# FINAL FIVE-YEAR REVIEW REPORT

## INSTALLATION RESTORATION SITE 9
## OPERABLE UNIT 1
## MARINE CORPS BASE
## CAMP PENDLETON, CALIFORNIA

**September 12, 2007**

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

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

September 27, 2007

Lieutenant Colonel B. W. Soderburg
Deputy AC/S Environmental Security
Marine Corps Base
Box 55508
Building 22165
Camp Pendleton, CA. 92055-5010

Re: Five-Year Review, Installation Restoration Site 9, Operable Unit 1, Marine Corps Base, Camp Pendleton, California

Dear Lieutenant Colonel Soderburg:

The U.S. Environmental Protection Agency (EPA) Region 9 has received the Final Five-Year Review of Installation Restoration Site 9, Operable Unit 1, Marine Corps Base Camp Pendleton, dated September 12, 2007 . We have reviewed the aforementioned document. Based on this review, EPA agrees with the findings, conclusions and recommendations provided in the Report, and concurs with the Marine Corps that the remedy in place at Camp Pendleton is protective of human health and the environment under the current land use and exposure pathways. We also concur with the determination of No Further Action at the Site.

If you have questions regarding this letter, please contact Martin Hausladen, Remedial Project Manager, at (415) 972-3007.

Sincerely,

Michael M. Montgomery, Chief
Federal Facilities and Site Cleanup Branch

cc: Theresa Morley, DON
Tayseer Mahmoud, DTSC
Brian Mc Daniel. CRWQCB
John Chesnutt, EPA R9

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APPROVED BY:

**B. W. SODERBERG,** LIEUTENANT COLONEL
**UNITED STATES MARINE CORPS**
**DEPUTY AC/S, ENVIRONMENTAL SECURITY**
**MARINE CORPS BASE CAMP PENDLETON**
**BY DIRECTION OF THE COMMANDING OFFICER**

27 SEPT 07
**DATE**

# DECLARATION OF ACCEPTANCE
# FOR THE
# FINAL FIVE-YEAR REVIEW REPORT
# FOR INSTALLATION RESTORATION SITE 9
# OPERABLE UNIT 1
# 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.

B. W. SODERBERG, LIEUTENANT COLONEL
UNITED STATES MARINE CORPS
DEPUTY AC/S, ENVIRONMENTAL SECURITY
MARINE CORPS BASE CAMP PENDLETON
BY DIRECTION OF THE COMMANDING OFFICER

27 SEPT 07
Date

# EXECUTIVE SUMMARY

This Final Five-Year Review Report 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 (MCBCP or Base), pursuant to Section 121(e) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9621(e), and the National Contingency Plan 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).

This report provides the results of the CERCLA final five-year review for IR Site 9, 41 Area Stuart Mesa Stabilization Pond at MCB Camp Pendleton. IR Site 9 is part of Operable Unit 1 (OU1) at MCB Camp Pendleton. IR Site 9 is the only OU1 site that requires completion of a final five-year review as a result of site closure under the CERCLA program. All other sites under OU1 were considered No Further Action (NFA) sites at the time the Record of Decision (ROD) was signed.

In accordance with EPA guidance on completing five-year reviews, a final five-year report is prepared once a site has attained No Further Action status under CERCLA. This final report ends the requirement to produce any more five-year reviews for OU1. The remedy has been shown to be protective of both human health and the environment.

# FIVE-YEAR REVIEW SUMMARY FORM – OU1

| SITE IDENTIFICATION | | |
|---|---|---|
| **Site name:** *Marine Corps Base Camp Pendleton, Site 9, 41 Area, Stuart Mesa Stabilization Pond* | | |
| **EPA ID:** *CA2170023533* | | |
| **Region:** 09 | **State:** CA | **City/County:** Camp Pendleton, San Diego County |

| SITE STATUS | |
|---|---|
| **NPL status:** ☑ Final ☐ Deleted ☐ Other (specify) _____ | |
| **Remediation status** (choose all that apply): ☐ Under Construction ☐ Operating ☑ Complete | |
| **Multiple OUs:** YES ☑ NO | Construction Complete date: NA /____/_____ |
| **Has the site been put into reuse?** ☑ YES NO | |

| REVIEW STATUS | |
|---|---|
| **Reviewing Agency:** ☐ EPA ☐ State ☐ Tribe ☑ Other Federal Agency Department of the Navy | |
| **Author Name:** Theresa Morley, PE | |
| **Author Title:** Remedial Project Manager | **Author Affiliation:** Naval Facilities Engineering Command Southwest |
| **Review period:** July 2002 (date of last five-year review) to June 30, 2007 | |
| **Date(s) of inspection:** Site revisited June 27, 2007 | |
| **Type of Review:** ☑ Policy (☐ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action site ☐ NPL State/Tribe-lead ☐ Regional Descretion) | |
| **Review number:** ☐ 1 (first) ☑ 2 (second) ☐ 3 (third) ☐ Other (specify) _____ | |
| **Triggering action:** ☐ Actual RA Onsite Construction at OU ☐ Actual RA Start at OU # _____ ☐ Construction Completion ☐ Previous Five-Year Review Report ☑ Other (specify) _Remedy Complete and final five-year review_____ | |
| **Triggering action date:** August 18, 2002 (EPA comments on previous Five-Year Review Report) | |
| **Due date (five years after triggering action date):** August 18, 2007 | |

# FIVE-YEAR REVIEW SUMMARY FORM – OU1
## (CONTINUED)

**Issues:**

- There are no issues remaining for this site.

**Recommendations and Follow-up Actions:**

- There are no follow-up actions required.

**Protectiveness Statement(s):**

The remedial action at OU1, IR Site 9, is protective of human health and the environment. This determination is made based on the Explanation of Significant Difference (ESD) signed by the Federal Facilities Agreement (FFA) team on May 29, 2004. The ESD removed Site 9 from further groundwater monitoring since it was determined the site had met the cleanup requirements for groundwater as stipulated in the ROD. Based on the results of the five-year review, the groundwater remedy for IR Site 9 was found to have been effective in meeting the remedial action objectives.

**Other Comments:**

- None.

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## FIGURES



## APPENDICES

# ACRONYMS/ABBREVIATIONS

| | |
|---|---|
| CCR | California Code of Regulations |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CLP | Contract Laboratory Program |
| DCA | dichloroethane |
| DCE | dichloroethene |
| DOD | Department of Defense |
| DoN | U.S. Department of the Navy |
| DTCS | Department of Toxic Substances Control |
| EPA | U.S. Environmental Protection Agency |
| ESD | Explanation of Significant Difference |
| FFA | Federal Facility Agreement |
| FS | feasibility study |
| GDIT | General Dynamics Information Technology |
| GIS | geographic information system |
| IR | Installation Restoration |
| IT | IT Corporation |
| MCB | Marine Corps Base |
| MCL | maximum contaminant level |
| mg/kg | milligrams per kilogram |
| mg/L | milligrams per liter |
| NAVFAC SW | Naval Facilities Engineering Command Southwest |
| NCP | National Oil and Hazardous Substances Pollution Contingency Plan |
| NEESA | Naval Energy and Environmental Support Activity |
| NPL | National Priorities List |
| OHM | OHM Remediation Services Corp. |
| OU | Operable Unit |
| PCE | tetrachloroethene |
| PRG | preliminary remediation goal |
| PWC | Public Works Center |
| RAO | Remedial Action Objective |
| RI | remedial investigation |
| RI/FS | remedial investigation/feasibility study |
| RNA | remediation by natural attenuation |
| ROD | Record of Decision |
| RWQCB | Regional Water Quality Control Board |
| SWDIV | Southwest Division Naval Facilities Engineering Command |
| SWRCB | California State Water Resources Control Board |
| TCE | trichloroethene |
| TPH | total petroleum hydrocarbons |
| UCL | upper confidence limit |
| VOC | volatile organic compound |
| USMC | United States Marine Corps |
| µg/kg | micrograms per kilogram |
| µg/L | micrograms per liter |

# 1.0 INTRODUCTION

The United States Department of the Navy (DON) has conducted a five-year review of the remedial actions implemented in accordance with the Record of Decision (ROD) issued for Installation Restoration (IR) Site 9, 41 Area Stuart Mesa Stabilization Pond, in the southwest portion of Marine Corps Base (MCB) Camp Pendleton (Figure 1). This review was conducted from April through June 2007. This report documents the results of this review. Analysis for the five-year review was conducted by the Naval Facilities Engineering Command Southwest Division (NAVFAC SW), with technical support from General Dynamics Information Technology (GDIT). This document was reviewed and finalized for compliance with DON *Policy for Conducting Five-Year Reviews Under the Installation Restoration Program* (DON, 2004), *DON Environmental Restoration Program Manual* (DON, 2006), and U.S Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance* (EPA, 2001).

