B-2. Vegetation and Erosion Control on the Top Deck of the Landfill**



**Photograph B-3. Evidence of Burrowing Animals on the Side of the Landfill**



**Photograph B-4. Drainage Channel at IR Site 7**



**Photograph B-5. Drainage Channel and Storm Water Inlet at IR Site 7**



**Photograph B-6. Trespassing Signage**



**Photograph B-7. Conditions at IR Site 1A as of August 2008**



**Photograph B-8. Current Land Conditions at Site 1D**



**Photograph B-9. Current Land Conditions at Site 30**



**Photograph B-10. Current Conditions at Site 1A-1**



**Photograph B-11. Current Conditions at IR Site 1H**



**Photograph B-12. Current Conditions of Areas Overlying 22/23 Area Groundwater**



**Photograph B-13. Current Conditions at Site 1111**



**Photograph B-14. Current Conditions at Site 33**



**Photograph B-15. Current Conditions at Site 1115**



**Photograph B-16. Current Conditions at Site 62**



**Photograph B-17. Current Conditions at Site 21**



**Photograph B-18. Current Conditions at Site 1114**



**Photograph B-19. Current Conditions at Site 1116**



**Photograph B-20. Current Conditions at Site 1117**



**Photograph B-21. Current Conditions at Site 1118**

**APPENDIX C**

**IR Site 7 Inspection Checklist and Interview Reports**

## Five-Year Review Site Inspection Checklist IR Site 7

("N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> IR Site 7	<b>Date of inspection:</b> August 13, 2008		
<b>Location and Region:</b> California/Region 9	<b>EPA ID:</b> CA2170023533		
<b>Agency, office, or company leading the Five-Year Review:</b> Battelle	<b>Weather/temperature:</b> Sunny, mid-70s		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> <b>Landfill cover/containment</b>  <input checked="" type="checkbox"/> <b>Access controls</b>                      Institutional controls                      Groundwater pump and treatment                      Surface water collection and treatment                      Other _____                      _____                 </td> <td style="width: 50%; vertical-align: top;">                     Monitored natural attenuation                      Groundwater containment                      Vertical barrier walls                 </td> </tr> </table>		<input checked="" type="checkbox"/> <b>Landfill cover/containment</b> <input checked="" type="checkbox"/> <b>Access controls</b> Institutional controls Groundwater pump and treatment Surface water collection and treatment Other _____ _____	Monitored natural attenuation Groundwater containment Vertical barrier walls
<input checked="" type="checkbox"/> <b>Landfill cover/containment</b> <input checked="" type="checkbox"/> <b>Access controls</b> Institutional controls Groundwater pump and treatment Surface water collection and treatment Other _____ _____	Monitored natural attenuation Groundwater containment Vertical barrier walls		
<b>Attachments:</b> Inspection team roster attached                      Site map attached			
II. INTERVIEWS (Check all that apply)			
<b>1. O&amp;M site manager</b> _____      _____      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed   at site   at office   by phone   Phone no. _____ Problems, suggestions;   Report attached _____ _____			
<b>2. O&amp;M staff</b> _____      _____      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed   at site   at office   by phone   Phone no. _____ Problems, suggestions;   Report attached _____ _____			



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> O&M manual As-built drawings Maintenance logs Remarks _____ None on-site _____	Readily available Readily available Readily available	Up to date Up to date Up to date	N/A N/A N/A
2.	<b>Site-Specific Health and Safety Plan</b> Contingency plan/emergency response plan Remarks _____ None on-site _____	Readily available Readily available	Up to date Up to date	N/A N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A
4.	<b>Permits and Service Agreements</b> Air discharge permit Effluent discharge Waste disposal, POTW Other permits _____ Remarks _____ None on-site _____	Readily available Readily available Readily available Readily available	Up to date Up to date Up to date Up to date	N/A N/A N/A N/A
5.	<b>Gas Generation Records</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A
6.	<b>Settlement Monument Records</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A
8.	<b>Leachate Extraction Records</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A
9.	<b>Discharge Compliance Records</b> Air Water (effluent) Remarks _____ None on-site _____	Readily available Readily available	Up to date Up to date	N/A N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____ None on-site _____	Readily available	Up to date	N/A

**IV. O&M COSTS**

1. **O&M Organization**  
 State in-house Contractor for State  
 PRP in-house Contractor for PRP  
 Federal Facility in-house  **Contractor for Federal Facility**  
 Other \_\_\_\_\_

