



**Five-Year Review Report for
Installation Restoration (IR) Site 9 - Operable Unit 1
Marine Corps Base Camp Pendleton
Camp Pendleton, California**

May 20, 2002

**Five-Year
Review Report**

Appendix A - Responses to Regulatory Review Comments Matrix
Appendix B - Institutional Control Documentation (Excerpts)
Appendix C - Interview Records and MCB Camp Pendleton Project Management Process
Appendix D - Site Inspection Checklist and Site Photographs

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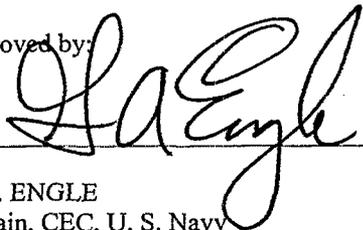
Five-Year Review Report

May 20, 2002

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Table of Contents

<i>List of Figures</i>	<i>iii</i>
<i>List of Tables</i>	<i>iii</i>
<i>Abbreviations and Acronyms</i>	<i>iv</i>
Section 1 Introduction	1-1
Section 2 Site Chronology	2-1
Section 3 Background	3-1
3.1 Physical Characteristics	3-1
3.2 Land and Resource Use	3-1
3.3 Initial Response.....	3-1
3.4 Contaminants	3-2
3.4.1 Soil and Vadose Zone.....	3-2
3.4.2 Groundwater	3-3
3.4.3 Surface Water and Sediments.....	3-4
Section 4 Remedial Actions	4-1
4.1 Remedy Selection	4-1
4.2 Remedy Implementation.....	4-1
4.3 System Operations/Operation and Maintenance.....	4-2
4.4 Progress Since the Last Five-Year Review.....	4-3
Section 5 Five-Year Review Process	5-1
Section 6 Five-Year Review Findings	6-1
6.1 Interviews.....	6-1
6.2 Site Inspection.....	6-2
6.3 Risk Information Review.....	6-2
6.4 Data Review.....	6-3
Section 7 Assessment	7-1
7.1 Is the Remedy Functioning as Intended by the Decision Document?	7-1
7.2 Are the Assumptions Used at the Time of Remedy Selection Still Valid?	7-1
7.3 Has Any Other Information Come to Light that Could Call Into Question the Protectiveness of the Remedy?	7-1
Section 8 Deficiencies	8-1
Section 9 Recommendations and Follow-up Actions	9-1
Section 10 Protectiveness Statement	10-1

Table of Contents (Cont.)

Section 11 Next Review 11-1

Section 12 Other Comments..... 12-1

Section 13 References..... 13-1

Appendix A Responses to Regulatory Review Comments Matrix

Appendix B Institutional Control Documentation (Excerpts)

***Appendix C Interview Records and MCB Camp Pendleton Project Management
Process***

Appendix D Site Inspection Checklist and Site Photographs

List of Figures

Figure 1-1	Location Map
Figure 2-1	Site Location and Base Areas
Figure 2-2	IR Site 9 – Site Map
Figure 3-1	Groundwater Basins and Nearest Production Wells to Site 9
Figure 3-2	Surface Runoff Direction
Figure 3-3	IR Site 9 – 5-Year Review – Summary of RI/FS Soil Analytical Results
Figure 3-4	IR Site 9 – 5-Year Review – Summary of RI/FS Groundwater Analytical Results
Figure 4-1	IR Site 9 – 5-Year Review – Groundwater Monitoring Well Locations
Figure 6-1	IR Site 9 – 5-Year Review – Summary of Groundwater Monitoring Results

List of Tables

Table 3-1	Summary of Phase I RI Results – Organic Concentrations in Soil
Table 3-2	Summary of Phase I RI Results – Metals Concentrations in Soil
Table 3-3	Summary of Phase I RI Results – Comparison of Groundwater Concentrations and MCLs
Table 3-4	Summary of Phase I RI Results IR Site 9 – Comparison of Surface-Water Concentrations and Regulatory Standards
Table 6-1	Summary of Semiannual Groundwater Monitoring Results – VOC Detections

Abbreviations and Acronyms

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
DoN	U.S. Department of the Navy
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
FS	feasibility study
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
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
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

Section 1

Introduction

The United States Department of the Navy (DoN) has conducted a 5-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 1-1). This review was conducted from December 2000 through January 2001. This report documents the results of the review. Analysis for the 5-year review was conducted by the Southwest Division Naval Facilities Engineering Command (SWDIV), with technical support from OHM Remediation Corp. (OHM), a wholly owned subsidiary of The IT Group (IT). This report was prepared in accordance with the draft guidance developed by the U.S. Environmental Protection Agency (EPA, 1999). A draft version of this report was submitted to federal and state regulatory agencies for review in March 2001. This report was finalized in accordance with the review comments and responses to comments. A copy of the comments and responses is provided in Appendix A. During the finalization process, both the DoN and the EPA issued their final guidance on conducting the five-year review. This document was reviewed and finalized for compliance with DoN (DoN, 2001) and EPA (EPA, 2001) final guidance.

The DoN has conducted this 5-year review as required by the ROD and consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requirements 121 (c), 42 U.S.C. 9621 (c) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C. F. R. 300.430 (f) (4) (ii). CERCLA §121(c), as amended, that states the following:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less than each 5 years after initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

As set forth in the NCP, Title 40 of the Code of Federal Regulations (CFR), Part 300.430(f)(4)(ii), states the following:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every 5 years after the initiation of the selected remedial action.

As outlined in DoN (DoN, 2001) and EPA (EPA, 2001) guidance documents, the purpose of a 5-year review is to determine whether the remedy at the site is protective of human health and the environment. The methods, findings, and conclusions of the reviews are documented in 5-year review reports. In addition, 5-year review reports identify deficiencies found during reviews, if any, and recommendations to address them.

The ROD for IR Site 9 was signed on December 12, 1995 (date of the last signature of the FFA members, the RWQCB). Because the hazardous substances, pollutants, or contaminants remaining at the site exceed concentrations that allow for unrestricted use and unlimited exposure, a 5-year review is required. This is the 5-year review for IR Site 9. Depending on future development of the site, another 5-year review could be required in the future if the remaining contamination continues to restrict unlimited use of the site.

Five-Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN) Site 9, 41 Area Stuart Mesa Stabilization Pond

EPA ID (from WasteLAN) 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 completion date:** ____ / ____ / ____

Has site been put into reuse? YES NO

REVIEW STATUS

Reviewing agency: EPA State Tribe Other Federal Agency _____ DoN _____

Author name: Ed Miranda

Author Title: Remedial Project Manager

Author affiliation: Southwest Division Naval Facilities Engineering Command

Review period: December / 2000 to January / 2001

Date(s) of inspection: 12 / 21 / 2000

Type of review: Statutory
 Policy (Post-SARA Pre-SARA NPL-Removal only
 Non-NPL Remedial Action Site NPL State/Tribe-lead
 Regional Discretion)

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) Initial 5-year review per NCP Part 300.430(f)(4)(ii) – contaminants remaining at the site exceed concentrations that allow for unlimited use and unrestricted exposure.

Triggering action date (from WasteLAN): 12 / 07 / 1995

Due date (five years after triggering action date): 12 / 07 / 2000

Five-Year Review Summary Form

Deficiencies:

- Base personnel are not aware of the reason for the restricted use classification for the site area due to a lack of signs indicating hazardous substances are present in the groundwater.
- Not enough groundwater data to fully evaluate the fate of PCE contamination.
- PCE has not degraded in one well as predicted in the fate and transport model and the concentration in this well are higher than 5 years ago.
- One of the security fence panels at the former grease disposal pit needs to be repaired.
- The dedicated groundwater sampling pump in well MW03-S needs to be repaired or replaced.
- Four additional wells need to be included in the monitoring plan to meet the ROD requirements of 12 wells to be sampled on a semi-annual basis.
- More soil and groundwater data are needed to assess the possible source of the increasing PCE in monitoring well 9W-07A.

Recommendations and Follow-up Actions:

- Repair the security fence panel at the grease disposal pit.
- Repair or replace the dedicated sampling pump in well MW-03S.
- Install signs to reinforce access restrictions to the site and provide contact information.
- Monitor groundwater levels in wells to establish the groundwater hydrology and identify the well screens in relation to the hydrogeologic units at the site.
- Collect groundwater samples from existing monitoring wells once to assess the extent of PCE and help redefine the 12 well monitoring plan per the ROD.
- Collect additional soil samples from the southeast portion of the waste stabilization pond through the installation of one soil boring in this area. The soil boring will be converted into a groundwater monitoring well for sampling of groundwater directly underlying the pond.
- Reassess the current monitoring program based on additional soil and groundwater sampling results. Modify the monitoring program as required so that the effectiveness of natural attenuation can be better assessed.

Protectiveness Statement(s):

Currently, there are no exposure routes to groundwater at Site 9. The remedy at IR Site 9 is protective of human health and the environment unless the exposure routes to groundwater change significantly in the future. Although the assumptions used at the time of the remedy selection may need revisions, such revisions are not expected to have a critical impact on the exposure risk. The revisions are more likely to impact the projection on the overall time frame required for the remedy to achieve the remedial goal. Institutional controls implemented for the site will continue to restrict the future land and groundwater uses in the vicinity of the site. These measures are the primary means for protecting human health and the environment from exposure risk.

Other Comments:

The effectiveness of natural attenuation will be reevaluated after additional groundwater monitoring data become available. The evaluation will be presented in the groundwater monitoring reports compiled on a semiannual basis.

Section 2

Site 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 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 remediate, 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 lagoon for oxidation and percolation of raw sewage generated in Las Flores 41 Area in the southwestern part of MCB Camp Pendleton (Figure 2-1) 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 and a partially fenced grease disposal pit to the east of the waste stabilization pond (Figure 2-2). 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 in the past.

Under the base IR program, the parties to the Federal Facility Agreement (FFA) assigned IR sites to groups in alphabetical order (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 indicated 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 remedial investigation/feasibility study (RI/FS) program for Operable Unit (OU) 1 (OU1). The remedial action for IR Site 9 was established through the signing of the OU1 ROD 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.

Based on the OUI ROD, the major components of the remedy for IR Site 9 include the following:

- Amend the Base MasterPlan 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.
- In the unlikely event that the site is converted to residential use, considerable regrading and import of clean fill, as well as notification requirements to inform interested parties of remaining site contaminants and their concentrations, 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 following is a chronology of events for IR Site 9, 41 Area Stuart Mesa Stabilization Pond:

Chronology of Site Events

Event	Date
Initial discovery of the Site and Process	1988 Site Inspection and sampling
Pre-NPL Responses	None
NPL Listing of MCB Camp Pendleton	15 November 1989
Removal Actions	None
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
ROD Amendments	None
Other Enforcement Documents	None
Remedial Design (start, finish)	Not required, remediation is by natural attenuation
Remedial Construction (start, finish)	Not applicable
Remedial Action (start)	December 7, 1995
Monitoring of Remedial Action	Semiannually since April 30, 1997
Final Closeout Report	None
Previous Five-Year Reviews	None

Section 3

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 $\frac{3}{4}$ mile east of the Pacific Ocean (Figure 3-1). 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 southwestward toward the Pacific Ocean (Figure 3-2). The nearest inhabited building is about 1,500 feet northeast of the site along Stuart Mesa Road (Figure 3-2).

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 (Figure 3-1). The site is within $\frac{1}{2}$ mile 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], 1975). 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 lagoon 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.

The site is currently inactive.

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 risks associated with exposures to soil and groundwater contamination at the site are within the acceptable criteria established in the NCP (40 CFR 300.430[e][2][I][A][2]). The results of the ecological risk assessment indicated no significant risk to the environment. Based on the risk assessment, no remedial action is required for soil contamination at the site. However, groundwater contamination exceeds maximum contaminant levels (MCLs) and, therefore, requires remedial action. Based on the level of groundwater contamination, the selected remedy is remediation by natural attenuation (RNA), which requires no additional remedial construction or response.

3.4 Contaminants

This section presents a brief summary of the analytical results from soil, groundwater, and surface-water sampling at IR Site 9 during the RI/FS process conducted between 1992 and 1994. The field sampling activities were conducted in two phases. Phase I RI was performed between February 1992 and April 1993 and included both soil and groundwater sampling. Phase II RI was conducted from May 1993 through April 1994 and included only groundwater sampling to verify the Phase I results. Additional information on groundwater contamination has since been obtained through the semiannual groundwater monitoring that was started in April 1997. The additional information is discussed and evaluated in Sections 4 through 8. For the purpose of background descriptions, the following sections summarize data only from the RI/FS phases. Additionally, only the data critical to the risk assessment were summarized and reviewed as part of this 5-year review process.

3.4.1 Soil and Vadose Zone

Ranges of organic and metal concentrations detected in IR Site 9 soil samples are presented in Tables 3-1 and 3-2, respectively. Also included in the tables are the preliminary remediation goals (PRGs) for 1994, when the RI/FS was completed, and background soil values, as appropriate. Soil samples were collected from 19 borings during site characterization. Figure 3-3 shows soil sample locations and a summary of analytical results. Analytical results are briefly summarized as follows:

- The highest concentrations of total petroleum hydrocarbons (TPH) were detected at the north end of the former effluent lagoon. A TPH concentration of 6,700 milligrams per kilogram (mg/kg) was detected in soil boring 9B-17 at approximately 6 feet below ground surface. Below 6 feet, TPH concentrations were very low or nondetect.
- TPH concentrations were generally detected in shallow soil. Elevated concentrations of TPH were detected in the borings within the contour line shown in Figure 3-3, along with concentrations of beryllium exceeding the PRG.
- Beryllium is a naturally occurring background metal in soil (Table 3-2). A site-specific statistical evaluation was performed for beryllium concentrations in soil at IR Site 9.

Statistical results indicate that a beryllium concentration of 0.96 mg/kg (or less) is the 95 percent upper confidence limit (UCL) of the background distribution. Only one soil sample exceeded the 95 percent UCL of the background distribution for beryllium at IR Site 9: a sample collected at 1 foot below ground surface in boring 9B-14 (Figure 3-3), with a beryllium concentration of 1.9 mg/kg.

3.4.2 Groundwater

Groundwater analytical results from the Phase I RI were used as the basis for risk assessment. They are summarized in Table 3-3. Figure 3-4 shows groundwater impacts at IR Site 9 during the monitoring period of 1992 through 1994. The groundwater contamination at IR Site 9 are summarized as follows:

- Tetrachloroethene (PCE) concentrations of 6.0, 10, and 4.0 micrograms per liter ($\mu\text{g/L}$) were detected in well 9W-07A (Figure 3-4) during the first, second, and third rounds of groundwater sampling, respectively. The MCL for PCE is 5.0 $\mu\text{g/L}$. Well 9W-07A is the shallow well of a three-well cluster and is screened from 29 to 39 feet below grade.
- A 1,2-dichloroethane (DCA) concentration of 2.0 $\mu\text{g/L}$ was detected in well MW-05 (Figure 3-4) during the first round of groundwater sampling. The MCL for 1,2-DCA is 0.5 $\mu\text{g/L}$. Well MW-05 was dry during the fourth quarter 1992 sampling event (second round) and could not be accessed for sampling during the third round because of flooding. In addition, 1,2-DCA was not detected during the second quarter 1993 sampling event. Figure 3-4 includes the second quarter 1993 (Phase 2 RI) analytical results for this well and other wells in which MCLs were exceeded during at least one quarter of sampling and for which samples could not be collected during the three previous quarters.
- Trichloroethene (TCE) concentrations of 11 and 15 $\mu\text{g/L}$ were detected in well MW-04D (Figure 3-4) during the first and second rounds of groundwater sampling in 1992, respectively. The MCL for TCE is 5.0 $\mu\text{g/L}$. Well MW-04D was not sampled during the third round of groundwater sampling because of the 1993 Spring flooding. TCE was detected at a concentration of 5.0 $\mu\text{g/L}$ during the second quarter 1993 sampling event. Well MW-04D was installed during the previous site inspection and is screened from approximately 16 to 30 feet below grade. Due to the TCE detection, two more rounds of sampling were conducted as part of the Phase II RI effort. The TCE levels appeared to be stabilized and did not increase. The highest TCE Level (15 $\mu\text{g/L}$) was used as the basis for risk assessment.
- Antimony and nickel exceeded MCLs in upgradient and downgradient wells. Statistical evaluations (SWDIV, 1993) indicate that these concentrations are representative of background.
- Mercury was detected in wells 9W-07A and 9W-07B during the third quarter 1992 sampling event but was not detected in several subsequent sampling events (fourth quarter 1992 and first and second quarters 1993) and, thus, appears to be related to field or laboratory contamination. Consequently, mercury is not included in Figure 3-4.

- TPH (analyzed using EPA Method m8015 with a diesel standard) was detected at a maximum concentration of 470 µg/L in well 9W-07A (Figure 3-4) during the third quarter 1992 sampling event. TPH was not detected in this well during subsequent rounds of sampling. An MCL has not been established for TPH and, thus, TPH is not plotted in Figure 3-4.

Groundwater analytical data indicate that an area of volatile organic contamination (TCE, PCE, and 1,2-DCA) was present downgradient from the former lagoon at IR Site 9. This area is shown by a contour line in Figure 3-4. No contaminants were detected in the wells upgradient from the former effluent lagoon.

Groundwater monitoring conducted since the completion of the RI indicates that TCE is present in wells 9W-06B and 9W-07A at concentrations below the MCL and that PCE is present in well 9W-07A at concentrations exceeding the MCL. Monitoring data are discussed in Section 6.

3.4.3 Surface Water and Sediments

Following January 1993 flooding, two surface-water samples were collected from the impoundment to supplement the ecological risk assessment. Analytical results for surface-water samples are compared with standards in Table 3-4. Antimony, beryllium, cadmium, cyanide, cobalt, chromium, mercury, selenium, and thallium were not detected in the surface-water samples.

Although copper and aluminum concentrations exceeded the acute and/or chronic water quality criteria, only in rare flooding conditions will the impoundment accumulate standing surface water. The impoundment is isolated from surrounding drainages and typically does not contain surface water. Therefore, the contaminants detected in surface-water samples should not present a significant ecological risk.

Section 4

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 OUI 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. No containment, excavation, removal, or treatment was performed. Institutional controls will be used in the unlikely event that IR Site 9 is used for residential purposes in the future. Considerable regrading and import of clean fill, as well as notification requirements to inform interested parties of remaining site contaminants (beryllium and TPH) and associated concentrations, would be required.
- The groundwater component of the selected remedy involves risk management through an amendment to the Base MasterPlan 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 4-1. An alternative evaluation will be performed once every 5 years to assess the effectiveness and document the progress of the alternative. Groundwater samples are analyzed for TPH by modified EPA Method 8015 and for volatile organic compounds (VOCs) by EPA Method 8240, using EPA CLP protocol. The DoN will provide results of the semiannual groundwater monitoring to the appropriate regulatory agencies.

The human health risk associated with exposures to groundwater contamination at IR Site 9 was deemed acceptable. 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 $\frac{3}{4}$ mile west of IR Site 9. Institutional control will 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 first post-ROD semiannual groundwater monitoring event was conducted on April 30, 1997. Eight wells (Figure 4-1) 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. The most recent sampling event was conducted on July 26 and 27, 2000. The sampling dates and events are summarized as follows:

Date	MW-3S	MW-3D	9W-6A	9W-6B	9W-6C	9W-7A	9W-7B	9W-7C
4/30/97	√	√	--	√	√	--	--	√
12/3/97	√	√	--	√	√	--	√	--
8/19/98	√	√	√	--	√	√	√	√
6/30/99	√	√	√	√	√	√	√	√
9/24/99	√	√	√	√	√	√	√	√
4/11/00	√	√	√	√	√	√	√	√
7/27/00	√	√	√	√	√	√	√	√

Note: √ - groundwater sampling and analysis were performed
 -- - groundwater not sampled.

Since 1994, IR Site 9 has been identified and shown as a restricted area in the basewide environmental and natural resource map that identifies all environmental sensitive areas and habitats of endangered species. Institutional control at the site can be demonstrated by the legend on the map that identifies the site as "Installation Restoration Site. Soil Contamination. Troop/Vehicle Transit OK if Otherwise Allowed. Digging or Bivouacking PROHIBITED." Such restraints are also incorporated in the geographic information system (GIS) database used by the base in planning and reviewing all military construction, maintenance, and repair projects. The base is currently in the process of updating the 41 Area Capital Improvement Plan (equivalent to a MasterPlan for the area). This plan will mandate constraints for the land use as noted in the above information. A copy (excerpts) of the current plans, maps, and related Range and Training Regulations (BOP3500.1K) that constitute the institutional control at this site is presented in Appendix B.

4.3 System Operations/Operation and Maintenance

The ROD does not require the construction of a remedial system. The selected remedy is based on natural attenuation. Therefore, no system operation/maintenance is needed. The current groundwater monitoring activities have been performed by the Navy Public Works Center (PWC) in San Diego on a semiannual basis.

IR Site 9 is not currently used for any purposes. A sewage overflow pipe to the evaporation/oxidation lagoon remains in place and reportedly was used occasionally during periods of heavy rainfall (SWDIV, 2000). However, based on the interview conducted as part of this review, the operator of the 41 Area lift station (Building 41300) indicated that the pipeline was bypassed and not connected to the lift station system. Details of the interview are presented in Appendix C but summarized in Section 6.1.

4.4 Progress Since the Last Five-Year Review

This is the 5-year review conducted since the OU1 ROD was issued. No other reviews were documented prior to this one.

Section 5

Five-Year Review Process

From December 2000 to January 2001, DoN Remedial Project Manager, Mr. Mike Radecki of the SWDIV, led this 5-year review process, with the participation of the following team members:

- Ms. Jayne Joy, MCB Camp Pendleton Assistant Chief Staff/Environmental Security
- Ms. Theresa Trost, MCB Camp Pendleton Assistant Chief Staff/Environmental Security
- Mr. Max Pan, P.E., IT Corporation (technical consultant)
- Mr. John Richards, P.E., IT Corporation (technical consultant).

This 5-year review consisted of the following activities:

- A review of relevant documents (see document list in Section 13)
- Interviews with the 41 Area commander, the 43 Area wastewater supervisor treatment plant operator, the base Facilities Management Department, and base Public Works Office personnel (see summary in Section 6.1 for names and dates of interview, and interview records in Appendix C)
- A site inspection (see site inspection summary in Section 6.2)
- In addition, a notice regarding this review will be placed in the local newspapers. A brief summary of the review will be distributed throughout the base.

Section 6

Five-Year Review Findings

This section summarizes results from presents the results of interviews and a site inspection conducted as part of the 5-year review.

6.1 Interviews

The interview records are presented in Appendix C. The following individuals were contacted in person and by telephone as part of the five-year review:

- Lt. Col. Stephen Linder, 41 Area Commander (interviewed in person on January 18, 2001)
- Capt. Byron Harper, Battalion Logistics Officer/Headquarters and Service Company Commander (interviewed by telephone on January 16, 2001)
- Lt. Robert D. Green, Assistant Battalion Logistics Officer/Assistant to Area Commander (interviewed by telephone on January 16, 2001, and in person on January 18, 2001)
- Mr. Brad Sherman, Environmental Protection Specialist, MCB Camp Pendleton Facilities Maintenance Division (interviewed by telephone on January 25, 2001)
- Mr. Mike Dodge, Environmental Protection Specialist, MCB Camp Pendleton Facilities Maintenance Division (interviewed by telephone on January 17, 2001)
- Mr. Tom Hoots, Wastewater Supervisor (as representative for 43 Area wastewater treatment plant operation), MCB Camp Pendleton Utilities Division, Shop 6887 (interviewed by telephone on January 26, 2001, and provided responses to questions through fax on February 1, 2001)
- Mr. Joe Baltikauski, 41 Area Planner, MCB Public Works Office (interviewed by telephone on January 25, 2001).

None of the persons interviewed had prior knowledge of the soil and groundwater contamination at IR Site 9. Personnel from the Facilities Maintenance Department had heard of an equipment operator losing consciousness while working in the area of IR Site 9 before an investigation was conducted under the Comprehensive Long-Term Environmental Action Navy Contract (i.e., the 1992-1994 RI/FS activities). The marines occupying 41 Area knew they were not allowed in the area of the stabilization pond but did not know the specific reason. IR Site 9 is shown as an IR site on the basewide environmental and natural resource constraints map (Appendix B). The legend on the constraints map (dated October 1994) indicates the following: "Installation Restoration Site, Soil Contamination, Troop – Vehicles Transit OK if Otherwise Allowed. Digging or Bivouacking PROHIBITED." The site restriction is also identified in the GIS database used by the base in planning and reviewing all military construction, maintenance, and

repair projects. A copy of the planning review process and decision tree diagram used by the base Public Works Office is included in Appendix C.

During the interview, Lt. Col. Linder indicated that the gate to the grease pit was down and that the fence did not entirely enclose the grease pit. Lt. Col. Linder also noted that an old sign in the stabilization pond area that was used to direct past disposal activities should be removed. Lt. Green and Mr. Baltikauski indicated that the base is in the process of updating the Capital Improvement Plan (MasterPlan) for 41 Area. IR Site 9 will be noted in this plan and designated similarly to the legend of the constraints map. Lt. Col. Linder would like the site to be used as a critical habitat mitigation area.

According to Mr. Sherman, the piping located within IR Site 9 was not removed because of the potential risk associated with hazardous conditions at the site. No operation and maintenance activities have been conducted at IR Site 9 by either the Facilities Maintenance Department or the Utilities Department.

6.2 Site Inspection

Mr. Max Pan and Mr. John Richards of the review team (Section 5) conducted a visual site inspection on December 21, 2000. The inspection checklist provided in the guidance (EPA, 1999) was used. The completed inspection checklist and site photographs are presented in Appendix D. The inspection results are summarized as follows:

- The site is inactive and is not used for any purposes. The former grease disposal pit is partially secured by a chain-linked fence installed along the access road and the west side. One of the fence panels is detached and needs repair. The former waste lagoon area has no fence. The lagoon 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 was relatively flat all across.
- The former disposal areas show no sign of recent disposal activities. The impoundment is dry. The earthen berm surrounding the impoundment appears to be intact.
- Most of the site is covered with vegetation, with a few bare patches of soil, and shows minimal erosion damage.
- The monitoring wells are protected with steel casings and traffic bumper posts. The steel casings were capped and locked. The well numbers are marked either on the steel casing or on the concrete finishing pad.

No significant site changes were identified during the site inspection.

6.3 Risk Information Review

The risk assessment performed during the RI process indicated that soil and groundwater contamination at IR Site 9 would not pose unacceptable risk to human health or the environment.

Groundwater remediation was required because the concentrations of PCE and TCE exceeded the State and Federal MCLs. Natural attenuation was the groundwater remedy selected to degrade the PCE and TCE contamination to concentrations below the State and Federal MCLs over a period of 10 years. As such, the MCLs were reviewed for changes that could affect the protectiveness of the selected remedy. The Federal MCLs are provided under the National Primary Drinking Water Regulations in 40 CFR, and the California MCLs are listed under the Domestic Water Quality and Monitoring Regulations in Title 22 of the California Code of Regulations (CCR), as follows:

- National Primary Safe Drinking Water Regulations (40 CFR 141): MCLs for TCE and PCE are both 5 µg/L, the same as the values listed in the ROD.
- California Domestic Water Quality and Monitoring Regulations (22 CCR 64444): MCLs for TCE and PCE are both 5 µg/L, the same as the values listed in the ROD.

Neither the State nor Federal MCLs for TCE and PCE have changed since the ROD was signed in December 1995. Therefore, there are no new standards that could affect the protectiveness of the selected remedy. The cleanup goals remain the same.

Because the land uses and site conditions have not changed since the ROD was signed, the exposure pathways used in the risk assessment modeling remain valid.

6.4 Data Review

The semiannual groundwater monitoring data were reviewed. The post-ROD semiannual monitoring data and data generated during the RI process are summarized in Table 6-1 and Figure 6-1. As show in Figure 6-1 with the exception of PCE in Well 9W-7A, the PCE and TCE concentrations in all of the wells are stabilized and significantly below MCLs. The data indicate that concentrations of PCE in Well 9W-7A have increased significantly over time. The PCE concentration is currently about four times higher than the historical concentrations reported during the 1994 Phase II RI process; however, the PCE contamination has not migrated vertically. This is based the results for Wells 9W-7B and 9W-7C which have well screens installed at a deeper depths.

Groundwater level data indicates that the most recent groundwater level at the site was generally about 2 feet lower than the 1997 level (9W-6A, 6B, 6C). This is likely due to the relatively dry weather experienced in 1999 and 2000. However, such fluctuation of groundwater levels is not uncommon and was also noted in the RI report (SWDIV, 1993). The groundwater gradient and flow directions have not changed significantly. Because PCE was detected in only one well, the extent and migration of the PCE could not be fully assessed with the limited data available. See Section 9 for recommended additional action.

Section 7 Assessment

This section discusses whether the remedy is functioning as intended, whether the assumptions upon which the remedy is based are still valid, and whether any new information is available that could affect the appropriateness of the remedy.

7.1 Is the Remedy Functioning as Intended by the Decision Document?

The groundwater remedy is based on the projection that natural attenuation will reduce TCE and PCE concentrations to less than MCLs in about 10 years. A review of the semiannual monitoring data indicates that TCE concentrations have been reduced and stabilized below the MCL. PCE concentrations have been reduced to the desirable level in all wells except well 9W-7A. Therefore, it appears that the remedy has functioned completely as predicted by fate and transport modeling in all but one well.

7.2 Are the Assumptions Used at the Time of Remedy Selection Still Valid?

The RI/FS concluded that groundwater contamination at the site would not pose unacceptable risk to human health or the environment. The physical conditions and land uses of the site have not changed since the ROD was signed. Therefore, the site risk should not change if the exposure routes do not change significantly.

The fate and transport modeling results indicated that the groundwater contamination would be reduced to concentrations below MCLs in about 10 years by natural attenuation processes. The modeling results were based on assumptions of site-specific hydrogeologic conditions and the concentrations and extent of the contamination at the time. Although the hydrogeologic conditions have not changed significantly, PCE concentrations have not decreased in Well 9W-7A as predicted by the model. The source and extent of PCE found in Well 9W-7A needs to be determined. The new data will be used to update the assumptions used in the fate and transport model at the time of the remedy selection as appropriate.

7.3 Has Any Other Information Come to Light that Could Call Into Question the Protectiveness of the Remedy?

Because the land uses and site conditions have not changed since the ROD was signed, the exposure pathways used in the risk assessment modeling remain valid. Therefore, the remedy remains protective. However, the increasing concentrations of PCE in Well 9W-7A require further evaluation to determine the impact on the timeframe to reach the remedial goals.

Section 8

Deficiencies

The visual inspection of the site and interviews with base personnel indicated that site conditions and land uses have not changed in the last 5 years. With the exception of one panel of the security fence at the former grease disposal pit, there is no sign of damage that requires repair or maintenance.

Base personnel are not aware of the reason for the restricted use classification for the site area due to a lack of signs indicating hazardous substances are present in the groundwater.

A review of the groundwater monitoring data indicated that the dedicated groundwater sampling pump in well MW-03S needs to be repaired or replaced. In addition, the groundwater data collected through the current groundwater monitoring plan do not provide an adequate basis for a full evaluation of the effectiveness of the selected remedy. As such, additional data, including groundwater level measurements and water-quality sampling, are required.

The ROD specified that semi-annual groundwater monitoring should include a total of 12 wells. The current monitoring program included only 8 wells and was not sampled consistently on a semi-annual basis. Therefore, the current monitoring program needs to be modified to include at least four more wells and be implemented on a timely manner. The exact purpose of the monitoring well (i.e., function of the well, monitoring parameters, evaluation criteria) should also be identified so that the monitoring data can be properly evaluated.