The DON is conducting environmental restoration activities at the Base as part of the IR Program. The IR Program was established by the Department of Defense (DoD) pursuant to CERCLA Section 121 to identify, evaluate, and control the spread of contaminants from historical waste sites at military installations. The Base was placed on the National Priorities List (NPL) in 1989 (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 U.S. Department of the Navy (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 Environmental Protection Agency's 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 1996 (EPA, 1990).

IR Site 9 is one of the Operable Unit (OU) 1 sites. The Record of Decision (ROD) for IR Site 9 was signed on December 12, 1995. This report documents the second five-year review conducted for IR Site 9, which is the only OU1 site that requires the completion of the final five-year review process as a result of site closure under the CERCLA program. All other sites under OU1 were determined to be No Further Action (NFA) sites at the time the Record of Decision (ROD) was signed.

## 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, 2004), a final five-year report is prepared once a site has attained No Further Action status under CERCLA. This final report ends the requirement to produce any more five-year reviews. The remedy has been shown to be protective of both human health and the environment.

### 1.2 FIVE-YEAR REVIEW TRIGGER DATE

According to the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), five-year review reports are to be completed and signed within five years of the trigger date for a site. The trigger date for this second IR Site 9 five-year review is August 18, 2007, five years from August 18, 2002, the date of the first five-year review.

## 2.0 CHRONOLOGY

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. 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 covers approximately 125,000 acres, almost entirely in San Diego County. The base currently supports more than 36,000 military personnel and employs approximately 4,600 civilians.

The DoN, acting on behalf of and in concert with the United States Marine Corps (USMC) and in accordance with authority in CERCLA, the NCP and Executive Order 12580, conducted and implemented the IR program at MCB Camp Pendleton since the early 1980s. The IR program is designed, in part, to evaluate and remedy, if necessary, contamination caused by hazardous substances, pollutants, or contaminants, pursuant to CERCLA. The initial list of eight IR sites at MCB Camp Pendleton was established on the basis of the results of the initial site assessment performed in 1983/1984 (Naval Energy and Environmental Support Activity [NEESA], 1984). In November 1989, MCB Camp Pendleton was added to the National Priorities List (NPL), primarily because an herbicide was detected in two drinking water production wells in a groundwater basin of the base.

IR Site 9 was identified during the site inspection process in 1988 (SWDIV, 1994). The site was used as a sewage pond for oxidation and percolation of raw sewage generated in Las Flores 41 Area in the southwestern part of MCB Camp Pendleton (Figure 1) from 1963 to 1974 or 1975. The site is southwest of Stuart Mesa Road and consists of an approximately 400- by 500-foot waste stabilization pond surrounded by engineered earthen berms (Figure 2). The waste stabilization pond reportedly was used for stockpiling soil contaminated with petroleum hydrocarbons, primarily fuel and oil. Mounds of dirt and dark stains were visible on the bottom of the waste stabilization pond, as indicated in the ROD. The visual inspection in 1988 also indicated that waste oils and other liquids may have been disposed of at the site.

Under the base IR program, the parties to the Federal Facility Agreement (FFA) assigned IR sites to groups (starting with Group A) based on potential impact to health and the environment. Those sites that posed the highest threat were addressed first (i.e., Group A sites). Along with five other sites, IR Site 9 was assigned to Group A. A remedial investigation (RI) of the Group A sites (SWDIV, 1993) was conducted between February 1992 and April 1993 and determined that IR Site 9 was the only site requiring further remedial action via a feasibility study (FS). Three additional rounds of groundwater monitoring (Phase II RI) were conducted between May 1993

and April 1994. The IR Site 9 FS was completed in 1994 (SWDIV, 1994) under the RI/FS program for OU 1. The remedial action for IR Site 9 was established through when the OU1 ROD was signed on December 12, 1995. IR Site 9 was the only site requiring further action under the OU1 ROD; no other sites addressed in the OU1 ROD required remedial action. These sites have all been determined to be No Further Action and are listed in Appendix C.

Based on the OU1 ROD, the remedy for IR Site 9 included no further action for soil and the following components for groundwater:

- Amend the Base Master Plan to restrict future access to groundwater in the immediate vicinity of IR Site 9 for the duration of the long-term monitoring or until groundwater contaminants no longer exceed cleanup goals. Also, in the unlikely event that IR Site 9 is converted to residential use, re-grading and the importation of clean fill, as well as notification of interested parties of remaining site contaminants (specifically one beryllium hit), would be required.
- Sample and analyze groundwater semiannually for 10 years to verify that dispersion and natural attenuation are occurring.
- Evaluate the effectiveness of the remedy no less often than every 5 years.
- Conduct compliance demonstration monitoring consisting of eight sampling events evenly spaced throughout a 1-year period during the eighth year of groundwater monitoring to assess the effectiveness of dispersion and natural attenuation processes.

The first post-ROD semiannual groundwater monitoring event was conducted on April 30, 1997 and continued through 2002. Eight wells were monitored for VOCs using EPA Method 8260B and various groundwater chemistry and bio-parameters, including total iron, ferrous and ferric iron, manganese, methane, ethane, ethene, nitrate, sulfate, sulfide, total organic carbon, pH, temperature, conductivity, turbidity, and dissolved oxygen. During the semiannual sampling for the second half of 2001, groundwater quality met the ROD Remedial Action Objectives (MCLs) in all monitored wells except 9W-07A.

The Navy conducted the first Five-Year Review for the site in 2002. The Five-Year Review concluded that, unlike VOC concentrations in other wells, PCE in monitoring well 9W-07A was not attenuating as predicted in the fate and transport model, and that PCE concentrations had increased over the last five years. Additional soil and groundwater data were recommended to investigate whether the waste stabilization pond was the source or if another separate source of PCE was present. The FFA team met and concluded that a letter work plan would be prepared to install one soil boring and one groundwater monitoring well to further assess the southeastern portion of the waste stabilization pond as a PCE source. The Draft Final Sampling and Analysis Plan (SAP) was submitted in November 2002 and the field work was conducted in January 2003.

Eight soil samples were collected from the soil boring and analyzed for VOCs. Neither PCE nor TCE were present above detection limits. The soil boring was converted to a temporary monitoring well (CPIR9-28) and groundwater samples were collected from this well. The well was sampled for VOCs: PCE and TCE were not detected in these samples. All soil and groundwater data were validated by a third party in accordance with Navy requirements. Results of the investigation were reported in a Technical Memorandum (Tech Memo, PWC, 2003) that concluded the pond was not the source of PCE or TCE in 9W-07A. The Tech Memo alsc

recommended discontinuing groundwater sampling at the site since RAOs had been met with the exception of well 9W-07A.

The Tech Memo also evaluated the chemical concentrations in soil and groundwater and included a baseline risk assessment. As part of the risk evaluation, it was determined that the PRG for beryllium had increased since the OU1 RI and the previously measured value was below the PRG. The risk assessment concluded that the concentrations in soil and groundwater (excluding 9W-07A) were protective of human health and the environment under a residential land use scenario. Therefore, no land use restrictions would be required. IR Site 9 soils meet the current (October 2004) EPA Region 9 Preliminary Remediation Goals for a residential use scenario.

The Tech Memo concluded that a separate point source release for well 9W-07A was not associated with Site 9 and that the PCE was bounded in groundwater by nondetect values. Therefore, the recommendations section proposed that a new site be established to investigate the source of VOCs in groundwater around well 9W-07A. The FFA team agreed with these findings and recommendation during the 72nd FFA meeting on April 17, 2003. The location of the well is now designated as IR Site 1114. The monitoring well network associated with Site 9 has been retained as part of Site 1114 for possible future monitoring needs.

An Explanation of Significant Difference (ESD) for OU 1 ROD IR Site 9 (PWC 2004) was prepared in order to acknowledge the early attainment of RAOs in IR Site 9 groundwater, document the conclusion of long-term groundwater monitoring , complete site closeout, and document the identification of Site 1114 (PWC 2004). The new site was designated as Site 1114 and is currently being monitored. The final signature on the ESD was June 28th, 2004.

The following is a chronology of events for IR Site 9, 41 Area Stuart Mesa Stabilization Pond:

| Event | Date |
|---|---|
| Initial discovery of the Site and Process | 1988 Site Inspection and sampling |
| NPL Listing of MCB Camp Pendleton | 15 November 1989 |
| Phase I RI | February 1992 through April 1993 |
| Phase II RI (groundwater monitoring) | May 1993 through April 1994 |
| FS | 1994 |
| ROD Signature | December 12, 1995 |
| Remedial Action (start) | December 7, 1995 |
| Monitoring of Remedial Action | Semiannually since April 30, 1997 |
| First Five-Year Review | August 18, 2002 |
| Technical Memorandum, Summary of Soil and Monitoring Well Sampling | July 8, 2003 |
| Explanation of Significant Difference (ESD) for Site Closure | June 28th, 2004 |

# 3.0 BACKGROUND

This section presents site background information, including physical characteristics, land use, and contaminants.