2. **O&M Cost Records**  
 Readily available Up to date  
 Funding mechanism/agreement in place  
 Original O&M cost estimate refer to the PCMMP (NAVFAC, 2008a) Breakdown attached

Total annual cost by year for review period if available

From _____	To _____	_____	Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	Breakdown attached
Date	Date	Total cost	
From _____	To _____	_____	Breakdown attached
Date	Date	Total cost	

3. **Unanticipated or Unusually High O&M Costs During Review Period**  
 Describe costs and reasons: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**V. ACCESS AND INSTITUTIONAL CONTROLS**  **Applicable** N/A

**A. Fencing**

1. **Fencing damaged** Location shown on site map  **Gates secured** N/A  
 Remarks \_\_\_\_\_ no damage observed \_\_\_\_\_

**B. Other Access Restrictions**

1. **Signs and other security measures** Location shown on site map N/A  
 Remarks \_\_\_\_\_ No Trespassing sign on gate \_\_\_\_\_

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented		Yes	No
	Site conditions imply ICs not being fully enforced		Yes	No
	Type of monitoring ( <i>e.g.</i> , self-reporting, drive by) _____ inspection as part of site maintenance _____			
	Frequency _____ semi-annual _____			
	Responsible party/agency _____ MCB Camp Pendleton _____			
	Contact _____ IR Manager at Environmental Security Office on Base.			
	Reporting is up-to-date		<input checked="" type="checkbox"/> Yes	No
	Reports are verified by the lead agency		X Yes	No
	Specific requirements in deed or decision documents have been met		Yes	No
	Violations have been reported		Yes	No
	Other problems or suggestions:    Γ Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	ICs are inadequate	N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	N/A		
	Remarks _____ none; same as when ROD implemented _____			
	_____			
3.	<b>Land use changes off site</b>	N/A		
	Remarks _____ none; same as when ROD implemented _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input checked="" type="checkbox"/> Applicable	N/A		
1.	<b>Roads damaged</b>	Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>			
Remarks __random equipment parked to side of landfill near main drain (SVE, soil cores, spent carbon drum)_____			
_____			
_____			
_____			
<b>VII. LANDFILL COVERS</b> x Applicable N/A			
<b>A. Landfill Surface</b>			
1.	<b>Settlement</b> (Low spots) Areal extent _____ Remarks _____	Location shown on site map Depth _____	<input checked="" type="checkbox"/> <b>Settlement not evident</b>
2.	<b>Cracks</b> Lengths _____ Widths _____ Remarks _____	Location shown on site map Depths _____	<input checked="" type="checkbox"/> <b>Cracking not evident</b>
3.	<b>Erosion</b> Areal extent _____ Remarks <b>geofence can be seen in several places</b> _____	Location shown on site map Depth _____	<input checked="" type="checkbox"/> <b>Erosion not evident</b>
4.	<b>Holes</b> Areal extent _____ Remarks <b>burrowing animals near GP-8 on side of landfill</b> _____	Location shown on site map Depth _____	Holes not evident
5.	<b>Vegetative Cover</b> <input checked="" type="checkbox"/> <b>Grass</b> Trees/Shrubs (indicate size and locations on a diagram) Remarks _____	Cover properly established	No signs of stress
6.	<b>Alternative Cover (armored rock, concrete, etc.)</b> <input checked="" type="checkbox"/> <b>N/A</b> Remarks _____		
7.	<b>Bulges</b> Areal extent _____ Remarks _____	Location shown on site map Height _____	<input checked="" type="checkbox"/> <b>Bulges not evident</b>
8.	<b>Wet Areas/Water Damage</b> Wet areas Ponding Seeps Soft subgrade Remarks _____	<input checked="" type="checkbox"/> <b>Wet areas/water damage not evident</b> Location shown on site map Location shown on site map Location shown on site map Location shown on site map	Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____