Section 9

Recommendations and Follow-up Actions

Based on responses to review comments (presented in Appendix A) made on the draft version of this report and discussions made during the 66th FFA meeting held on November 14, 2001, the DoN will take the following action to rectify the deficiencies identified by this review:

- Repair the security fence panel at the grease disposal pit.
- Repair or replace the dedicated sampling pump in well MW-03S.
- Install signs to reinforce access restrictions to the site and provide contact information.
- Monitor groundwater levels in existing wells to establish the groundwater hydrology and identify the well screens in relation to the hydrogeologic units at the site.
- Collect groundwater samples from existing monitoring wells once to assess the extent of PCE migration and help redefine the 12 well monitoring plan per the ROD.
- Although the ROD already specified that the soil contamination at the site required no further action, it was decided in the 66th FFA meeting that, in light of continuing detection of PCE in groundwater sample from Well 9W-7A, additional soil samples will be collected from the southeast portion of the waste stabilization pond. This area appeared to have not been sampled during the RI stage. The soil sampling will be performed through the installation of one soil boring in this area. The soil boring will be converted into a groundwater monitoring well for sampling of groundwater. The DoN and Marine Corps should develop a work plan in collaboration with the FFA members on details of the sampling approach.
- Reassess the current monitoring program after the above information becomes available. Modify the monitoring program as required so that the effectiveness of natural attenuation can be fully monitored and assessed.
- If additional soil and/or groundwater data indicated that a previously unidentified source is causing the groundwater contamination found in 9W-7A, additional action should be initiated as required.

Section 10

Protectiveness Statement

Currently, there are no exposure routes to groundwater at IR Site 9. The remedy at IR Site 9 is protective of human health and the environment unless the exposure routes to groundwater changes significantly in the future. Although the assumptions used at the time of the remedy selection may need revisions, such revisions are not expected to have a critical impact on the exposure risk. The revisions are more likely to impact the projection on the overall time frame required for the remedy to achieve the remedial goal. Institutional controls implemented for the site will continue to restrict the future land and groundwater uses in the vicinity of the site. These measures are the primary means for protecting human health and the environment from exposure risk.

Section 11

Next Review

This is a statutory site that requires ongoing 5-year reviews. The next review is due to be completed on or before December 7, 2005.

Section 12

Other Comments

The effectiveness of natural attenuation will be reevaluated after additional groundwater monitoring data become available. The evaluation will be presented in groundwater monitoring reports compiled on a semiannual basis.

Section 13

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SWRCB, see California State Water Resources Control Board.

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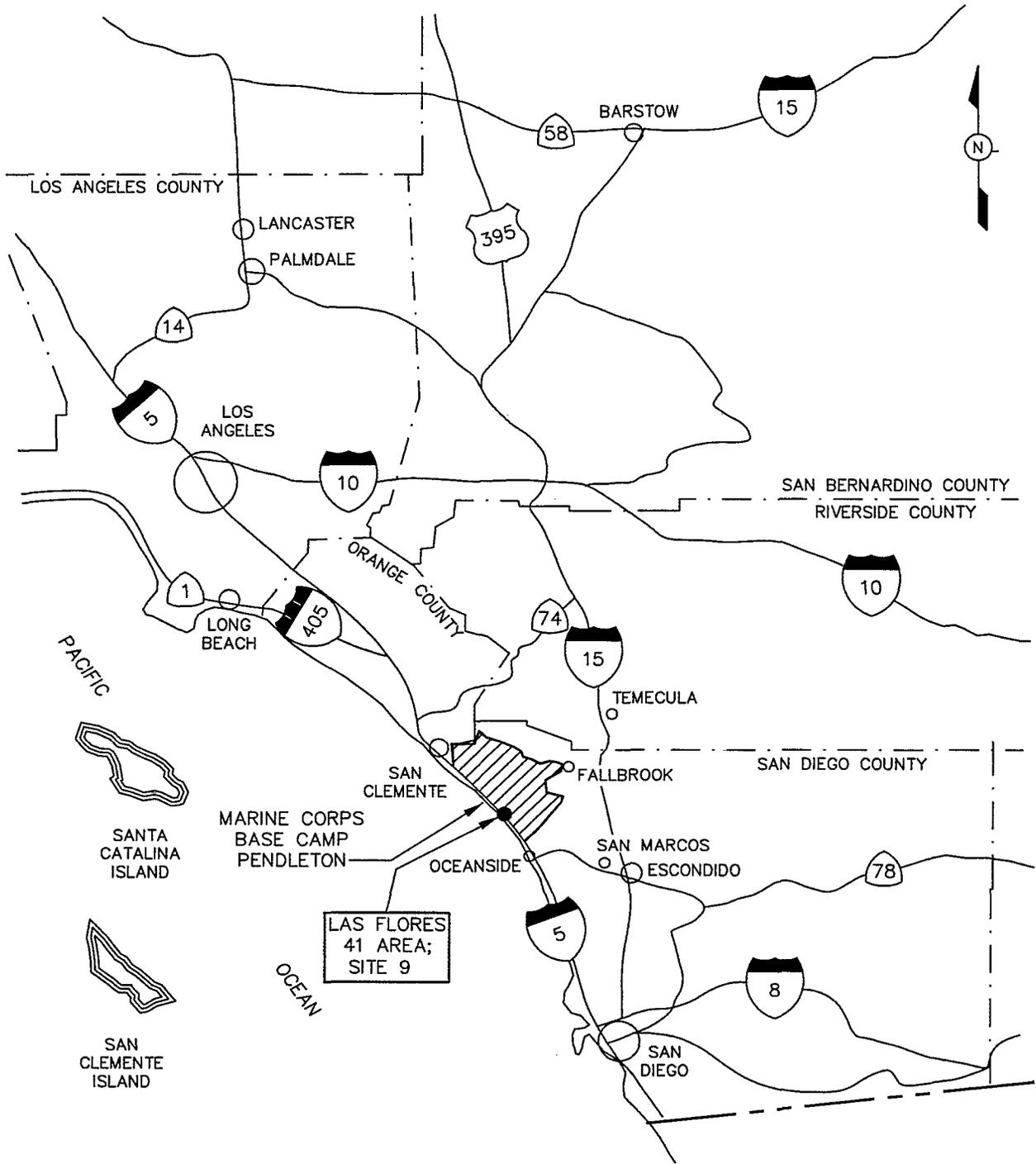
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Figures



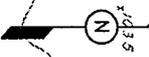
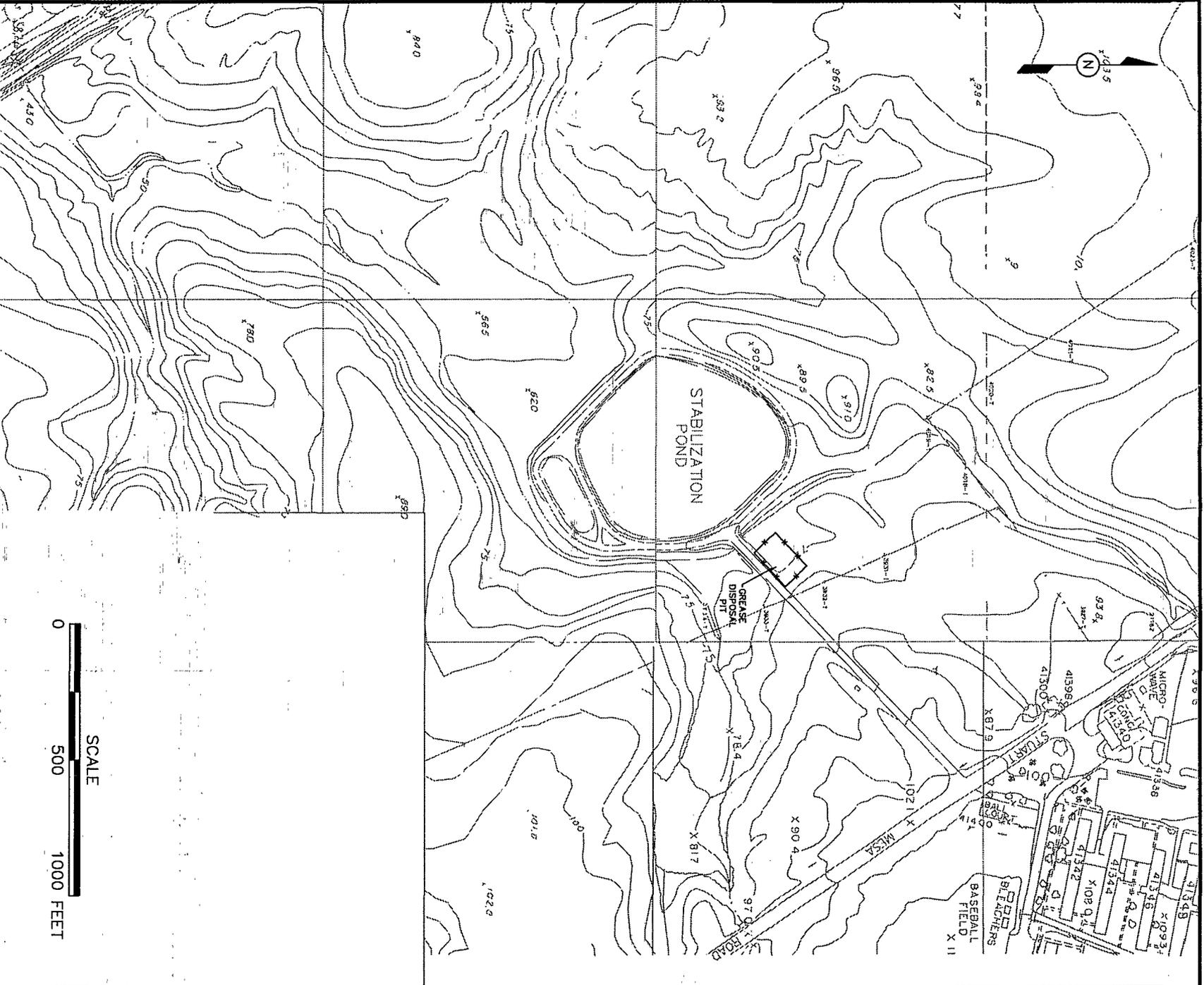
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SOURCE:

NAVAL ENERGY AND ENVIRONMENTAL SUPPORT ACTIVITY, 1984, "INITIAL ASSESSMENT STUDY, MARINE CORPS BASE, CAMP PENDLETON, CALIFORNIA," NEESA 13-057, PREPARED BY SCS ENGINEERS, INC., SEPT.

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 A Subsidiary of OHM Corporation
 SAN DIEGO, CA

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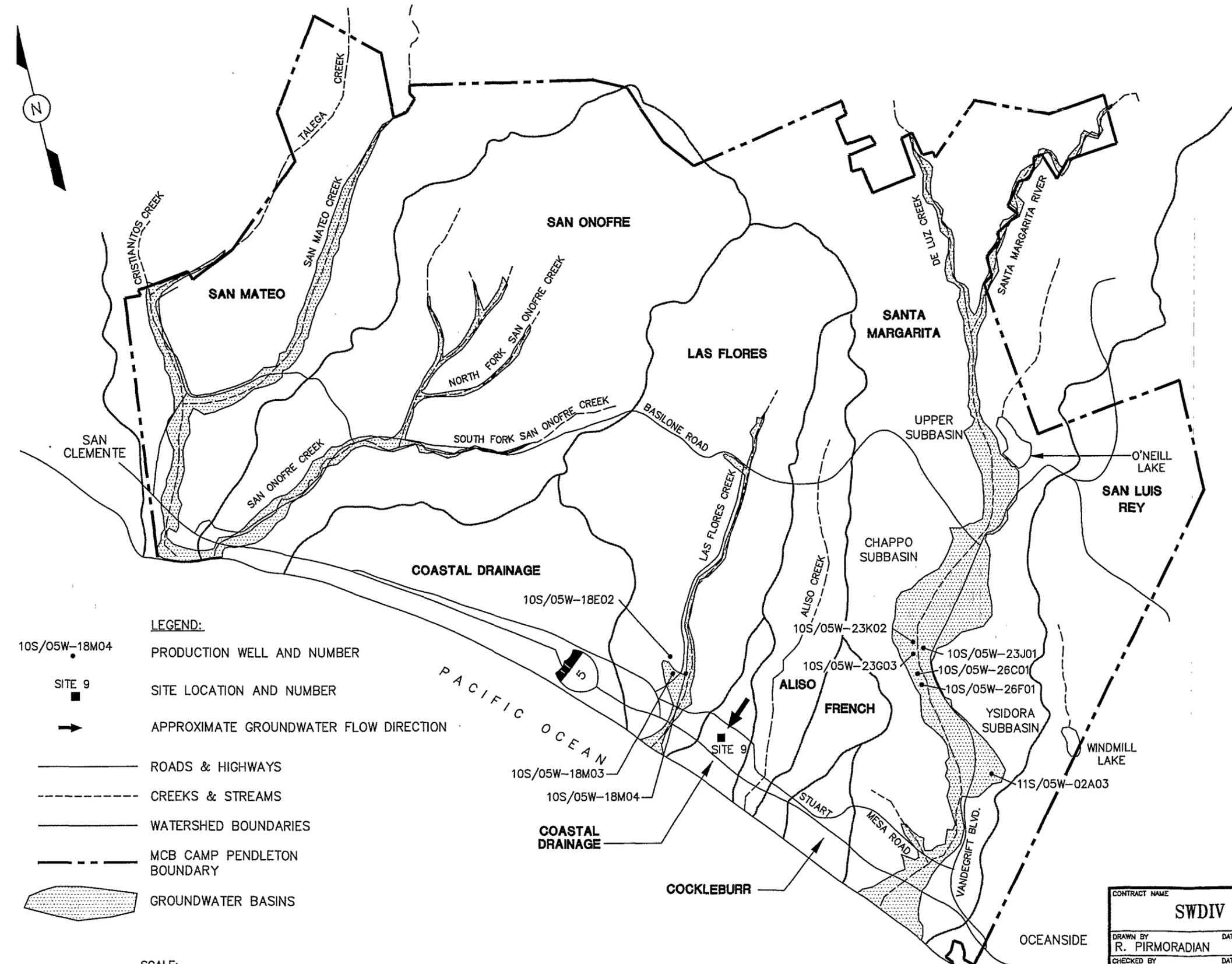
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 DATE 3/22/01

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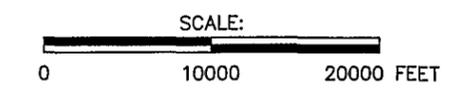
**IR SITE 9
 SITE MAP**

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 MARINE CORPS BASE
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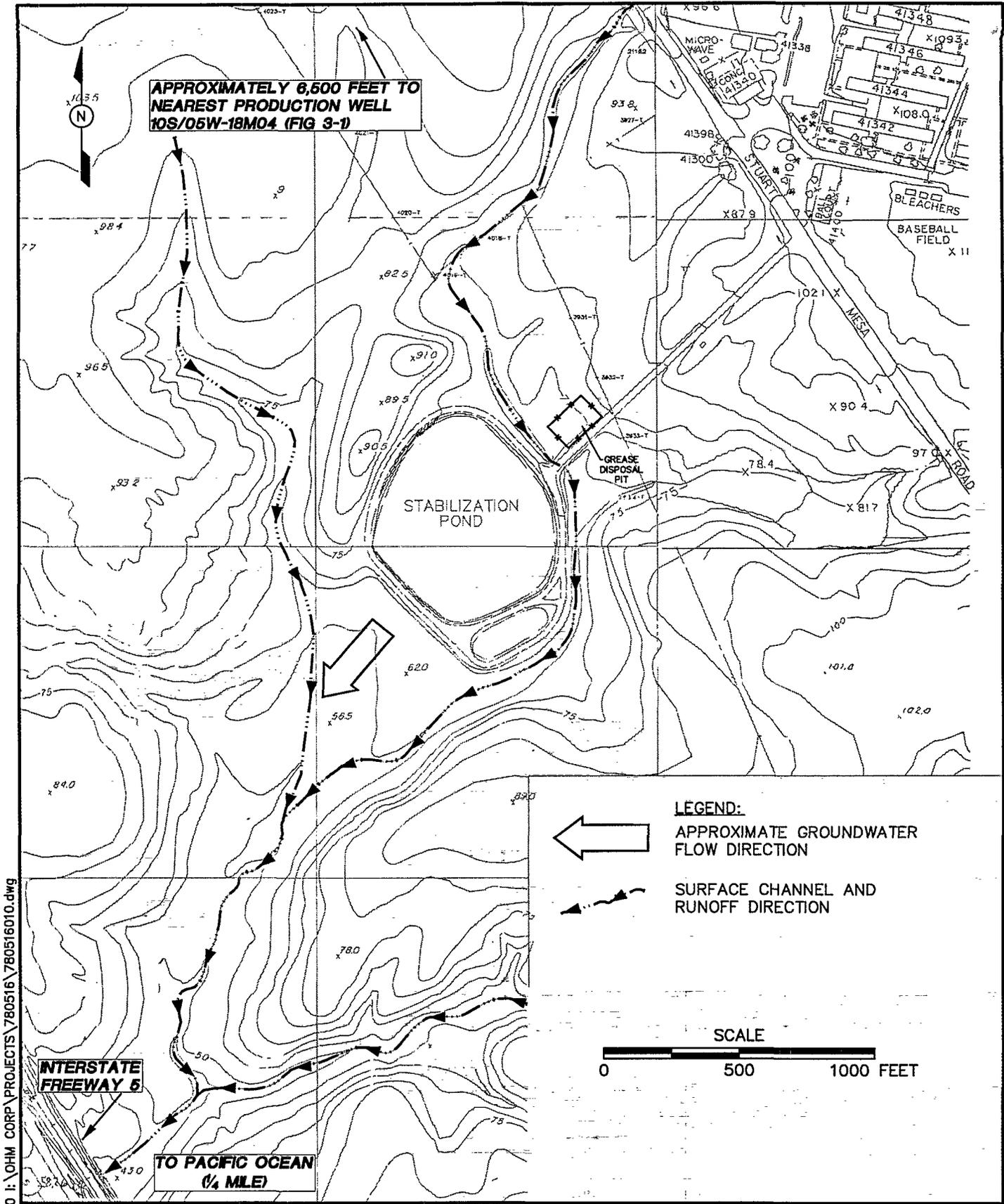


- LEGEND:**
- 10S/05W-18M04 PRODUCTION WELL AND NUMBER
 - SITE 9 SITE LOCATION AND NUMBER
 - APPROXIMATE GROUNDWATER FLOW DIRECTION
 - ROADS & HIGHWAYS
 - CREEKS & STREAMS
 - WATERSHED BOUNDARIES
 - MCB CAMP PENDLETON BOUNDARY
 - GROUNDWATER BASINS



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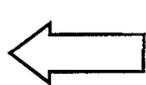


STABILIZATION POND

GREASE DISPOSAL PIT

INTERSTATE FREEWAY 5

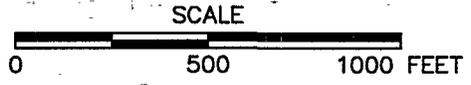
TO PACIFIC OCEAN (1/4 MILE)



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APPROXIMATE GROUNDWATER FLOW DIRECTION



SURFACE CHANNEL AND RUNOFF DIRECTION



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FIGURE No. FIG 3-2		REVISION 0		IR SITE 9 SURFACE RUNOFF DIRECTION MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA			



9B-17	TPH-D	Be
DEPTH (ft)	(mg/kg)	(mg/kg)
1.75	35	.51 B
3.25	350	0.27 B
5.75	6,700	0.61 B
9.25	1.3	0.24 B
12.50	ND	ND
18.30	7.4	ND

9B-16	TPH-D	Be
DEPTH (ft)	(mg/kg)	(mg/kg)
1.00	350	0.28 B
6.00	ND	0.33 B
13.00	ND	0.22 B
17.00	ND	0.59 B

9B-14	TPH-D	Be
DEPTH (ft)	(mg/kg)	(mg/kg)
1.00	81	1.9
5.75	ND	ND
9.50	ND	ND
17.00	ND	ND

9B-11	TPH-D	Be
DEPTH (ft)	(mg/kg)	(mg/kg)
1.00	1,600	0.34 B
1.75	54	0.36 B
4.25	ND	0.21 B
10.0	60	0.23 B
12.00	53	0.31 B

9B-10	TPH-D	Be
DEPTH (ft)	(mg/kg)	(mg/kg)
0.75	210	0.44 B
1.50	570	0.15 B
5.00	180	0.21 B
7.75	ND	0.14 B
15.50	ND	0.64 B
19.80	ND	0.52 B

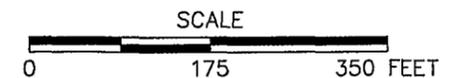
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- BOREHOLE OR SURFACE SEDIMENT SAMPLE LOCATION
- ⊕ MONITORING WELL LOCATION
- ▲ SURFACE-WATER SAMPLING LOCATION
- DENOTES EXTENT OF CONTAMINATION WHERE AT LEAST ONE CONTAMINANT EXCEEDS THE PRELIMINARY REMEDIATION GOAL (PRG) OR TOTAL PETROLEUM HYDROCARBON CONCENTRATIONS EXCEED 100 PARTS PER MILLION; QUERIED WHERE INFERRED
- LOW CONCENTRATIONS OF BERYLLIUM (WITH B QUALIFIERS) OUTSIDE THE DELINEATED AREA OF CONTAMINATION ARE NOT PLOTTED, EVEN THOUGH CONCENTRATIONS EXCEED THE PRG
- ← APPROXIMATE GROUNDWATER FLOW DIRECTION
- Be BERYLLIUM
- ND NOT DETECTED
- mg/kg MILLIGRAMS PER KILOGRAMS
- TPH-D TOTAL PETROLEUM HYDROCARBONS ANALYZED BY EPA METHOD m8015 WITH A DIESEL CALIBRATION STANDARD

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 13B, 13D, AND 14C
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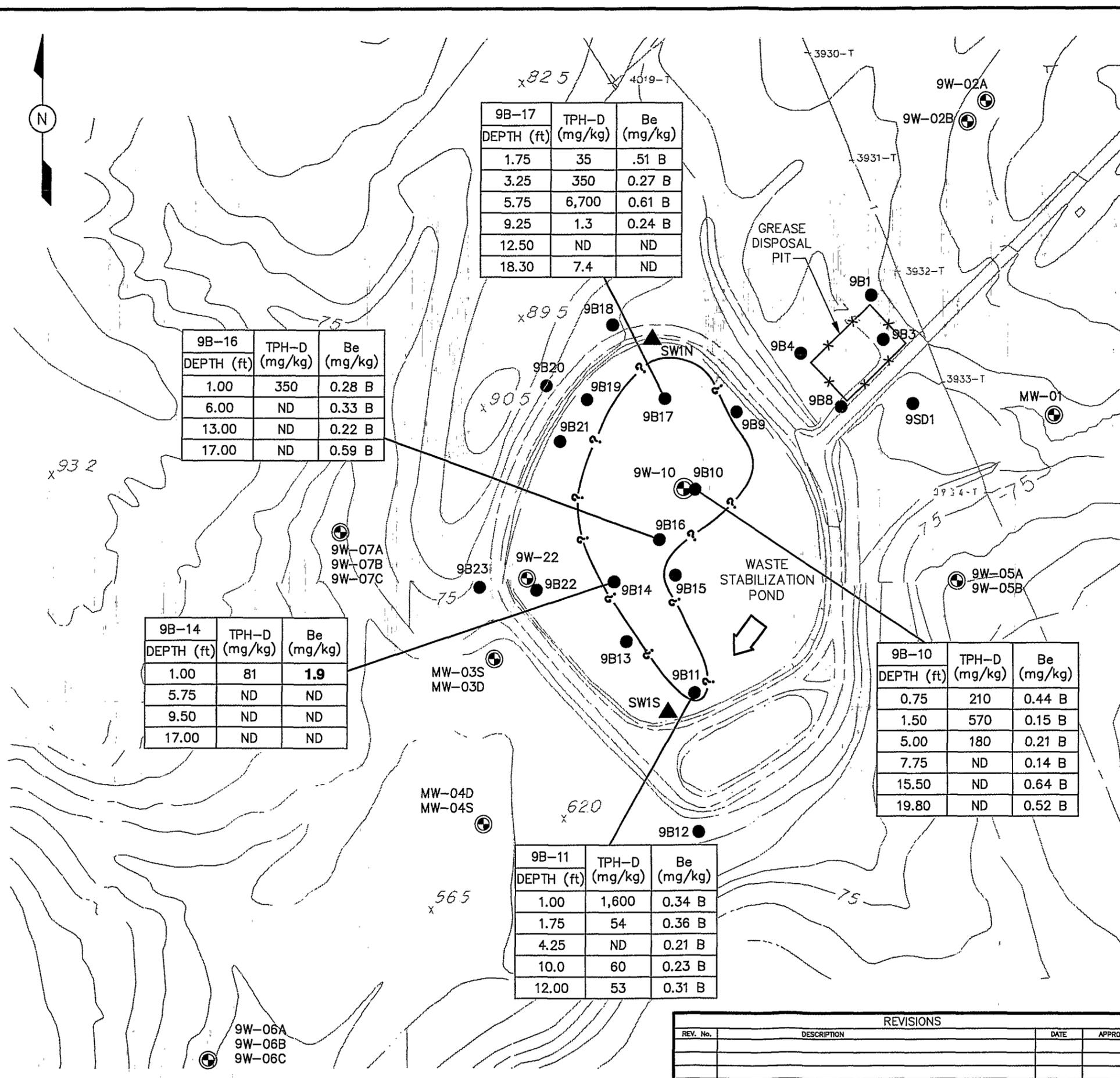
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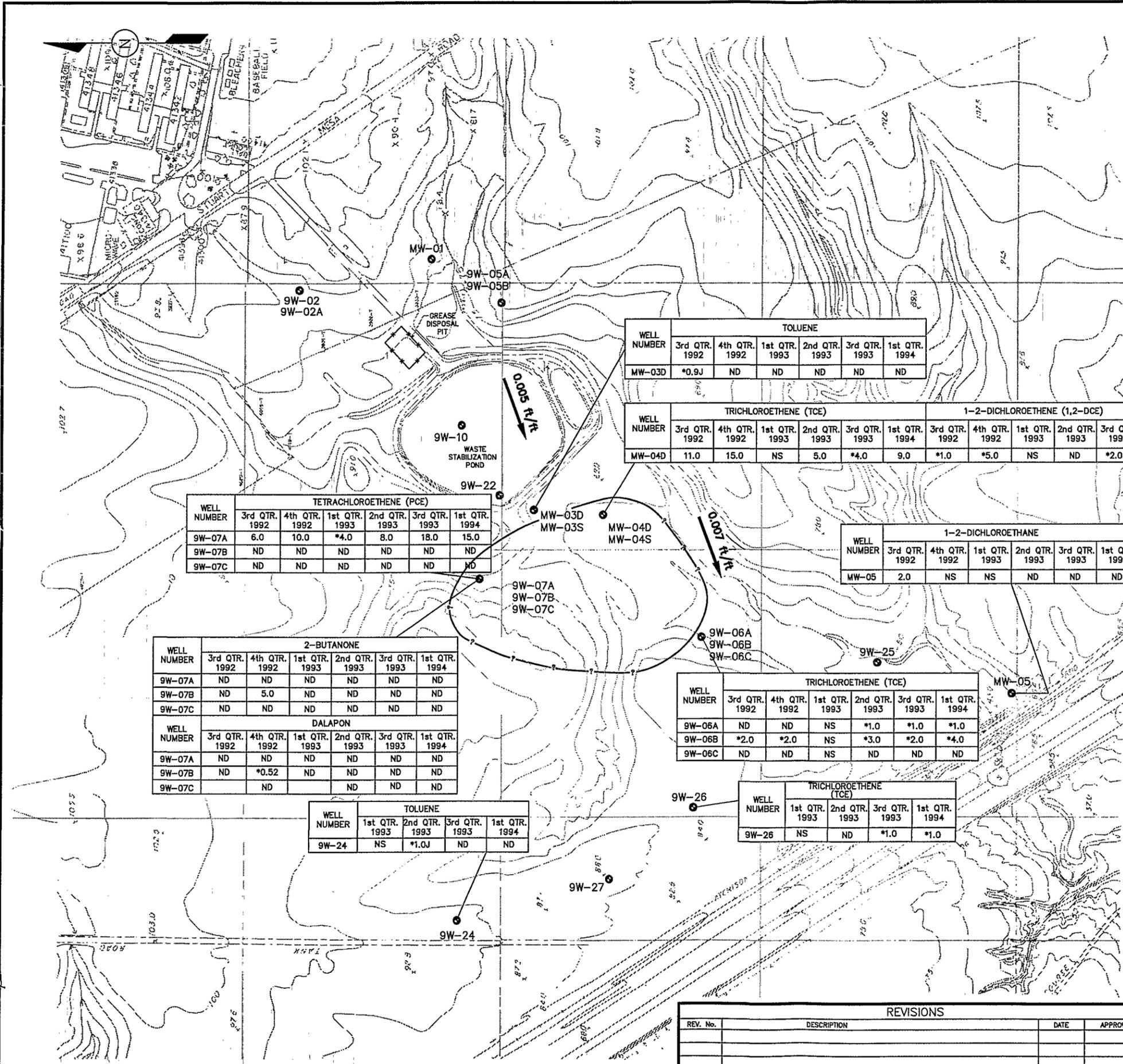
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LEGEND:

9W-07A MONITORING WELL LOCATION

0.005 ft/ft APPROXIMATE GROUNDWATER FLOW DIRECTION AND GRADIENT IN SHALLOW (UNCONFINED) AQUIFER MEASURED 28 AUGUST 1992 (3rd Qtr. 1992)

DENOTES EXTENT OF CONTAMINATION WHERE THE CONCENTRATION OF AT LEAST ONE CONTAMINANT EXCEEDS THE MAXIMUM CONTAMINANT LEVEL (MCL), QUERIED WHERE INFERRED

* DENOTES CONCENTRATION BELOW MCL

3rd QTR. 1992 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 3rd QUARTER OF 1992 (FIRST SAMPLING ROUND, GROUP A WELLS)

4th QTR. 1992 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 4th QUARTER OF 1992 (SECOND SAMPLING ROUND, GROUP A WELLS)

1st QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 1st QUARTER OF 1993 (THIRD SAMPLING ROUND, GROUP A WELLS) THIS WAS AN INCOMPLETE SAMPLING EVENT DUE TO FLOODING

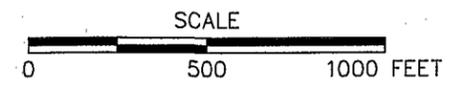
2nd QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 2nd QUARTER OF 1993 (FOURTH SAMPLING ROUND, GROUP A WELLS; FIRST SAMPLING ROUND, PHASE 2 GROUP A WELLS)

3rd QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 3rd QUARTER OF 1993 (FIFTH SAMPLING ROUND, GROUP A WELLS; SECOND SAMPLING ROUND, PHASE 2 GROUP A WELLS)

NS ANALYTE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/l)

ND NOT SAMPLED

J DATA VALIDATION QUALIFIER INDICATING AN ESTIMATED CONCENTRATION



TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON
GENERAL DEVELOPMENT MAPS 13B, 13D, 14A AND 14C
DATE: DECEMBER 1987

REFERENCE: OU-1 ROD (SWDIV, 1995)

NOTE:
WELLS THAT DO NOT HAVE ANALYTICAL DATA CORRESPONDING TO THAT WELL DID NOT HAVE DETECTABLE LEVELS OF CONTAMINANTS DURING THE SAMPLING EVENTS.