## 3.1 PHYSICAL CHARACTERISTICS

IR Site 9 is located in the southwest portion of MCB Camp Pendleton, approximately 1 mile south of the Las Flores Creek groundwater basin and ¾ mile east of the Pacific Ocean (Figure 1). The site is located between two forks of a natural drainage arroyo on a relatively low-lying wave-cut terrace. An ephemeral stream trends north and east of the stabilization pond and drains south westward toward the Pacific Ocean. The nearest building is about 1,500 feet northeast of the site along Stuart Mesa Road. .

IR Site 9 is located in marine terrace deposits, outside the Santa Margarita Basin. No production (drinking water) wells are located downgradient from IR Site 9. The nearest drinking water well is about 6,500 feet northeast of the site . The site is ½ mile upgradient of the nonbeneficial groundwater use boundary, as defined in the Comprehensive Water Quality Control Plan for the San Diego Basin (California State Water Resources Control Board [SWRCB], 1994). Interstate 5 runs approximately along the line demarcating this boundary.

## 3.2 LAND AND RESOURCE USE

The waste stabilization pond at IR Site 9 was operated as a sewage pond for oxidation and percolation of raw sewage generated in 41 Area from 1963 to 1974 or 1975. In 1975, a wet well and a lift station (Building 41300) were installed and raw sewage was pumped into a treatment facility in the 43 Area. The sewer line to the waste stabilization pond and the outfall pipe in the pond were left in place as an emergency overflow backup system and reportedly were used occasionally.

The waste stabilization pond, which contained water only briefly following heavy rainfall, was used for stockpiling soil contaminated with petroleum hydrocarbons, primarily fuel and oil. The area immediately northeast of the waste stabilization pond was used for disposal of mess hall grease trap wastes, a practice that began after sewage treatment operations at IR Site 9 were discontinued.

## 3.3 INITIAL RESPONSE

No removal action has been conducted since the site was identified in 1988. The Phase I RI and associated studies for IR Site 9 were conducted between February 1992 and April 1993. Three additional quarterly groundwater monitoring events (Phase II RI) were conducted from May 1993 through April 1994. In accordance with EPA guidance for conducting an RI under CERCLA (EPA, 1988), the nature and extent of contamination were assessed to a level sufficient to support ecological and human health risk assessments and the FS. Based on the human health risk assessment, the risk levels associated with exposures to soil and groundwater contamination at the site were determined to be within the risk management range established in the NCP (40 CFR 300.430[e][2][I][A][2]). The results of the RI ecological risk assessment indicated no significant risk to the environment for soil contamination at the site. However, groundwater contamination exceeded Federal and State maximum contaminant levels (MCLs) and, therefore,

required remedial action. Based on the level of groundwater contamination, the selected remedy was remediation by natural attenuation, which required no additional remedial construction or response.

## 3.4 CONTAMINANTS

This section discusses the contaminants that were previously identified at IR Site 9.

### 3.4.1 Groundwater

Groundwater analytical data demonstrated that an area of volatile organic contamination (TCE and PCE) was present downgradient from the former pond at IR Site 9. No contaminants were detected in the wells upgradient from the former effluent pond. Groundwater monitoring conducted semiannually from 1997 through 2002, indicated that TCE is present in wells 9W-06B and 9W-07A at concentrations below the MCL and that as noted above, PCE is present in well 9W-07A at concentrations exceeding the MCL. However, this well is now IR Site 1114 and is no longer part of IR Site 9.

# 4.0 REMEDIAL ACTIONS

This section discusses remedial actions at IR Site 9, including remedy selection, implementation, system operation, and progress.

## 4.1 REMEDY SELECTION

The remedial action selected for IR Site 9 was specified in the OU1 ROD (SWDIV, 1995). The OUI ROD was signed on December 12, 1995, by the parties to the FFA. The ROD stipulated the following remedial action:

- No action is needed for IR Site 9 soil contamination. Site soil was left in place. Also, in the unlikely event that IR Site 9 is converted to residential use, re-grading and the importation of clean fill, as well as notification of interested parties of remaining site contaminants (specifically one beryllium hit), would be required.
- The groundwater component of the selected remedy involved risk management through an amendment to the Base Master Plan restricting future access to groundwater in the immediate vicinity of the site and initiating monitoring of contaminant concentrations and migration. Monitoring consists of semiannual groundwater sampling and analysis of 12 wells for 10 years, with compliance monitoring consisting of eight sampling events to be conducted during the eighth year. Monitoring well locations are shown in Figure 2. An alternative evaluation will be performed once every 5 years to assess the effectiveness and document the progress of the alternative.

The human health risk associated with exposures to groundwater contamination at IR Site 9 was deemed acceptable within the risk management range. However, PCE and TCE concentrations exceeded State and Federal MCLs in two of the monitoring wells and, thus, required remedial action. Based on limited computer modeling performed as part of the FS process, the results indicated that natural attenuation would reduce groundwater contamination to less than the MCLs in 10 years and that the plume migration would not reach the ocean approximately ¾ mile west of IR Site 9. Institutional controls would manage the potential risk posed by the site by

limiting access, restricting land and groundwater uses, and monitoring groundwater impacts during natural attenuation.

### 4.2 REMEDY IMPLEMENTATION

The remedy has been implemented as stated in the ROD. Groundwater monitoring activities, which had been performed semiannually, were concluded in late 2002 as a result of the Five Year Review.

### 4.3 SYSTEM OPERATIONS/OPERATION AND MAINTENANCE

The ROD did not require the construction of a remedial system. The selected remedy was based on natural attenuation.

## 5.0 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

Soil and monitoring well sampling were conducted in 2003 to address a data gap identified during the previous Five-Year Review (OHM, 2002). Results of the investigation were reported in a Technical Memorandum (PWC, 2003). Additional semiannual monitoring by PWC was also conducted through 2003 (PWC, 2001, 2002a, 2002b, and 2003). PCE concentrations have increased in monitoring well 9W-7A. However, supplemental sampling data have identified a separate source outside of the pond. This limited release and its attendant groundwater contamination at and in the vicinity of monitoring well 9W-7A are addressed as IR Site 1114. This new site is being monitored under the IR program. The monitoring well network formerly associated with Site 9 has been transferred to Site 1114 in case they need to be sampled. An Explanation of Significant Difference (ESD) for OU 1 ROD IR Site 9 (PWC 2004) was prepared in order to acknowledge the early attainment of RAOs in IR Site 9 groundwater, document the conclusion of long-term groundwater monitoring, complete site closeout, and document the identification of a new IR Site (1114) associated with well 9W-07A (PWC 2004). IR Site 9 has been closed, which was documented in the ESD signed in May 2004.

### 5.1 PROTECTIVENESS STATEMENTS FROM LAST REVIEW

The following is the protectiveness statement from the last five year review that was completed in October 2002. *The remedial action at OU-1 is protective of human health and the environment. This determination is made based on the information considered and evaluated in the performance of this five-year review update. Currently, there are no exposure pathways to groundwater at IR Site 9 and the groundwater meets the cleanup requirements stipulated in the ROD (with the exception of 9W-07A, which has been removed from IR Site 9 and is now called IR Site 1114. IR Site 9 soils do not require remediation for the current military land-use scenario, and ICs for the soil continue to restrict the future land uses in the vicinity of the site.*

Since the last five year review it was determined that the PRG for beryllium had increased and the value from the OU1 ROD was now below the PRG. The concentrations in soil and groundwater (excluding 9W-07A) are protective of human health and the environment under a residential land use scenario. Therefore, no land use restrictions are now required. IR Site 9 soils meet the current (October 2004) EPA Region 9 Preliminary Remediation Goals for a residential use scenario. The Base Master Plan (currently being updated) will remove any reference to IR Site 9.

## 5.2 STATUS OF RECOMMENDATIONS AND FOLLOW-UP ACTIONS FROM LAST REVIEW

The last Five Year Review (2002) recommended three actions.

- *Discontinue sampling of IR Site 9 groundwater.* This has been completed with the last sampling event in 2003 that documented there were no concentrations in groundwater wells above MCLs, except for well 9W-07A. This well is now IR Site 1114 and the monitoring well network has also transferred to IR Site 1114 for possible future monitoring needs.

- *The Explanation of Significant Difference should be finalized.* The ESD to discontinue groundwater monitoring at IR Site 9, close the site, and establish a new IR site for well 9W-07A was signed, after agency review and concurrence, on June 28th, 2004.

- *The groundwater at new IR Site 1114 should be investigated.* The groundwater at IR Site 1114 was investigated in 2004 as part of the new Triad approach with the assistance and concurrence of the regulatory agencies. A soil gas survey is scheduled to be conducted at the site in late 2007.