9.	<b>Slope Instability</b>	Slides	Location shown on site map	<input checked="" type="checkbox"/> <b>No evidence of slope instability</b>
	Areal extent _____			
	Remarks _____			
<b>B. Benches</b>				
	Applicable		<input checked="" type="checkbox"/> <b>N/A</b>	
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)				
1.	<b>Flows Bypass Bench</b>		Location shown on site map	N/A or okay
	Remarks _____			
2.	<b>Bench Breached</b>		Location shown on site map	N/A or okay
	Remarks _____			
3.	<b>Bench Overtopped</b>		Location shown on site map	N/A or okay
	Remarks _____			
<b>C. Letdown Channels</b>				
	<input checked="" type="checkbox"/> <b>Applicable</b>		N/A	
(Channel lined with erosion control mats, <b>riprap</b> , grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)				
1.	<b>Settlement</b>		Location shown on site map	<input checked="" type="checkbox"/> <b>No evidence of settlement</b>
	Areal extent _____		Depth _____	
	Remarks _____			
2.	<b>Material Degradation</b>		Location shown on site map	<input checked="" type="checkbox"/> <b>No evidence of degradation</b>
	Material type _____		Areal extent _____	
	Remarks _____			
3.	<b>Erosion</b>		Location shown on site map	<input checked="" type="checkbox"/> <b>No evidence of erosion</b>
	Areal extent _____		Depth _____	
	Remarks _____			
4.	<b>Undercutting</b>		Location shown on site map	<input checked="" type="checkbox"/> <b>No evidence of undercutting</b>
	Areal extent _____		Depth _____	
	Remarks _____			
5.	<b>Obstructions</b>	Type _____	<input checked="" type="checkbox"/> <b>No obstructions</b>	
	Location shown on site map		Areal extent _____	
	Size _____			
	Remarks _____			
6.	<b>Excessive Vegetative Growth</b>		Type _____	
	<input checked="" type="checkbox"/> <b>No evidence of excessive growth</b>			
	Vegetation in channels does not obstruct flow			
	Location shown on site map		Areal extent _____	
	Remarks _____			

<b>D. Cover Penetrations</b> X Applicable    N/A				
1.	<b>Gas Vents</b> Properly secured/locked Evidence of leakage at penetration N/A Remarks _____	Functioning	Active Routinely sampled Needs Maintenance	Passive Good condition
2.	<b>Gas Monitoring Probes</b> X Properly secured/locked } Evidence of leakage at penetration Remarks _____	Functioning	<input checked="" type="checkbox"/> <b>Routinely sampled</b> Needs Maintenance	Good condition N/A
3.	<b>Monitoring Wells</b> (within surface area of landfill) <input checked="" type="checkbox"/> Properly secured/locked Good condition Needs Maintenance Remarks _____	<input checked="" type="checkbox"/> <b>Functioning</b> Evidence of leakage at penetration N/A		<input checked="" type="checkbox"/> Routinely sampled
4.	<b>Settlement Monuments</b> Remarks _____	<input checked="" type="checkbox"/> <b>Located</b>	<input checked="" type="checkbox"/> <b>Routinely surveyed</b>	N/A
<b>E. Gas Collection and Treatment</b> Applicable    X N/A				
1.	<b>Gas Treatment Facilities</b> Flaring Good condition Remarks _____	Thermal destruction Needs Maintenance		Collection for reuse
2.	<b>Gas Collection Wells, Manifolds and Piping</b> Good condition Remarks _____	Needs Maintenance		
3.	<b>Gas Monitoring Facilities</b> (e.g., gas monitoring of adjacent homes or buildings) Good condition Remarks _____	Needs Maintenance		N/A
<b>F. Cover Drainage Layer</b> Applicable <input checked="" type="checkbox"/> N/A				
1.	<b>Outlet Pipes Inspected</b> Remarks _____	Functioning	N/A	
2.	<b>Outlet Rock Inspected</b> Remarks _____	Functioning	N/A	

<b>G. Detention/Sedimentation Ponds</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Siltation</b> Areal extent _____ Depth _____ Siltation not evident Remarks _____		N/A
2.	<b>Erosion</b> Areal extent _____ Depth _____ Erosion not evident Remarks _____		
3.	<b>Outlet Works</b> Functioning Remarks _____		N/A
4.	<b>Dam</b> Functioning Remarks _____		N/A
<b>H. Retaining Walls</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Deformations</b> Location shown on site map Deformation not evident Horizontal displacement _____ Vertical displacement _____ Rotational displacement _____ Remarks _____		
2.	<b>Degradation</b> Location shown on site map Degradation not evident Remarks _____		
<b>I. Perimeter Ditches/Off-Site Discharge</b>		<input checked="" type="checkbox"/> Applicable	N/A
1.	<b>Siltation</b> Location shown on site map Siltation not evident Areal extent _____ Depth _____ Remarks _____ <b>lined rip rap –good condition</b>		
2.	<b>Vegetative Growth</b> Location shown on site map N/A <input checked="" type="checkbox"/> <b>Vegetation does not impede flow</b> Areal extent _____ Type _____ Remarks _____		
3.	<b>Erosion</b> Location shown on site map <input checked="" type="checkbox"/> Erosion not evident Areal extent _____ Depth _____ Remarks _____		
4.	<b>Discharge Structure</b> <input checked="" type="checkbox"/> <b>Functioning</b> N/A Remarks _____		
<b>VIII. VERTICAL BARRIER WALLS</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Settlement</b> Location shown on site map Settlement not evident Areal extent _____ Depth _____ Remarks _____		