WELL NUMBER	TOLUENE					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
MW-03D	*0.9J	ND	ND	ND	ND	ND

WELL NUMBER	TRICHLOROETHENE (TCE)					1-2-DICHLOROETHENE (1,2-DCE)						
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
MW-04D	11.0	15.0	NS	5.0	*4.0	9.0	*1.0	*5.0	NS	ND	*2.0	*2.0

WELL NUMBER	TETRACHLOROETHENE (PCE)					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-07A	6.0	10.0	*4.0	8.0	18.0	15.0
9W-07B	ND	ND	ND	ND	ND	ND
9W-07C	ND	ND	ND	ND	ND	ND

WELL NUMBER	1-2-DICHLOROETHANE					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
MW-05	2.0	NS	NS	ND	ND	ND

WELL NUMBER	2-BUTANONE					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-07A	ND	ND	ND	ND	ND	ND
9W-07B	ND	5.0	ND	ND	ND	ND
9W-07C	ND	ND	ND	ND	ND	ND

WELL NUMBER	DALAPON					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-07A	ND	ND	ND	ND	ND	ND
9W-07B	ND	*0.52	ND	ND	ND	ND
9W-07C	ND	ND	ND	ND	ND	ND

WELL NUMBER	TOLUENE			
	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-24	NS	*1.0J	ND	ND

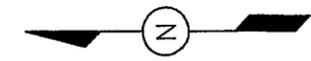
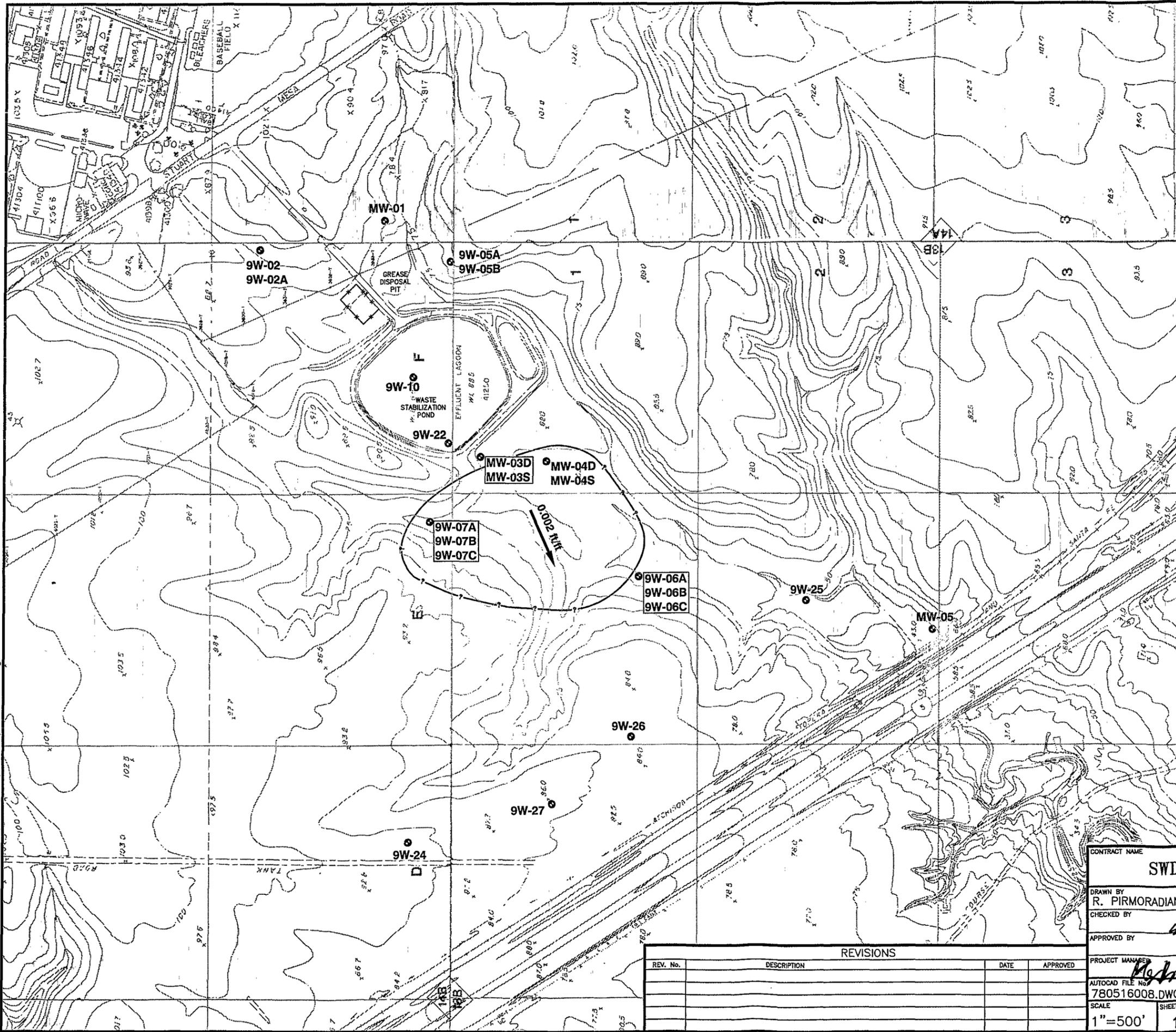
WELL NUMBER	TRICHLOROETHENE (TCE)					
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-06A	ND	ND	NS	*1.0	*1.0	*1.0
9W-06B	*2.0	*2.0	NS	*3.0	*2.0	*4.0
9W-06C	ND	ND	NS	ND	ND	ND

WELL NUMBER	TRICHLOROETHENE (TCE)			
	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994
9W-26	NS	ND	*1.0	*1.0

REVISIONS			
REV. No.	DESCRIPTION	DATE	APPROVED

CONTRACT NAME SWDIV		OHM Remediation Services Corp. A Subsidiary of OHM Corporation SAN DIEGO, CA	
DRAWN BY R. PIRMORADIAN	DATE 1/29/01	IR SITE 9 5-YEAR REVIEW SUMMARY OF RI/FS GROUNDWATER ANALYTICAL RESULTS	
CHECKED BY	DATE		
APPROVED BY	DATE	MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA	
PROJECT MANAGER	DATE		
AUTOCAD FILE No. 780516007.DWG		SCALE 1"=500'	DRAWING No. FIG 3-4
SCALE	SHEET OF	DOCUMENT CONTROL No.	OHM PROJECT No.
1"=500'	1 1	SW10151	780516

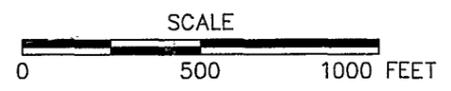
Feb 07, 2001 - 15:27:51 I:\OHM CORP\PROJECTS\780516\780516008.dwg



- LEGEND:**
-  MONITORING WELL SAMPLED SEMIANNUALLY
 -  APPROXIMATE GROUNDWATER FLOW DIRECTION AND GRADIENT IN SHALLOW (UNCONFINED) AQUIFER MEASURED 26 JULY 2000
 -  DENOTES EXTENT OF CONTAMINATION WHERE THE CONCENTRATION OF AT LEAST ONE CONTAMINANT EXCEEDS THE MAXIMUM CONTAMINANT LEVEL (MCL), QUERIED WHERE INFERRED

TOPOGRAPHIC REFERENCE:
 MARINE CORPS BASE CAMP PENDLETON
 GENERAL DEVELOPMENT MAPS 13B, 13D, 14A AND 14C
 DATE: DECEMBER 1987

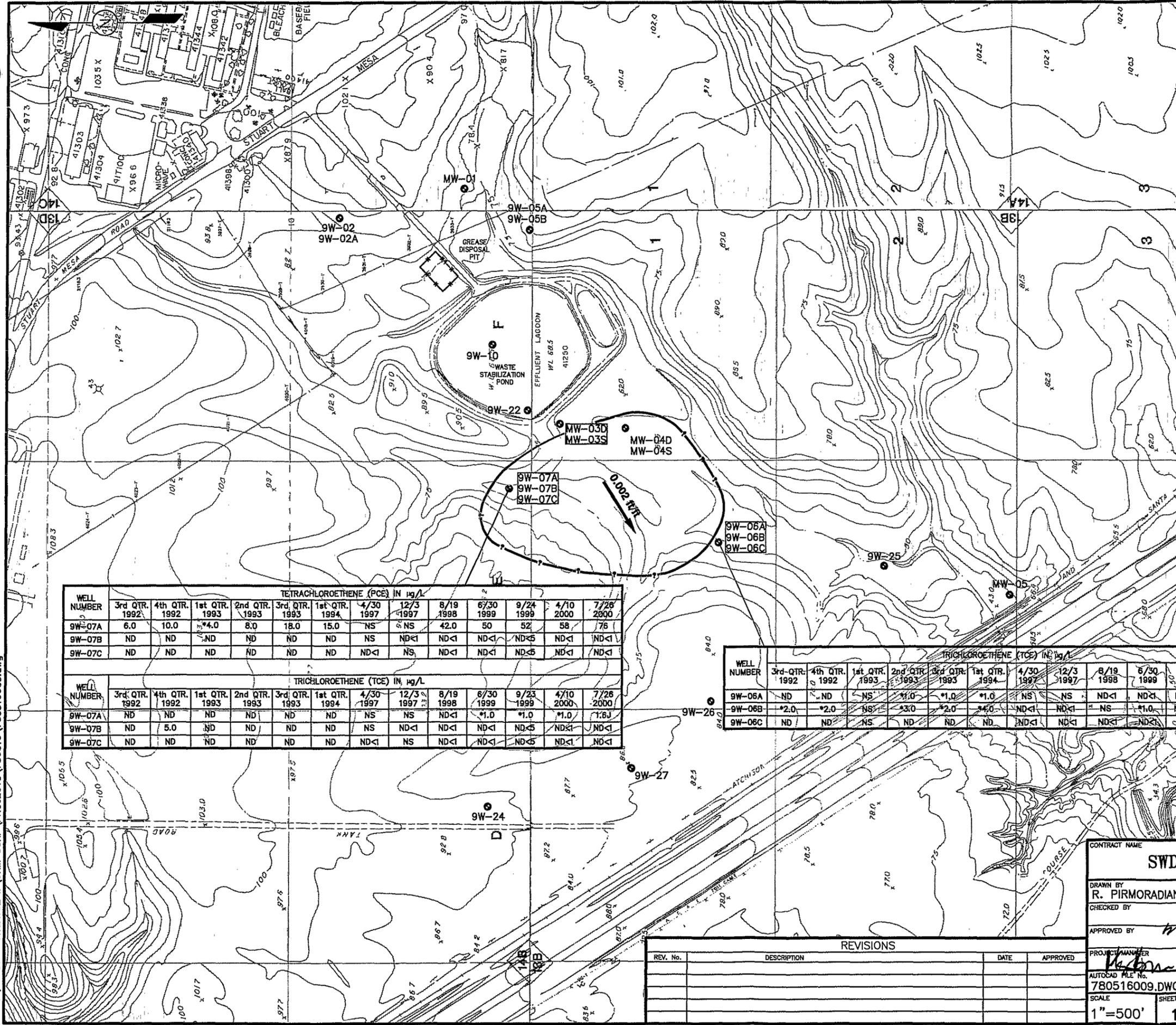
REFERENCE: OU-1 ROD (SWDIV, 1995)
 SEMIANNUAL GROUNDWATER
 MONITORING REPORT (PWC, 2000)



CONTRACT NAME SWDIV		 OHM Remediation Services Corp. A Subsidiary of OHM Corporation SAN DIEGO, CA	
DRAWN BY R. PIRMORADIAN	DATE 2/1/01	IR SITE 9 - 5-YEAR REVIEW GROUNDWATER MONITORING WELL LOCATIONS	
CHECKED BY	DATE		
APPROVED BY <i>[Signature]</i>	DATE 3-22-01		
PROJECT MANAGER <i>[Signature]</i>		MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA	
AUTOCAD FILE No. 780516008.DWG			
SCALE 1"=500'	SHEET 1	OF 1	DOCUMENT CONTROL No. SW10151
		OHM PROJECT No. 780516	DRAWING No. FIG 4-1

REVISIONS			
REV. No.	DESCRIPTION	DATE	APPROVED

Dec 10, 2001 - 11:24:52 I:\OHM CORP\PROJECTS\780516\780516009.dwg



LEGEND:

9W-07A MONITORING WELL SAMPLED SEMIANNUALLY

0.002 ft/ft
 APPROXIMATE GROUNDWATER FLOW DIRECTION AND GRADIENT IN SHALLOW (UNCONFINED) AQUIFER MEASURED 27 JULY 2000

DENOTES EXTENT OF CONTAMINATION WHERE THE CONCENTRATION OF AT LEAST ONE CONTAMINANT EXCEEDS THE MAXIMUM CONTAMINANT LEVEL (MCL), QUERIED WHERE INFERRED

3rd QTR. 1992 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 3rd QUARTER OF 1992

4th QTR. 1992 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 4th QUARTER OF 1992

1st QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 1st QUARTER OF 1993 (THIS WAS AN INCOMPLETE SAMPLING EVENT DUE TO FLOODING)

2nd QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 2nd QUARTER OF 1993

3rd QTR. 1993 DENOTES GROUNDWATER SAMPLES COLLECTED DURING THE 3rd QUARTER OF 1993

ANALYTE CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

NS NOT SAMPLED

ND<1 NOT DETECTED AT THE SPECIFIED LEVEL

J DATA VALIDATION QUALIFIER INDICATING AN ESTIMATED CONCENTRATION

* DENOTES CONCENTRATION BELOW MCL

NOTE:
 ONLY THE THREE SPECIFIED CLUSTER WELLS WERE MONITORED. WELLS THAT DO NOT HAVE ANALYTICAL DATA CORRESPONDING TO THAT WELL DID NOT HAVE LEVELS OF CONTAMINANTS ABOVE THE DETECTION LEVELS DURING THE SAMPLING EVENTS.

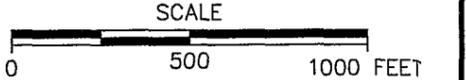
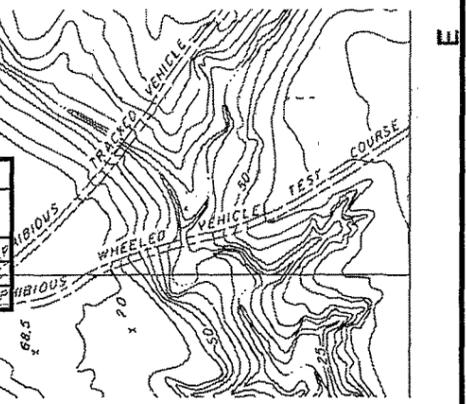
TOPOGRAPHIC REFERENCE:
 MARINE CORPS BASE CAMP PENDLETON
 GENERAL DEVELOPMENT MAPS 13B, 13D, 14A AND 14C
 DATE: DECEMBER 1987

REFERENCE: OU-1 ROD (SWDIV, 1995)
 SEMIANNUAL GROUNDWATER MONITORING REPORT (PWC, 2000)

WELL NUMBER	TETRACHLOROETHENE (PCE) IN µg/L												
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	4/30 1997	12/3 1997	8/19 1998	6/30 1999	9/24 1999	4/10 2000	7/26 2000
9W-07A	6.0	10.0	*4.0	8.0	18.0	15.0	NS	NS	42.0	50	52	58	76
9W-07B	ND	ND	ND	ND	ND	ND	NS	ND<1	ND<1	ND<5	ND<1	ND<1	ND<1
9W-07C	ND	ND	ND	ND	ND	ND	ND<1	NS	ND<1	ND<1	ND<5	ND<1	ND<1

WELL NUMBER	TRICHLOROETHENE (TCE) IN µg/L												
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	4/30 1997	12/3 1997	8/19 1998	6/30 1999	9/23 1999	4/10 2000	7/26 2000
9W-07A	ND	ND	ND	ND	ND	ND	NS	NS	ND<1	*1.0	*1.0	*1.0	1.6J
9W-07B	ND	5.0	ND	ND	ND	ND	NS	ND<1	ND<1	ND<1	ND<5	ND<1	ND<1
9W-07C	ND	ND	ND	ND	ND	ND	ND<1	NS	ND<1	ND<1	ND<5	ND<1	ND<1

WELL NUMBER	TRICHLOROETHENE (TCE) IN µg/L												
	3rd QTR. 1992	4th QTR. 1992	1st QTR. 1993	2nd QTR. 1993	3rd QTR. 1993	1st QTR. 1994	4/30 1997	12/3 1997	8/19 1998	6/30 1999	9/23 1999	4/10 2000	7/26 2000
9W-06A	ND	ND	NS	*1.0	*1.0	*1.0	NS	NS	ND<1	ND<1	ND<5	ND<1	0.5J
9W-06B	*2.0	*2.0	NS	*3.0	*2.0	*4.0	ND<1	ND<1	NS	*1.0	ND<5	*1.0	*1.0
9W-06C	ND	ND	NS	ND	ND	ND	ND<1	ND<1	ND<1	ND<1	ND<5	ND<1	ND<1



REV. No.	DESCRIPTION	DATE	APPROVED

CONTRACT NAME SWDIV		OHM Remediation Services Corp. A Subsidiary of OHM Corporation SAN DIEGO, CA	
DRAWN BY R. PIRMORADIAN	DATE 2/1/01	IR SITE 9 - 5-YEAR REVIEW SUMMARY OF GROUNDWATER MONITORING RESULTS	
CHECKED BY	DATE	MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA	
APPROVED BY <i>[Signature]</i>	DATE 12/11/01	PROJECT NUMBER 780516009.DWG	
AUTOCAD FILE No.	DATE 12-11-01	SCALE 1"=500'	SHEET OF 1 1
DOCUMENT CONTROL No. SW10151	OHM PROJECT No. 780516	DRAWING No. FIG 6-1	

Tables

TABLE 3-1
Summary of Phase I RI Results - Organic Concentrations in Soil

Analyte	Range of Concentrations ($\mu\text{g}/\text{kg}$)		1994 PRG ($\mu\text{g}/\text{kg}$)
	Minimum	Maximum	
Acetone	ND	110	27,000,000
2-Butanone	ND	16	13,500,000
4,4'-DDT	ND	34J	1,900
Diethylphthalate	ND	1,400J	216,000,000
Endosulfan sulfate	ND	30J	
Ethylbenzene	ND	190	27,000,000
bis(2-Ethylhexyl)phthalate	ND	240	46,000
Fluorene	ND	2,600J	10,800,000
Methylene chloride	ND	6	85,000
2-Methylnaphthalene	ND	22,000	
Naphthalene	ND	4,500	10,800,000
di-n-Octylphthalate	ND	210J	5,400,000
Phenanthrene	ND	5,700	
Toluene	ND	1,100	54,000,000
Total xylenes	ND	1,100	540,000,000
2,4,5-Trichlorophenol	ND	820	27,000,000
Diesel	ND	6,700,000	
Gasoline	ND	11,000	

Summary of validated soil analytical results from all depths for all organic compounds detected at Site 9. Validated analytical data are presented in Appendices X and Z of the draft final RI Report for Group A sites (SWDIV, 1993). Concentrations have been rounded off to whole numbers for values exceeding 10, to one decimal place for values less than 10, and to two decimal places for values less than 1.0.

Contract Laboratory Program (CLP) qualifiers:

J - Estimated valued. Mass spectral data indicate the presence of a compound below the stated practical quantitation limit.

IR - Installation Restoration

ND - not detected

PRG - preliminary remediation goal, as calculated for the human health risk assessment as of 1994

RI - remedial investigation

SWDIV - Southwest Division Naval Facilities Engineering Command

$\mu\text{g}/\text{kg}$ - micrograms per kilogram

Ref: Record of Decision for Operable Unit 1 (SWDIV, 1995).

TABLE 3-2

Summary of Phase I RI Results - Metals Concentrations in Soil^a

Analyte	Range of Concentrations (mg/kg)		Range of Background Values (mg/kg) ^b		1994 PRG (mg/kg)
	Minimum	Maximum	Minimum	Maximum	
Aluminum	3,230	30,400	3,120	33,000	
Arsenic	ND	4.3	ND<1.3	4.9	0.36
Barium	ND	349	ND<2.2	665	18,900
Beryllium	ND	1.9	ND<0.10	1.1B	0.15
Cadmium	ND	13	ND<1.2	4.7	270
Calcium	ND	5,770	ND<139	15,400	
Cation exchange capacity ^c	1.4	2.6	NA	NA	
Chromium	ND	53	ND<3.2	71	1,350
Cobalt	ND	27	ND<1.4	41	1,160
Copper	ND	205	ND<2.6	87	
Electrical conductivity ^d	0.14	0.21	NA	NA	
Iron	3,430	37,900	2,680	37,900	
Lead	ND	207	ND<1	27	
Magnesium	1,000B	8,320	ND<335	12,300	
Manganese	31	721	32	1,550	27,000
Mercury	ND	1.3	ND<0.12	0.11	81
Molybdenum	ND	15	ND<2.0	2.2B	1,350
Nickel	ND	46	ND<4.5	50	5,400
pH ^e	7.4	7.6	NA	NA	
Potassium	ND	3,740	ND<441	6,940	
Selenium	ND	3.1B	ND	ND	1,350
Silver	ND	3.4	ND<1.6	3.6	1,350
Sodium	ND	630B	ND<554	1,720	
Total organic carbon	7,440	22,800	NA	NA	
Total phosphorus	392	663	NA	NA	
Vanadium	8.4B	125	7.8B	81	2,430
Zinc	ND	598	ND<6	114	54,000

TABLE 3-2

Summary of RI Results - Metals Concentrations in Soil^a

Summary of validated soil analytical results from all depths for all metals detected at Site 9. Data base for background values is presented in Appendix N and validated analytical data are presented in Appendices X and Z of the draft final RI report for Group A sites (SWDIV, 1993). Concentrations have been rounded off to whole numbers for values exceeding 10, to one decimal place for values less than 10, and to two decimal places for values less than 1.0.

^aIncludes inorganics and general chemistry analytes.

^bRange of background concentrations for the marine terrace deposits; validated analytical results.

^cCation exchange capacity units are milliequivalents per 100 grams.

^dElectrical conductivity units are millimhos.

^epH in units.

Contract Laboratory Program (CLP) qualifiers:

B - Reported value is greater than or equal to the instrument detection limit but less than the contract-required detection limit.

IR - Installation Restoration

mg/kg - milligrams per kilogram

ND - not detected

PRG - preliminary remediation goal, as calculated for the human health risk assessment as of 1994

RI - remedial investigation

SWDIV - Southwest Division Naval Facilities Engineering Command

Ref: Record of Decision for Operable Unit 1 (SWDIV, 1995).

TABLE 3-3

Summary of Phase I RI Results - Comparison of Groundwater Concentrations and MCLs

Analyte	Range of Concentrations (µg/L)		1994 Federal MCL (µg/L)	1994 CA MCL (µg/L)
	Minimum	Maximum		
Alkalinity, bicarbonate	118	400		
Aluminum	ND	2,780		
Antimony	ND	19B ^a	6.0 ^p	
Arsenic	ND	14	50	50
Barium	ND	292	1,000	1,000
Beryllium	ND	0.2B	4.0 ^p	
Boron	ND	296		
2-Butanone	ND	5.0		
Cadmium	ND	13	5.0	10
Calcium	37,400	227,000		
Chloride	115,000	731,000		
Chromium	ND	76	100	50
Cobalt	ND	10B		
Copper	ND	6.5B		
Dalapon	ND	0.5	200	
1,2-Dichloroethane	ND	2.0	5.0	0.50
1,2-Dichloroethene	ND	5.0	70	6.0
Iron	ND	3,410		
Magnesium	32,200	154,000		
Manganese	ND	779		
Mercury ^c	ND	66	2.0	2.0
Molybdenum	ND	11B		
Nickel	ND	1,100 ^a	100 ^b	
Nitrate	ND	18,000	10,000 (as N)	45,000 (as NO ₃)
pH ^d	5.40	7.8		
Potassium	ND	16,300		
Selenium	ND	2.6B	50	10
Silver	ND	6.1B		
Sodium	108,000	309,000		
Sulfate	76,000	372,000		
Tetrachloroethene	ND	10	5.0	5.0
Thallium	ND	1.1BW	2.0 ^b	
Toluene	ND	0.9J	1,000	
Total dissolved solids	600,000	2,030,000		

**TABLE 3-3
Summary of Phase I RI Results - Comparison of Groundwater Concentrations and MCLs**

Analyte	Range of Concentrations (µg/l)		1994 Federal MCL (µg/l)	1994 CA MCL (µg/l)
	Minimum	Maximum		
Trichloroethene	ND	15	5.0	5.0
Vanadium	ND	9.6B		
Zinc	ND	183		
Diesel	ND	470		

Summary of validated analytical results for compounds detected during third and fourth quarters 1992 and first quarter 1993 sampling. Validated analytical data are presented in Appendices W and Y of the draft final RI report for Group A sites (SWDIV, 1993). Concentrations have been rounded off to whole numbers for values exceeding 10, to one decimal place for values less than 10, and to two decimal places for values less than 1.0.

^aWithin background levels.

^bPromulgated MCL, but not in effect until January 1994.

^cMaximum concentration detected during third quarter 1992, within a few days of detection of a mercury concentration of 15 µg/L in a field blank. Suspect contamination in the sample bottle. Mercury was not detected during the subsequent sampling rounds.

^dpH in units.

Contract Laboratory Program (CLP) qualifiers:

B - Reported value is greater than or equal to the instrument detection limit but less than the contract-required detection limit.

J - Estimated value. Mass spectral data indicate the presence of a compound below the stated practical quantitation limit.

W - Postdigestion spike for graphite furnace atomic absorption analysis exceeds control limits, and sample absorption is less than 50 percent of spike absorption.

CA - California

IR - Installation Restoration

MCL - maximum contaminant level

ND - not detected

RI - remedial investigation

SWDIV - Southwest Division Naval Facilities Engineering Command

µg/L - micrograms per liter

Ref: Record of Decision for Operable Unit 1 (SWDIV, 1995).

TABLE 3-4
Summary of Phase I RI Results IR Site 9 - Comparison of Surface-Water Concentrations and Regulatory Standards

Analyte	Range of Concentrations (µg/L)		Aquatic Life Standards (µg/L)			
	Minimum	Maximum	California (SWRCB, 1992)		Federal (EPA, 1992)	
			Acute	Chronic	Acute	Chronic
Aluminum	342	355	--	--	750	87
Arsenic	1.3B	1.4B	360	190	360	190
Barium	26BE	28BE	--	--	--	--
Calcium	9,090	9,680	--	--	--	--
Copper ^a	23B	25	8.4	6.0	8.4	6.0
Iron	638	758	--	--	--	1,000
Magnesium	5,300	5,460	--	--	--	--
Manganese	20	53	--	--	--	--
Nickel ^a	ND	8.1B	722	80	722	80
Potassium	3,780B	3,830B	--	--	--	--
Sodium	11,800	12,300	--	--	--	--
Vanadium	3.0B	3.0B	--	--	--	--
Zinc ^a	3.7B	9.2B	59.5	54	59.5	54

Summary of validated analytical results for compounds detected during January 1993 sampling. Validated analytical data are presented in Appendices W and Y of the draft final RI report for Group A sites (SWDIV, 1993). Concentrations have been rounded off to whole numbers for values exceeding 10, to one decimal place for values less than 10, and to two decimal places for values less than 1.0.

^aStandards are hardness-dependent; standards developed using calculated hardness (as CaCO₃) value of 45 milligrams per liter for Site 9 surface water.

Contract Laboratory Program (CLP) qualifiers:

B - Reported value greater than or equal to the instrument detection limit but less than the contract-required detection limit.

E - Reported value is estimated because of interference.

EPA - U.S. Environmental Protection Agency.

IR - Installation Restoration

ND - not detected

RI - remedial investigation

SWDIV - Southwest Division Naval Facilities Engineering Command

SWRCB - California State Water Resources Control Board

µg/L - micrograms per liter

-- No standard.

Ref: Record of Decision for Operable Unit 1 (SWDIV, 1995)

Table 6-1

Summary of Semiannual Groundwater Monitoring Results - VOC Detections, Marine Corps Base Camp Pendleton, California

Sampling Information		Analytical Results (µg/L)								
Sample Identification	Sample Date	Acetone	Bromomethane	cis-1,2-Dichloroethane	Naphthalene	Trichloroethene	Toluene	Tetrachloroethene	1,2,3-Trichlorobenzene	2-Butanone
MW-03S	4/30/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
MW-03S	12/3/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
MW-03S	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
MW-03S	6/29/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
MW-03S	9/24/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
MW-03S	4/12/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
MW-03S	7/26/00	ND (<5)	ND (1.3 BJ)	ND (<1)	1.8 J	ND (<1)	ND (<1)	ND (<1)	ND (<2)	ND (<5)
MW-03D	3rd Qtr 1992					ND	0.9J	ND		ND
MW-03D	4th Qtr 1992					ND	ND	ND		ND
MW-03D	1st Qtr 1993					ND	ND	ND		ND
MW-03D	2nd Qtr 1993					ND	ND	ND		ND
MW-03D	3rd Qtr 1993					ND	ND	ND		ND
MW-03D	1st Qtr 1994					ND	ND	ND		ND
MW-03D	4/30/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
MW-03D	12/3/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
MW-03D	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
MW-03D	6/29/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
MW-03D	9/24/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
MW-03D	4/12/00					ND (<1)	ND (<1)	ND (<1)		ND (<1)
MW-03D	7/26/00	ND (<5)	ND (1.6 BJ)	ND (<1)	ND (1.1 BJ)	ND (<1)	ND (<1)	ND (<1)	0.4 J	ND (<5)
9W-06A	3rd Qtr 1992					ND	ND	ND		ND
9W-06A	4th Qtr 1992					ND	ND	ND		ND

Table 6-1

Summary of Semiannual Groundwater Monitoring Results - VOC Detections, Marine Corps Base Camp Pendleton, California

Sampling Information		Analytical Results (µg/L)								
Sample Identification	Sample Date	Acetone	Bromomethane	cis-1,2-Dichloroethane	Naphthalene	Trichloroethene	Toluene	Tetrachloroethene	1,2,3-Trichlorobenzene	2-Butanone
9W-06A	1st Qtr 1993					--	--	--		--
9W-06A	2nd Qtr 1993					1	ND	ND		ND
9W-06A	3rd Qtr 1993					1	ND	ND		ND
9W-06A	1st Qtr 1994					1	ND	ND		ND
9W-06A	4/30/97					NS	NS	NS		NS
9W-06A	12/3/97					NS	NS	NS		NS
9W-06A	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
9W-06A	6/30/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
9W-06A	9/23/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
9W-06A	4/10/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
9W-06A	7/26/00	ND (<5)	ND (0.7 BJ)	ND (<1)	ND (<3)	0.5 J	ND (<1)	ND (<1)	ND (<1)	ND (<5)
9W-06B	3rd Qtr 1992					2	ND	ND		ND
9W-06B	4th Qtr 1992					2	ND	ND		ND
9W-06B	1st Qtr 1993					--	--	--		--
9W-06B	2nd Qtr 1993					3	ND	ND		ND
9W-06B	3rd Qtr 1993					2	ND	ND		ND
9W-06B	1st Qtr 1994					4	ND	ND		ND
9W-06B	4/30/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-06B	12/3/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-06B	8/19/98					NS	NS	NS		NS
9W-06B	6/30/99					1	ND (<1)	ND (<1)		ND (<4)
9W-06B	9/24/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)

Table 6-1

Summary of Semiannual Groundwater Monitoring Results - VOC Detections, Marine Corps Base Camp Pendleton, California

Sampling Information		Analytical Results (µg/L)								
Sample Identification	Sample Date	Acetone	Bromomethane	cis-1,2-Dichloroethane	Naphthalene	Trichloroethene	Toluene	Tetrachloroethene	1,2,3-Trichlorobenzene	2-Butanone
9W-06B	4/12/00					1	ND (<1)	ND (<1)		ND (<3)
9W-06B	7/26/00	ND (<5)	ND (1.3 BJ)	0.8 J	ND (<3)	1	ND (<1)	ND (<1)	ND (<2)	ND (<5)
9W-06C	3rd Qtr 1992					ND	ND	ND		ND
9W-06C	4th Qtr 1992					ND	ND	ND		ND
9W-06C	1st Qtr 1993					--	--	--		--
9W-06C	2nd Qtr 1993					ND	ND	ND		ND
9W-06C	3rd Qtr 1993					ND	ND	ND		ND
9W-06C	1st Qtr 1994					ND	ND	ND		ND
9W-06C	4/30/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-06C	12/3/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-06C	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
9W-06C	6/29/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
9W-06C	9/24/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
9W-06C	4/12/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
9W-06C	4/13/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
9W-06C	7/26/00	ND (<5)	ND (0.8 BJ)	ND (<1)	ND (<3)	ND (<1)	ND (<1)	ND (<1)	ND (<2)	ND (<5)
9W-07A	3rd Qtr 1992					ND	ND	6		ND
9W-07A	4th Qtr 1992					ND	ND	10		ND
9W-07A	1st Qtr 1993					ND	ND	4		ND
9W-07A	2nd Qtr 1993					ND	ND	8		ND
9W-07A	3rd Qtr 1993					ND	ND	18		ND
9W-07A	1st Qtr 1994					ND	ND	15		ND

Table 6-1

Summary of Semiannual Groundwater Monitoring Results - VOC Detections, Marine Corps Base Camp Pendleton, California

Sampling Information		Analytical Results (µg/L)								
Sample Identification	Sample Date	Acetone	Bromomethane	cis-1,2-Dichloroethane	Naphthalene	Trichloroethene	Toluene	Tetrachloroethene	1,2,3-Trichlorobenzene	2-Butanone
9W-07A	4/30/97					NS	NS	NS		NS
9W-07A	12/3/97					NS	NS	NS		NS
9W-07A	8/19/98					ND (<1)	ND (<1)	42		ND (<10)
9W-07A	6/30/99					1	ND (<1)	50		ND (<4)
9W-07A	9/24/99					1	ND (<5)	52		ND (<100)
9W-07A	4/11/00					1	ND (<1)	58		ND (<3)
9W-07A	7/26/00	ND (<20)	ND (5.6 BJD)	ND (<4)	3.3 JD	1.6 JD	ND (<4)	76 D	ND (<8)	ND (<20)
9W-07B	3rd Qtr 1992					ND	ND	ND		ND
9W-07B	4th Qtr 1992					ND	ND	ND		5
9W-07B	1st Qtr 1993					ND	ND	ND		ND
9W-07B	2nd Qtr 1993					ND	ND	ND		ND
9W-07B	3rd Qtr 1993					ND	ND	ND		ND
9W-07B	1st Qtr 1994					ND	ND	ND		ND
9W-07B	4/30/97					NS	NS	NS		NS
9W-07B	12/3/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-07B	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
9W-07B	6/30/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
9W-07B	9/24/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
9W-07B	4/11/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
9W-07B	7/27/00	4.14 J	0.9 BJ	ND (<1)	ND (<3)	ND (<1)	ND (<1)	ND (<1)	ND (<2)	ND (<5)
9W-07C	3rd Qtr 1992					ND	ND	ND		ND
9W-07C	4th Qtr 1992					ND	ND	ND		ND

Table 6-1

Summary of Semiannual Groundwater Monitoring Results - VOC Detections, Marine Corps Base Camp Pendleton, California

Sampling Information		Analytical Results (µg/L)								
Sample Identification	Sample Date	Acetone	Bromomethane	cis-1,2-Dichloroethane	Naphthalene	Trichloroethene	Toluene	Tetrachloroethene	1,2,3-Trichlorobenzene	2-Butanone
9W-07C	1st Qtr 1993					ND	ND	ND		ND
9W-07C	2nd Qtr 1993					ND	ND	ND		ND
9W-07C	3rd Qtr 1993					ND	ND	ND		ND
9W-07C	1st Qtr 1994					ND	ND	ND		ND
9W-07C	4/30/97					ND (<1)	ND (<1)	ND (<1)		ND (<1)
9W-07C	12/3/97					NS	NS	NS		NS
9W-07C	8/19/98					ND (<1)	ND (<1)	ND (<1)		ND (<10)
9W-07C	6/30/99					ND (<1)	ND (<1)	ND (<1)		ND (<4)
9W-07C	9/23/99					ND (<5)	ND (<5)	ND (<5)		ND (<100)
9W-07C	4/11/00					ND (<1)	ND (<1)	ND (<1)		ND (<3)
9W-07C	7/27/00	9	ND (0.9 BJ)	ND (<1)	ND (<3)	ND (<1)	ND (<1)	ND (<1)	ND (<2)	ND (<5)

Contract Laboratory Program (CLP) qualifiers:

B - Analyte detected in method blank

J - Estimated quantity (below reporting limit and above method detection limit).