## 5.3 RESULTS OF IMPLEMENTED ACTIONS

The results of the implemented actions have been: documented closure of IR Site 9 through a signed ESD and establishment of a new IR Site (1114) to investigate PCE in well (w-07A.

# 6.0 FIVE-YEAR REVIEW PROCESS

From April to June 2007, DoN Remedial Project Manager, Ms. Theresa Morley, PE, of NAVFAC SW, led this five-year review process, with the participation of the following team members:

- Ms. Chrissy Dangel, MCB Camp Pendleton Assistant Chief of Staff/Environmental Security

- Mr. James Hoyle, PG, GDIT (technical consultant, NAVFAC contractor)

Ms. Morley was supported by NAVFAC SW technical, legal, and managerial staff. Mr. Hoyle was supported by technical staff including engineers, hydrogeologists, and regulatory specialists.

# 7.0 FIVE-YEAR REVIEW FINDINGS

This section summarizes results from the site inspection conducted as part of the five-year review.

## 7.1 INTERVIEWS

Interviews were conducted with the former and current MCB Camp Pendleton Environmental Security staff tasked with managing IR Site 9. No substantive changes in site conditions have occurred that warrant additional interviews. The site is located in an undeveloped, remote area with limited access. The interviews are included in Appendix B.

## 7.2 SITE INSPECTION

On June 3, 2007, Mr. David Bloom, GDIT, conducted a visual site inspection. On June 28th, 2007, Ms. Dangel and Ms. Morley inspected and photographed the site. The site photographs are presented in Appendix A. The inspection results are summarized as follows:

- The site is not used for any purposes. The pond is surrounded by an earthen dike on all sides. The dike is about 8 feet tall as measured from the bottom of the pond, which is re atively flat all across.
- The former disposal areas show no sign of recent disposal activities. The impoundment is dry. The earthen berm surrounding impoundment is intact.
- Most of the site is covered with dense vegetation, with a few bare patches of soil, and shows minimal erosion damage.

No site changes were identified during the site inspection compared to previous inspections.

## 7.3 RISK INFORMATION REVIEW

The risk assessment performed during the 1994 RI process indicated that soil and groundwater contamination at IR Site 9 was within the NCP's risk management range. There was one measurement of beryllium (1.9 ppm) in soil that was above the PRG for a residential land use scenario. When the risk analysis was conducted in 2003, the PRG had been revised (to 150 ppm). The risk analysis determined that concentrations in soil and groundwater were protective of human health and the environment under a residential land use scenario. Therefore, no land use restrictions would be required.

Semiannual groundwater sampling conducted since 1997 has demonstrated attenuation of PCE and TCE in all wells except 9W-7A to below MCLs. Monitoring well 9W-7A has been transferred to IR Site 1114. Therefore, the risk from groundwater at IR Site 9 is within the acceptable criteria as defined by federal and state drinking water standards.

## 7.4 DATA REVIEW

This section presents a table of the validated analytical results for the constituents of concern from groundwater sampling at IR Site 9 after the last five-year review. The following data were samples taken from temporary well CPIR9-28 (PWC 2003).

TABLE 1 – GROUNDWATER ANALYTICAL RESULTS – TECH MEMO –JULY 2003

| PWC Sample ID | Laboratory Sample ID | PCE (ug/kg) | TCE (ug/kg) |
|---|---|---|---|
| CPIR-28Well shallow | XCMXM3-0013S | 1U | 1U |
| CPIR-28Well shallow | XCMXM3-0014S | 1U | 1U |

| | | | |
|---|---|---|---|
| CPIR-28Well deep | XCMXM3-0017 | 1U | 1UJ |
| CPIR-28Well deep | XCMXM3-0018 | 1U | 1UJ |

Notes:
U - Indicates the compound or analyte was analyzed for but was not detected at or above the stated limit
UJ - Indicates the compound or analyte was analyzed for but was not detected. The sample detection limit is an estimated value.

### 7.5 DOCUMENT REVIEW

This five-year review consisted of a review of all relevant documents and available data for IR Site 9, as listed below.

1. Data obtained from the *Final Marine Corps Base Camp Pendleton, California, Record of Decision Operable Unit 1* (SWDIV, 1995)
2. Data obtained from *Groundwater Monitoring Reports* issued since 1997 by Navy Public Works Center for SWDIV
3. Data obtained from *Technical Memorandum Summary of Soil and Monitoring Well Sampling*, July 2003 (PWC, 2003)
4. Explanation of Significant Difference for the 1995 Record of Decision, IR Site 9 (SWDIV, 2004)

## 8.0 TECHNICAL ASSESSMENT

The technical assessment of the protectiveness of a remedy during a five-year review is primarily based on answering the following three questions:

- Is the remedy functioning as intended by the decision document?
- Are the assumptions (e.g., exposure assumptions, toxicity data, cleanup levels, RAOs) 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 remedy?

The following sections address each of these questions and how they relate to selected remedy impletion at IR Site 9.

### 8.1 IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENT?

A review of the groundwater monitoring data from the 2003 Tech Memo indicates that TCE and PCE concentrations have been reduced below their respective MCLs. Therefore, the remedy is complete.

### 8.2 ARE THE ASSUMPTIONS USED AT THE TIME OF REMEDY SELECTION STILL VALID?

The standard risk screening concentration values have changed since the risk screening for soil contaminants at IR Site 9 were performed in 1994. For the Technical Memorandum and ESD, site soil concentrations were compared with current EPA Region 9 PRGs (October 2004). The one measurement of beryllium at 1.9 ppm that was above residential PRGs in 1994 is below the 2004 residential PRG of 150 ppm. The concentrations of contaminants compared favorably for a residential use scenario. The assumptions used at the time of remedy selection are still valid for site soils.

### 8.3 HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No.

## 9.0 ISSUES

There are no issues for this site.

## 10.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

There are no recommendations or follow-up actions required for this site.

## 11.0 PROTECTIVENESS STATEMENT

The remedial action at OU1, IR Site 9, is protective of human health and the environment. This determination is made based on the Explanation of Significant Difference (ESD) signed by the Federal Facilities Agreement (FFA) team on May 29, 2004. The ESD removed Site 9 from further groundwater monitoring since it was determined the site had met the cleanup requirements for groundwater as stipulated in the ROD. Based on the results of the five-year review, the groundwater remedy for IR Site 9 was found to have been effective in meeting the remedial action objectives.

## 12.0 NEXT REVIEW

This is the final five-year review report for this site and for OU1.

## 13.0 REFERENCES

Department of the Navy, 2004, *Policy for Conducting Five-Year Reviews Under the Installation Restoration Program,* May 21.

PWC, see Southwest Division Naval Facilities Engineering Command, prepared by Navy Public Works Center.

Southwest Division Naval Facilities Engineering Command, 1993, *Draft Final RI Report for Group A Sites, Site 9 - Operable Unit 1 - Marine Corps Base Camp Pendleton, California,* prepared by Jacobs Engineering Group Inc., October.

Southwest Division Naval Facilities Engineering Command, 1995, *Draft Final, Revision 1, Record of Decision for Operable Unit 1 - Site 9 and Group A Sites, Marine Corps Base Camp Pendleton, California,* prepared by Jacobs Engineering Group Inc., 2 October.

Southwest Division Naval Facilities Engineering Command, 2002a, *Semiannual Groundwater Monitoring Report for the First Half of 2002. IR Site 9, 41 Area Stabilization Pond, Marine Corps Base Camp Pendleton,* California, prepared by Navy Public Works Center, September.

Southwest Division Naval Facilities Engineering Command, 2002b, *Draft Final Sampling and Analysis Plan (Field Sampling Plan/Quality Assurance Project Plan) Monitoring Well Installation IR Site 9, 41 Area Waste Stabilization Pond, Marine Corps Base Camp Pendleton, California,* prepared by Navy Public Works Center, November.

Southwest Division Naval Facilities Engineering Command, 2003, *Semiannual Groundwater Monitoring Report for the Second Half of 2002. IR Site 9, 41 Area Stabilization Pond, Marine Corps Base Camp Pendleton,* California, prepared by Navy Public Works Center, February.

Southwest Division Naval Facilities Engineering Command, 2003, *Technical Memorandum, Summary of Soil and Monitoring Well Sampling, IR Site 9, Marine Corps Base Camp Pendleton, California*, prepared by Navy Public Works Center, July.