<b>C. Treatment System</b>		Applicable	N/A
1.	<b>Treatment Train</b> (Check components that apply) Metals removal _____ Oil/water separation _____ Bioremediation _____ Air stripping _____ Carbon adsorbers _____ Filters _____ Additive (e.g., chelation agent, flocculent) _____ Others _____ Good condition _____ Needs Maintenance _____ Sampling ports properly marked and functional _____ Sampling/maintenance log displayed and up to date _____ Equipment properly identified _____ Quantity of groundwater treated annually _____ Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) N/A _____ Good condition _____ Needs Maintenance _____ Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> N/A _____ Good condition _____ Proper secondary containment _____ Needs Maintenance _____ Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> N/A _____ Good condition _____ Needs Maintenance _____ Remarks _____ _____		
5.	<b>Treatment Building(s)</b> N/A _____ Good condition (esp. roof and doorways) _____ Needs repair _____ Chemicals and equipment properly stored _____ Remarks _____ _____		
6.	<b>Monitoring Wells</b> (pump and treatment remedy) Properly secured/locked _____ Functioning _____ Routinely sampled _____ Good condition _____ All required wells located _____ Needs Maintenance _____ N/A _____ Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data		
	Is routinely submitted on time		Is of acceptable quality
2.	Monitoring data suggests:		
	Groundwater plume is effectively contained		Contaminant concentrations are declining

<b>D. Monitored Natural Attenuation</b>				
1.	<b>Monitoring Wells</b> (natural attenuation remedy)			
	Properly secured/locked	Functioning	Routinely sampled	Good condition
	All required wells located	Needs Maintenance		N/A
	Remarks _____			
	_____			
<b>X. OTHER REMEDIES</b>				
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.				
<b>XI. OVERALL OBSERVATIONS</b>				
<b>A.</b>	<b>Implementation of the Remedy</b>			
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).			
	_____ Cover intact, vegetation plenty, perimeter drainage ditches in good condition _____			
	_____			
	_____			
	_____			
	_____			
	_____			
	_____			
	_____			
	_____			

# INTERVIEW RECORD 1

<b>Site Name:</b> IR Site 7 Box Canyon Landfill		<b>EPA ID No.:</b>	
<b>Subject:</b> Five-Year Review interview/inspection		<b>Time:</b> 1430	<b>Date:</b> 8/13/2008
<b>Type:</b> Telephone <input checked="" type="checkbox"/> Visit      Other <b>Location of Visit:</b> 1220 Pacific Highway, San Diego, CA		Incoming	Outgoing
<b>Contact Made By:</b>			
<b>Name:</b> Pamela Rodgers		<b>Title:</b> Principal Research Scientist	<b>Organization:</b> Battelle
<b>Individual Contacted:</b>			
<b>Name:</b> Theresa Morley		<b>Title:</b> Remedial Project Manager	<b>Organization:</b> NAVFAC
<b>Telephone No:</b> (619) 532-1502 <b>Fax No:</b> (619) 532-4160 <b>E-Mail Address:</b> <a href="mailto:theresa.morley@navy.mil">theresa.morley@navy.mil</a>		<b>Street Address:</b> 1220 Pacific Highway <b>City, State, Zip:</b> San Diego, CA 92132-5181	
<b>Summary Of Conversation</b>			
<ol style="list-style-type: none"> <li>1. What is your overall impression of the project? (general sentiment). <i>Going well – cover is holding up; the drainage channels are cleared every 6 months (Sept and March).</i></li> <li>2. Is the remedy functioning as expected? How well is the remedy performing? <i>Yes, the remedy is working out ok. Soil gas concentrations in compliance probe GP-9 are in compliance.</i></li> <li>3. What effects have site operations had on the surrounding community? <i>The community has not voiced any concerns since the last 5-year review report.</i></li> <li>4. Are you aware of any community concerns regarding the site or its operation and administration? <i>None</i></li> <li>5.             <ol style="list-style-type: none"> <li>a. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. <i>A local contractor started a wildfire which was extinguished by the local fire department.</i></li> <li>b. have there been any complaints violations, or other incidents related to the site requiring a response by your office or state/local office? <i>No.</i></li> </ol> </li> <li>6. Do you feel well informed about the site’s activities and progress? <i>Yes.</i></li> <li>7. Do you have any comments, suggestions, or recommendations regarding the site’s management or operation? <i>Recently asked and received keys for all of the monitoring wells.</i></li> <li>8. What do the monitoring data show? Are there any trends that show contaminant levels are decreasing? <i>No trends observed for the groundwater monitoring data – very few VOCs, decrease of SVOCs and metals. Soil gas concentrations have decreased in GP-9.</i></li> <li>9. Is there a continuous on-site O&amp;M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. <i>A Post-Closure Monitoring and Maintenance Plan was finalized in April 2008. All schedules for monitoring and inspections are provided in there. The maintenance schedule described in this plan has been followed since the ROD was signed.</i></li> </ol>			