IR - Installation Restoration

ND - not detected

NS - not sampled, dedicated pump in well not operable

VOC - volatile organic compound

µg/L- micrograms per liter

Ref: Southwest Division Naval Facilities Engineering Command, 2000, Draft Semiannual Groundwater Monitoring Report for Second Half of 2000, IR Site 9, Marine Corps Base Camp Pendleton, California, prepared by Navy Public Works Center, October.

Appendix A
Responses to Regulatory Review Comments
Matrix

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
General Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
		<p>The document provided an evaluation that makes the effectiveness of the preferred alternative, natural attenuation, questionable. The inadequacy of the soil and groundwater data used for the selection of this alternative makes the risk assessment inadequate, and therefore, protectiveness of human health and the environment questionable. Total Petroleum Hydrocarbons (TPH) analysis should have been substituted or supplemented by an analytical method (like SW8270) that provides data usable for risk assessment purposes. Also, there seems to be a portion (southeast quadrant) of the former effluent lagoon that was not adequately covered during the soil sampling.</p> <p>The review is late, since it should have been completed before December 12, 2000, per Title 40 for the Code of Federal Regulations, Part 300.430(f)(4)(ii), which states that: "... the lead agency shall review such action no less often than every five years after initiation of the selected remedy selection." Additionally, two of the major components of the remedy do not seem to be fully implemented, institutional controls and semiannual groundwater monitoring. DTSC has not yet seen a physical evidence, printed report, or any other document that verifies the amendment of the base master plan to restrict future access to the groundwater in the immediate vicinity of Site 9. It also appears that not groundwater was sampled and analyzed in both semesters of 1996 and one semester of 1998.</p> <p>The report seems to contradict itself as it admits the existence of insufficient data to adequately assess the effectiveness of natural attenuation, but attempts to advocate protectiveness of the selected remedy. Unfortunately, it appears that the selected remedy, natural attenuation, is not effective and protective of human health and the environment and the assumptions in the RI/FS and the ROD were incorrect in assuming that PCE would decrease with time. This fact has been corroborated at other bases, like George AFB, that have selected natural attenuation as remedy and have not seen a decrease in contaminants.</p>	<p>The risk assessment performed during the RI stage was reviewed and approved by the parties to the FFA prior to their signing the OU1 ROD. The assessment concluded that the risk associated with exposures to the soil and groundwater contamination at the site was within the acceptable criteria established in the NCP. Natural Attenuation was selected as the remedy for groundwater contamination because concentrations of contamination exceeded MCLs, not because it presented unacceptable environmental risk. We believe that past efforts were adequate, appropriate, and in full compliance with EPA guidance and CERCLA protocols.</p> <p>We understand that the review and assessment should have been done in a more expeditious manner and that the effectiveness of the selected remedy should have been monitored and evaluated more frequently. Through this review, we have identified data gaps and consequently developed a monitoring plan that will provide critical data for a conclusive assessment. Our revised groundwater monitoring plan now consists of 15 wells installed in 8 locations. The revised groundwater monitoring plan is summarized in Attachment 1. We believed that the 41 Area Master Plan, the Environmental Constraints Map, the Base Special Map, and the Base GIS ArcView IR layer, as well as applicable range training regulations, adequately addressed the site status. We will include additional information on these materials in Appendix A.</p> <p>The focus of this 5-year review is not to reexamine the validity of past decisions, but to assess the effectiveness of the selected remedy in protecting human health and the environment. In that regard, the risk associated with exposure to the soil contamination was not reassessed because the ROD stipulated no specific remedy other than control on future site development for residential use. Based on our review of the groundwater monitoring data, the risk associated with exposure to groundwater contamination and the assumptions used in the past (arsenic was identified as the primary contributor to the exposure risk and that arsenic was not site-related) were not impacted.</p>

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
General Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
(Cont.)			Unless the current concentrations of PCE and TCE contamination continue to increase and migrate significantly, we believe the exposure risk will not change significantly or become unacceptable. However, we recognize that the data were not sufficient to perform a conclusive assessment of the effectiveness of NA and that additional monitoring data would be required in order to complete such an assessment.
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
1.	Five-Year Review Summary Form, page v.	Please include the author name, author title, author affiliation and footnotes (*, **, ***).	Your comments will be incorporated.
2.	Ibid, page vi, Deficiencies.	DTSC concurs with the four bullets in the Deficiencies section. However, we believe that there are not enough soil samples, and therefore soil data, to evaluate whether a source of hydrocarbons is present or not. Therefore, we request that an additional bullet be added describing the soil data deficiency.	As discussed in our response to your general comments, we believe that the RI adequately addressed soil contamination at the site (the previous wastewater processing pond and grease disposal pit). We may, however, perform additional soil investigation if the future groundwater monitoring data indicate the existence of a previously unidentified source of PCE or TCE. We will share our plan with you if the additional groundwater data support the need for further soil assessment.
3.	Ibid, page vi, Deficiencies.	TPH should have not been used to justify protectiveness, since its reporting includes concentrations of many hydrocarbons grouped as one value, and it does not give any useful information to evaluate risk to human health and the environment.	The risk assessment was previously reviewed and approved by the parties to the FFA prior to their signing the OUI ROD. TPH was one of the many constituents of concern that were included in the risk assessment.
4.	Ibid, page vi, Recommendations and Follow-up Actions.	We concur with the three recommendations in this section. However, an additional bullet should be added to include additional soil samples and analyses in the southeast quadrant of the former lagoon, which was not adequately covered in the RI/FS. DTSC recommends that SW 8270 be used instead of TPH, in order to evaluate risk adequately. Also, this section should match the recommendations and follow-up actions in Section 9.	We will revise this section to make it consistent with the revised monitoring plan and follow-up actions presented in Section 9. As discussed in our response to comment Nos. 2 and 3, we will perform additional soil investigation if future monitoring data indicate such action is warranted.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
5.	Ibid, page vi, Protectiveness Statement(s).	Given the facts that the integrity of the fence around the site has not been kept intact, the multiple identified deficiencies, and the lack of physical proof about the complete implementation of institutional controls at the site, we may not agree with the statement that the remedy at site is expected to be protective of human health and the environment until after reviewing the additional data requested and reevaluation of the effectiveness of natural attenuation.	Your comments are noted. We are in the process of collecting additional groundwater monitoring data to address these issues.
6.	Section 1, page 1, Introduction, sixth paragraph.	The quote for 40 CFR 300.430(f)(4)(ii) is missing the word "often" between "less" and "than". The correct sentence in the regulation reads: "..., the lead agency shall review such action no less often than every five years after initiation of the selected remedy section." That means that this review should have been completed before December 2000.	Your comments will be incorporated. We recognize that this review should have been conducted more expeditiously and we will conduct our future reviews in a timely manner.
7.	Section 2, page 2-2, 4 th bullet.	Please re-write this to be consistent with 40 CFR 300.430(f)(4)(ii). Evaluation of the effectiveness should be made no less often than every five years.	Your comment will be incorporated.
8.	Section 3.4.1, Soil and Vadose Zone, page 3-2.	It appears from Figure 3-3 that although soil samples from 19 borings were collected during the RI/FS, a good portion of the former effluent lagoon (the southeast quadrant) was not sampled. This is inappropriate, since a significant portion of the lagoon (approximately 25%) was not adequately characterized and a potential source could have been missed. If a source was missed, that could explain the increase in PCE concentrations in groundwater. Natural attenuation should be selected only after sources of contamination have been removed or remediated.	As discussed in our response to your general comments, we believe the RI adequately addressed soil contamination at the site (the previous wastewater processing pond and grease disposal pit). We may, however, perform additional soil investigation if future groundwater monitoring data indicate the existence of a previously unidentified source of PCE or TCE. We will share our plan with you if the additional groundwater data support the need for future soil assessment.
9.	Ibid, 1 st bullet.	The TPH concentration in soil boring 9B-17 at 6 feet below ground surface is reported as 67,000 mg/kg and 6,700 mg/kg in Figure 3-3. Please correct this discrepancy.	The TPH concentration should be 6,700 mg/kg. The text will be revised accordingly.
10.	Ibid.	Although TPH analysis is appropriate for the tank program, it should not be included in documents that evaluate risk to human health and the environment, since its reporting includes concentration of many hydrocarbons grouped as one value. TPH should have not been used to justify protectiveness. Some other analysis that report concentrations of individual compounds (like SW8270) should have been utilized instead.	TPH was one the constituents of concern addressed by the risk assessment, which was based on a comprehensive investigation of both organic and inorganic contamination. The RI investigation was conducted in accordance with the work plan approved by the parties to the FFA. We believe that past efforts were adequate, appropriate, and in compliance with applicable CERCLA protocols and EPA guidance.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
11.	Section 3.4.2, page 3-3, 5 th bullet.	It seems that mercury was eliminated as a contaminant of concern without adequate justification other than a possibility of being a laboratory artifact. One out of three times (33.3% frequency) is not an adequate frequency to drop a COC.	See our response to your comment No. 10.
12.	Ibid, 6 th bullet.	TPH was detected at 470 µg/L in well 9W-07A during the third quarter of 1992. Again, TPH analysis should not be included in documents that evaluate risk to human health and the environment, since its reporting includes concentrations of many hydrocarbons grouped as one value. TPH should have not been used to justify protectiveness. Additionally, maximum contaminant limits (MCLs) are established for individual compounds. TPH reporting includes concentrations of many hydrocarbons grouped as one value and should not be used to compare with any MCL.	See our response to your comment No. 10.
13.	Section 4.1, Remedy Selection, page 4-1, first bullet.	Given the soil and groundwater data deficiencies mentioned above, increasing PCE levels in groundwater, and the possibility of a source left undetected in the soil, clearly highlight the need to conduct further investigation/active remediation at this site.	We are in the process of collecting additional groundwater monitoring data in accordance with the revised monitoring plan (Attachment 1). If the future monitoring data indicate the existence of a previously unidentified source of PCE or TCE, we will perform an additional soil investigation and further study of possible remedial alternatives. We will share our plan with you if the additional groundwater data support the need for future soil assessment.
14.	Section 4.2, Remedy Implementation, pages 4-1, 4-2.	Semiannual groundwater monitoring was one component of the ROD. However, it appears that no groundwater was sampled and analyzed in both semesters of 1996 and one semester of 1998. Please clarify.	We understand that the semiannual monitoring was not consistently performed in the past. As we proposed in the revised monitoring plan (Attachment 1), we will rectify this deficiency and conduct all the monitoring activities in a timely manner.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
15.	Ibid.	Another component of the ROD was institutional controls (ICs) to limit access to the site soil and groundwater. This section mentions Site 9 being a restricted area in the base master plan, and also mentions some restraints that have been incorporated in the Geographic Information System (GIS) using by the base in planning and reviewing all military construction, maintenance, and repairs. ICs should be re-evaluated since there are an integral part of the ROD. However, the document fails to evaluate the effectiveness and protectiveness of ICs. It would help this review if some map, and/or report from the GIS be included in this document as an appendix to corroborate the effectiveness of the institutional controls in the ROD.	The requested information was addressed in a June 21, 2001, letter from Maj. Kinder (Environmental Compliance Department Head of MCB Camp Pendleton) to Mr. Martin Hausladen (EPA Region IX), with copies sent to all members of the FFA. In addition to the information compiled in the 41 Area Master Plan, the status of the site is also shown on the Base Environmental Constraints Map, the Base GIS ArcView IR layer, and the Base Special Map, and is regulated under Base Range and Training Regulation BO P3500.1K. This information will be added to Appendix A.
16.	Section 4.4, Progress Since the Last Five-Year Review, Page 4-2.	Although this section refers to last Five-Year review performed, some explanation of the progress (or lack thereof) should be included even if this is the first Five-Year review. DTSC believes that, based on the limited data provided, not progress have been made at Site 9.	Progress was made on institutional control and groundwater monitoring. The site is now clearly identified in the base GIS database, the Base Environmental Constraint Map, and the 41 Area Master Plan as an installation restoration site restricted for development or access. Therefore, the institutional control has been effective since the ROD was signed in 1995.
17.	Section 5, Five-Year Review Process, page 5-1.	Please explain why soil and groundwater sampling, and consequently, reevaluation of the effectiveness of natural attenuation were not part of the Five-Year review activities.	As discussed in our response to your general comment, soil contamination at the site requires no remedial action and, therefore, does not need to be reviewed. Groundwater has been sampled on a semiannual basis since 1997. We recognize that the sampling activities were not consistently performed and that existing groundwater monitoring data are not sufficient to conduct a conclusive evaluation of the effectiveness of natural attenuation. We have identified data gaps and consequently developed a monitoring plan (Attachment 1) that will provide critical data for a conclusive assessment.
18.	Section 6.3, Risk Information Review, pages 6-2 and 6-3.	A risk assessment should be performed again after additional soil and groundwater data is obtained to make sure that risk is still acceptable at the site. Given the data deficiencies mentioned above we disagree with statement that the risk assessment modeling remains valid.	See our response to your comment No. 17. We recognize that existing groundwater monitoring data are not sufficient to conduct a conclusive assessment of the effectiveness of the selected remedy. We have identified data gaps and consequently developed a monitoring plan (Attachment 1) that will provide critical data for a conclusive assessment.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
19.	Section 6.4, Data Review, page 6-4.	Although the report acknowledges the existence of limited data, the last sentence in this section states: "However, the available data suggests that PCE/TCE has not migrated vertically." We can't agree with this assessment until additional data is collected.	The groundwater monitoring data collected from 1992 to 2000 suggested that contamination had not migrated vertically in wells 9W-07A, -07B, and -07C and 9W-06A, -06B, and -06C, where the cluster wells are screened at discrete levels. We will continue to monitor these wells to verify our conclusions.
20.	Section 7.2, Are the Assumptions Used at the Time of Remedy Selection Still Valid?, page 7-1.	DTSC believes that the assumptions used in the fate and transport model at the time of remedy selection need to be revised with new adequate data that covers the entire site (see comment 8) and uses analyses that are adequate for risk assessment (see comment 10, 11, and 12).	The fate and transport study was reviewed and approved by parties to the FFA. As concluded by our review, we recognize that the fate of PCE had not been attenuated as predicted. However, the current monitoring data continue to support the transport model (plume did not migrate) used in the past study. We are in the process of obtaining more adequate information through our revised monitoring plan (Attachment 1). Your comments on the validity of previous fate and transport modeling will be addressed when additional information becomes available.
21.	Section 8 Deficiencies, page 8-1.	Please modify this section to address the identified deficiencies mentioned above.	We will revise this section to incorporate our revised monitoring plan (Attachment 1) and action.
22.	Section 9, Recommendations and Follow-up Actions, page 9-1, third bullet.	We agree with the installation and sampling of additional wells to delineate the PCE plume. However, we request that soil sampling be conducted in the former effluent lagoon to confirm/deny the presence of a source and to adequately assess risk from soil with adequate analytical methods.	We believe the RI adequately addressed soil contamination at the site (the previous wastewater processing pond and grease disposal pit). We may, however, perform additional soil investigation if future monitoring data indicate the existence of a previously unidentified source of PCE or TCE. We will share our plan with you if the additional groundwater data support the need for future soil assessment.
23.	Ibid.	Please include a bullet to address the confirmation of the implementation of institutional controls as commented above (see comment 15).	Please see our response to your comment No. 15.
24.	Section 10, Protectiveness Statement, page 10-1.	Given the deficiencies identified above, and the fact that PCE levels appear to be increasing, contrary to the assumptions in the OU 1 RI/FS and ROD, DTSC can not concur with this statement until additional soil and groundwater data are collected and natural attenuation is reevaluated.	Your comments are noted. We are in the process of collecting additional groundwater monitoring data so that a full assessment can be conducted. We will provide you with the monitoring data as available.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
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Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Manny Alonzo, Federal Facilities Unit A, Office of Military Facilities, DTSC, dated 7/18/01			
25.	Section 12, Other Comments, Page 12-1.	The reevaluation of the effectiveness and protectiveness of natural attenuation should have been reviewed before the fifth anniversary of the ROD signature as required in 40 CFR 300.430(f)(4)(ii). Therefore, such reevaluation is overdue, and therefore, it should be made as soon as possible.	We recognize that this review could have been done in a more expeditious manner. We will provide more frequent monitoring and evaluation efforts in the future.
26.	Appendices.	Please include an appendix that contains positive documentation of the implementation of the institutional controls in the base master plan, GIS, or other entity. A letter from the base civil engineer or the person responsible for implementing, updating, and enforcing the base master plan would be appropriate. The letter could describe how the institutional controls have been implemented and what is being made to ensure that access to the site is restricted.	Please see our response to your comments No. 15 and 23. The following information will be provided in Appendix A: copy of a letter from Maj. Kinder (Base Environmental Security Department Head) addressing the institutional controls placed on Site 9, excerpts related to environmental procedures from Base Range and Training Regulation BO P3500.1K, copy of digital figure of Site 9 from 41 Area Master Plan, copy of digital figure of Site 9 from Base Environmental Constraint Map. The maps and master plan are all GIS-based.
General Comments from Beatrice Griffey, M.Sc., RG, Associate Engineering Geologist, Site Mitigation and Cleanup Unit, RWQCB, dated 7/17/01			
		<p>The RWQCB is requiring the inclusion of the following items in the subject documents:</p> <ul style="list-style-type: none"> • include a map illustrating the location of the former sewage treatment plant and the former subsurface line used to convey wastewater from the plant to the oxidation/percolation pond, • provide details regarding the construction and installation of the wastewater conveyance line, • provide a comprehensive list and a map illustrating the locations of facilities and activities in the area involving the use, storage, or disposal of chlorinated solvents, historic and recent, and • provide cross-sections illustrating the hydrogeologic relationships between all existing groundwater monitoring wells at the site. 	The majority of the requested information was already presented in the 1993 and 1994 RI/FS reports. The purpose of the 5-year review was to examine the effectiveness of the selected remedy. As such, we will address these general comments through our future investigation efforts, as proposed in the report. The additional information could include figures of geologic and hydrogeologic cross-sections, as-built conditions of past wastewater conveyance system, and source of solvent usage in adjacent areas.
Specific Comments from Beatrice Griffey, M.Sc., RG, Associate Engineering Geologist, Site Mitigation and Cleanup Unit, RWQCB, dated 7/17/01			
		The proposed activities for MW-03S need to be consistent, refer to Five-Year Review Summary Former (fourth deficiency), Section 8.0, Section 9.0, and Five-Year Review Inspection Checklist (Section IX).	We have recommended to either repair or replace the sampling pump in well MW-03S. We will revise the text to make the action consistent.
		Correct the discrepancy in TPH concentrations noted in Section 3.4.1 and Figure 3-3 for the soil sample collected in boring 9B-17 at 6' bgs.	The TPH concentration in Section 3.4.1 will be revised from 67,000 mg/kg to 6,700 mg/kg, consistent with the concentration reported in Figure 3-3.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from Beatrice Griffey, M.Sc., RG, Associate Engineering Geologist, Site Mitigation and Cleanup Unit, RWQCB, dated 7/17/01			
		Provide details regarding the proposed reassessment of natural attenuation at the site, Report Section 9.0, fifth bullet.	The effort will include an evaluation of the hydrogeologic boundary conditions and retardation factors used in previous modeling. In response to your comments, we have developed a revised groundwater monitoring plan, which is provided in Attachment 1. The rate and effectiveness of natural attenuation will be reassessed after the recommended data collection activities are performed.
		Section 9.0 is to include proposed activities if chlorinated solvents are encountered in sentry monitoring wells east of Interstate 5. Note, detectable concentrations of DCA have been encountered in groundwater collected from MW-05. Additionally, future groundwater monitoring activities are to include all existing groundwater monitoring wells at the site.	If significant contamination (concentrations higher than MCLs) is found in 9W-24, 9W-26, or 9W-27, we believe that an additional investigation of the PCE plume should be conducted. It could indicate that the source of PCE was not related to the waterwater stabilization pond at the site and, therefore, should be addressed separately.
General Comments from EPA Region IX, dated 8/3/01			
1.		This Draft Five-Year Review Report, Installation Restoration Site 9, Operable Unit 1, Marine Corps Base, Camp Pendleton, California (the Five-Year Review Report) is more a summary of data than a critical review and interpretation of data collected over the past five years. The current monitoring program appears to consist of monitoring at three well clusters, all downgradient of the source area. While the selection of natural attenuation as a remedy for groundwater contamination is cited as being part of the Record of Decision (ROD) for Installation Restoration (IR) Site 9, no data are presented in this report to assess the occurrence of natural attenuation processes. Please include a discussion of the rationale for sampling only three monitoring well clusters in a downgradient location, and list all data collected that meets the requirements of the ROD.	The decision process for the current monitoring program was not documented. We recognize that the current program is deficient and, therefore, did not provide sufficient data for a conclusive evaluation of the effectiveness of natural attenuation. We have identified the data gaps and consequently developed a revised monitoring plan (summarized in Attachment 1) that will provide better data coverage both upgradient and downgradient of the site.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
General Comments from EPA Region IX, dated 8/3/01			
2.		<p>The report concludes that natural attenuation apparently is not diminishing the groundwater concentrations of tetrachloroethene (perchloroethylene, or PCE), as predicted by earlier modeling efforts that were used in establishing the ROD. However, other than the increasing PCE concentrations in one monitoring well, no other data analyses are presented to assess the natural attenuation process. This report should also present and assess the other parameters that are more diagnostic for assessing natural attenuation (electron acceptor concentrations, ethene production, Total Organic Carbon (TOC), etc.), preferably compared to the values used in the previous modeling effort. If low-flow purging and sampling are being used for collection of groundwater samples, the parameters such as dissolved oxygen and redox potential should also be available. If these data indicate that natural attenuation processes are diminishing such that the rates of anaerobic transformation of PCE and trichloroethene (TCE) are slowing, please then consider that the conditions of the ROD are not being met and will not be met in the future and an alternative approach to site remediation is necessary.</p>	<p>Because of the lack of groundwater data in areas upgradient and downgradient from the plume, a meaningful comparison of changes in groundwater chemistry could not be performed. Until additional data are collected, the biodegradation rate cannot be fully evaluated. Therefore, it is not known whether diminishing biodegradation or a previously unidentified mechanism caused the elevated PCE concentration.</p>

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
1.	Section 3.4.2, Groundwater, Page 3-3, Figures 3-4, 4-1 and 6-1, Table 6-1.	The rationale for the groundwater monitoring program requires explanation regarding the wells that are now being monitored, and presumably that will provide data for an assessment of natural attenuation. Table 3-4 only shows chemicals that have been detected in the various monitoring wells during the Remedial Investigation through the first quarter of 1994. Figure 6-1 shows only data for TCE and PCE, and includes the RI data as well as data for the ongoing monitoring program; based on Table 6-1 and the designated well clusters in Figure 4-1, it appears that only three downgradient monitoring well locations are now included in this program. No monitoring wells in the source area (9W-10 and 9W-22) or in the immediate downgradient location (the MW-04 cluster) are in the ongoing program. Please explain how these three monitoring locations were selected, and how they are useful for assessing natural attenuation, especially when no data for assessing natural attenuation are presented or discussed in this Five-Year Review Report. For completeness in of the figures, please indicate when wells were dry and could not be sampled (rather than just not sampled for some other reason) and the actual detection limits (rather than just ND). Also, please be consistent in the figures and the text when referring to the source area (is it a stabilization pond, an effluent lagoon, or impoundment?)	The decision process for the current monitoring program was not documented. We recognize that the current program is deficient in providing data critical to the evaluation of natural attenuation. We have proposed a revised monitoring plan (Attachment 1) that will provide better data coverage. Your comments will be incorporated into the figures. The source area will be called out as a "waste stabilization pond" to be consistent with the site callout in the OUI ROD.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
2.	Section 3.4.2, Groundwater, Page 3-3, Reference to Table 3-3.	Table 3-3 lists the maximum and minimum values for a number of groundwater analytes, but provides no discussion of the data. Please state whether the concentrations indicate any trends in groundwater quality, and which analytes have been carried over into the five-year monitoring program. Based on the footnote in Table 3-3, it appears that the data represent only three sampling events (two in 1992 and once 1993?), so a comparison of maximum and minimum values seems moot. Also, Figure 3-4 lists three more sampling events (six total events) for VOCs extending into 1994. Please clarify if analytes other than VOCs were sought in these other three sampling events represented in Table 3-3. Because the data represent conditions as of 1993, please consider another round of groundwater sampling for these analytes to confirm these analyses, which may have been obtained using what are now recognized as less reliable sampling and purging methods.	Two phases of RI were performed as indicated in the site event chronology (page 2-2 of the report). The Phase I RI was performed between February 1992 and April 1993 and included both soil and groundwater sampling. The Phase II RI was performed between May 1993 and April 1994 and included only groundwater sampling. The risk assessment was based primarily on the Phase I data, whereas the Phase II data were compared with Phase I data to make sure the Phase I data were adequate for the risk assessment. Table 3-3 as currently presented includes only the Phase I data. Our intention was to show the data range used in the risk assessment (usually the maximum detections were used) so that a comparison between the current level and those used in the risk assessment could be made. We will revise the text discussion to make it clear that Table 3-3 includes only data used by the risk assessment. We will also add additional discussions summarizing the Phase II data. It should be noted that the focus of this review is to evaluate whether the selected remedy is still protective of human health and the environment, not to validate the adequacy of previous reports reviewed and received concurrence by the parties to the FFA.
3.	Section 3.4.2, Groundwater, Page 3-3, Reference to Figure 3-3.	Total Petroleum Hydrocarbon as diesel (TPH-D) is apparently limited to shallow soils, and these data are only for the source area. No other data, tables or figures are presented to characterize other chemicals present in this source area (particularly analytes of the VOC, metals, and SVOC suites).	The focus of this review is to evaluate whether the selected remedy is protective of human health and the environment. The exposure risk associated with the soil contamination at Site 9 was deemed acceptable and requires no further action. Detailed information on soil contamination at Site 9 was presented in previous RI reports and will not be repeated in this report.
4.	Section 3.4.2, Groundwater, Page 3-3.	The first bulleted item appears to be incomplete. This paragraph mentions three PCE detections in monitoring wells shown in Figure 3-4 and the MCL for PCE. The figure also lists PCE at 8, 18 and 15 µg/L from samples collected in the 3rd and 4th quarters of 1993 and the 1st quarter of 1994, respectively, which are also above the MCL. Please clarify why these additional, and more recent analyses, were not discussed in this section.	This section will be revised to incorporate the Phase II RI data. Please also see our response to your comment No. 2 as to why the Phase II data were not included.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
5.	Section 3.4.2, Groundwater, Page 3-3.	The third bulleted point appears to be incomplete. This paragraph reports three TCE detections in monitoring wells and does not mention all detections listed in Figure 3-4. This figure details an additional detection of TCE above the MCL drinking water standard of 5 µg/L, 9 µg/L in the 1st quarter of 1994. Please clarify why these additional, and more recent analyses, were not discussed in this section.	This section will be revised to incorporate the Phase II RI data. Please also see our response to your comment No. 2 as to why the Phase II data were not included.
6.	Section 3.4.2, Groundwater, Page 3-3.	The fourth bulleted point states that antimony and nickel were detected at concentrations above their respective MCLs, but does not mention that cadmium was also detected above the MCL (Table 3-3). Antimony and nickel detections are assumed to be reflective of background conditions. No discussion is provided regarding cadmium detections. In addition, no discussion of background conditions is presented in the report. At a minimum the report should present a table of background range detections and reference the appropriate report for the reader. As mentioned above, another round of groundwater sampling should be considered for confirmation and comparison with the 1993 data set.	The risk exposure associated with groundwater contamination was deemed acceptable. Natural attenuation was selected because PCE and TCE concentrations exceeded MCLs. Cadmium was not identified by the risk assessment as a constituent of concern and was not specifically addressed by the OUI ROD.
7.	Section 3.4.2, Groundwater, Page 3-4.	The last paragraph within this sections notes that TCE is present in wells 9W-06B and 9W-07A at concentrations in excess of the MCL, but does not mention that TCE was also detected in MW-04D at 9 µg/L (above the MCL of 5 µg/L) during the 1st quarter sampling of 1994. Please explain why the MW-04 cluster has not been included in the ongoing monitoring program as the figures all show that this location is immediately downgradient of the suspected source area.	We recognize that MW-04 cluster wells should be, and will be, included in the monitoring program. Our revised monitoring plan is summarized in Attachment 1 and includes MW-04 as an evaluation well.
8.	Section 3.4.3, Surface Water and Sediments.	This section states that two surface water samples were collected from the impoundment during a flooding event, and Table 3-4 lists these data. Please revise the table to show that only two samples were collected, rather than a maximum and minimum value which suggest a more vast sampling effort. Also please note that the Table 3-4 footnote beginning with Summary of validated data . . . is not relevant to this table, and has been copied verbatim from Table 3-3 for the groundwater data.	Your comments will be incorporated.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001

OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
9.	Section 4.1, Remedy Selection, Page 4-1.	It is not clear how the current monitoring program meets the requirements of the ROD. The second bulleted item, second sentence, states that the ROD stipulates a remedial action which includes monitoring that 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, and that the monitoring well locations are shown on Figure 4-1. Figure 4-1 shows 14 monitoring well locations, with 3-well clusters at two locations and 2-well clusters at four locations; this figure designates two clusters of three wells each and one cluster of two wells, for total of eight wells at the three locations, as monitored on a semiannual basis. Please clarify how the conditions of the ROD are being met by the current sampling plan, which appears to have deleted four monitoring wells from the 12 wells specified in the ROD.	We recognize that the current monitoring data are not sufficient for a conclusive assessment of the effectiveness of NA and have, consequently, proposed a revised monitoring plan, as presented in Attachment 1. The revised monitoring plan includes 15 wells installed in 8 locations, with discrete screen intervals to monitor groundwater quality within different hydrogeologic units.
10.	Section 4.2, Remedy Implementation, Page 4-1.	This section states that the first post-ROD semiannual groundwater monitoring event was conducted on April 30, 1997" and that Eight wells were monitored for VOCs using EPA Method 8260B and various groundwater chemistry and bio-parameters . . . , but none of the latter data are reported. Presumably these analyses are part of the semiannual monitoring program because of their value in assessing natural attenuation, although the second bullet of Section 4.1 only states that VOCs and TPH will be analyzed for groundwater samples. However, none of the groundwater chemistry parameters or bio-parameters are reported or discussed in this report. Please clarify what analytes and other groundwater chemistry parameters are being measured in the semiannual monitoring program, and why these data are not included in this Five-Year Review Report.	The OUI ROD specified only VOCs and TPH as the monitoring parameters. Various groundwater general chemistry parameters and other bioparameters were added by the Navy so that the characteristics and the effectiveness of biodegradation could be evaluated. However, the current monitoring program did not have enough coverage for background and downstream water quality and, therefore, did not produce data sufficient to support a trend analysis. Consequently, we have proposed a revised groundwater monitoring plan (Attachment 1) to address this critical data gap.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
11.	Section 4.3, Systems Operations/Operation and Management, Page 4-2.	This section states that the ROD requires no construction of a remedial system because the selected remedy is based on natural attenuation, but no data for or assessment of natural attenuation is described in this Five-Year Review Report. If the ROD specifically includes an evaluation of natural attenuation processes, again please describe how this requirement is being met. Please also note that Section 13, References, contains no citation of the natural attenuation literature or guidance that has been prepared by the US EPA and branches of the Department of Defense, and which would be the basis for a program to assess natural attenuation.	The fate and transport model was originally presented in the 1994 RI/FS report. We recognize that the validity of this model should be critically reviewed. However, the current monitoring data were not sufficient to support a conclusive evaluation. We are in the process of collecting additional data so that a complete evaluation can be conducted.
12.	Section 6.4, Data Review, Page 6-3.	This discussion of the possible causes of the increase in PCE concentrations in monitoring well 9W-7A is incomplete. There are several explanations to be considered in rationalizing the changes from 4 to 18 µg/L through 1994 to current levels of 42 to 76 µg/L. The last sentence of the second paragraph suggests that changing the analytical method from the CLP method to the SW846 procedure (EPA Method 8260B) could be source of the increase. An alternate explanation could be the possible change from a previous procedure using a bailer (or pump) to purge and collect a sample to the now-preferred low-flow purging and sampling procedures, which are known to increase VOC concentrations by eliminating volatilization losses. Another explanation could be that the anaerobic natural attenuation processes are now shutting down as the oxidizable substrate (i.e., the electron-donors) are being depleted; in this regard, one such substrate would be the hydrocarbons as represented by the TPH-D which are apparently now non-detect in groundwater. This decrease in the biotransformation rate of PCE would result in increased PCE concentrations and lower concentrations of the TCE transformation product, as are being observed. Yet another explanation is that a plume of PCE from a source not apparent in the reported data is now moving through the subsurface at the location of 9W-7A. Please consider reviewing all site data (including parameters used to purge monitoring wells such as dissolved oxygen and redox potentials) to support or refute these several explanations, particularly with regard to the natural attenuation processes that are cited in the ROD.	Your comments are noted. We are in the process of collecting additional data to better define the cause of elevated PCE concentrations observed over the last few years. It is not known at this time whether diminishing biodegradation or a previously unidentified source caused such elevation. We will provide you with the results of our analyses as they become available.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
13.	Section 6.4, Data Review, Page 6-3.	As part of a review process for groundwater data, some evaluation of the accuracy, precision, and comparability of the data should be presented. As noted above, it is possible that changes in groundwater purging and sampling procedures may partially explain the some 10-fold increases in PCE concentrations from the RI into the ongoing semiannual monitoring program. If the procedures have changed, please consider collecting additional measurements of the other water quality parameters in Table 3-3 to obtain more accurate and representative data. Please also evaluate data precision to assess criteria for determining when concentration differences among sampling events are actual increases (or decreases) and when the apparent differences are due to inherent sampling and analytical variabilities.	Your comments are noted. We have checked the sampling protocols and found that the groundwater wells were purged with a dedicated submersible pump and then sampled with a bailer. We are in the process of collecting additional monitoring data using low-flow pumps.
14.	Section 6.1, Interviews, Page 6-1, and Appendix A.	These interviews indicate that constraints on access to and use of the suspected source areas are well-marked on maps, but the interviews also indicate that there is little knowledge among the interviewees as to why the restrictions are in place. It is not stated whether there are signs posted in the restricted areas to indicate the presence of monitoring wells. Please consider the suggestion of Capt. Harper that, "the area with restricted access be marked so that personnel stay out of that area as," a request that some physical signs be placed at the sites indicating why access is restricted, with possibly a contact for additional information.	Your comments will be incorporated.
15.	Section 6.4, Data Review, Page 6-3.	The second paragraph in this section again does not mention TCE detections above the MCL in MW-04D (9 µg/L in 1st quarter of 1994.) Also, there is no reported sampling since of this well after 1994. Again, please explain why additional sampling of this well has not been considered, given the fact that the last reported sampling at this well resulted in a detected concentration which exceeded the MCL.	We recognize that MW-04 cluster wells should be, and will be, included in the monitoring program. Our revised monitoring plan is summarized in Attachment 1.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
16.	Section 7.1, Is the Remedy Functioning as Intended by the Decision Document?, Page 7-1.	The text states that the TCE concentrations have been reduced and stabilized below the MCL, but that there is no indication of a trend of gradual reduction of PCE concentrations. As shown in the above comments, there is the possibility that the rates of natural (anaerobic) attenuation processes are decreasing and the lower TCE concentrations and increased PCE concentrations are the result of this change in groundwater chemistry. The bases for the modeling of the natural attenuation processes used to develop the ROD are not stated, but it should be noted that the longer chain hydrocarbons that constitute diesel fuels (and possibly the constituents of sewage sludge) are of lower solubility than the shorter chain hydrocarbons and have resulting low biodegradation rates. It is then likely that the more biodegradable constituents of the diesel fuel or sewage sludge are now depleted over six years to the point that the rates of oxidative biodegradation of the remaining substrates are too slow to maintain the anaerobic conditions that may have existed. Because there are no likely sources of oxidizable substrates at this controlled site to restore the anaerobic conditions, please consider that another 3 years (to the eight year landmark) will show no increased rates of natural anaerobic attenuation processes. Therefore the natural attenuation remedy is neither functioning efficiently now nor will it become more efficient in the future.	Your comments are noted. Because of the lack of upgradient/background groundwater data, we were unable to perform a trend analysis, as you suggested. We did notice that the current levels of dissolved oxygen and redox potential seemed to support an anaerobic environment. However, until more groundwater data from areas that are unaffected by the plume are available for comparison, we could not make a conclusive analysis.
17.	Section 7.2, Are the Assumptions Used at the Time of the Remedy Selection Still Valid?	This section acknowledges that the PCE concentrations have not decreased as expected, but that PCE concentrations are not expected to increase much more than at present because the site has been inactive and no additional source of contamination have been identified. This statement ignores the situation that the reason for the 10-fold increase in PCE concentrations over 8 years in 9W-7A, some 400 feet from the suspected source area, is not explained. The statement that the hydrogeologic conditions have not changed significantly is not supported, and another section of the report states that the groundwater levels have dropped several feet. Please evaluate all hydrogeologic and groundwater chemistry parameters more completely to determine if assumptions in the natural attenuation model have changed and are no longer valid.	The risk assessment performed in 1993 used the then maximum concentrations of PCE (10 ppb) and TCE (15 ppb) in the risk calculation. As such, the risk level did not increase tenfold as suggested by your comment. We are in the process of obtaining additional monitoring data so that the hydrogeologic and geochemical conditions at the site can be better defined. Your comments on these issues will be addressed when the data become available.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
18.	Section 9, Recommendations and Follow-up Actions, Page 9-1.	This section needs to outline the additional sampling in more detail, possibly including MW-04D to address data gap issues associated with 1994 detections in this well above the MCL for TCE. The location and rationale for installing new monitoring wells should be specified. Please consider that recent EPA guidance on the Five-Year Review Report process requires specific information on specific actions to be taken, person(s) or groups responsible for implementing the action, and a date when the action will be completed.	In response to your comments, we have developed a revised monitoring plan (Attachment 1) to address your concerns.
19.	Figures 6-1.	A footnote in this table states: Wells that do not have analytical data corresponding to that well did not have detectable levels of contaminants during the sampling events. While this statement apparently pertains to the ongoing monitoring program, the footnote is not strictly correct because monitoring wells sampled in the RI did show chemicals present, and these data are not shown on Figure 6-1. Other than the three locations of the groundwater monitoring well clusters in the ongoing program, none of the other monitoring wells have been sampled and analyzed, so they would not be indicated on the figure. Most importantly and as noted previously, MW-04D did have TCE concentrations that exceeded the MCL in 1994, but the footnote would suggest that TCE is now non-detect when in fact it apparently has not been sampled and analyzed for TCE since 1994. If subsequent sampling has indicated non-detect levels of TCE in this monitoring well, then please explain why it is still being included within the isoconcentration contour.	Your comments are noted. We will revise the figure to clarify this issue and the fact that only three cluster wells are monitored.
20.	Table 3-1.	This table lists only the maximum and minimum values for these analytes, but the number of samples analyzed is not listed. Also, the samples from the suspected source area should be distinguished from the samples collected from outside the source area. Please consider adding this information to make the tables more informative for the reader.	Table 3-1 shows the range of contamination that was evaluated by the risk assessment. The focus of this review is to evaluate whether the selected remedy is protective of human health and the environment. The exposure risk associated with soil contamination at Site 9 was deemed acceptable and requires no further action. Detailed information on soil contamination was presented in previous RI reports. Soil contamination is outside the scope of the 5-year review.

REVIEW COMMENTS - DRAFT FIVE-YEAR REVIEW REPORT
Installation Restoration (IR) Site 9 – Operable Unit 1, Marine Corps Base Camp Pendleton
California, dated March 23, 2001
OHM Project No. 780516, Delivery Order No. 0138, Document Control Number SW9443

Comment No.	Section/Page Number	Comment	Department of the Navy's Response
Specific Comments from EPA Region IX, dated 8/3/01			
21.	Table 3-2.	As for the above comment, this table lists the maximum and minimum values and does not indicate the data set size or whether the samples were from the suspected source area. Please consider adding this information to make the tables more informative for the reader.	Table 3-2 shows the range of contamination that was used by the risk assessment. The focus of this review is to evaluate whether the selected remedy is protective of human health and the environment. The exposure risk associated with soil contamination at Site 9 was deemed acceptable and requires no further action. Detailed information on soil contamination was presented in previous RI reports. Soil contamination is outside the scope of the 5-year review.
22.	Table 3-3.	The MCL for copper is 1,300 µg/L. This value should be included in this table. Figures text and tables are not consistent in data reporting. This presentation is then incomplete, difficult to follow, and hampers the understanding of the report conclusions. Please clarify the use of data in the figures to allow more facile location of the data in the tables, explaining why some data are left off the figures.	Your comments are noted. The focus of this review is to evaluate whether the selected remedy is protective of human health and the environment. The exposure risk associated with soil contamination at Site 9 was deemed acceptable and requires no further action. Detailed information on soil contamination was presented in previous RI reports. Soil contamination is outside the scope of the 5-year review.

Attachment 1
Revised Site 9 Groundwater Monitoring
Network (2001-2002)

Revised Site 9 Groundwater Monitoring Network (2001-2002)

Well No.	Screen Location (ft msl)		9/19/01 GW level	Hydrogeologic Unit*	Monitoring Purposes
	top	bottom	(ft msl)		
9W-02	39.23	24.23	53.98	Terrace Deposit, C	Background/Upgradient
9W-02A	9.61	-10.40	55.47	Terrace Deposit, C	Background/Upgradient
MW-03S	52.91	42.91	45.00	Channel Deposit, uC	Evaluation monitoring
MW-03D	37.60	22.60	44.53	Channel Deposit, uC-sC	Evaluation monitoring
MW-04S	54.70	47.70	45.83	Channel Deposit, uC	Evaluation monitoring
MW-04D	46.00	31.00	45.67	Channel Deposit, uC	Evaluation monitoring
9W-07A	39.31	29.31	44.7	Channel Deposit, uC	Evaluation monitoring
9W-07B	13.66	-1.34	44.85	Lower Channel Deposit, sC	Evaluation monitoring
9W-07C	-11.77	-21.77	43.91	Lower Channel Deposit, sC	Evaluation monitoring
9W-06A	48.21	33.21	39.73	Channel Deposit, uC	Compliance monitoring
9W-06B	14.99	4.99	41.16	Lower Channel Deposit, sC	Compliance monitoring
9W-06C	-9.29	-29.29	41.14	Lower Channel Deposit, sC	Compliance monitoring
9W-24	42.58	27.58	38.06	Channel Deposit, uC	Compliance monitoring
9W-26	40.12	20.12	34.81	Channel Deposit, uC	Compliance monitoring
9W-27	42.97	22.97	36.86	Channel Deposit, uC	Compliance monitoring

*Hydrogeologic units are based on RI boring logs. Additional sampling and monitoring is required to verify and characterize the water quality and the connection between units.

C: Confined aquifer

uC: Unconfined aquifer

sC: Semi-confined (leaky) aquifer

Revised Site 9 Groundwater Sampling and Analysis Plan

Monitoring Parameters	Method	Monitoring Purposes	Frequency
pH	Field/flow cell	General water chemistry	Semi-annually
Turbidity	Field/flow cell	General water chemistry	Semi-annually
Temperature	Field/flow cell	General water chemistry	Semi-annually
Dissolved Oxygen	Field/flow cell	Oxidation/reduction states	Semi-annually
Redox Potential	Field/flow cell	Oxidation/reduction states	Semi-annually
Water Level	Field	Groundwater hydrology	Semi-annually
Nitrate/Nitrite	EPA 353.3	Oxidation/reduction states	Semi-annually
Sulfate/Sulfide	EPA 300.0	Oxidation/reduction states	Semi-annually
Carbonate/Bicarbonate	EPA 310.1	Oxidation/reduction states	Semi-annually
Iron, total/dissolved	EPA 6010A	Oxidation/reduction states	Semi-annually
Manganese, total/dissolved	EPA 6010A	Oxidation/reduction states	Semi-annually
Total organic carbon	EPA 9060	Oxidation/reduction states	Semi-annually
Volatile Organic Compound	EPA 8260B	Plume fate and transport monitoring	Semi-annually
Total Petroleum Hydrocarbon	EPA 418.1	Plume fate and transport monitoring	Semi-annually
methane	EPA 3810	Plume fate and transport monitoring	Semi-annually
ethane	EPA 3811	Plume fate and transport monitoring	Semi-annually
ethene	EPA 3812	Plume fate and transport monitoring	Semi-annually
TDS	EPA 160.1	Water quality speciation	Baseline*
Na, Cl, Ca, K	EPA 300.0	Water quality speciation	Baseline
Conductivity	EPA 120.1	Water quality speciation	Baseline

* Baseline should be performed at least once to verify the water quality and geochemical conditions

The groundwater samples will be collected from the screen intervals with a low-flow pump in accordance with EPA guidance EPA/540/S-95/504 for minimal drawdown groundwater sampling procedures.

Appendix B
Institutional Control Documentation
(Excerpts)



UNITED STATES MARINE CORPS

MARINE CORPS BASE

BOX 555008

CAMP PENDLETON, CALIFORNIA 92055-5008

IN REPLY REFER TO:

5090.14

ENVSEC/42

21 Jun 01

Mr. Martin Hausladen, Code SFD-8-B
USEPA Region IX, Federal Facilities
75 Hawthorne Street
San Francisco, CA 94105

Dear Mr. Hausladen:

Per the Record of Decision for Operable Unit 1, institutional controls were to be placed in the Base Master Plan for Site 9 - 41 Area Stuart Mesa Waste Stabilization. Enclosures (1) and (2) are copies of the digital documentation from the 41 Area Master Plan presenting the institutional controls placed on Site 9. Enclosure (1) presents the entire 41 Area Master Plan and Enclosure (2) is zoomed in on Site 9.

If you have any further questions, please call Ms. La Rae Landers at (760) 725-9741.

Sincerely,

R. E. Kinder
Environmental Compliance
Department Head
Assistant Chief of Staff,
Environmental Security
By direction of the
Commanding General

- Encl: (1) Digital Figure of the 41 Area Master Plan, Marine Corps Base, Camp Pendleton, California
- (2) Digital Figure from the 41 Area Master Plan zoomed in on Site 9, Marine Corps Base, Camp Pendleton, California

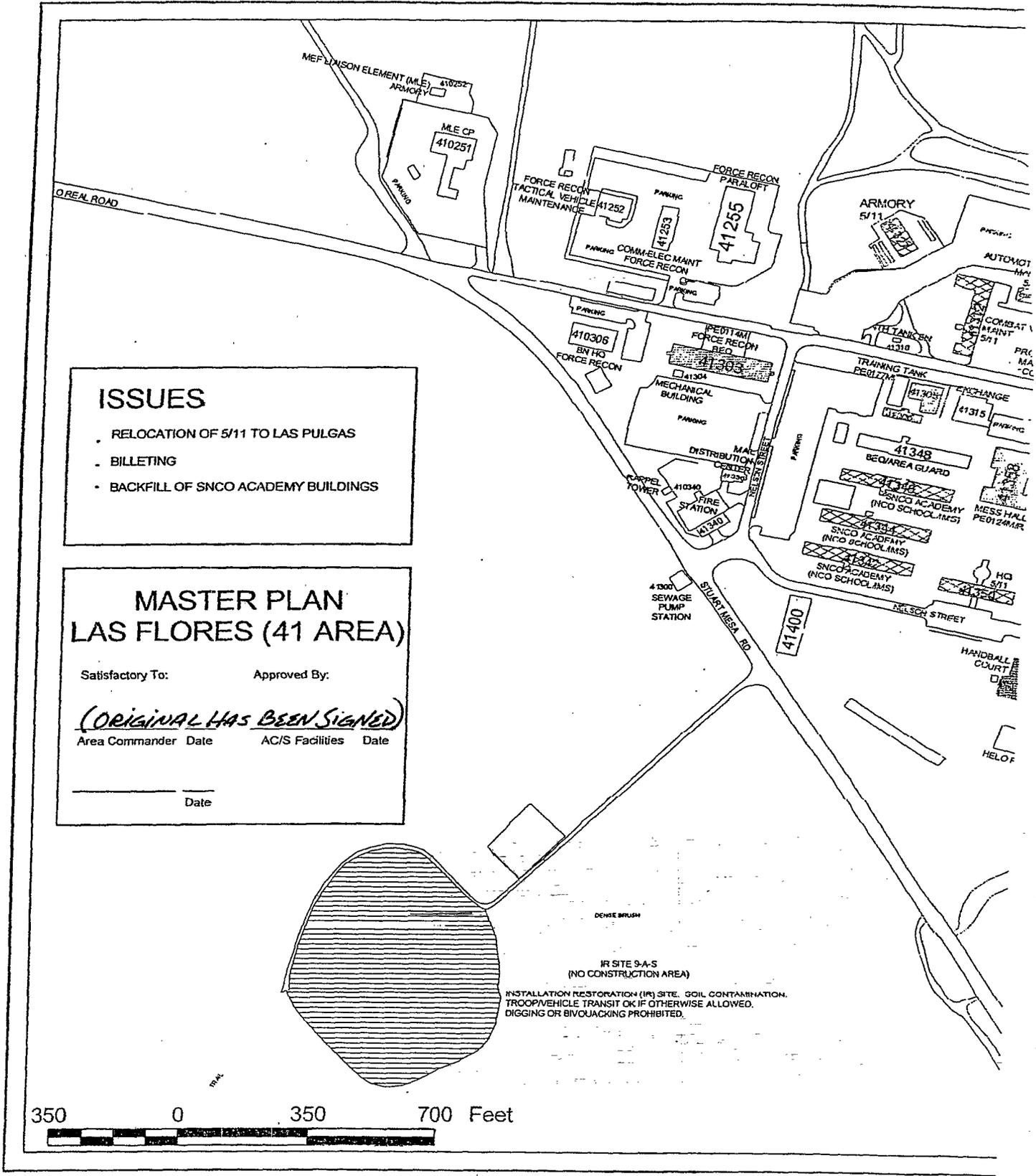
HAS BEEN SENT

Copy to:

Ms. Beatrice Griffey
Regional Water Quality Control Board
San Diego Region
9771 Clairemont Mesa Blvd., Suite B
San Diego, CA 92124-1331

Mr. Manny Alonzo
Department of Toxic Substances Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90630

Ms. Kathie Beverly
Department of the Navy
SWDiv, NAVFACENGCOM
1220 Pacific Highway
San Diego, CA 92132



ISSUES

- RELOCATION OF 5/11 TO LAS PULGAS
- BILLETING
- BACKFILL OF SNCO ACADEMY BUILDINGS

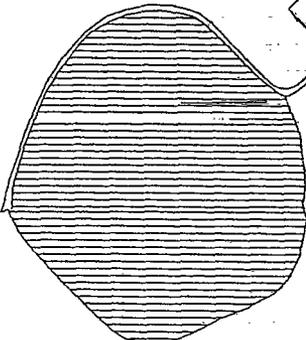
**MASTER PLAN
LAS FLORES (41 AREA)**

Satisfactory To: _____ Approved By: _____

(ORIGINAL HAS BEEN SIGNED)

Area Commander Date _____ AC/S Facilities Date _____

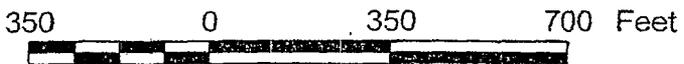
_____ Date _____

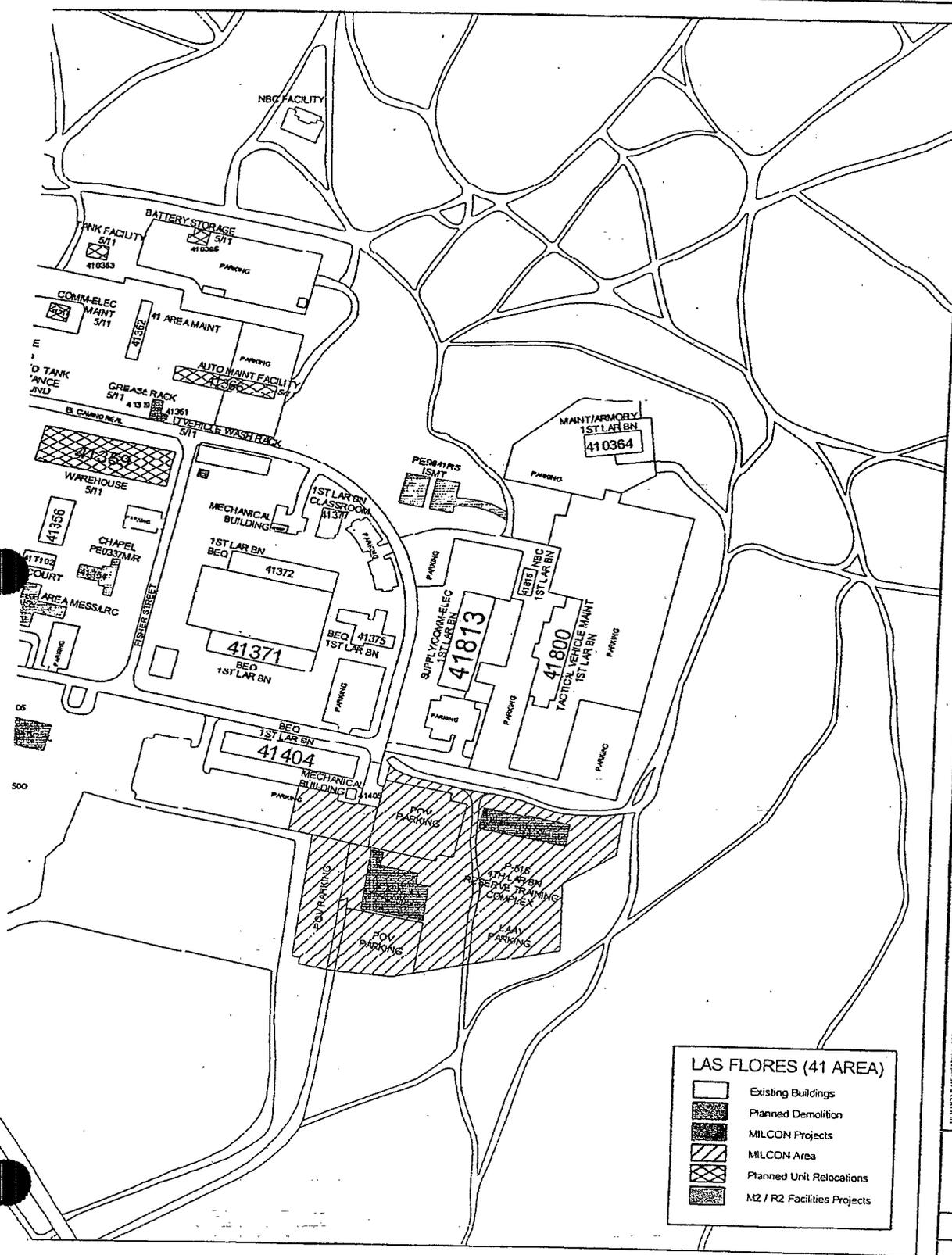


DENSE BRUSH

IR SITE 9-A-5
(NO CONSTRUCTION AREA)

INSTALLATION RESTORATION (IR) SITE. SOIL CONTAMINATION.
TROOP/VEHICLE TRANSIT OK IF OTHERWISE ALLOWED.
DIGGING OR BIVOUACKING PROHIBITED.





LAS FLORES (41 AREA)

- Existing Buildings
- Planned Demolition
- MILCON Projects
- MILCON Area
- Planned Unit Relocations
- M2 / R2 Facilities Projects

PUBLIC WORKS OFFICE
 MARINE CORPS BASE CAMP PENDLETON
 CAMP PENDLETON, CALIFORNIA

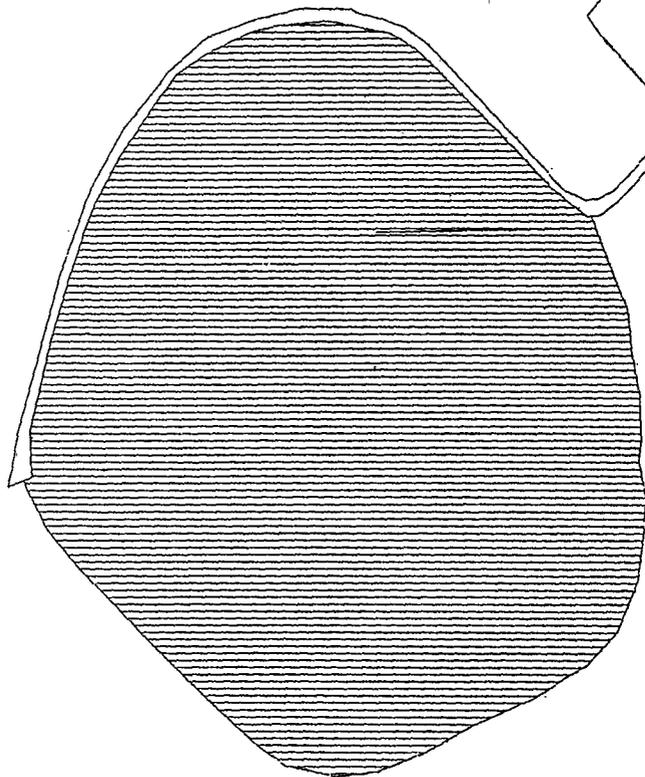
Public Works Office
 Marine Corps Base Camp Pendleton

Camp Las Flores (41 Area)

SCALE: 1" = 350'
 FIGURE 1
 1 - 1

ENCLOSURE (1)

STACLE



DENSE BRUSH

IR SITE 9-A-S
(NO CONSTRUCTION AREA)

INSTALLATION RESTORATION (IR) SITE. SOIL CONTAMINATION.
TROOP/VEHICLE TRANSIT OK IF OTHERWISE ALLOWED.
DIGGING OR BIVOUACKING PROHIBITED

ENCLOSURE (2)

480 640 Feet



MARINE CORPS BASE
CAMP PENDLETON



ENVIRONMENTAL CONSTRAINTS MAP

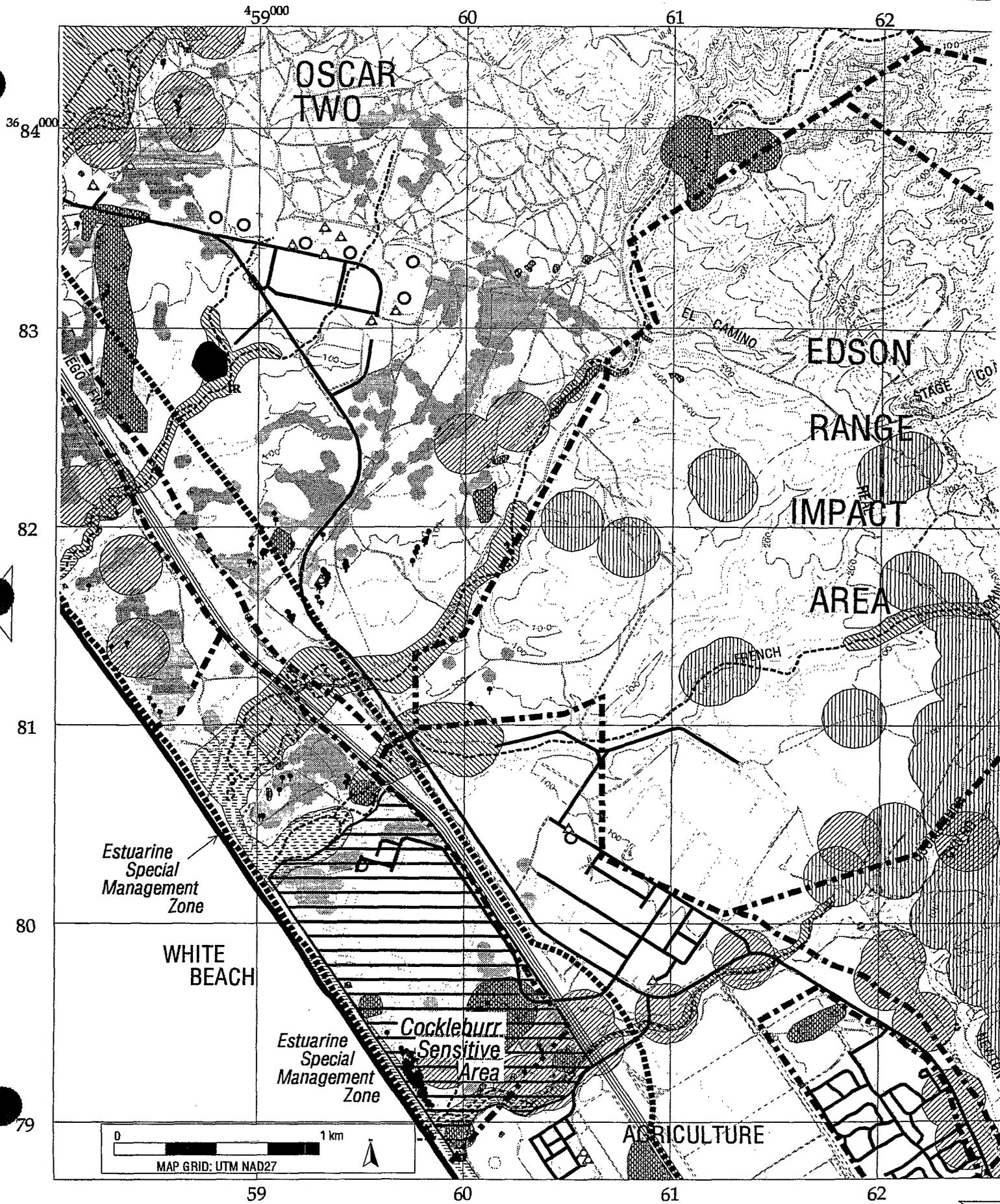
ASSISTANT CHIEF OF STAFF, ENVIRONMENTAL SECURITY
MCB CAMP PENDLETON

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REVISED: SEPTEMBER 1999
NEXT SCHEDULED REVISION: MARCH 2000



United States Marine Corps

Marine Corps Base, Camp Pendleton BO P3500.1K



RANGE AND TRAINING REGULATIONS

(Range Operations Division)



**Marine Corps Base
Camp Pendleton, CA.**

RANGE AND TRAINING REGULATIONS

CHAPTER 2

ENVIRONMENTAL PROCEDURES

	<u>PARAGRAPH</u>	<u>PAGE</u>
GENERAL	2000	2-3
ENVIRONMENTAL PROCEDURES APPLICABLE TO ALL TRAINING ACTIVITIES	2001	2-3
AREAS PROHIBITED TO TRAINING	2002	2-4
POLICE OF RANGES AND TRAINING AREAS	2003	2-5
FIELD HEADS, URINALS, AND WASTEWATER	2004	2-6
FIELD DRINKING WATER SUPPLY	2005	2-6
OPERATION OF VEHICLES	2006	2-7
ENVIRONMENTAL CONSIDERATIONS AND RESTRICTIONS	2007	2-7

RANGE AND TRAINING REGULATIONS

CHAPTER 2

ENVIRONMENTAL PROCEDURES

2000. GENERAL. The ranges and training areas of Camp Pendleton are heavily used. Camp Pendleton is also the home of many endangered species, wetlands, and sensitive habitat which are protected by federal laws carefully enforced by the local regulatory community. To successfully realize all training objectives while complying with environmental laws and regulations, it is essential to consider environmental concerns while planning training operations and exercises. Proper planning will preserve all training facilities for future generations of Marines; therefore, it is essential that training units adhere to the provisions of this Chapter. All users of ranges and training areas are responsible for knowing and adhering to applicable environmental laws and regulations, including, but not limited to, the current Fire Danger Rating and restrictions associated with the environmentally sensitive areas identified on both the Camp Joseph H. Pendleton Special Training Map and the most current MCB Environmental Constraints Map. This GIS map may be obtained through the Assistant Chief of Staff, Environmental Security. Questions with respect to applicable environmental regulations may also be referred to the Assistant Chief of Staff, Environmental Security (NEPA) (ext. 725-9759).