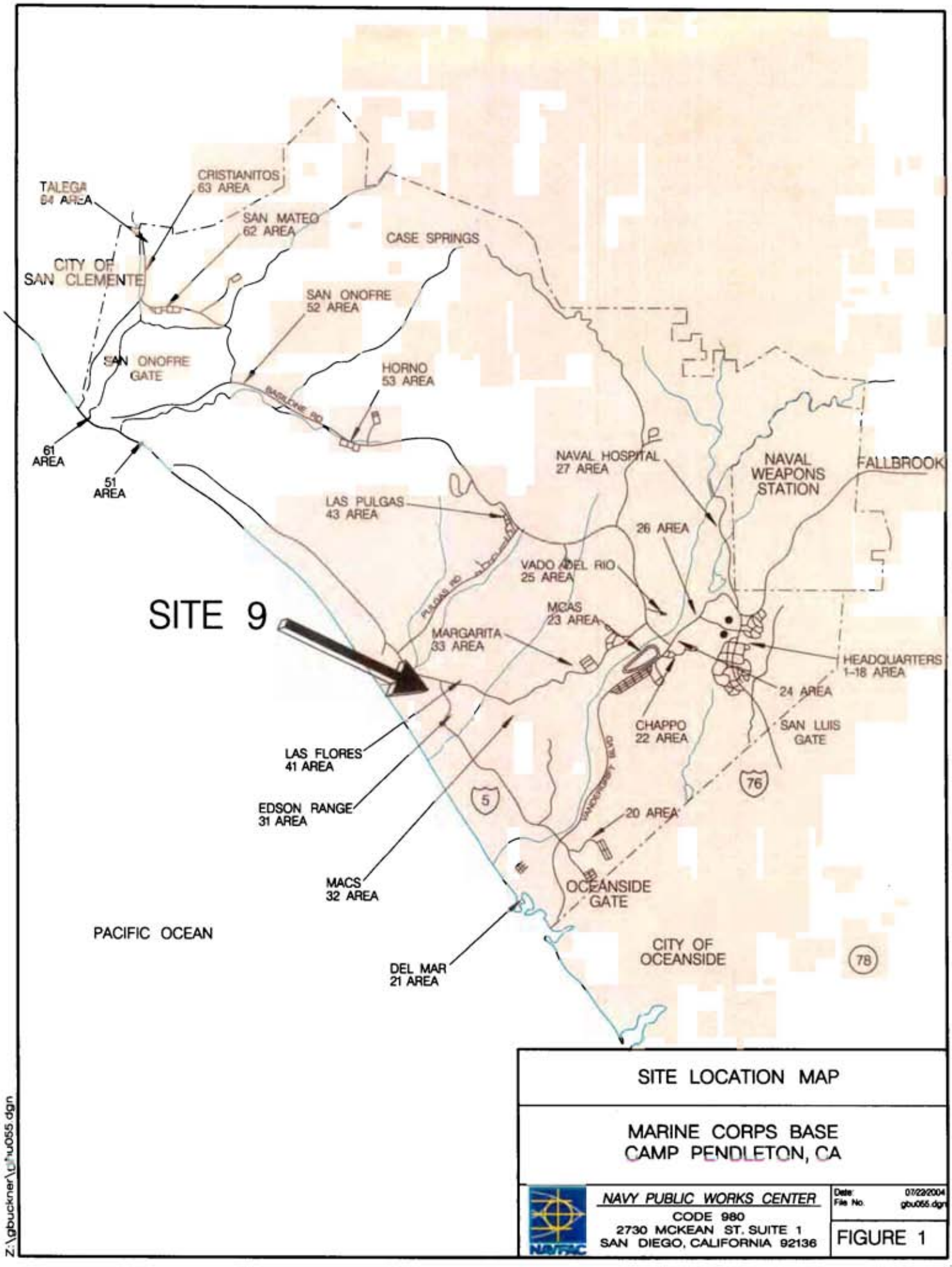
Southwest Division Naval Facilities Engineering Command, 2004, *Explanation of Significant Difference for Operable Unit 1 Record of Decision, Installation Restoration Site 9, Stuart Mesa Stabilization Pond, Marine Corps Base Camp Pendleton*, May 10.

OHM, 2002, *5-Year Review for IR Site 9, Stuart Mesa Stabilization Pond, MCB Camp Pendleton, California,* April.

U.S. Environmental Protection Agency, 2001, *Final, Comprehensive Five-Year Review Guidance*, EPA/540/R-01-007, OSWER Directive 9355.7-03B-P, Office of Emergency and Remedial Response, Washington, DC, June.

U.S. Environmental Protection Agency, 2004. *Region IX Preliminary Remediation Goals (PRGs).* October

# FIGURES




SITE LOCATION MAP

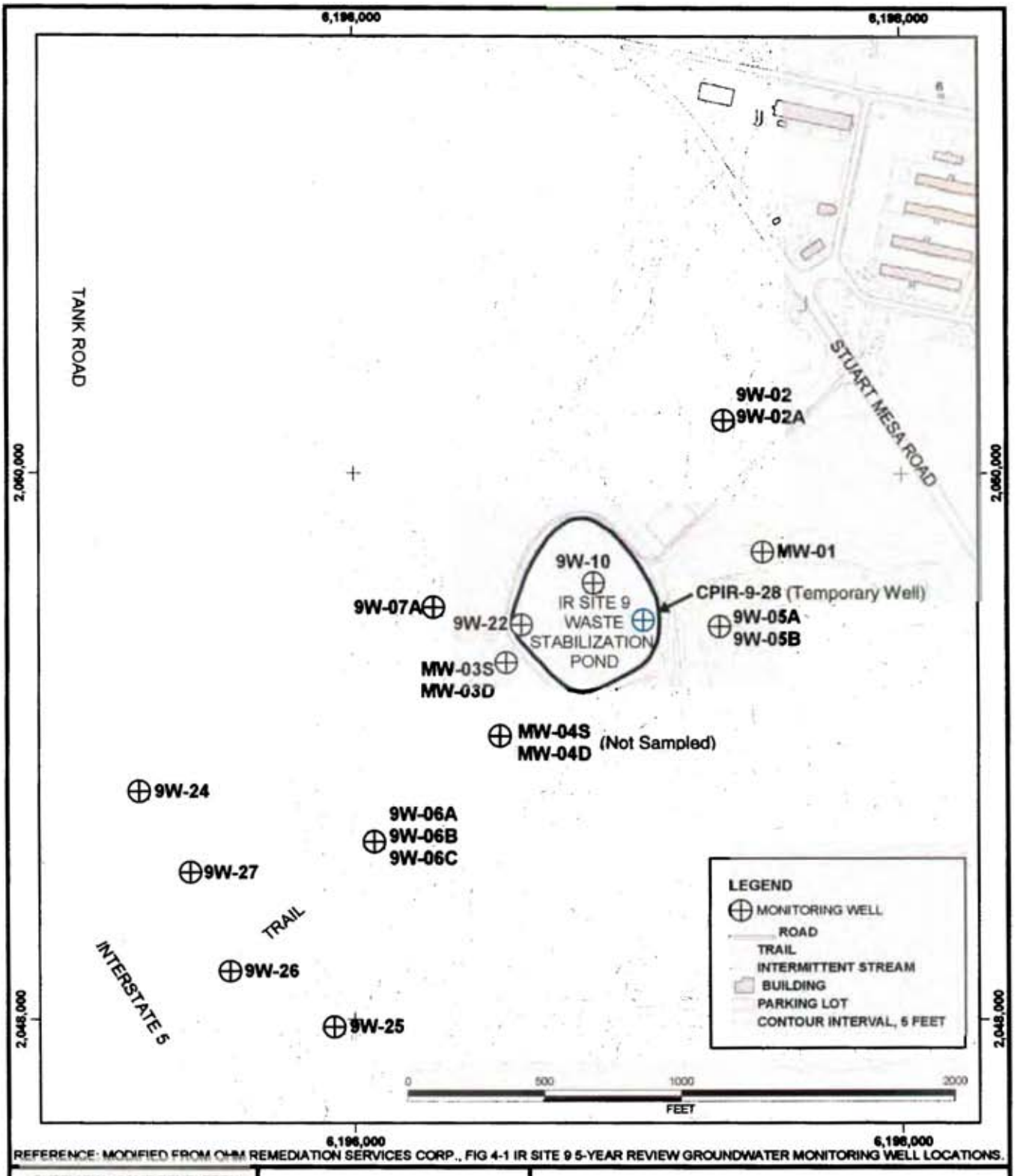
MARINE CORPS BASE
CAMP PENDLETON, CA

NAVY PUBLIC WORKS CENTER
CODE 980
2730 MCKEAN ST. SUITE 1
SAN DIEGO, CALIFORNIA 92136

Date: 07/22/2004
File No. gbu055.dgn

FIGURE 1

Z:\gbuckner\c*hu055.dgn




REFERENCE: MODIFIED FROM OHM REMEDIATION SERVICES CORP., FIG 4-1 IR SITE 9 5-YEAR REVIEW GROUNDWATER MONITORING WELL LOCATIONS.

