

FINAL

ACTION MEMORANDUM

NON TIME-CRITICAL REMOVAL ACTION
SITE 33 MARINE CORPS BASE CAMP PENDLETON
CALIFORNIA

Contract No. N62473-07-D-4013
Task Order 0030
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ABBREVIATIONS AND ACRONYMS

AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
Ca-HSC	California Health and Safety Code
Cal-EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	contaminant of potential concern
DCE	dichloroethene
DERP	Defense Environmental Restoration Program
DNAPL	dense, non-aqueous phase liquid
DoD	United States Department of Defense
DON	United States Department of Navy
DOT	(California) Department of Transportation
DTSC	(Cal-EPA) Department of Toxic Substances Control
EO	Executive Order
FFA	Federal Facilities Agreement
FS	feasibility study
IR	Installation Restoration
MCB	Marine Corps Base
MCL	maximum contaminant level
NAVFAC	Naval Facilities Engineering Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NTCRA	non time-critical removal action
O&M	operation and maintenance
OU	operable unit
PCE	tetrachloroethene
PPE	personal protective equipment
RAO	removal action objective
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
r-PRG	residential preliminary remediation goal
RWQCB	Regional Water Quality Control Board
SSHP	Site Safety and Health Plan
STLC	soluble threshold limit concentration

SVE	soil vapor extraction
SVOC	semivolatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solid
TTLC	total threshold limit concentration
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
UST	underground storage tank
VOC	volatile organic compound
WET	(California) Waste Extraction Test

Section 1.0: PURPOSE

The purpose of this Action Memorandum (AM) is to document the decision made by the United States Department of the Navy (DON) to undertake a Non-Time Critical Removal Action (NTCRA) for Site 33 at the Marine Corps Base Camp Pendleton, California (hereafter referred to as MCB Camp Pendleton or the Base). The United States Department of Defense (DoD) has the authority to undertake Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response actions, including removal actions, under 42 United States Code (USC) §9604, 10 USC §2705, and Federal Executive Order (EO) 12580. Further, this removal action is consistent, to the maximum extent practicable, with Chapter 6.8 of the California Health and Safety Code (Ca-HSC).

The DON is conducting a removal action in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), United States Environmental Protection Agency (U.S. EPA), DoD, and DON guidance. The NCP requires the lead agent to take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release where the lead agent determines such action is necessary based on enumerated factors (40 CFR 300.415[b][1]). U.S. EPA has categorized removal actions in three ways: emergency, time-critical, and non-time critical based on the type of situation, the urgency and threat of the release or potential release, and the subsequent timeframe in which the action must be initiated. In this case, the DON has initiated a NTCRA in response to volatile organic compounds (VOCs) in groundwater, specifically tetrachloroethene (PCE), which currently pose a threat to human health and groundwater resources.

The proposed NTCRA will consist of source area removal by conducting an excavation in the area of the highest concentrations of PCE in groundwater. This excavation will involve removing vadose zone and saturated soil and will likely include dewatering activities as well as the installation of an in situ bioreactor to address residual concentrations of PCE. Excavated soil will be disposed of off-site, wastewater will be treated prior to discharge to the sanitary sewer, the excavation will be backfilled with clean material, and the site will be restored. The proposed action is expected to remove significant PCE mass from the subsurface and will substantially reduce risks to human health and groundwater resources. The following removal action objectives (RAOs) were developed for the proposed NTCRA at Site 33:

- Reduce the overall risk to human health and the environment by addressing the area of highest concentrations of PCE in the subsurface.
- Protect the beneficial uses and water-quality objectives of the lower San Onofre Creek.

The proposed removal action for this site is deemed appropriate and consistent with: (1) the factors set forth within the NCP, 40 CFR §300.415(b)(2); and (2) Chapter 6.8, Ca-HSC, because there are:

- Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or food chains;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;

There are no nationally significant or precedent-setting issues at Site 33.

Section 2.0: SITE CONDITIONS AND BACKGROUND

2.1 Site Description

Site 33 is located in the 52 Area (northwestern portion) of MCB Camp Pendleton (see Figure 1) and consists of an area located to the south of Building 520452 (52 Area Armory) (see Figure 2), in which chlorinated solvents, specifically PCE, have been detected in groundwater. Groundwater impacts likely resulted from past operations in a gun cleaning located south of Building 520452, which is depicted on Figure 2. This area consists of a concrete pad surrounded by a block wall with a drainage outlet on the south end of the pad. The gun cleaning area is known to have been used for solvent application and storage. In addition, two Quonset huts (Buildings 52654 and 52655), which have since been demolished, were formerly located southeast of the gun cleaning area. As shown on Figure 2, a 4,000 gallon underground storage tank (UST) previously located near former Building 52652 was historically used to store diesel fuel (Ninyo & Moore, 1998).

2.1.1 Removal Site Evaluation. Prior to the field investigation conducted from 1995 through 1996 as part of the Group D Remedial Investigation (RI) (Naval Facilities Engineering Command [NAVFAC] Southwest, 1997), no sampling activities had been conducted at Site 33. This initial investigation indicated the presence of PCE in groundwater at concentrations that exceeded the maximum contaminant level (MCL) of 5 µg/L. Between 1995 and 2003, five environmental investigations were conducted within the vicinity of Site 33; each is listed below and summarized in Table 1:

- **Group D RI Field Investigation** – Field sampling activities were conducted at Site 33 from 1995 through 1996 as part of the Group D RI (NAVFAC Southwest, 1997).
- **Site 52652 Site Assessment** - A site investigation of a former UST near Building 52651 was conducted as part of the Base UST program (Ninyo & Moore, 1998). Building 52652 was demolished prior to the 2006 field investigation.
- **Phase 2 RI Field Investigation** – A field investigation was conducted in 1998 as part of the OU 4 RI/feasibility study (FS) (Parsons, 1999).
- **2001 – 2003 RI Field Investigation** – During December 2001 and January 2002 additional samples were collected to further evaluate conditions at Site 33 (Parsons, 2004).
- **2003 RI Field Investigation** – Additional sampling was conducted in 2003, the results of which were documented in an appendix to the Operable Unit (OU) 5 RI Report (Parsons, 2004).