# INTERVIEW RECORD 1

<b>Site Name:</b> IR Site 7 Box Canyon Landfill		<b>EPA ID No.:</b>	
<b>Subject:</b> Five-Year Review interview/inspection		<b>Time:</b> 1430	<b>Date:</b> 8/13/2008
<b>Type:</b> Telephone <input checked="" type="checkbox"/> Visit      Other <b>Location of Visit:</b> 1220 Pacific Highway, San Diego, CA		Incoming	Outgoing

### Contact Made By:

<b>Name:</b> Pamela Rodgers	<b>Title:</b> Principal Research Scientist	<b>Organization:</b> Battelle
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### Individual Contacted:

<b>Name:</b> Theresa Morley	<b>Title:</b> Remedial Project Manager	<b>Organization:</b> NAVFAC
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9. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.  
*The maintenance schedule described in this plan has been followed since the ROD was signed.*
11. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.  
*An extraction system was installed at compliance probe GP-9 which ran for 6 weeks without a change in methane concentrations during the 6 weeks. Concentrations in GP-9 now in compliance. Additional extraction and thermal oxidation is planned for GP-9 and GP-10. Two soil gas probes were added (GP-18 and GP-19) within the new groundwater monitoring wells installed to evaluate upgradient conditions.*
12. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.  
*A landfill cover optimization study was conducted in November 2005 to eliminate ponding. The surface drainage was regarded to allow for better drainage. The report is included as an appendix to the Post-Closure Monitoring and Maintenance Plan. Inspection and monitoring of landfill cover is provided in the Plan.*
13. Do you have any comments, suggestions, or recommendations regarding the project? *No.*
14. Describe the gas extraction system near GP10  
*An extraction system was installed at GP-9 which ran for 6 weeks without a change in methane concentrations during the 6 weeks. Concentrations in GP-9 now in compliance. Additional extraction and thermal oxidation is planned for GP-9 and GP-10. VOCs are not an issue at this site.*
15. Describe the results of most recent settlement monuments survey – when? Results compared to last survey?  
*The results from the last survey indicated that the cover has settled about 0.40 feet since the last 5-year review, but this settlement will not affect the protectiveness and it is within tolerance limits.*
16. Who performs the O&M of the site?  
*Groundwater/soil gas monitoring – Chadux/Tetra Tech  
 Drainage – Public Works Center on Base  
 Settlement – Land Mark Survey  
 Lithgow oversees all O&M and documents all activities in an annual report.*
17. Has there been any damage to or degradation of : integrity of site security, site access roads, stormwater management system, gas and groundwater monitoring wells, landfill cap? *No.*
18. Any non-routine maintenance performed? *Only the landfill cover optimization in 2005.*

## INTERVIEW RECORD 1

<b>Site Name:</b> IR Site 7 Box Canyon Landfill		<b>EPA ID No.:</b>	
<b>Subject:</b> Five-Year Review interview/inspection		<b>Time:</b> 1430	<b>Date:</b> 8/13/2008
<b>Type:</b> Telephone <input checked="" type="checkbox"/> Visit      Other <b>Location of Visit:</b> 1220 Pacific Highway, San Diego, CA		Incoming	Outgoing
<b>Contact Made By:</b>			
<b>Name:</b> Pamela Rodgers	<b>Title:</b> Principal Research Scientist	<b>Organization:</b> Battelle	
<b>Individual Contacted:</b>			
<b>Name:</b> Theresa Morley	<b>Title:</b> Remedial Project Manager	<b>Organization:</b> NAVFAC	
19. Do the Land use and site conditions remain the same? <i>Yes.</i>			
20. Does the concentration of the methane gas call into question the protectiveness of the remedy? <i>No, because exposure is not toxic and methane is a product of a landfill.</i>			