2001. ENVIRONMENTAL PROCEDURES APPLICABLE TO ALL TRAINING ACTIVITIES

1. The following activities are prohibited on all ranges and training areas aboard Camp Pendleton:

a. Burying, dumping, abandonment, or otherwise disposing of trash, rubbish, or garbage except at established landfills and per current directives.

b. Burying, dumping, abandonment, or otherwise disposing of any type of explosive material, pyrotechnic or chemical ammunition, or any type of hazardous waste.

c. The draining or spilling of oil, fuel, or any other hazardous or regulated substance from vehicles or other machinery, or from any container onto the ground, or into the water.

d. Removal or intentional destruction of rare plants (see MCB Environmental Constraints Map), trees, brush, cactus, or any other vegetation. Cutting or otherwise removing tree limbs or large portions of any other plant is also prohibited. Limit camouflage material to previously felled vegetation.

e. Killing, injuring, or harassing wildlife or livestock. Killing of poisonous snakes is not expressly prohibited; however, most snake bites on the Base have resulted from untrained individuals trying to handle snakes. When required, contact the Base Game Wardens for snake removal.

f. Removal or intentional destruction of archaeological materials or artifacts or the disturbance to any archaeological site.

2. Consult with the Assistant Chief of Staff, Environmental Security prior to conducting any earth work on impact berms. Lead toxicity levels must be determined prior to earth work commencing by a qualified industrial hygienist.

3. Violation of these provisions may result in disciplinary action under the Uniform Code of Military Justice, or prosecution in state or federal court. Violation of these provisions may also result in potential adverse impacts to future training opportunities aboard the Base.

2002. AREAS PROHIBITED TO TRAINING

1. Prohibited land areas include:

a. Cantonment areas except those facilities specifically designated for training, (e.g., obstacle courses, rappel towers, gas chambers, etc.)

b. Designated historical/archeological sites

c. Las Pulgas Ammunition Supply Point (ASP)

d. Landfills

e. Range 401 (EOD Range), except for authorized EOD training

f. MASS-3 Area

g. Marine Memorial Golf Course

h. Installation Restoration and National Priority List (NPL) sites

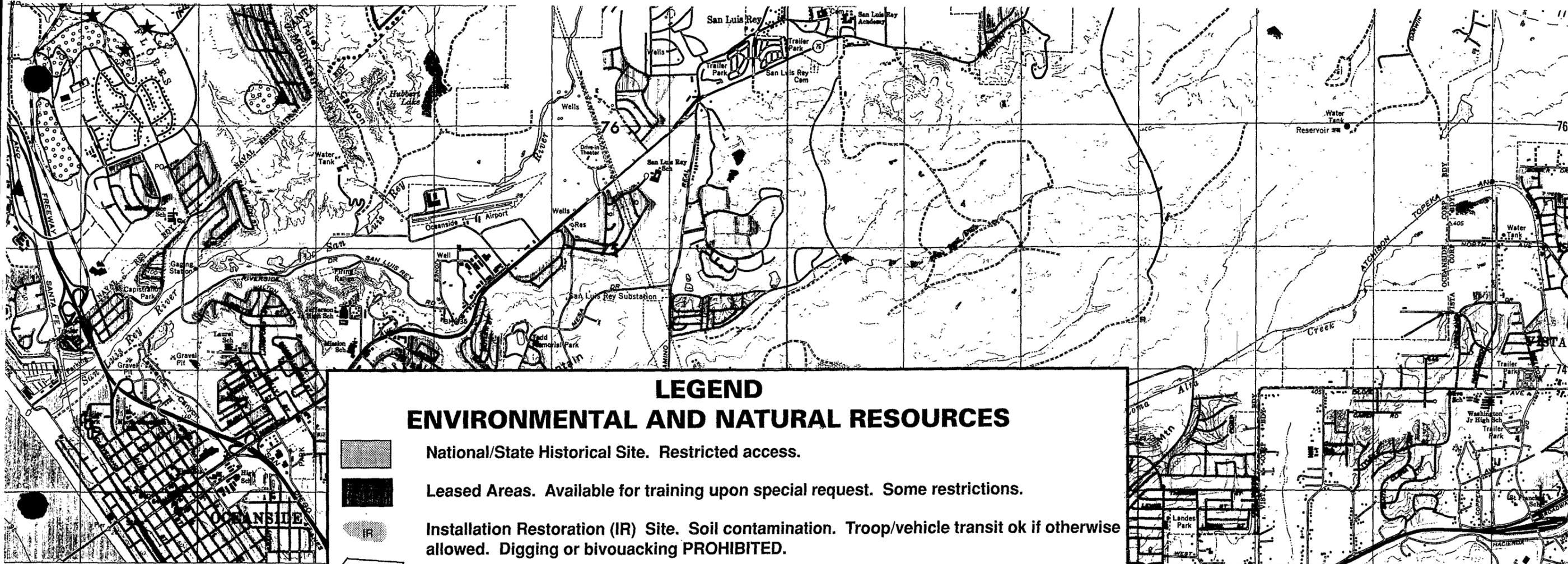
i. Any area where training land restoration and erosion control work is ongoing (usually, but not exclusively, coastal bluffs and terraces); these areas will be marked with appropriate warning signs and fences.

j. All training areas, ranges and field training facilities are off-limits to units and personnel unless the training area, range, or field training facility has been properly scheduled; or specifically permitted by LONGRIFLE.

k. Training in the vicinity of rivers, creeks, and natural drainage's may require special consideration and, therefore, is subject to the provisions of this Chapter, paragraph 2007; and Chapter 6, paragraph 6008.6, of this Manual as well as provisions contained in the most current Environmental Constraints Map.

l. Areas marked with signs which say "Off Limits for Environmental Reasons" or "California Least Tern Nesting Site" or "Wetlands" are off-limits to training units.

m. Avoid, to the maximum extent possible, parking vehicles or heavy equipment under the canopies of trees. Do not dig fighting holes under the canopies of trees. Such activities damage the root systems, eventually killing the trees.



LEGEND ENVIRONMENTAL AND NATURAL RESOURCES

- National/State Historical Site. Restricted access.
- Leased Areas. Available for training upon special request. Some restrictions.
- Installation Restoration (IR) Site. Soil contamination. Troop/vehicle transit ok if otherwise allowed. Digging or bivouacking PROHIBITED.
- Flight Restriction in force 15 Apr - 31 Aug. California least tern nesting season.
- Rare plants this vicinity. Obey posted warnings.
- Vernal pools this vicinity. Obey posted warnings.

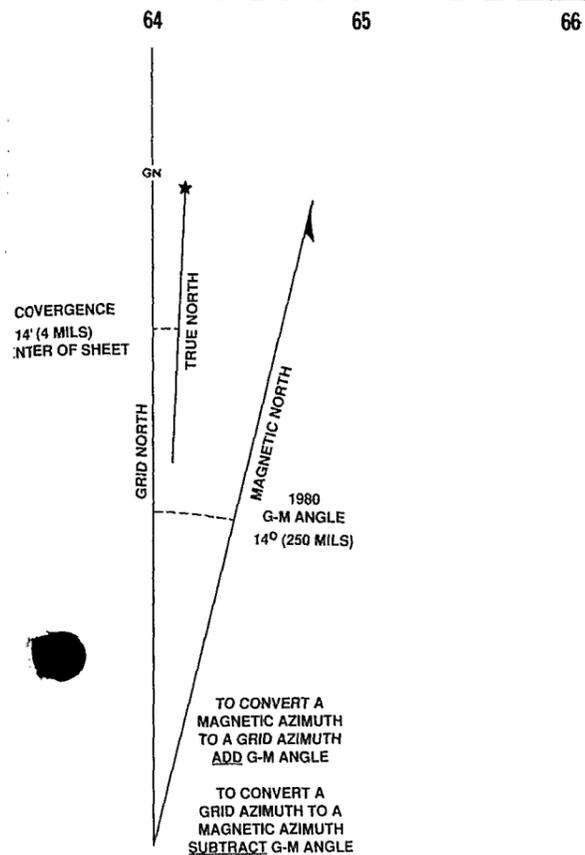
ENDANGERED/THREATENED SPECIES

- | | |
|--|---|
| <ul style="list-style-type: none"> Coastal California gnatcatcher Stephens' kangaroo rat California least tern | <ul style="list-style-type: none"> Least Bell's vireo/vireo habitat Light-footed clapper rail |
|--|---|

NOTE: Survey and marking of vernal pool and rare plant sites are ongoing.

The presence of endangered/threatened species or their habitat does not prohibit training. Commanders must note, however, that the environmental information depicted hereon is cautionary and advisory in nature, NOT DEFINITIVE.

Adherence to BO P6820.3_ (PROCEDURES FOR ENVIRONMENTAL REVIEW) will ensure units are provided with latest survey/environmental information prior to going to the field.

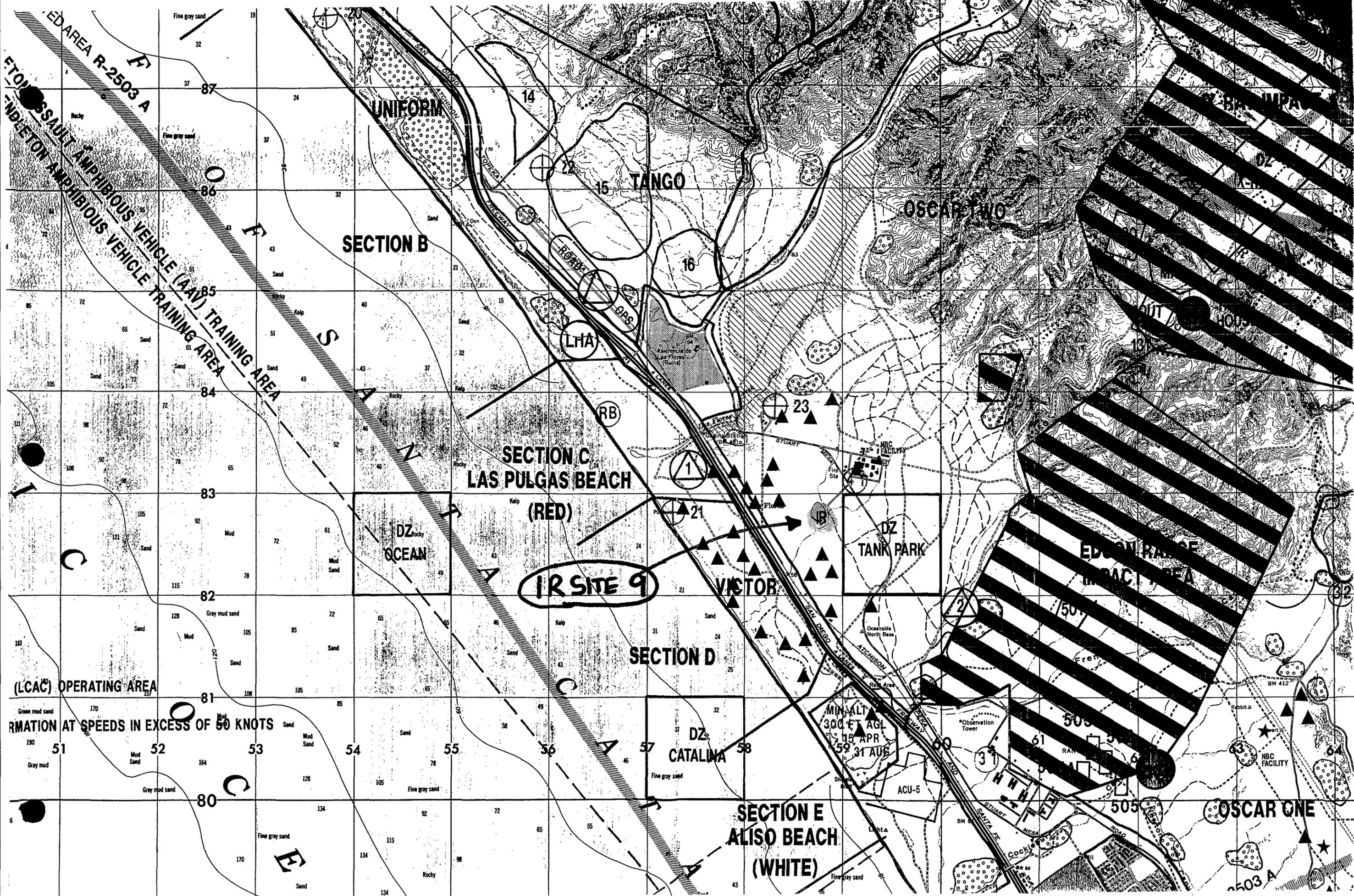


REVISED OCTOBER 1994
TRAINING RESOURCES MANAGEMENT DIVISION
OPERATIONS AND TRAINING DEPARTMENT
MCB, CAMP PENDLETON
TO BE USED IN CONJUNCTION WITH
BO P3500.1_ (RANGE AND TRAINING REGULATIONS)
NEXT SCHEDULED REVISION
AUGUST 1996

USERS SHOULD REFER CORRECTIONS, ADDITIONS, AND COMMENTS FOR IMPROVING THIS PRODUCT
 TO: DIRECTOR, DEFENSE MAPPING AGENCY, ATTN: PR, 8613 LEE HIGHWAY, FAIRFAX, VA 22031-2137.

DMA STOCK NO. V895SCAMPENDLE

ED. NO. 002



(LCAC) OPERATING AREA
FORMATION AT SPEEDS IN EXCESS OF 50 KNOTS

IR SITE 9

OSCAR ONE

2503 A

Appendix C
Interview Records and MCB Camp
Pendleton Project Management Process

INTERVIEW DOCUMENTATION FORM

The following is a list of individuals interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/ Position	Organization	Date
Lt. Col. Stephen Linder	41 Area Commander	USMC MCB Camp Pendleton	18 January 2001
Capt. Byron Harper	Battalion Logistics Officer/ Headquarters & Service Company Commander	USMC MCB Camp Pendleton	16 January 2001
Lt. Robert D. Green	Assistant Battalion Logistics Officer/ Assistant to Area Commander	USMC MCB Camp Pendleton	16 January 2001 & 18 January 2001
Mr. Brad Sherman	Environmental Protection Specialist	MCBCP – FMD	25 January 2001
Mr. Mike Dodge	Environmental Protection Specialist	MCBCP – FMD	17 January 2001
Mr. Tom Hoots	Wastewater Supervisor	MCBCP – Utilities Division, Shop 6887	26 January 2001 & 01 February 2001
Mr. Joe Baltikauski	41 Area Planner	MCBCP Public Works	25 January 2001

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 08:00	Date: 18 Jan. 2001
Type: <input type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Location of Visit: Site 9 – 41 Area Waste Stabilization Pond			
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Lt. Col. Stephen Linder		Title: 41 Area Commander	Organization: USMC
Telephone No.: (760) 725-2258		Street Address: First LAR	
Fax No.: (760) 763-1331		City, State, Zip: Camp Pendleton, CA 92054	
E-Mail Address: lindersj@1mardiv.usmc.mil			
Summary of Conversation			
<p>1. What is your impression of the Project?</p> <p style="padding-left: 40px;">Lt. Col. Linder: No knowledge of the site prior to 01-12-01. What is the responsibility of the area commander regarding this site?</p>			
<p>2. What effect has the site had on 41 Area?</p> <p style="padding-left: 40px;">Lt. Col. Linder: There has been no effect.</p>			
<p>3. Are you aware of any concerns regarding the site or its operation and administration? If yes, please give details.</p> <p style="padding-left: 40px;">Lt. Col. Linder: No.</p>			
<p>4. Do you know of any land use or access restrictions to Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond? If yes, what are the restrictions?</p> <p style="padding-left: 40px;">Lt. Col. Linder: Yes. After being contacted by MCBCP Environmental Security (ES). We cannot do any training in the area of Site 9, including bivouacs.</p>			
<p>5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, maneuvers, or emergency responses? If yes, please provide details.</p> <p style="padding-left: 40px;">Lt. Col. Linder: Yes, the gate to the grease pit area has been knocked down. Also the fence does not completely surround the grease pit, therefore anyone can gain access to the pit area. It may limit vehicle access.</p>			

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	Time: 08:00	Date: 18 Jan. 2001

6. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by you or your office? If yes, please provide details.

Lt. Col. Linder: No communications regarding this site until contacted by ES.

7. Have there been any complaints, violations, or other incidents related to the Site 9 requiring a response by your office? If so, please give details of the events and the results of the responses

Lt. Col. Linder: No.

8. Do you feel adequately informed about the site?

Lt. Col. Linder: Until recently, no.

9. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Lt. Col. Linder: 1) Remove the sign within the pond that indicates dumping is allowed.
2) Fix the access gate to the grease pit
3) Reuse the site as critical habitat mitigation area
4) Staff is currently developing a "Master Plan" for the 41 Area for use by the 41 Area Commander.

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 13:45	Date: 16 Jan. 2001
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
Location of Visit			
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Capt. Byron Harper		Title: Battalion Logistic Officer / Headquarters and Service Company Commander	Organization: USMC
Telephone No.: (760) 725-2625		Street Address: First LAR	
Fax No.: (760) 763-1331		City, State, Zip: Camp Pendleton, CA 92054	
E-Mail Address: harperbr@1mardiv@usmc.mil			
Summary of Conversation			
<p>1. What is your impression of the Project?</p> <p style="padding-left: 40px;">Capt. Harper: No knowledge of Site 9 prior to 01-12-01</p> <p>2. What effect has the site had on 41 Area?</p> <p style="padding-left: 40px;">Capt. Harper: There has been no effect</p> <p>3. Are you aware of any concerns regarding the site or its operation and administration? If yes, please give details.</p> <p style="padding-left: 40px;">Capt. Harper: No.</p> <p>4. Do you know of any land use or access restrictions to Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond? If yes, what are the restrictions?</p> <p style="padding-left: 40px;">Capt. Harper: No.</p> <p>5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, maneuvers, or emergency responses? If yes, please provide details.</p> <p style="padding-left: 40px;">Capt. Harper: No.</p> <p>6. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by you or your office? If yes, please provide details.</p> <p style="padding-left: 40px;">Capt. Harper: No</p>			

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	EPA ID No.: CA2170023533
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	Time: 13:45 Date: 16 Jan. 2001

7. Have there been any complaints, violations, or other incidents related to the Site 9 requiring a response by your office? If so, please give details of the events and the results of the responses

Capt. Harper: No

8. Do you feel adequately informed about the site?

Capt. Harper: Yes, from my standpoint. If we are supposed to stay out of the area, that is all I need to know. We have no reason to train in that area.

9. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Capt. Harper: Ensure that the area with restricted access is marked so that personnel stay out of that area.

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 14:00 / 0815	Date: 01/16/2001 / 01/18/2001
Type: <input checked="" type="checkbox"/> Telephone <input checked="" type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
Location of Visit: Site 9 – Waste Stabilization Pond			
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Lt. Robert D. Green		Title: Assistant Battalion Logistic Officer / Assistant to Area Commander	Organization: USMC
Telephone No.: (760) 725-2654		Street Address: First LAR	
Fax No.: (760) 763-1331		City, State, Zip: Camp Pendleton, CA 92054	
E-Mail Address: greenrd2@1mardiv.usmc.mil			
Summary of Conversation			
1. What is your impression of the Project? <p style="margin-left: 40px;">Lt. Green No knowledge of Site 9</p>			
2. What effect has the site had on 41 area? <p style="margin-left: 40px;">Lt. Green No effect.</p>			
3. Are you aware of any concerns regarding the site or its operation and administration? If yes, please give details. <p style="margin-left: 40px;">Lt. Green No.</p>			
4. Do you know of any land use or access restrictions to Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond? If yes, what are the restrictions? <p style="margin-left: 40px;">Lt. Green No.</p>			
5. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, maneuvers, or emergency responses? If yes, please provide details. <p style="margin-left: 40px;">Lt. Green No.</p>			
6. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by you or your office? If yes, please provide details. <p style="margin-left: 40px;">Lt. Green No.</p>			

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	Time: 14:00 / 0815	Date: 01/16/2001 / 01/18/2001

7. Have there been any complaints, violations, or other incidents related to the Site 9 requiring a response by your office? If so, please give details of the events and the results of the responses

Lt. Green No.

8. Do you feel adequately informed about the site?

Lt. Green No.

9. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Lt. Green What is 41 Area's role or responsibility for the supervision or security of Site 9?

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 09:40	Date: 17 Jan. 2001
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Mr. Mike Dodge		Title: Environmental Protection Specialist	Organization: Facility Maintenance Environmental Office
Telephone No.: (760) 725-3868		Street Address: Facilities Maintenance Department	
Fax No.: (760) 725-3913 or 4071		Building 2296	
E-Mail Address: dodgemp@mail.cpp.usmc.mil		City, State, Zip: MCB Camp Pendleton, CA 92055	
Summary of Conversation			
<p>1. What is your impression of the Project? Are you (your department) aware of the soil and groundwater are impacted at the site?</p> <p style="padding-left: 40px;">Dodge: I have not been to the site in several years, so I do not know what the site looks like now. I am not aware of any impacts to soil or groundwater.</p>			
<p>2. Do you still use the pipe for any discharge? If not, why is the pipe not abandoned properly? If yes, describe the nature of the discharge (frequency, volume, contents of discharge).</p> <p style="padding-left: 40px;">Dodge: I don't know if the pipe is connected to sanitary sewer or storm water discharge from the Las Flores area. I do not know if the pipe has been abandoned.</p>			
<p>3. Is there a continuous onsite O&M presence? If so, please describe staff and activities. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years?</p> <p style="padding-left: 40px;">Dodge: No O&M for the last 5 years</p>			
<p>4. Have there been unexpected O&M difficulties or costs at the site in the last five years?</p> <p style="padding-left: 40px;">Dodge: No O&M has been performed by FMD.</p>			
<p>5. Do you have any comments, suggestions, or recommendation regarding Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond?</p> <p style="padding-left: 40px;">Dodge: No comments.</p>			

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 15:30	Date: 25 Jan. 2001
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other Location of Visit		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Brad Sherman		Title: Environmental Protection Specialist	Organization: MCBCP - FMD
Telephone No.: (760) 725-3868		Street Address: Facilities Maintenance Department	
Fax No.: (760) 725-3913 or 4071		Building 2296	
E-Mail Address: shermankb@mail.cpp.usmc.mil		City, State, Zip: MCB Camp Pendleton, CA 92055	
Summary of Conversation			
<p>1. What is your impression of the Project? Are you (your department) aware of the soil and groundwater are impacted at the site?</p> <p style="padding-left: 40px;">Sherman: Not aware of the project, but aware that the IR site exists from the notation on the Base Constraints map. Not aware of the soil and groundwater impacted at the site.</p>			
<p>2. Do you still use the pipe for any discharge? If not, why is the pipe not abandoned properly? If yes, describe the nature of the discharge (frequency, volume, contents of discharge).</p> <p style="padding-left: 40px;">Sherman: No, the pipe is not used for any discharges. The sewer plant was upgraded and the pipe was bypassed. The pipe was not removed because the site was off-limits due to the hazardous conditions. (An operator working in the area passed out.)</p>			
<p>3. Is there a continuous onsite O&M presence? If so, please describe staff and activities. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years?</p> <p style="padding-left: 40px;">Sherman: No O&M by FMD</p>			
<p>4. Have there been unexpected O&M difficulties or costs at the site in the last five years?</p> <p style="padding-left: 40px;">Sherman: No O&M by FMD</p>			

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond	Time: 15:30	Date: 25 Jan. 2001

5. Do you have any comments, suggestions, or recommendation regarding Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond?

Sherman: Clean up the site to obtain positive test results for all constituents.

INTERVIEW RECORD

Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 07:45 N/A	Date: 26 Jan. 01 01 Feb. 01
Type: <input type="checkbox"/> Telephone <input type="checkbox"/> Visit <input checked="" type="checkbox"/> Other Location of Visit		<input type="checkbox"/> Incoming <input type="checkbox"/> Outgoing	
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Mr. Tom Hoots		Title: Wastewater Supervisor	Organization: MCBCP - Utilities Division, Shop 6887
Telephone No.: (760) 725-4018		Street Address: Facilities Maintenance Department, Utilities Division, Shop 6887	
Fax No.: (760)763-0099		City, State, Zip: Marine Corp Base Camp Pendleton CA 92055	
E-Mail Address: hootstl@mail.cpp.usmc.mil			
Summary of Conversation			
<p>1. What is your impression of the Project? Are you (your department) aware of the soil and groundwater are impacted at the site?</p> <p style="padding-left: 40px;">Hoots: Was not aware of the project until the last week of January 2001. I have not been provided an information on the site.</p>			
<p>2. Do you still use the pipe for any discharge? If not, why is the pipe not abandoned properly? If yes, describe the nature of the discharge (frequency, volume, contents of discharge).</p> <p style="padding-left: 40px;">Hoots: Do not have information with regard to piping at the site.</p>			
<p>3. Is there a continuous onsite O&M presence? If so, please describe staff and activities. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines in the last five years?</p> <p style="padding-left: 40px;">Hoots: No O&M presence for Utilities Department.</p>			
<p>4. Have there been unexpected O&M difficulties or costs at the site in the last five years?</p> <p style="padding-left: 40px;">Hoots: No O&M presence for Utilities Department.</p>			
<p>5. Do you have any comments, suggestions, or recommendation regarding Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond?</p> <p style="padding-left: 40px;">Hoots: None.</p>			

INTERVIEW RECORD

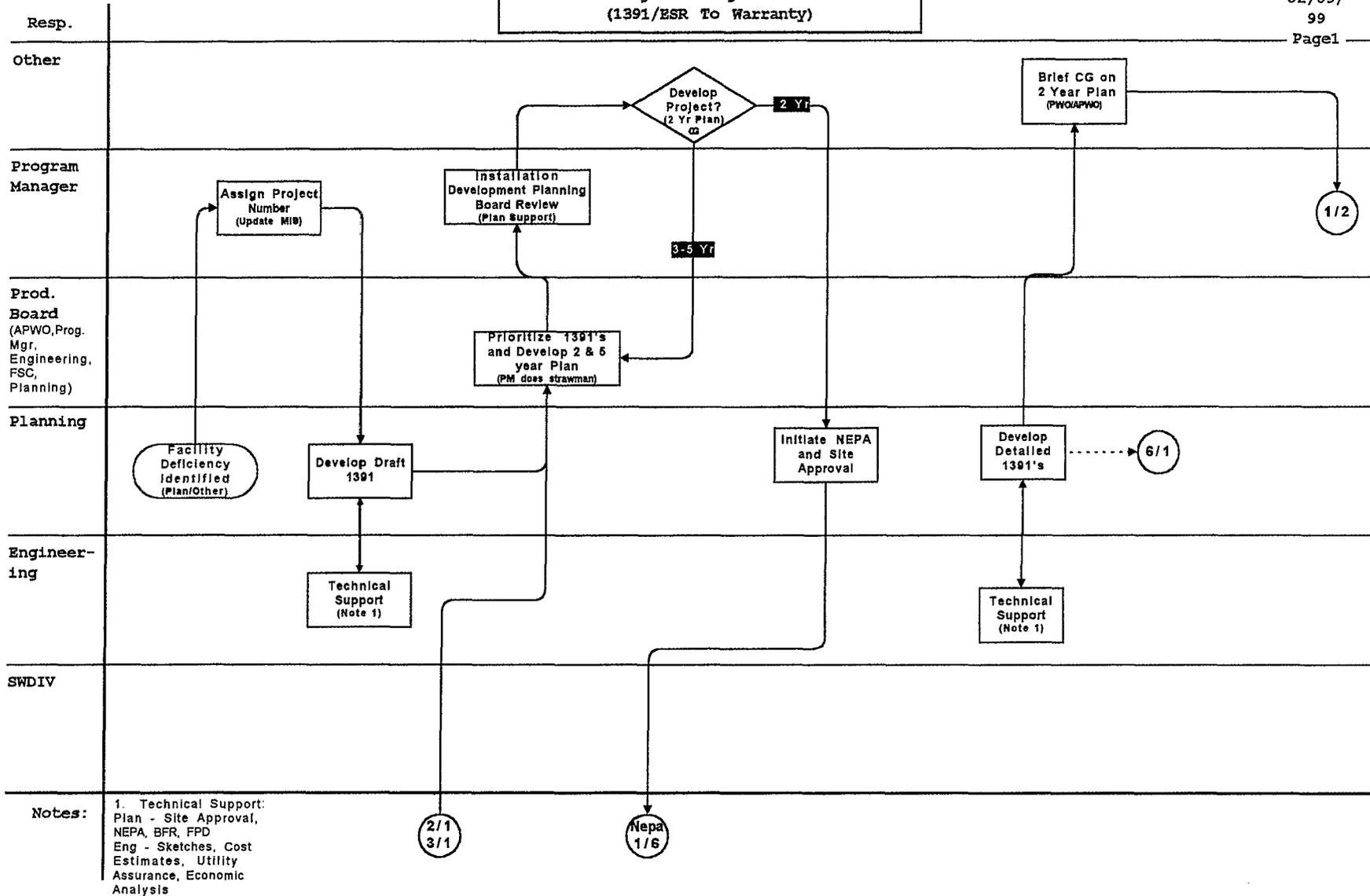
Site Name: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		EPA ID No.: CA2170023533	
Subject: Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond		Time: 14:50	Date: 25 Jan. 2001
Type: <input checked="" type="checkbox"/> Telephone <input type="checkbox"/> Visit <input type="checkbox"/> Other		<input type="checkbox"/> Incoming <input checked="" type="checkbox"/> Outgoing	
Location of Visit			
Contact Made By:			
Name: John Richards		Title: Senior Project Engineer	Organization: IT Corporation
Individual Contacted			
Name: Mr. Joe Baltikauski		Title: Area Planner	Organization: Public Works Department
Telephone No.: (760) 763-0134		Street Address: Dept. of the Navy, AC/S Facilities	
Fax No.: (760) 725-6454		Attn (PWO)	
E-Mail Address: baltikauskijw@mail.cpp.usmc.mil		Marine Corps Base	
		Box 555013	
		City, State, Zip: Camp Pendleton, CA 92055-5013	
Summary of Conversation			
1. What is your impression of the Project?			
Baltikauski: No knowledge of the site before today.			
2. Are you (or the base planning department) aware of the restriction on land and groundwater use at the site due to various soil and groundwater contaminants?			
Baltikauski: No knowledge of the site before today.			
3. Does the 41 Area Master Plan indicate any restrictions regarding Site 9 – 41 Area Stuart Mesa Waste Stabilization Pond? If so, what are the restrictions? How are they implemented? If not, what is your plan to amend the current plan to accommodate the restriction? How/when will it be implemented?			
Baltikauski: No knowledge of the site before today. Update the 41 Area Capital Improvements Plan. The schedule is to have the Plan updated by late February 2001.			
4. Have there been any changes to the 41 Area Master Plan in the last five years that would affect Site 9? If yes, please explain.			
Baltikauski: No.			
5. Do you have any comments, suggestions, or recommendation regarding Site 9?			
Baltikauski: No			