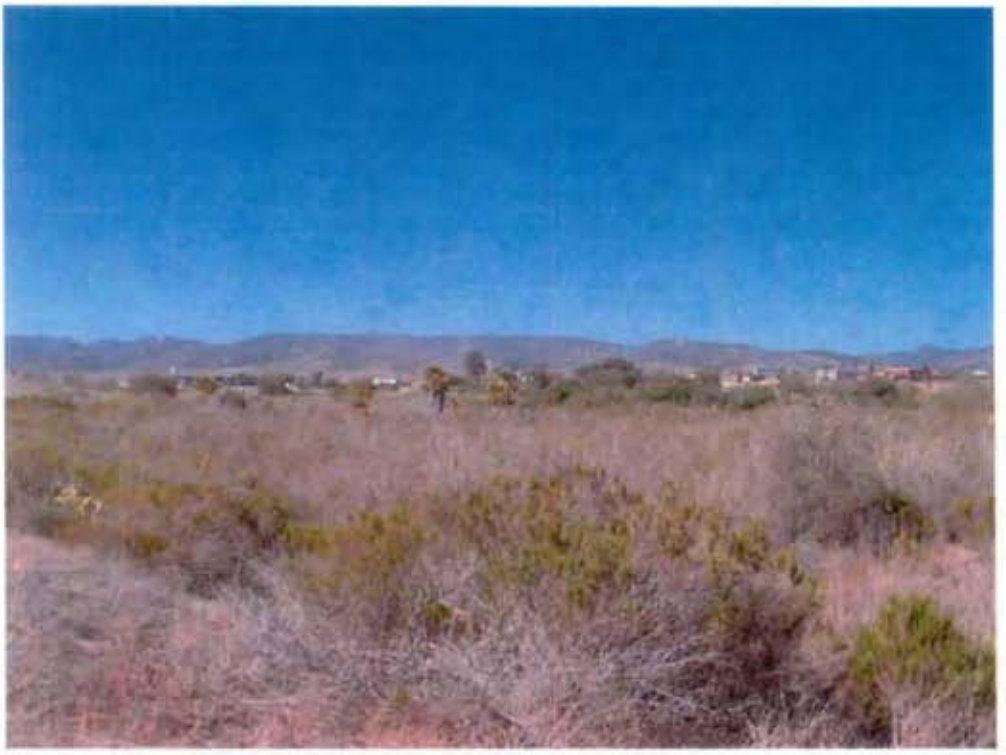

MAP PROJECTION: NAD 83
CALIFORNIA STATE PLANE
ZONE 6, SURVEY FEET

# SITE MAP

## IR SITE 9
## MARINE CORPS BASE
## CAMP PENDLETON, CALIFORNIA

| | | | |
|---|---|---|---|
| **GENERAL DYNAMICS**<br>3430 CAMINO DEL RIO NORTH<br>SAN DIEGO, CALIFORNIA 92108 | DATE: JUL 27, 2007<br>FILE: Pendleton_IR9_1 .mxd | FIGURE: **2** |

# APPENDIX A
## PHOTOGRAPHS



**VIEWS TO**
**NORTHEAST AND SOUTHEAST FROM WESTERN EDGE OF SITE**

# APPENDIX B
INTERVIEWS

# Site Inspection Checklist

## I. SITE INFORMATION

| | |
|---|---|
| Site name: Site 9 - 41 Area Waste Stabilization Pond | Date of inspection: 6-20-07 |
| Location and Region: MCB Camp Pendleton Region 9 | EPA ID: CA 2170023533 |
| Agency, office, or company leading the five-year review: U.S. Navy | Weather/temperature: Partly Sunny 72° F |

**Remedy Includes:** (Check all that apply)

- G Landfill cover/containment
- G Access controls
- G Institutional controls
- G Groundwater pump and treatment
- G Surface water collection and treatment
- (X) Other Site Closed

- G Monitored natural attenuation
- G Groundwater containment
- G Vertical barrier walls

**Attachments:** G Inspection team roster attached G Site map attached

## II. INTERVIEWS (Check all that apply)

1. ~~O&M~~ site manager Mark Bonsavage (Previous) — Base Remedial Project Manager — 6-20-07
   Name / Title / Date
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

2. O&M staff _____ _____ _____
   Name / Title / Date
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency _____
   Contact _____ _____ _____ _____
   Name / Title / Date / Phone no.
   Problems; suggestions; G Report attached _____

   Agency _____
   Contact _____ _____ _____ _____
   Name / Title / Date / Phone no.
   Problems; suggestions; G Report attached _____

   Agency _____
   Contact _____ _____ _____ _____

| Name | Title | Date | Phone no. |
|---|---|---|---|
| Problems; suggestions; G Report attached _____ | | | |

4. Other interviews (optional) G Report attached.

## III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - G O&M manual — G Readily available — G Up to date — G N/A
   - G As-built drawings — G Readily available — G Up to date — G N/A
   - G Maintenance logs — G Readily available — G Up to date — G N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** — G Readily available — G Up to date — G N/A
   - G Contingency plan/emergency response plan — G Readily available — G Up to date — G N/A

   Remarks _____

3. **O&M and OSHA Training Records** — G Readily available — G Up to date — G N/A

   Remarks _____

4. **Permits and Service Agreements**
   - G Air discharge permit — G Readily available — G Up to date — G N/A
   - G Effluent discharge — G Readily available — G Up to date — G N/A
   - G Waste disposal, POTW — G Readily available — G Up to date — G N/A
   - G Other permits _____ — G Readily available — G Up to date — G N/A

   Remarks _____

5. **Gas Generation Records** — G Readily available — G Up to date — G N/A

   Remarks _____

6. **Settlement Monument Records** — G Readily available — G Up to date — G N/A

   Remarks _____

7. **Groundwater Monitoring Records** — G Readily available — G Up to date — G N/A

   Remarks _____

8. **Leachate Extraction Records** G Readily available G Up to date G N/A
Remarks

9. **Discharge Compliance Records**
G Air G Readily available G Up to date G N/A
G Water (effluent) G Readily available G Up to date G N/A
Remarks

10. **Daily Access/Security Logs** G Readily available G Up to date G N/A
Remarks

## IV. O&M COSTS

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

2. **O&M Cost Records**
G Readily available G Up to date
G Funding mechanism/agreement in place
Original O&M cost estimate N/A G Breakdown attached

Total annual cost by year for review period if available

From____ To____ ____ G Breakdown attached
Date Date Total cost

From____ To____ ____ G Breakdown attached
Date Date Total cost

From____ To____ ____ G Breakdown attached
Date Date Total cost

From____ To____ ____ G Breakdown attached
Date Date Total cost

From____ To____ ____ G 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 G Applicable G N/A

**A. Fencing**

1. **Fencing damaged** G Location shown on site map G Gates secured G N/A
Remarks

**B. Other Access Restrictions**

1. **Signs and other security measures** G Location shown on site map G N/A
Remarks Signs were removed when the site was closed

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**
Site conditions imply ICs not properly implemented G Yes G No G N/A
Site conditions imply ICs not being fully enforced G Yes G No G N/A

Type of monitoring (*e.g.*, self-reporting, drive by) N/A Site is closed
Frequency
Responsible party/agency
Contact

| Name | Title | Date | Phone no. |
|---|---|---|---|

Reporting is up-to-date G Yes G No G N/A
Reports are verified by the lead agency G Yes G No G N/A

Specific requirements in deed or decision documents have been met G Yes G No G N/A
Violations have been reported G Yes G No G N/A
Other problems or suggestions: G Report attached

2. **Adequacy** G ICs are adequate G ICs are inadequate G N/A
Remarks

**D. General**

1. **Vandalism/trespassing** G Location shown on site map G No vandalism evident
Remarks

2. **Land use changes on site** G N/A
Remarks

3. **Land use changes off site** G N/A
Remarks

## VI. GENERAL SITE CONDITIONS

**A. Roads** G Applicable G N/A

1. **Roads damaged** G Location shown on site map G Roads adequate G N/A
Remarks

B. Other Site Conditions

Remarks _____

## VII. LANDFILL COVERS G Applicable (G N/A)

A. Landfill Surface

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** G Location shown on site map G Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** G Location shown on site map G Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** G Grass G Cover properly established G No signs of stress
   G Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
   Remarks_____

7. **Bulges** G Location shown on site map G Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** G Wet areas/water damage not evident
   G Wet areas G Location shown on site map Areal extent_____
   G Ponding G Location shown on site map Areal extent_____
   G Seeps G Location shown on site map Areal extent_____
   G Soft subgrade G Location shown on site map Areal extent_____

Remarks_____

9. **Slope Instability** G Slides G Location shown on site map G No evidence of slope instability
Areal extent_____
Remarks_____

B. **Benches** G Applicable G N/A
(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. **Flows Bypass Bench** G Location shown on site map G N/A or okay
Remarks_____

2. **Bench Breached** G Location shown on site map G N/A or okay
Remarks_____

3. **Bench Overtopped** G Location shown on site map G N/A or okay
Remarks_____

**C. Letdown Channels** G Applicable G N/A
(Channel lined with erosion control mats, riprap, 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. **Settlement** G Location shown on site map G No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** G Location shown on site map G No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** G Location shown on site map G No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** G Location shown on site map G No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ G No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
G No evidence of excessive growth

G Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent_____
Remarks_____

**D. Cover Penetrations** G Applicable G N/A

1. **Gas Vents** G Active G Passive
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance
G N/A
Remarks_____

2. **Gas Monitoring Probes**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

4. **Leachate Extraction Wells**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks_____

5. **Settlement Monuments** G Located G Routinely surveyed G N/A
Remarks_____

**E. Gas Collection and Treatment** G Applicable G N/A

1. **Gas Treatment Facilities**
G Flaring G Thermal destruction G Collection for reuse
G Good condition G Needs Maintenance
Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
G Good condition G Needs Maintenance
Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
G Good condition G Needs Maintenance G N/A
Remarks_____

**F. Cover Drainage Layer** G Applicable G N/A

1. **Outlet Pipes Inspected** G Functioning G N/A

Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
Remarks_____

**G. Detention/Sedimentation Ponds** G Applicable G N/A

1. **Siltation** Areal extent_____ Depth_____ G N/A
G Siltation not evident
Remarks_____

2. **Erosion** Areal extent_____ Depth_____
G Erosion not evident
Remarks_____

3. **Outlet Works** G Functioning G N/A
Remarks_____

4. **Dam** G Functioning G N/A
Remarks_____

**H. Retaining Walls** G Applicable G N/A

1. **Deformations** G Location shown on site map G Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. **Degradation** G Location shown on site map G Degradation not evident
Remarks_____

**I. Perimeter Ditches/Off-Site Discharge** G Applicable G N/A

1. **Siltation** G Location shown on site map G Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. **Vegetative Growth** G Location shown on site map G N/A
G Vegetation does not impede flow
Areal extent_____ Type_____
Remarks_____

3. **Erosion** G Location shown on site map G Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** G Functioning G N/A
Remarks_____

## VIII. VERTICAL BARRIER WALLS G Applicable G N/A

1. **Settlement** G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   G Performance not monitored
   Frequency_____ G Evidence of breaching
   Head differential_____
   Remarks_____

## C. Treatment System G Applicable G N/A

1. **Treatment Train** (Check components that apply)
   G Metals removal G Oil/water separation G Bioremediation
   G Air stripping G Carbon adsorbers
   G Filters_____
   G Additive (*e.g.*, chelation agent, flocculent)_____
   G Others_____
   G Good condition G Needs Maintenance
   G Sampling ports properly marked and functional
   G Sampling/maintenance log displayed and up to date
   G Equipment properly identified
   G Quantity of groundwater treated annually_____
   G Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   G N/A G Good condition G Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   G N/A G Good condition G Proper secondary containment G Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   G N/A G Good condition G Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   G N/A G Good condition (esp. roof and doorways) G Needs repair
   G Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   G Properly secured/locked G Functioning G Routinely sampled G Good condition
   G All required wells located G Needs Maintenance G N/A

Remarks_____

**D. Monitoring Data**

1. Monitoring Data
   G Is routinely submitted on time  G Is of acceptable quality

2. Monitoring data suggests:
   G Groundwater plume is effectively contained  G Contaminant concentrations are declining

**D. Monitored Natural Attenuation**

1. **Monitoring Wells** (natural attenuation remedy)
   G Properly secured/locked  G Functioning  G Routinely sampled  G Good condition
   G All required wells located  G Needs Maintenance  G N/A
   Remarks_____

## X. OTHER REMEDIES

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.

## XI. OVERALL OBSERVATIONS

**A. Implementation of the Remedy**

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.).

Site is closed with no land use restrictions. There is no risk.

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

N/A

C. **Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

N/A

D. **Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

N/A

# Site Inspection Checklist

## I. SITE INFORMATION

| | |
|---|---|
| Site name: Site 9-41 Area Waste Stabilization Pond | Date of inspection: 6/27/07 |
| Location and Region: MCB Camp Pendleton EPA Region 9 | EPA ID: CA 2170023533 |
| Agency, office, or company leading the five-year review: NAVY | Weather/temperature: — |

**Remedy Includes**: (Check all that apply)

- G Landfill cover/containment
- G Access controls
- G Institutional controls
- G Groundwater pump and treatment
- G Surface water collection and treatment
- G ~~Other~~ SITE IS CLOSED
- G Monitored natural attenuation
- G Groundwater containment
- G Vertical barrier walls

**Attachments:** G Inspection team roster attached G Site map attached

## II. INTERVIEWS (Check all that apply)

1. **O&M site manager** CHRISSY DANIEL (CURRENT) BASE RPM 6/27/07
   Name Title Date
   Interviewed G at site ~~G at office~~ G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed G at site G at office G by phone Phone no. _____
   Problems, suggestions; G Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

   Agency _____
   Contact _____ _____ _____ _____
   Name Title Date Phone no.
   Problems; suggestions; G Report attached _____

   Agency _____
   Contact _____ _____ _____ _____
   Name Title Date Phone no.
   Problems; suggestions; G Report attached _____

   Agency _____
   Contact

| Name | Title | Date | Phone no. |
|---|---|---|---|
| Problems; suggestions; G Report attached _____ | | | |

4. **Other interviews** (optional) G Report attached.

## III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - G O&M manual — G Readily available — G Up to date — ~~G N/A~~
   - G As-built drawings — G Readily available — G Up to date — ~~G N/A~~
   - G Maintenance logs — G Readily available — G Up to date — ~~G N/A~~

   Remarks _____

2. **Site-Specific Health and Safety Plan** — G Readily available — G Up to date — ~~G N/A~~
   G Contingency plan/emergency response plan — G Readily available — **G Up to date** — ~~G N/A~~

   Remarks _____

3. **O&M and OSHA Training Records** — G Readily available — **G Up to date** — ~~G N/A~~

   Remarks _____

4. **Permits and Service Agreements**
   - G Air discharge permit — G Readily available — G Up to date — ~~G N/A~~
   - G Effluent discharge — G Readily available — G Up to date — ~~G N/A~~
   - G Waste disposal, POTW — G Readily available — G Up to date — ~~G N/A~~
   - G Other permits _____ — G Readily available — G Up to date — ~~G N/A~~

   Remarks _____

5. **Gas Generation Records** — G Readily available — G Up to date — ~~G N/A~~

   Remarks _____

6. **Settlement Monument Records** — G Readily available — G Up to date — ~~G N/A~~

   Remarks _____

7. **Groundwater Monitoring Records** — ~~G Readily available~~ — G Up to date — G N/A

   Remarks

8. **Leachate Extraction Records** G Readily available G Up to date ~~G N/A~~
Remarks

9. **Discharge Compliance Records**
G Air G Readily available G Up to date ~~G N/A~~
G Water (effluent) G Readily available G Up to date ~~G N/A~~
Remarks

10. **Daily Access/Security Logs** G Readily available G Up to date ~~G N/A~~
Remarks

## IV. O&M COSTS

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

2. **O&M Cost Records**
G Readily available ~~G Up to date~~
G Funding mechanism/agreement in place
Original O&M cost estimate N/A G Breakdown attached

Total annual cost by year for review period if available

From____ (Date) To____ (Date) ____ (Total cost) G Breakdown attached
From____ (Date) To____ (Date) ____ (Total cost) G Breakdown attached
From____ (Date) To____ (Date) ____ (Total cost) G Breakdown attached
From____ (Date) To____ (Date) ____ (Total cost) G Breakdown attached
From____ (Date) To____ (Date) ____ (Total cost) G Breakdown attached

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

## V. ACCESS AND INSTITUTIONAL CONTROLS G Applicable ~~G N/A~~

A. Fencing

1. **Fencing damaged** G Location shown on site map G Gates secured ~~G N/A~~
Remarks

**B. Other Access Restrictions**

1. **Signs and other security measures** G Location shown on site map G N/A
Remarks SIGNS GONE

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

| | | | |
|---|---|---|---|
| Site conditions imply ICs not properly implemented | G Yes | ~~G No~~ | G N/A |
| Site conditions imply ICs not being fully enforced | G Yes | ~~G No~~ | G N/A |

Type of monitoring (*e.g.*, self-reporting, drive by) SITE CLOSED
Frequency
Responsible party/agency
Contact

| Name | Title | Date | Phone no. |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Reporting is up-to-date | G Yes | G No | ~~G N/A~~ |
| Reports are verified by the lead agency | G Yes | G No | ~~G N/A~~ |
| Specific requirements in deed or decision documents have been met | ~~G Yes~~ | G No | G N/A |
| Violations have been reported | G Yes | G No | ~~G N/A~~ |

Other problems or suggestions: G Report attached

2. Adequacy G ICs are adequate G ICs are inadequate ~~G N/A~~
Remarks

**D. General**

1. **Vandalism/trespassing** G Location shown on site map ~~G No vandalism evident~~
Remarks