## INTERVIEW RECORD 2

<b>Site Name: IR Site 7 Box Canyon Landfill</b>		<b>EPA ID No.:</b>	
<b>Subject: Five-year review</b>		<b>Time:</b>	<b>Date: 12/4/2008</b>
<b>Type:</b> 9 Telephone        9 Visit        9 Other		9 Incoming    9 Outgoing	
<b>Location of Visit:</b>			
<b>Contact Made By:</b>			
<b>Name:</b> Pamela Rodgers		<b>Title:</b> Principal Research Scientist	<b>Organization:</b> Battelle
<b>Individual Contacted:</b>			
<b>Name:</b> Dr. Rick Bottoms		<b>Title:</b> RCRA/IR Branch Head	<b>Organization:</b> USMC / ES
<b>Telephone No:</b> (760) 725-9744		<b>Street Address:</b> Bldg 22165 11 Street	
<b>Fax No:</b> (760) 725-0207		<b>City, State, Zip:</b> Camp Pendleton, Ca. 92055	
<b>E-Mail Address:</b> rick.bottoms@usmc.mil			
<b>Summary Of Conversation</b>			
1. What is your overall impression of the project? (general sentiment) <i>Challenging, complicated, convoluted</i>			
2. Is the remedy functioning as expected? How well is the remedy performing? <i>Yes, for the most part</i>			
3. What effects have site operations had on the surrounding community? <i>None, that I am aware</i>			
4. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. <i>None</i>			
5a. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. <i>No</i>			
5b. have there been any complaints violations, or other incidents related to the site requiring a response by your office or state/local office? If so give details of events and results of responses. <i>None, that I am aware of</i>			
6. Do you feel well informed about the site's activities and progress? <i>Yes</i>			
7. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? <i>None</i>			
8. What do the monitoring data show? Are there any trends that show contaminant levels are decreasing? <i>There is a continuous release of Methane gas along the North-West side of the site along the geological formation as expected. Areas adjacent to housing and school of the east side show no signs of contaminant concern. Methane in GP-9 was a high of 7.9% in April 2007 and has been steadily dropping to below the compliance threshold to it's current level of 4.9% (July 2008).</i>			
9. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. <i>Yes, there is regular monitoring for gas levels, soil cap integrity, vegetation cover and security.</i>			
10. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts. <i>No changes that I am aware of except as the Methane gas monitoring is documented over time an anticipated frequency of gas vapor monitoring is relaxed based on documented levels and established monitoring criteria</i>			

11. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details. <i>Yes, Additional installation of monitoring wells have increased costs</i>
12. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency. <i>Yes, (1) selected seasonal timing when vegetation cap is mowed and or hand weeded depending of soil slope of cap and (2) Frequency of management review has optimized scheduled gas vapor monitoring by reducing frequency and costs of analysis.</i>
13. Do you have any comments, suggestions, or recommendations regarding the project? <i>None</i>
14. Describe the gas extraction system near GP10 <i>Presently there is no permanent gas extraction system in the area of GP-10, since it is a non compliance well. The landfill and cover overlie a very permeable sand and gravel alluvial unit. The hypothesis is that LFG is escaping from the landfill near GP-10 (above the screened intervals of the GP-10) and maybe migrating in this alluvial unit. This hypothesis is based in part on the decreasing concentrations of LFG (methane) with depth in the GP-10.</i>
15. Describe the results of most recent settlement monuments survey – when? Results compared to last survey? <i>In six years from 2002 to 2008 the settlement results indicate a change of .36 to .2 ft for SM1 and SM2, respectively.</i>
16. Who performs the O&M of the site? Most recently relative to gas monitoring <i>Tetra Tech / EMI 1230 Columbia Street, Suite 1000 / San Diego, CA 92101</i>  <i>and forage control:</i>  <i>PWC – NAVFAC-SW</i>
17. Has there been any damage to or degradation of : integrity of site security, site access roads, stormwater management system, gas and groundwater monitoring wells, landfill cap? <i>None</i>
18. Any non-routine maintenance performed? <i>Installation of keyed alike locks for gate and wells</i>
19. Do the Land use and site conditions remain the same? <i>Yes, to the best of my knowledge</i>
20. Does the concentration of the methane gas call into question the protectiveness of the remedy? <i>I don't believe so</i>