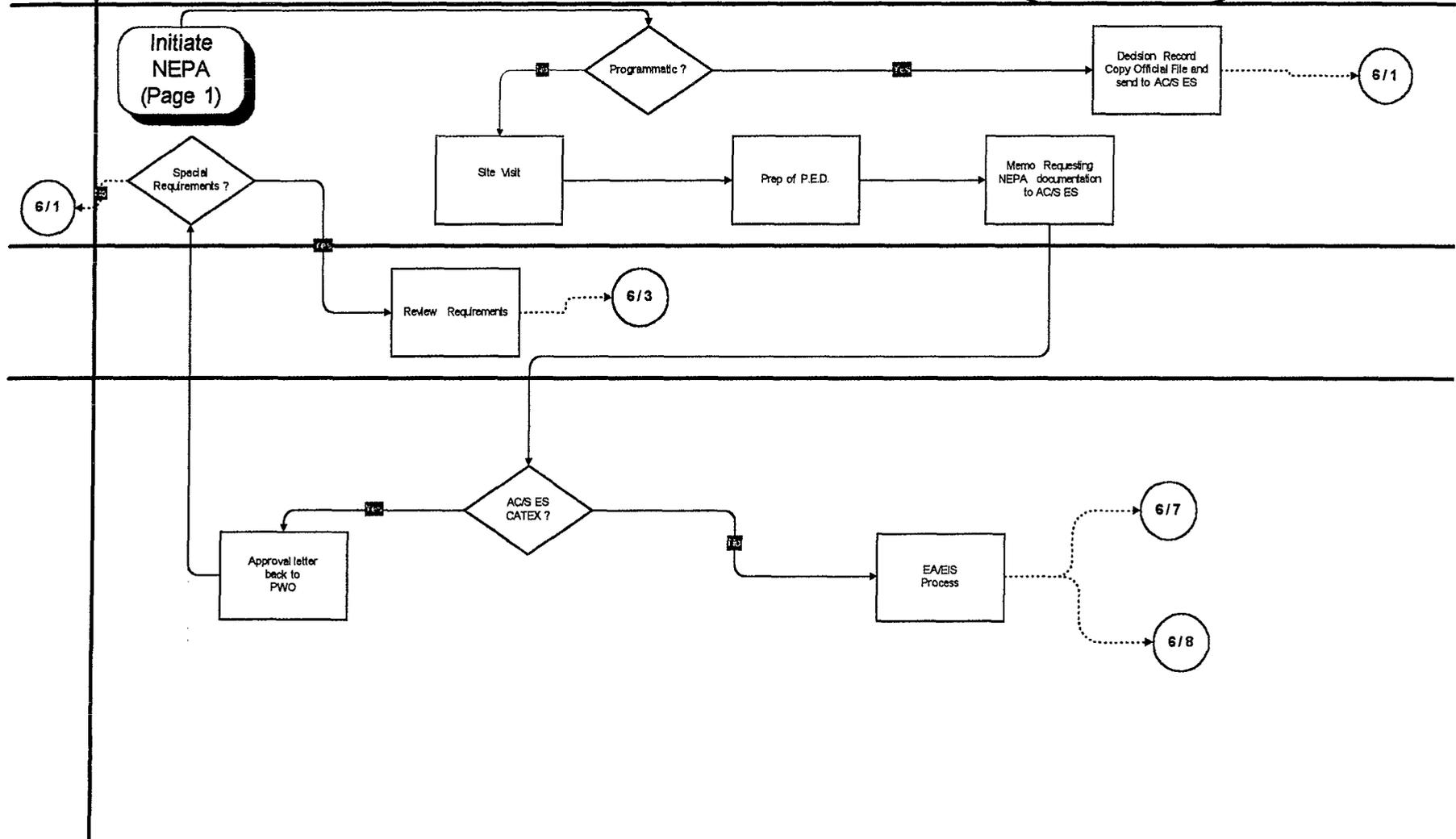
MCB Camp Pendleton
Military Construction Project Management Process
Environmental Review Decision Tree Diagram

MCON Project Management Process
(1391/ESR To Warranty)

02/09/
99

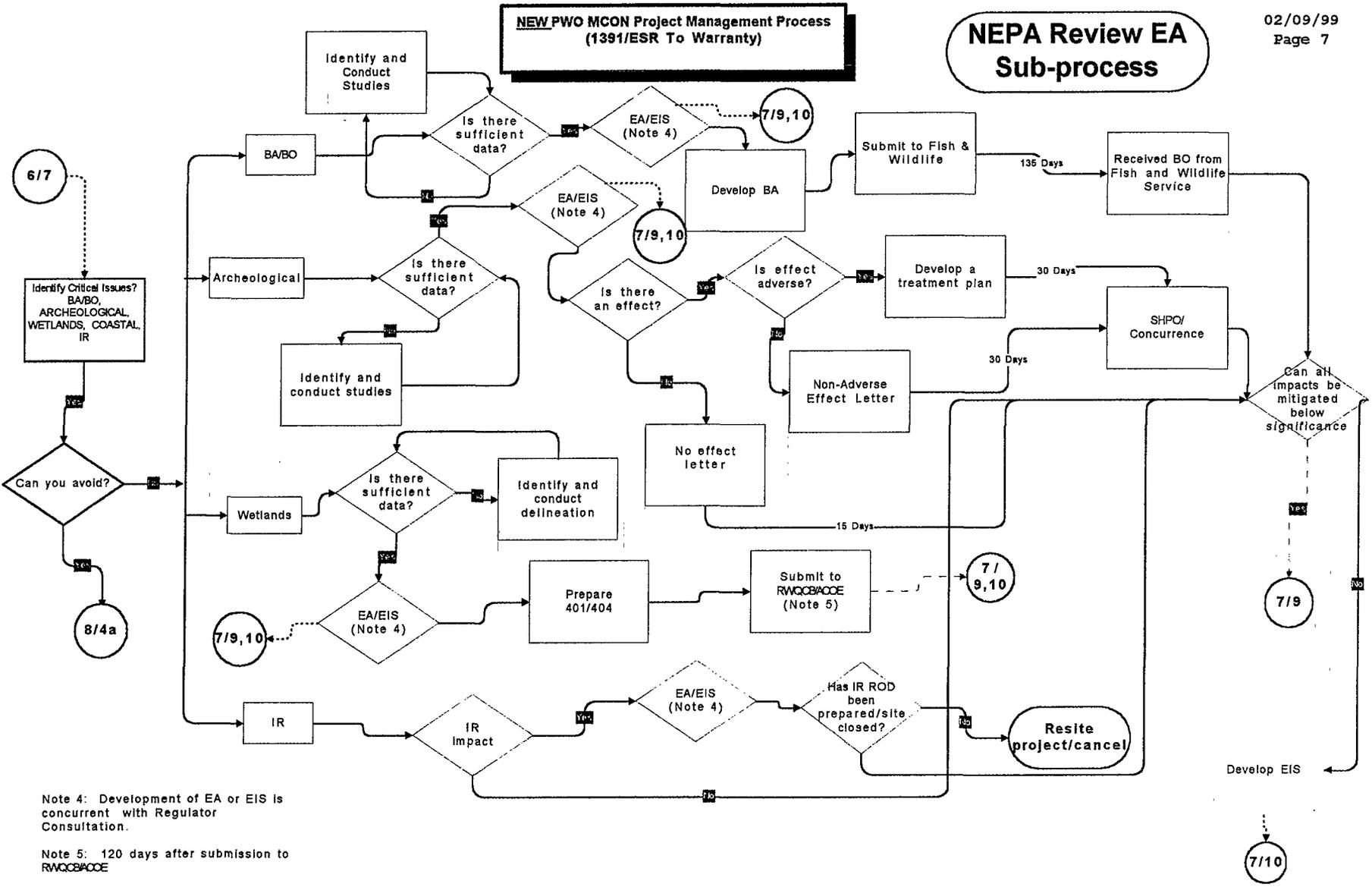
Page1





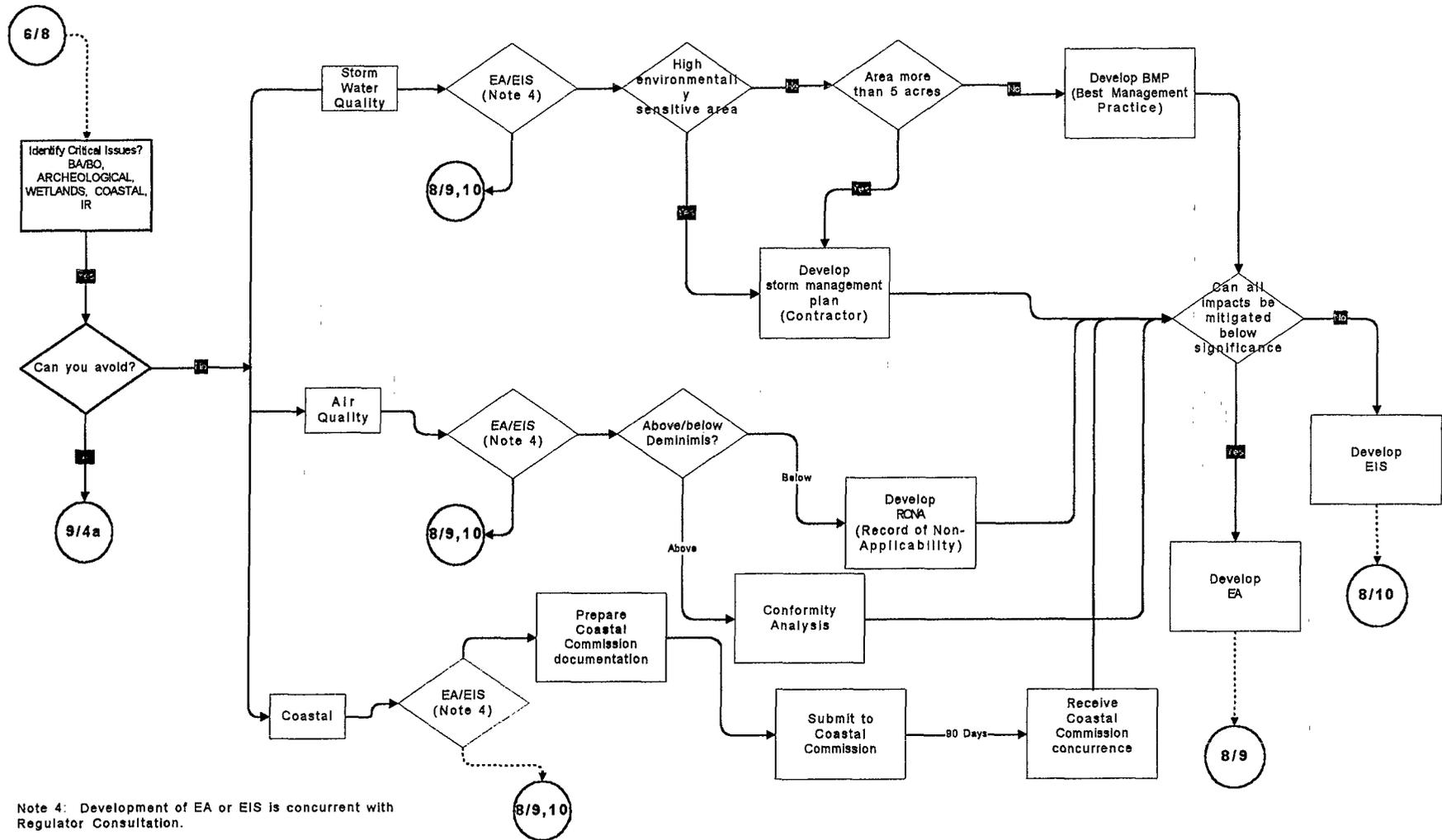
**NEW PWO MCON Project Management Process
(1391/ESR To Warranty)**

**NEPA Review EA
Sub-process**

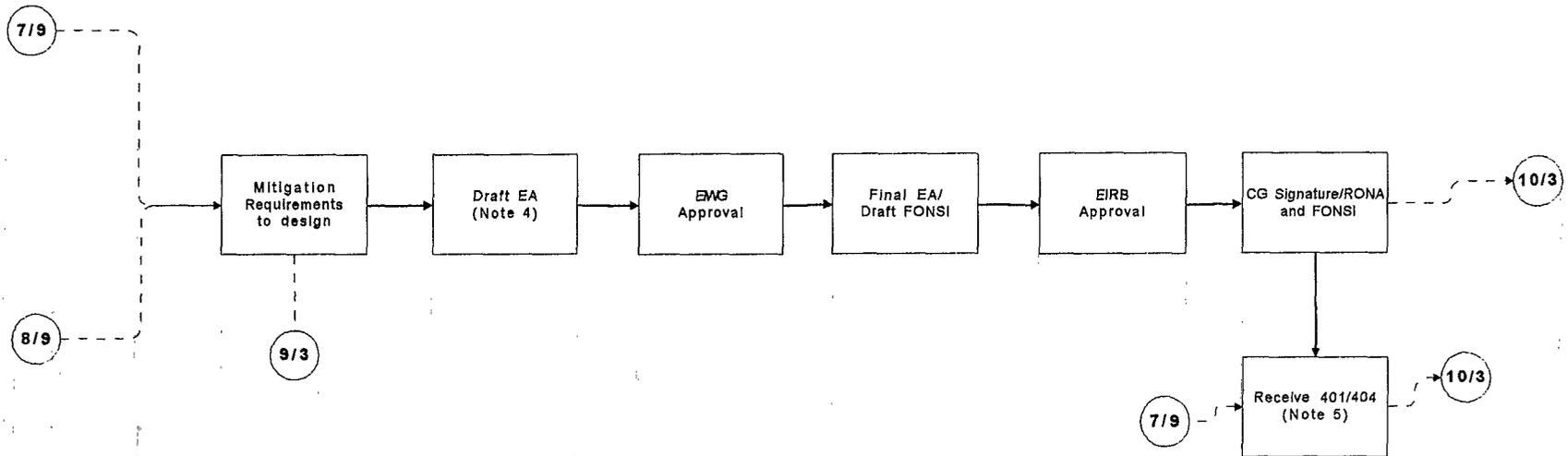


Note 4: Development of EA or EIS is concurrent with Regulator Consultation.

Note 5: 120 days after submission to RWQCBACE



Develop EA



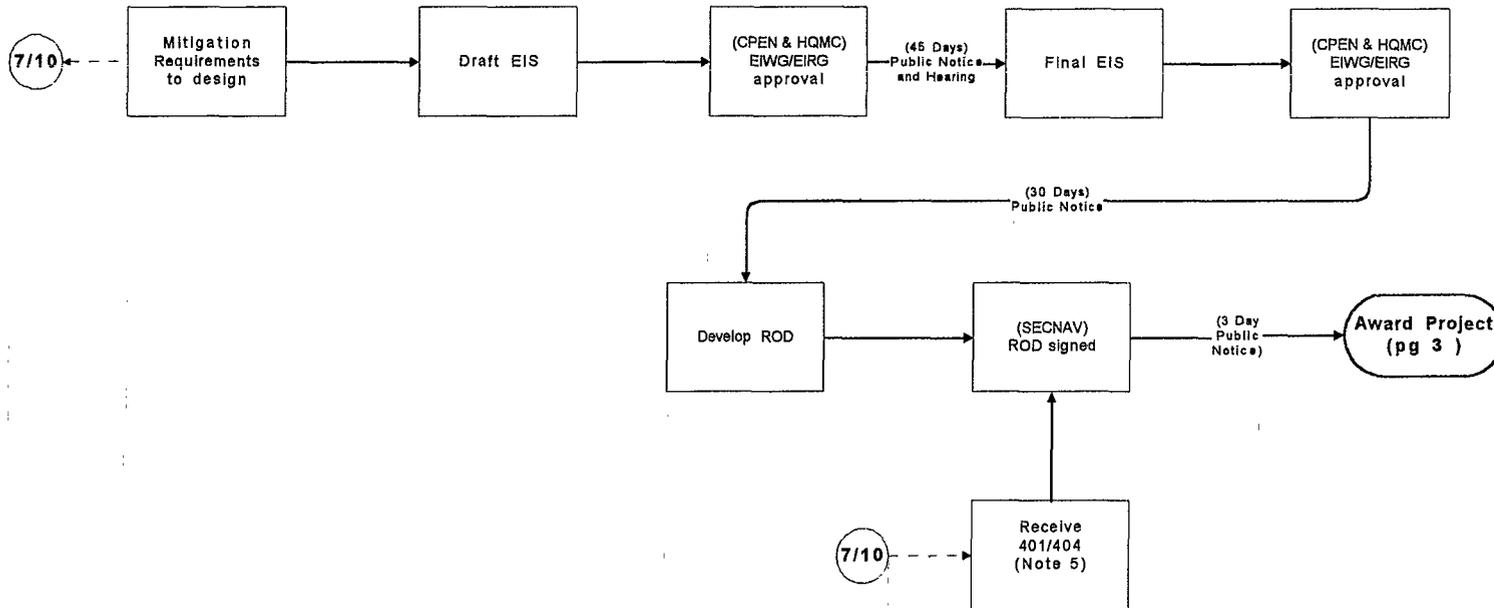
Note 4: Development of EA or EIS is concurrent with Regulator Consultation.

Note 5: 120 days after submission to RACQ/ACE

**NEW PWO MCON Project Management Process
(1391/ESR To Warranty)**

**NEPA Review EIS
Sub-process**

02/09/99
Page 10

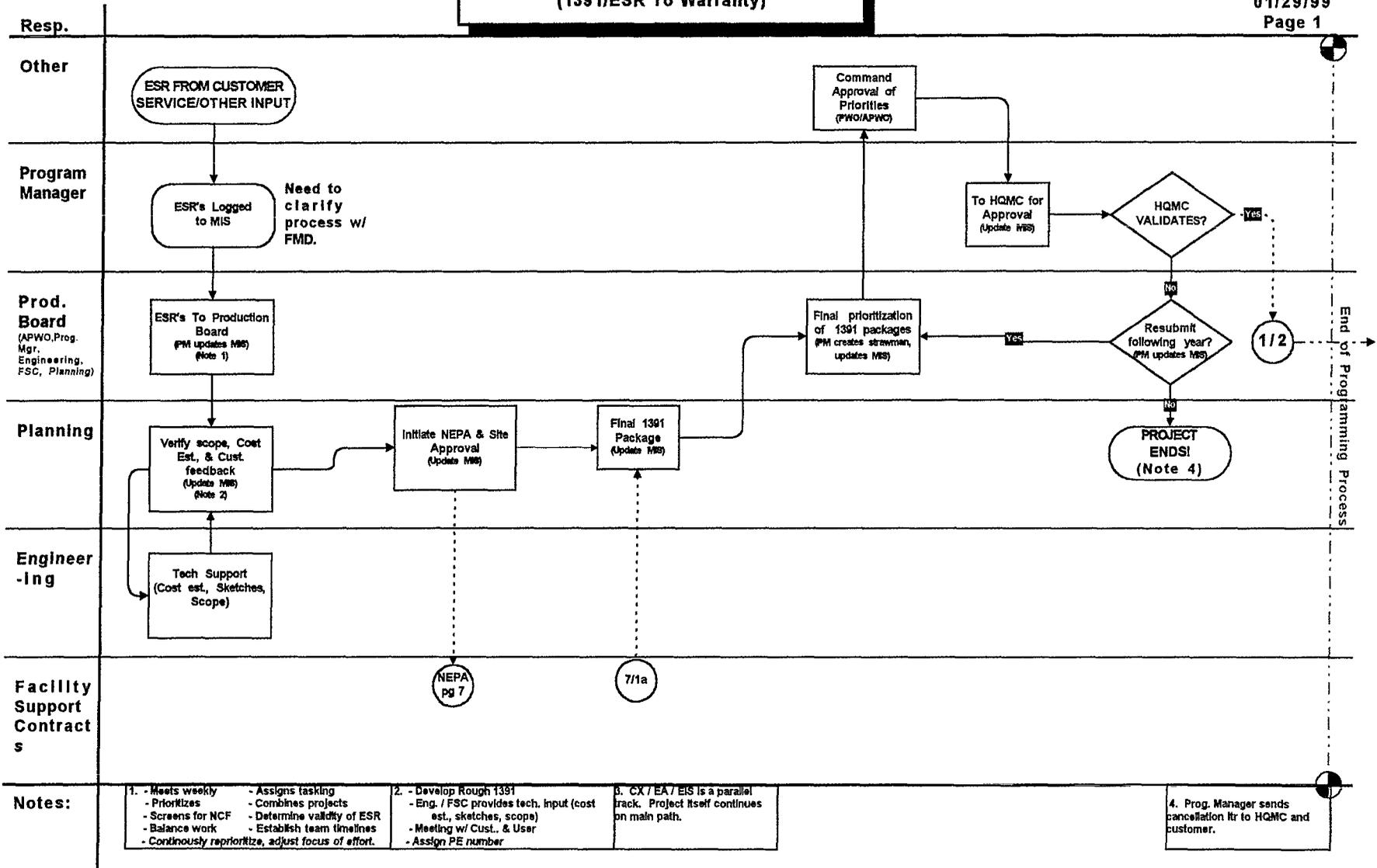


Note 5: 120 days after submission to RWQCB/ACOE

MCB Camp Pendleton
Public Works Office
Maintenance and Repair Project Management process
Environmental Review Decision Tree Diagram

**NEW PWO M2R2 Project Management Process
(1391/ESR To Warranty)**

01/29/99
Page 1



Notes:

- | | | | |
|---|---|---|--|
| <ul style="list-style-type: none"> 1. - Meets weekly - Prioritizes - Screens for NCF - Balance work - Continuously reprioritize, adjust focus of effort. | <ul style="list-style-type: none"> - Assigns tasking - Combines projects - Determine validity of ESR - Establish team timelines | <ul style="list-style-type: none"> 2. - Develop Rough 1391 - Eng. / FSC provides tech. input (cost est., sketches, scope) - Meeting w/ Cust., & User - Assign PE number | <ul style="list-style-type: none"> 3. CX / EA / EIS is a parallel track. Project itself continues on main path. |
|---|---|---|--|

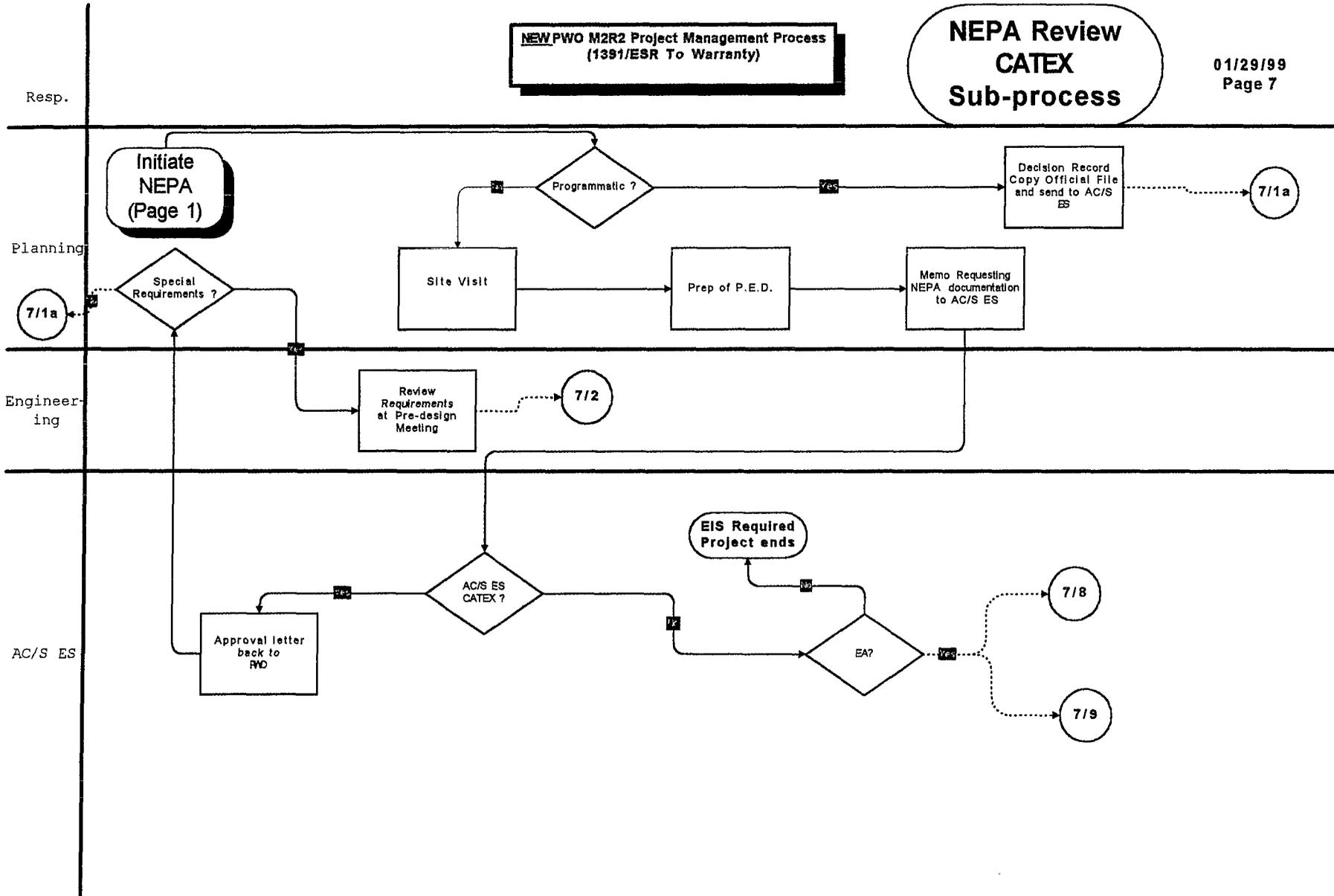
4. Prog. Manager sends cancellation ltr to HQMC and customer.

Resp.