2. **Land use changes on site** ~~G N/A~~
Remarks

3. **Land use changes off site** ~~G N/A~~
Remarks

## VI. GENERAL SITE CONDITIONS

A. Roads G Applicable ~~G N/A~~

1. Roads damaged G Location shown on site map G Roads adequate G N/A
Remarks

**B. Other Site Conditions**

Remarks _____

## VII. LANDFILL COVERS G Applicable G ~~N/A~~

**A. Landfill Surface**

1. **Settlement** (Low spots) G Location shown on site map G Settlement not evident
   Areal extent _____ Depth _____
   Remarks _____

2. **Cracks** G Location shown on site map G Cracking not evident
   Lengths _____ Widths _____ Depths _____
   Remarks _____

3. **Erosion** G Location shown on site map G Erosion not evident
   Areal extent _____ Depth _____
   Remarks _____

4. **Holes** G Location shown on site map G Holes not evident
   Areal extent _____ Depth _____
   Remarks _____

5. **Vegetative Cover** G Grass G Cover properly established G No signs of stress
   G Trees/Shrubs (indicate size and locations on a diagram)
   Remarks _____

6. **Alternative Cover (armored rock, concrete, etc.)** G N/A
   Remarks _____

7. **Bulges** G Location shown on site map G Bulges not evident
   Areal extent _____ Height _____
   Remarks _____

8. **Wet Areas/Water Damage** G Wet areas/water damage not evident
   G Wet areas G Location shown on site map Areal extent _____
   G Ponding G Location shown on site map Areal extent _____
   G Seeps G Location shown on site map Areal extent _____
   G Soft subgrade G Location shown on site map Areal extent _____

Remarks_____

_____

9. **Slope Instability** G Slides G Location shown on site map G No evidence of slope instability
Areal extent_____
Remarks_____

_____

**B. Benches** G Applicable G N/A
(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. **Flows Bypass Bench** G Location shown on site map G N/A or okay
Remarks_____

_____

2. **Bench Breached** G Location shown on site map G N/A or okay
Remarks_____

_____

3. **Bench Overtopped** G Location shown on site map G N/A or okay
Remarks_____

_____

**C. Letdown Channels** G Applicable G N/A
(Channel lined with erosion control mats, riprap, 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. **Settlement** G Location shown on site map G No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

_____

2. **Material Degradation** G Location shown on site map G No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

_____

3. **Erosion** G Location shown on site map G No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

_____

4. **Undercutting** G Location shown on site map G No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

_____

5. **Obstructions** Type_____ G No obstructions
G Location shown on site map Areal extent_____
Size_____
Remarks_____

_____

6. **Excessive Vegetative Growth** Type_____
G No evidence of excessive growth

G Vegetation in channels does not obstruct flow
G Location shown on site map Areal extent _____
Remarks _____

**D. Cover Penetrations** G Applicable G N/A

1. **Gas Vents** G Active G Passive
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance
G N/A
Remarks _____

2. **Gas Monitoring Probes**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks _____

3. **Monitoring Wells** (within surface area of landfill)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks _____

4. **Leachate Extraction Wells**
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G Evidence of leakage at penetration G Needs Maintenance G N/A
Remarks _____

5. **Settlement Monuments** G Located G Routinely surveyed G N/A
Remarks _____

**E. Gas Collection and Treatment** G Applicable G N/A

1. **Gas Treatment Facilities**
G Flaring G Thermal destruction G Collection for reuse
G Good condition G Needs Maintenance
Remarks _____

2. **Gas Collection Wells, Manifolds and Piping**
G Good condition G Needs Maintenance
Remarks _____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
G Good condition G Needs Maintenance G N/A
Remarks _____

**F. Cover Drainage Layer** G Applicable G N/A

1. **Outlet Pipes Inspected** G Functioning G N/A

Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
Remarks_____

**G. Detention/Sedimentation Ponds** G Applicable G N/A

1. **Siltation** Areal extent_____ Depth_____ G N/A
G **Siltation** not evident
**Remarks**_____

2. **Erosion** Areal extent_____ Depth_____
G **Erosion** not evident
**Remarks**_____

3. **Outlet Works** G Functioning G N/A
**Remarks**_____

4. **Dam** G Functioning G N/A
Remarks_____

**H. Retaining Walls** G Applicable G N/A

1. **Deformations** G Location shown on site map G Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. **Degradation** G Location shown on site map G Degradation not evident
Remarks_____

**I. Perimeter Ditches/Off-Site Discharge** G Applicable G N/A

1. **Siltation** G Location shown on site map G Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. **Vegetative Growth** G Location shown on site map G N/A
G Vegetation does not impede flow
Areal extent_____ Type_____
Remarks_____

3. **Erosion** G Location shown on site map G Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. **Discharge Structure** G Functioning G N/A
**Remarks**

Remarks_____

2. **Outlet Rock Inspected** G Functioning G N/A
Remarks_____

**G. Detention/Sedimentation Ponds** G Applicable G N/A

1. Siltation Areal extent_____ Depth_____ G N/A
G Siltation not evident
Remarks_____

2. Erosion Areal extent_____ Depth_____
G Erosion not evident
Remarks_____

3. Outlet Works G Functioning G N/A
Remarks_____

4. Dam G Functioning G N/A
Remarks_____

H. Retaining Walls G Applicable G N/A

1. Deformations G Location shown on site map G Deformation not evident
Horizontal displacement_____ Vertical displacement_____
Rotational displacement_____
Remarks_____

2. Degradation G Location shown on site map G Degradation not evident
Remarks_____

**I. Perimeter Ditches/Off-Site Discharge** G Applicable G N/A

1. Siltation G Location shown on site map G Siltation not evident
Areal extent_____ Depth_____
Remarks_____

2. Vegetative Growth G Location shown on site map G N/A
G Vegetation does not impede flow
Areal extent_____ Type_____
Remarks_____

3. Erosion G Location shown on site map G Erosion not evident
Areal extent_____ Depth_____
Remarks_____

4. Discharge Structure G Functioning G N/A
Remarks_____

## VIII. VERTICAL BARRIER WALLS G Applicable ~~G N/A~~

1. **Settlement** G Location shown on site map G Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   G Performance not monitored
   Frequency_____ G Evidence of breaching
   Head differential_____
   Remarks_____

## C. Treatment System G Applicable G N/A

1. **Treatment Train** (Check components that apply)
   G Metals removal G Oil/water separation G Bioremediation
   G Air stripping G Carbon adsorbers
   G Filters_____
   G Additive (*e.g.*, chelation agent, flocculent)_____
   G Others_____
   G Good condition G Needs Maintenance
   G Sampling ports properly marked and functional
   G Sampling/maintenance log displayed and up to date
   G Equipment properly identified
   G Quantity of groundwater treated annually_____
   G Quantity of surface water treated annually_____
   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   G N/A G Good condition G Needs Maintenance
   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   G N/A G Good condition G Proper secondary containment G Needs Maintenance
   Remarks_____

4. **Discharge Structure and Appurtenances**
   G N/A G Good condition G Needs Maintenance
   Remarks_____

5. **Treatment Building(s)**
   G N/A G Good condition (esp. roof and doorways) G Needs repair
   G Chemicals and equipment properly stored
   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   G Properly secured/locked G Functioning G Routinely sampled G Good condition
   G All required wells located G Needs Maintenance G N/A

Remarks

D. Monitoring Data

1. Monitoring Data
G Is routinely submitted on time G Is of acceptable quality

2. Monitoring data suggests:
G Groundwater plume is effectively contained G Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
G Properly secured/locked G Functioning G Routinely sampled G Good condition
G All required wells located G Needs Maintenance G N/A
Remarks

## X. OTHER REMEDIES

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.

## XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

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.).

SITE CLOSED- NO LUCS

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

N/A

| C. | **Early Indicators of Potential Remedy Problems** |
|---|---|
| | Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.<br>N/A |
| **D.** | **Opportunities for Optimization** |
| | Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.<br>N/A |

# APPENDIX C
## OTHER SITES IN OU1 AND OTHER OUS

The five-year reviews for Camp Pendleton have not been consolidated into one report. Since this is the final five-year review for OU1, the OU3 five-year review report was not added for the sake of clarity. Rather, that five-year review will be submitted in 2009 when the OU3 five-year review is due. No five-year reviews are required for OU2 and OU4 as all of the sites in those OUs have been closed with no land use restrictions. Once the OU5 ROD is signed, that OU will be included in the OU3 Five Year Review due in 2009.

The following is a list of the other sites in the OU1 ROD besides Site 9. All of the sites have been closed with unrestricted land use.

Site 4 – Marine Corps Air Station (MCAS) Drainage Ditch

Site 4A - Marine Corps Air Station (MCAS) Concrete-Lined Surface Impoundment

Site 24 – 26 Area Morale, Welfare and Recreation (MWR) Maintenance Facility