## **APPENDIX D**

### **Comparison of Numeric Criteria and ARARs**

## **D.1 INTRODUCTION**

The information provided herein was used to evaluate the question, “Are the exposure assumptions, toxicity data, cleanup levels, and RAO used at the time of remedy selection still valid?”, on the basis of human-health and ecological risk assessment, federal and state regulations evaluated as potential ARARs for the remedial action, and achievement of the RAO. Toxicity information for human and ecological cleanup goals were reviewed and changes noted in the summary tables below. Appendix A of the Post-Closure Monitoring and Maintenance Plan (PCMMP) (NAVFAC, 2008b) provides a summary of all applicable or relevant and appropriate requirements (ARARs) for the final closure cover at IR Site 7, including the IR Sites that used IR Site 7 to dispose of excavated soil (i.e., 1A, 1D, 1E, 1F, and 2A).

## **D.2 TOXICITY VALUES**

The change in toxicity values are relevant to locations where excavation has already taken place (i.e., IR Sites 1A, 1D, 30, 1A-1, and 1A). Remedial goals selected were either background or the lower of the human health (HH) and ecological receptor (ER) goals.

### **D.2.1 Remedial Goals Selected Based on Human Health**

A comparison of the human health toxicity values used to derive the RGs for these five IR sites were compared to current toxicity values provided in the U.S. EPA Regional Screening Level table (U.S. EPA, 2008). The results of the comparisons are provided in Tables D-1 through D-5.

### **D.2.2 Remedial Goals Selected Based on Ecological Receptors**

Toxicity reference values (TRVs) for ecological receptors were reviewed and compared to toxicity values used to derive the ecological remedial goals. Remedial goals based on ecological receptors were selected for various metals at IR Sites 1A and 1A-1 (Tables D-1 and D-4, respectively). In accordance with USEPA Region 9 direction, the primary source of TRVs was a report produced for the U.S. Navy (EFA West, 1998). The U.S. Navy values (EFA West, 1998) are draft TRVs for mammals and birds developed by an interagency group on behalf of the U.S. Navy for potential general use in ecological risk assessments in the San Francisco Bay area. These TRVs were released in draft form, have generally not been externally peer reviewed, and represent conservative values drawn from a review of the toxicological literature. The USEPA Region 9 has since required the use of these TRVs throughout the Region (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations); DTSC has also adopted their use (DTSC, 2000).

Because EFA West (1998) does not provide TRVs for all the Tier-1 preliminary COPCs, additional sources of ecotoxicity data were consulted, and include a suite of sources used broadly for many ecological risk assessments country-wide:

- Oak Ridge National Laboratory (ORNL) databases of screening benchmarks for
- Ecological risk assessment;
- Agency for Toxic Substances and Disease Registry (ATSDR) toxicity profiles;
- USFWS synoptic reviews of hazards to fish, wildlife, and invertebrates;
- U.S. EPA’s Integrated Risk Information System (IRIS) database;

- Registry of Toxic Effects of Chemical Substances, a National Institute of Occupational Safety and Health database;
- Hazardous Substances Data Bank, a National Library of Medicine on-line toxicological database;
- Oil and Hazardous Materials/Technical Assistance Data System on-line database;
- Los Alamos National Laboratory database;
- U.S. EPA Region 6 ERA guidance for hazardous waste combustion facilities; and
- Technical literature.

The results of the comparisons are provided in Tables D-1 through D-5.

### **D.3 ARARs**

IR Site 7 is the only IR site where ARARs are a concern. As discussed in the PCMMP, the primary requirements for establishing a post-closure water quality monitoring program for IR Site 7 was stated to be in Title 22, Code of California Regulations (22 CCR), (§) 66264.94 and 66264.98. However, the associated requirements are actually from §66264.91 through §66264.100 of Article 6, Chapter 14, Division 4.5 of 22 CCR. The reader is referred to the PCMMP (NAVFAC, 2008) for a summary of the requirements. The PCMMP was developed to incorporate the requirements of from §66264.91 through §66264.100 of Article 6, Chapter 14, Division 4.5 of 22 CCR.