Planning

Engineering

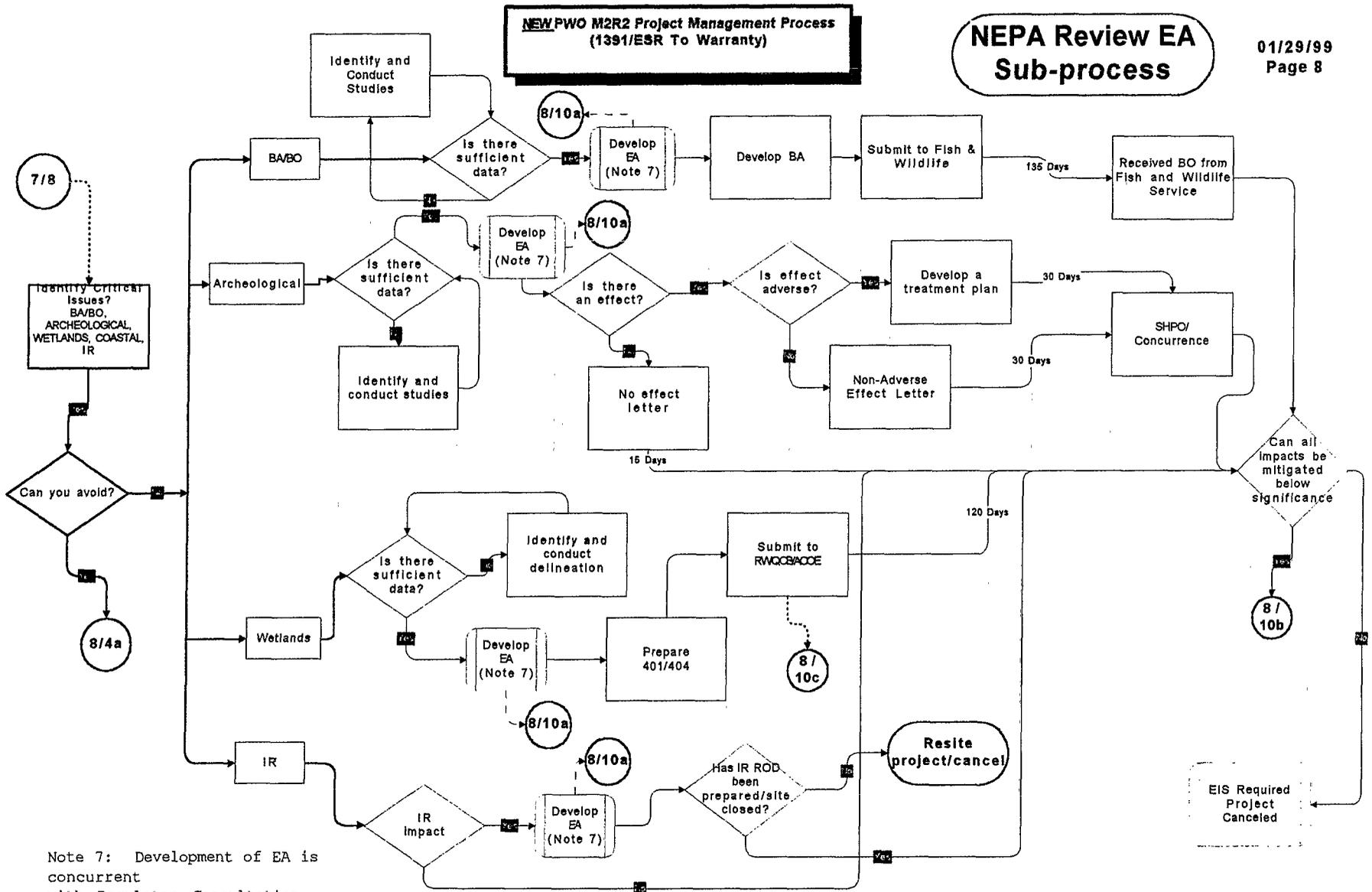
AC/S ES



**NEW PWO M2R2 Project Management Process
(1391/ESR To Warranty)**

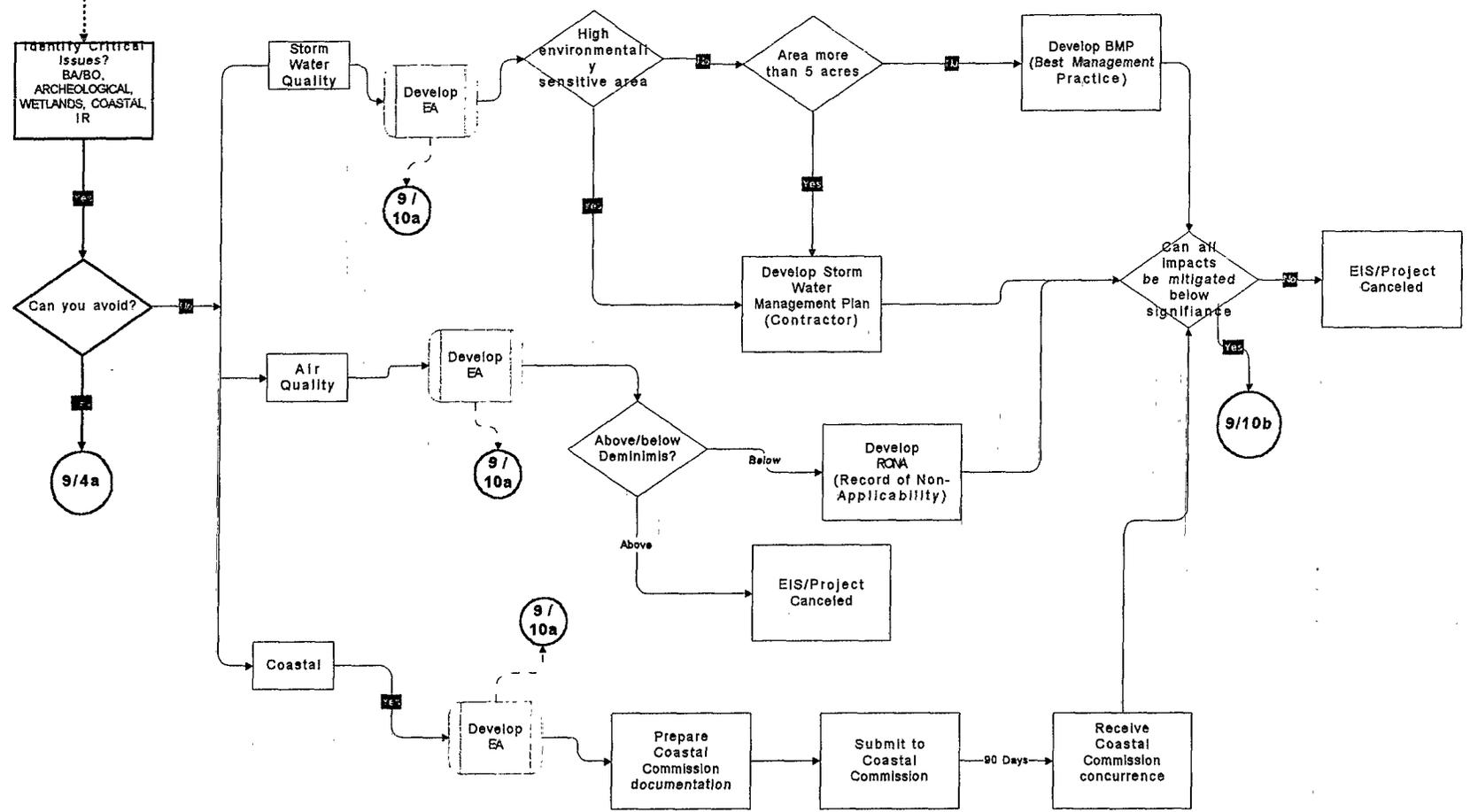
**NEPA Review EA
Sub-process**

01/29/99
Page 8

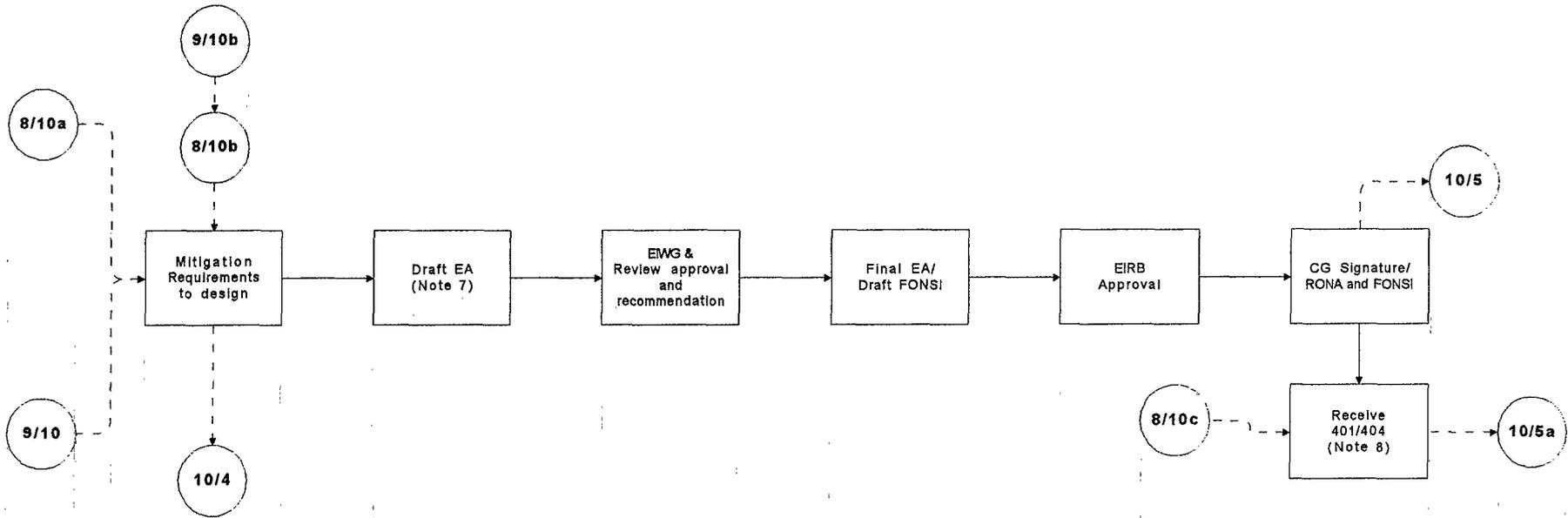


Note 7: Development of EA is concurrent with Regulator Consultation

7/9



Develop EA



Note 7: Concurrent with Regulator Consultations

Note 8: 120 days after submission to RWQCB/ACOE

Appendix D
Site Inspection Checklist and Site
Photographs

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the five-year review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: <u>SITE 9-41 AREA Stuart Mesa waste stabilization Pond</u>	Date of inspection: <u>December 21, 2000</u>
Location and Region:	EPA ID: <u>CA 2170023533</u>
Agency, office, or company leading the five-year review:	Weather/temperature:
Remedy Includes: (Check all that apply) <input type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other <u>Groundwater remediation through monitored natural attenuation</u>	
Attachments: <input type="checkbox"/> Inspection team roster attached <input checked="" type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>This site has no O&M program specified in the ROD</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> Name Title Date </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
2. O&M staff _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> Name Title Date </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



APPROXIMATELY 6,500 FEET TO
NEAREST PRODUCTION WELL
10S/05W-18M04 (FIG 3-1)

ABOVE GRADE
OVERFLOW
PIPELINE

STABILIZATION
POND

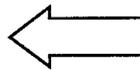
GREASE
DISPOSAL
PIT

Fence panel broken
(see attached photograph)

INTERSTATE
FREEWAY 5

TO PACIFIC OCEAN
(1/2 MILE)

LEGEND:



APPROXIMATE GROUNDWATER
FLOW DIRECTION



SURFACE CHANNEL AND
RUNOFF DIRECTION

SCALE



OHM Remediation Services Corp.
A Subsidiary of OHM Corporation
SAN DIEGO, CA

DRAWN BY R. PIRMORADIAN DATE 1/29/01

CHECKED BY DATE

APPROVED BY DATE

PROJECT MANAGER DATE

**SITE MAP
IR SITE 9**

**MARINE CORPS BASE
CAMP PENDLETON, CALIFORNIA**

CONTRACT NAME

SWDIV

AUTOCAD FILE No.

780516010.DWG

PLOT SCALE

1=1

SHEET OF

1 1

SCALE

1"=500'

DOCUMENT CONTROL No.

SW9443

OHM PROJECT No.

780516

FIGURE No.

FIG

REVISION

0

Feb 07, 2001 - 15:26:02 I:\OHM CORP\PROJECTS\780516\780516010.dwg

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; Report attached _____

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

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

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

4. **Other interviews (optional)** Report attached. **SEE APPENDIX A FOR DETAILS**

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	O&M Documents <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records Remarks <i>Groundwater is monitored semi-annually and the monitoring report is available with the base environmental security department</i>	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
8.	Leachate Extraction Records Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
10.	Daily Access/Security Logs Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS			
1.	O&M Organization	<input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Other _____	N/A
2.	O&M Cost Records	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached	(N/A)
Total annual cost by year for review period if available			
	From _____ To _____	_____ <input type="checkbox"/> Breakdown attached	
	Date Date	Total cost	
	From _____ To _____	_____ <input type="checkbox"/> Breakdown attached	
	Date Date	Total cost	
	From _____ To _____	_____ <input type="checkbox"/> Breakdown attached	
	Date Date	Total cost	
	From _____ To _____	_____ <input type="checkbox"/> Breakdown attached	
	Date Date	Total cost	
3.	Unanticipated or Unusually High O&M Costs During Review Period	Describe costs and reasons: _____	
		N/A	

V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Fencing			
1.	Fencing damaged	<input checked="" type="checkbox"/> Location shown on site map	<input type="checkbox"/> Gates secured <input type="checkbox"/> N/A
	Remarks <u>Photograph attached</u>		

B. Other Access Restrictions							
1.	Signs and other security measures <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Site is identified as a restricted area in the basewide environmental and natural resource map</u>						
C. Institutional Controls							
1.	Implementation and enforcement Site conditions imply ICs not properly implemented <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A Site conditions imply ICs not being fully enforced <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A Type of monitoring (e.g., self-reporting, drive by) _____ Frequency _____ Responsible party/agency _____ Contact _____						
	<table style="width: 100%; border: none;"> <tr> <td style="width: 33%;">Name</td> <td style="width: 33%;">Title</td> <td style="width: 17%;">Date</td> <td style="width: 17%;">Phone no.</td> </tr> </table>	Name	Title	Date	Phone no.		
Name	Title	Date	Phone no.				
	Reporting is up-to-date <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Reports are verified by the lead agency <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A Specific requirements in deed or decision documents have been met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A Violations have been reported <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A Other problems or suggestions: <input type="checkbox"/> Report attached _____ _____ _____						
2.	Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A Remarks <u>Site 9 is identified as a restricted area in the geographic information system (GIS) database used by the base in planning and reviewing all military construction, maintenance, and repair projects.</u>						
D. General							
1.	Vandalism/trespassing <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> No vandalism evident Remarks _____						
2.	Land use changes onsite <input type="checkbox"/> N/A Remarks <u>None</u>						
3.	Land use changes offsite <input type="checkbox"/> N/A Remarks <u>None</u>						

VI. GENERAL SITE CONDITIONS			
A. Roads	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1. Roads damaged	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
Remarks _____ _____			
B. Other Site Conditions			
Remarks _____ _____ _____ _____ _____			
VII. LANDFILL COVERS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
A. Landfill Surface			
1. Settlement (Low spots)	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident	
Areal extent _____	Depth _____		
Remarks _____ _____			
2. Cracks	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Cracking not evident	
Lengths _____	Widths _____	Depths _____	
Remarks _____ _____			
3. Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident	
Areal extent _____	Depth _____		
Remarks _____ _____			
4. Holes	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Holes not evident	
Areal extent _____	Depth _____		
Remarks _____ _____			
5. Vegetative Cover	<input type="checkbox"/> Grass	<input type="checkbox"/> Cover properly established	<input type="checkbox"/> No signs of stress
<input type="checkbox"/> Trees/Shrubs (indicate size and locations on a diagram)			
Remarks _____ _____			
6. Alternative Cover (armored rock, concrete, etc.)	<input type="checkbox"/> N/A		
Remarks _____ _____			

7.	Bulges Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Height _____	<input type="checkbox"/> Bulges not evident
8.	Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade Remarks _____	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Areal extent _____ Areal extent _____ Areal extent _____ Areal extent _____
9.	Slope Instability Areal extent _____ Remarks _____	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of slope instability
B. Benches <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 Remarks _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
2.	Bench Breached Remarks _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
3.	Bench Overtopped Remarks _____	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> N/A or okay
C. Letdown Channels <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> 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 Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map Depth _____	<input checked="" type="checkbox"/> No evidence of settlement
2.	Material Degradation Material type _____ Remarks _____	<input type="checkbox"/> Location shown on site map Areal extent _____	<input checked="" type="checkbox"/> No evidence of degradation

3.	Erosion	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of erosion
	Areal extent _____	Depth _____	
	Remarks _____		
4.	Undercutting	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No evidence of undercutting
	Areal extent _____	Depth _____	
	Remarks _____		
5.	Obstructions Type _____	<input checked="" type="checkbox"/> No obstructions	
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Size _____		
	Remarks _____		
6.	Excessive Vegetative Growth Type _____		
	<input checked="" type="checkbox"/> No evidence of excessive growth		
	<input checked="" type="checkbox"/> Vegetation in channels does not obstruct flow		
	<input type="checkbox"/> Location shown on site map	Areal extent _____	
	Remarks _____		
D. Cover Penetrations <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Gas Vents	<input type="checkbox"/> Active	<input type="checkbox"/> Passive
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Evidence of leakage at penetration	<input type="checkbox"/> Needs O&M	<input type="checkbox"/> Good condition
	Remarks _____		
2.	Gas Monitoring Probes	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs O&M	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> N/A
	Remarks _____		
3.	Monitoring Wells (within surface area of landfill)	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs O&M	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> N/A
	Remarks _____		
4.	Leachate Extraction Wells	<input type="checkbox"/> Functioning	<input type="checkbox"/> Routinely sampled
	<input type="checkbox"/> Properly secured/locked	<input type="checkbox"/> Needs O&M	<input type="checkbox"/> Good condition
	<input type="checkbox"/> Evidence of leakage at penetration		<input type="checkbox"/> N/A
	Remarks _____		

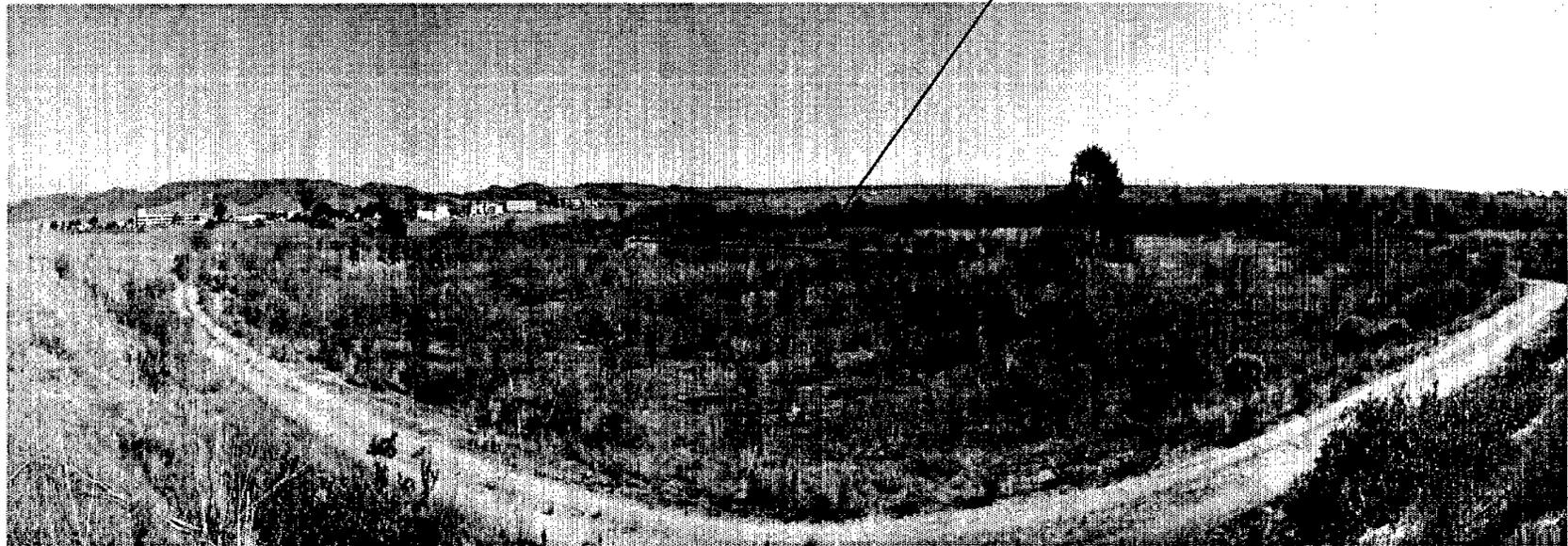
5.	Settlement Monuments	<input type="checkbox"/> Located	<input type="checkbox"/> Routinely surveyed	<input type="checkbox"/> N/A
Remarks _____				
E. Gas Collection and Treatment				
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Gas Treatment Facilities			
<input type="checkbox"/> Flaring		<input type="checkbox"/> Thermal destruction	<input type="checkbox"/> Collection for reuse	
<input type="checkbox"/> Good condition		<input type="checkbox"/> Needs O&M		
Remarks _____				
2.	Gas Collection Wells, Manifolds and Piping			
<input type="checkbox"/> Good condition		<input type="checkbox"/> Needs O&M		
Remarks _____				
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings)			
<input type="checkbox"/> Good condition		<input type="checkbox"/> Needs O&M	<input type="checkbox"/> N/A	
Remarks _____				
F. Cover Drainage Layer				
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Outlet Pipes Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
2.	Outlet Rock Inspected	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
G. Detention/Sedimentation Ponds				
		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A	
1.	Siltation	Areal extent _____	Depth _____	<input type="checkbox"/> N/A
<input type="checkbox"/> Siltation not evident				
Remarks _____				
2.	Erosion	Areal extent _____	Depth _____	
<input type="checkbox"/> Erosion not evident				
Remarks _____				
3.	Outlet Works	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				
4.	Dam	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A	
Remarks _____				

H. Retaining Walls		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Deformations	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
	Horizontal displacement _____	Vertical displacement _____	
	Rotational displacement _____		
	Remarks _____		
<hr/>			
2.	Degradation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
	Remarks _____		
<hr/>			
I. Perimeter Ditches/Off-Site Discharge		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Siltation	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
	Areal extent _____	Depth _____	
	Remarks _____		
<hr/>			
2.	Vegetative Growth	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
	<input type="checkbox"/> Vegetation does not impede flow		
	Areal extent _____	Type _____	
	Remarks _____		
<hr/>			
3.	Erosion	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
	Areal extent _____	Depth _____	
	Remarks _____		
<hr/>			
4.	Discharge Structure	<input type="checkbox"/> Functioning	<input type="checkbox"/> N/A
	Remarks _____		
<hr/>			
VIII. VERTICAL BARRIER WALLS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Settlement	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident
	Areal extent _____	Depth _____	
	Remarks _____		
<hr/>			
2.	Performance Monitoring	Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored		
	Frequency _____	<input type="checkbox"/> Evidence of breaching	
	Head differential _____		
	Remarks _____		

IX. GROUNDWATER/SURFACE WATER REMEDIES <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
A. Groundwater Extraction Wells, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs O&M <input type="checkbox"/> N/A Remarks _____ _____		
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M Remarks _____ _____		
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____		
B. Surface Water Collection Structures, Pumps, and Pipelines		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M Remarks _____ _____		
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M Remarks _____ _____		

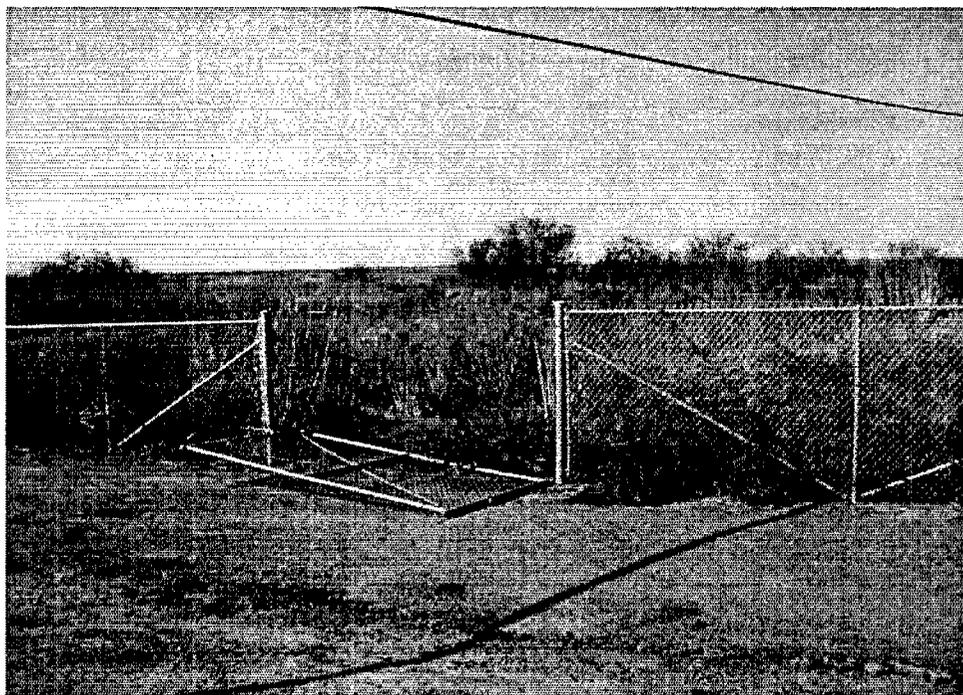
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____
C. Treatment System <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	Treatment Train (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____
2.	Electrical Enclosures and Panels (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M Remarks _____ _____
3.	Tanks, Vaults, Storage Vessels <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs O&M Remarks _____ _____
4.	Discharge Structure and Appurtenances <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M Remarks _____ _____
5.	Treatment Building(s) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	Monitoring Wells (pump and treatment remedy) <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs O&M <input type="checkbox"/> N/A Remarks _____ _____

D. Monitored Natural Attenuation	
1.	<p>Monitoring Wells (natural attenuation remedy)</p> <p> <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input checked="" type="checkbox"/> Needs O&M <input type="checkbox"/> N/A </p> <p>Remarks <u>Photographs of the monitoring wells attached. The sampling pump in MW-03S needs to be repaired or replaced.</u></p>
X. OTHER REMEDIES	
<p>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.</p> <p style="text-align: center;">(N / A)</p>	
XI. OVERALL OBSERVATIONS	
A.	<p>Implementation of the Remedy</p> <p>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.).</p> <p><u>See 5-year report for detailed evaluation on the effectiveness of the remedy.</u></p> <hr/>
B.	<p>Adequacy of O&M</p> <p>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.</p> <p><u>The site is located in an isolated area with limited access. No signs of significant damages were found during this inspection. The broken fence panel should be repaired.</u></p> <hr/>



Abandoned above grade sewer pipeline

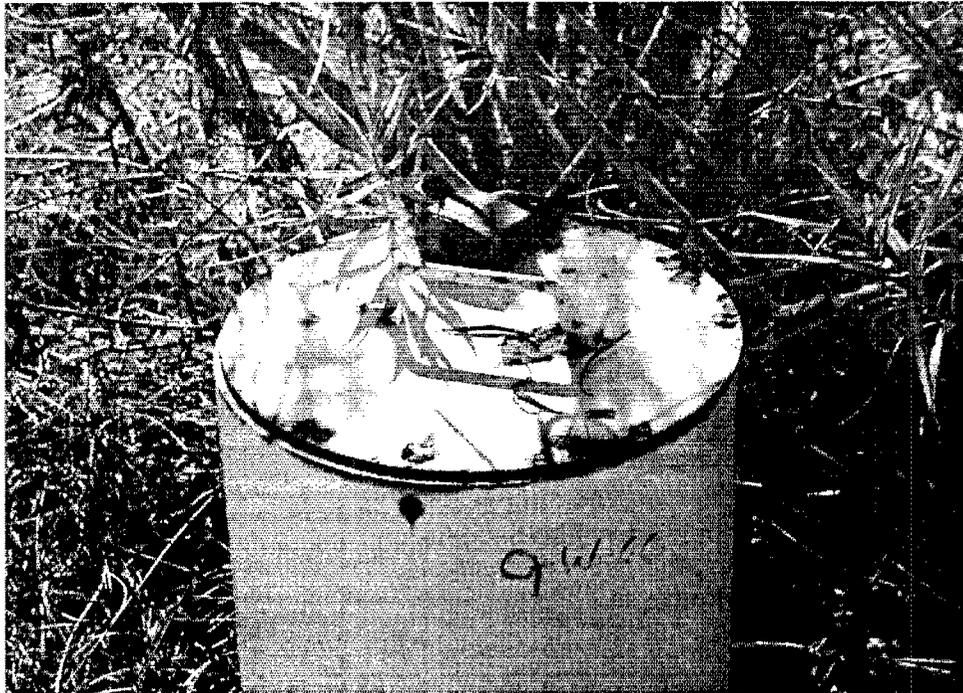
Photograph No. 1: IR Site 9 – 41 Area Waste Stabilization Pond
Looking Northeast (January 03, 2001)



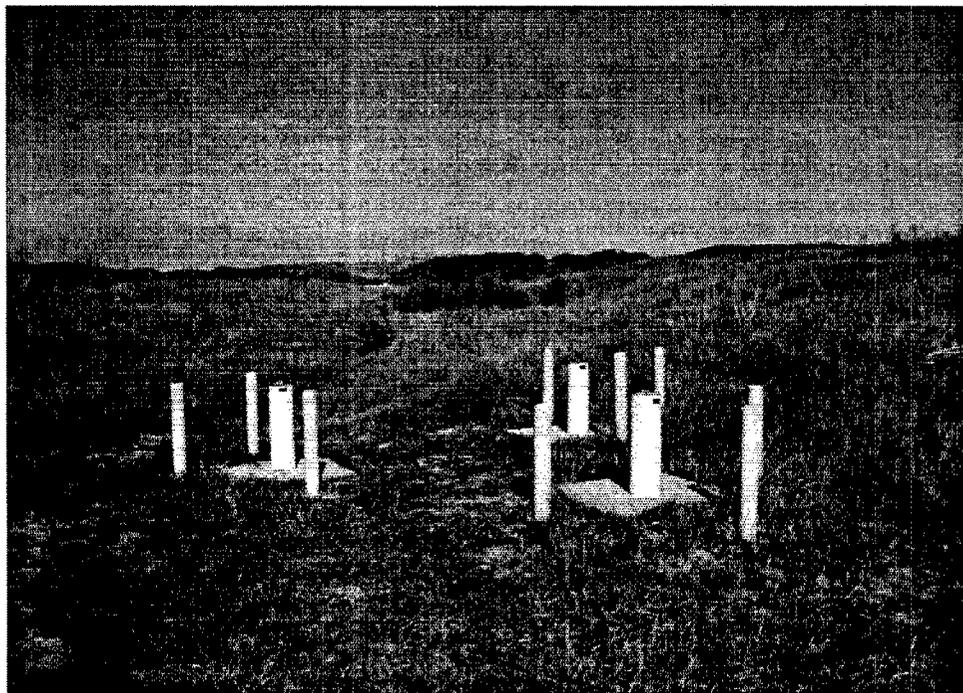
Photograph No. 2: Damaged gate in fence for restricting access to the Former Grease Pit.
Looking North (January 03, 2001)



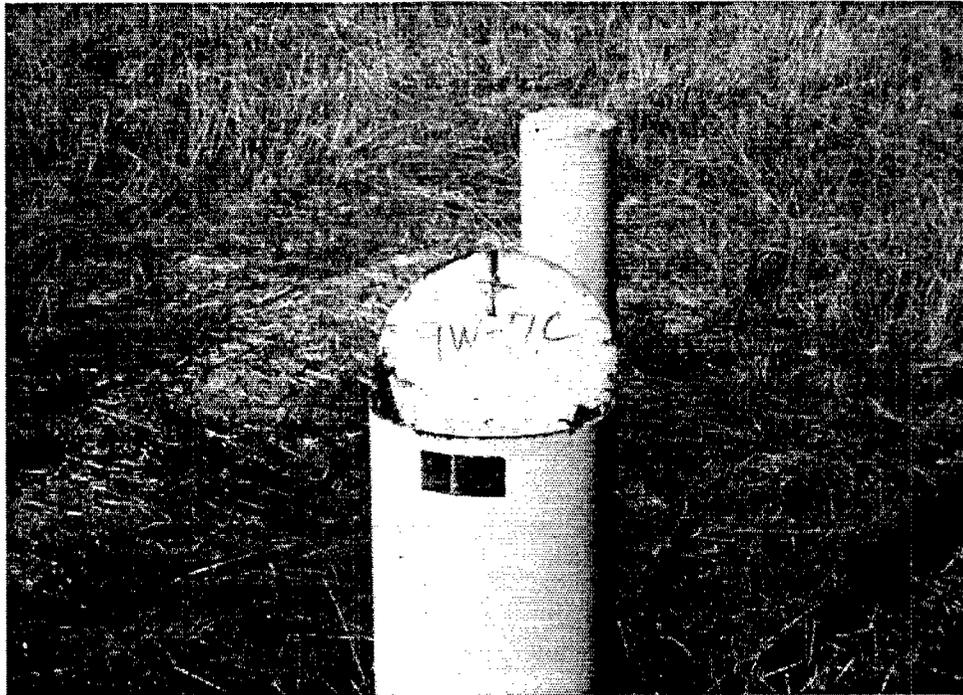
Photograph No. 3: Monitoring Well cluster 9W-6A, -6B, & -6C
Looking North (January 03, 2001)



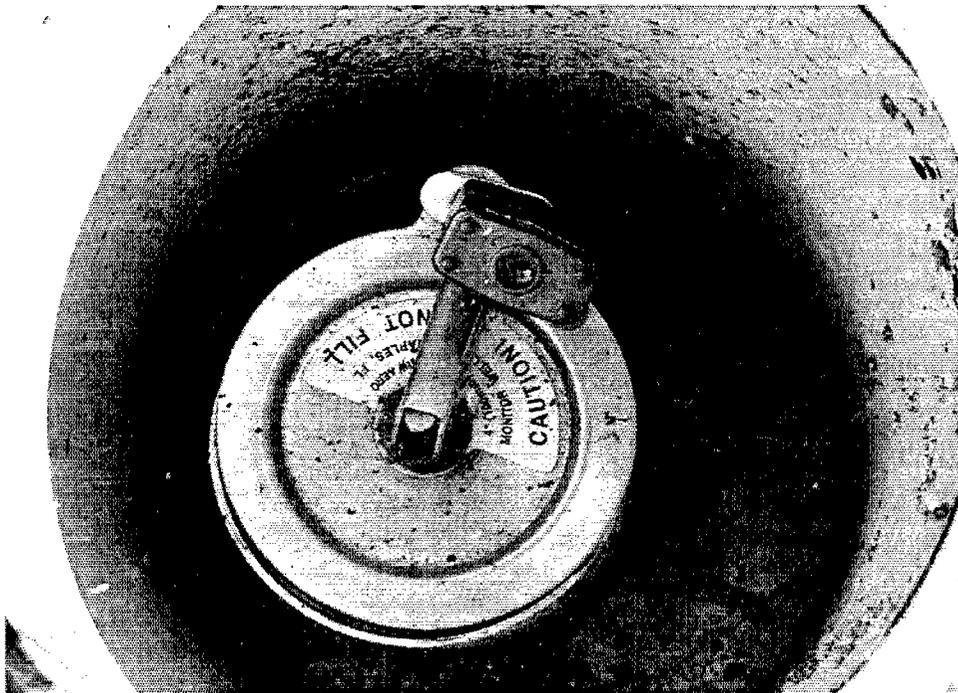
Photograph No. 4: Monitoring Well 9W-6C
(January 03, 2001)



Photograph No. 5: Monitoring Well cluster 9W-7A, -7B, & -7C
Looking East (January 03, 2001)



Photograph No. 6: Monitoring Well 9W-7C
(January 03, 2001)



Photograph No. 7: Interior view of Monitoring Well 9W-7C
(January 03, 2001)