### **D.4 REFERENCES**

- DTSC. 2000. Use of Navy/U.S. Environmental Protection Agency (USEPA) Region 9 Biological Technical Assistance Group (BTAG) Toxicity Reference Values (TRVs) for Ecological Risk Assessment. EcoNote4. Human and Ecological Risk Division, California. Department of Toxic Substances Control. 8 December.
- EFA West. 1998. Development of Toxicity Reference Values for Conducting Ecological Risk Assessments at Naval Facilities in California, Interim Final. Engineering Field Activity West, Naval Facilities Engineering Command, United States Navy, San Bruno, California.
- U.S.EPA. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. RSL Table Update. Sept 2008

**Table D-1. Site 1A Comparison of Toxicity Values**

<b>COC</b>	<b>Revised RG (mg/kg)<sup>(1)</sup></b>	<b>Source</b>	<b>Change?</b>
Antimony	8.8	background	no
Arsenic	17	background	no
Barium	2206	ER	no
Boron	3.6	ER	no
Chromium (Total)	298	ER	no
Copper	3129	HH	no
Lead	72.8	ER	no
Manganese	1812	HH	no
Mercury	1.33	ER	no
Thallium	1.4	background	no
Vanadium	78	HH	no
Zinc	254	ER	no

ERA - ecological receptor

HH - human health

(1) NAVFAC. 2007. *Preliminary Draft Explanation of Significant Difference, Installation Restoration Site 1A Marine Corps Base Camp Pendleton, California*. September 25.

**Table D-2. Site 1D Comparison of Toxicity Values**

<b>COC</b>	<b>RG 0-5 ft (mg/kg)<sup>(1)</sup></b>	<b>Source</b>	<b>Change?</b>
Antimony	8.8	background	no
Arsenic	4.3	background	no
Chromium	210	HH	no
Copper	26	background	no
Iron	26459	background	no
Lead	29	background	no
Zinc	111	background	no

HH - human health

(1) Parsons. 2007. *Final Remedial Design Addendum for Sites 1D and 30 Marine Corps Base Camp Pendleton, California*. November.

**Table D-3. Site 30 Comparison of Toxicity Values**

<b>COC</b>	<b>RG 0-5 ft (mg/kg)<sup>(1)</sup></b>	<b>Source</b>	<b>Change?</b>	<b>RG 5-10 ft (mg/kg)</b>	<b>Source</b>	<b>Change?</b>
Antimony	8.8	background	no	31	HH	no
Arsenic	4.3	background	no	4.3	background	no
Chromium	33	background	no	33	background	no
Cobalt	13	background	no	NA	NA	NA
Copper	26	background	no	NA	NA	NA
Lead	29	background	no	130	LeadSpread model	no
Manganese	3,200	HHRA	no	3,200	HH	no

NA - not applicable

HH – human health

(1) Parsons. 2007. *Final Remedial Design Addendum for Sites 1D and 30 Marine Corps Base Camp Pendleton, California*. November.

**Table D-4. Site 1A-1 Comparison of Toxicity Values**

	<b>RG 0-5 ft (mg/kg)<sup>(1)</sup></b>	<b>Source</b>	<b>Change?</b>
2,3,7,8-TCDD TEQ*	4.1	background	no
Antimony	16	ER	16
Arsenic	4.6	background	no
Cadmium	2	HH	no
Lead	73	ER	no
Manganese	1,800	HH	no
Vanadium	78	HH	no
Zinc	250	ER	no
p,p'-DDD	2	HH	no
p,p'-DDE	1.4	HH	no
p,p'-DDT	1.7	HH	no

ERA - ecological receptor

HH - human health

Units = ng/kg for TCDD

(1) Parsons. 2008. *Final Remedial Design Addendum for Sites 1A-1 and 1H Marine Corps Base Camp Pendleton, California*. April.

**Table D-5. Site 1H Comparison of Toxicity Values**

	<b>RG 0-5 ft (mg/kg)<sup>(1)</sup></b>	<b>Source</b>	<b>Change?</b>
2,3,7,8-TCDD TEQ*	4.1	background	no
Antimony	31	HH	no
Arsenic	10.9	background	no
Copper	2,900	HH	no
Lead	150	HH	no
Manganese	1,800	HH	no

HH - human health

units=ng/kg for TCDD

(1) Parsons. 2008. *Final Remedial Design Addendum for Sites 1A-1 and 1H Marine Corps Base Camp Pendleton, California*. April.