The most recent field investigation was conducted in 2006 in support of the Site 33 RI/FS (Parsons, 2008). This investigation was conducted to define the spatial extent and distribution of contaminants of potential concern (COPCs) in source area soils, soil gas, and groundwater. The suspected release is estimated to have occurred approximately 30 years ago, however, groundwater concentrations of PCE above MCLs have only migrated approximately 200 feet downgradient from source area. This relatively limited migration appears to be due to the presence of low-permeability sediments at the site and the associated low rate of groundwater flow. As a result of this slow rate of migration, it appears that the plume has not reached steady-state conditions and in the event that no action were taken at the site the plume would likely continue its slow migration in the downgradient direction (generally toward the south and southeast). Over time, the plume will migrate towards the San Onofre Creek channel. However, given the hydrogeologic conditions at the site, it is expected to take over 100 years for the plume to reach the edge of the river.

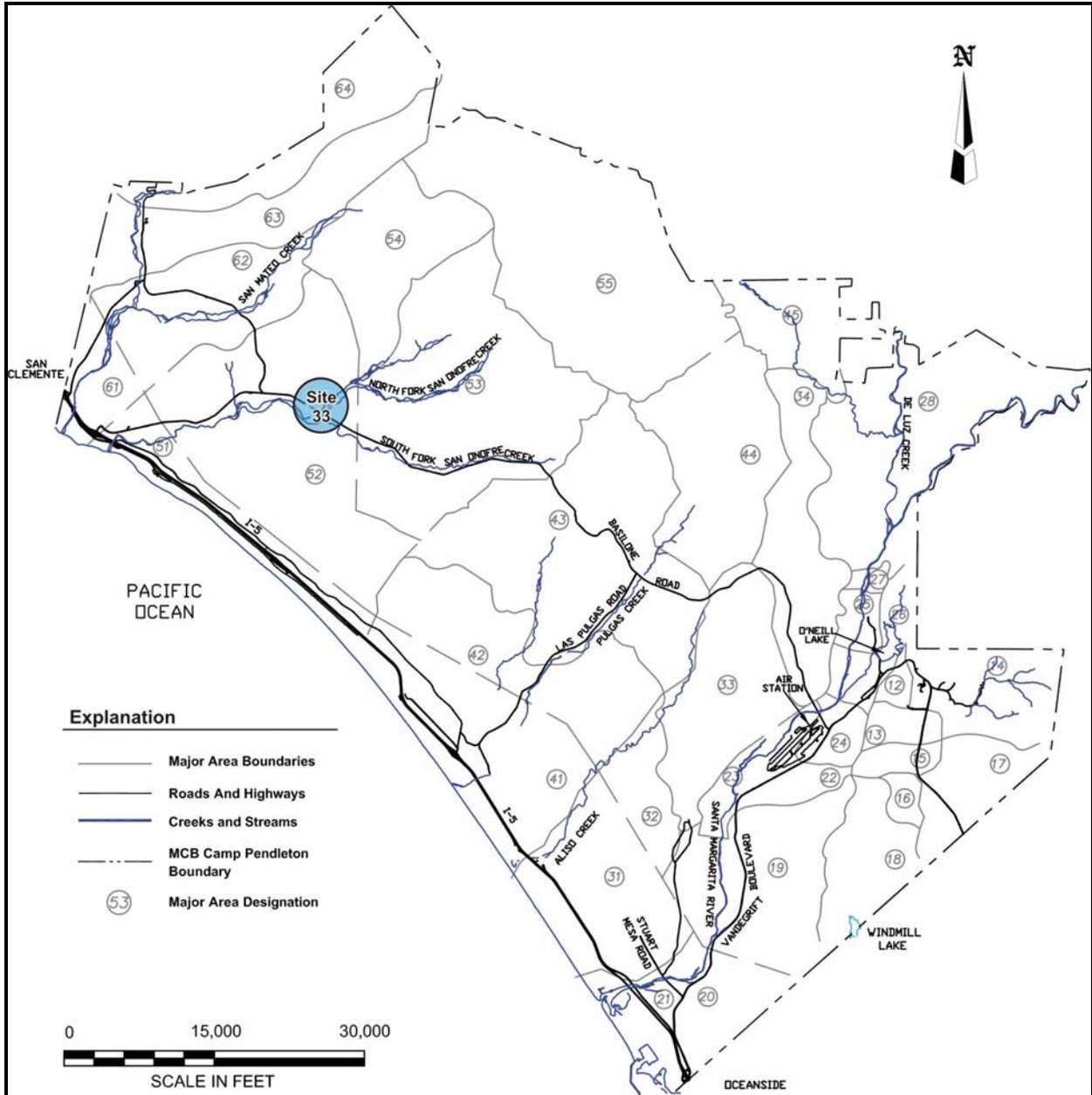


Figure 1. Map of MCB Camp Pendleton Showing the Location of Site 33

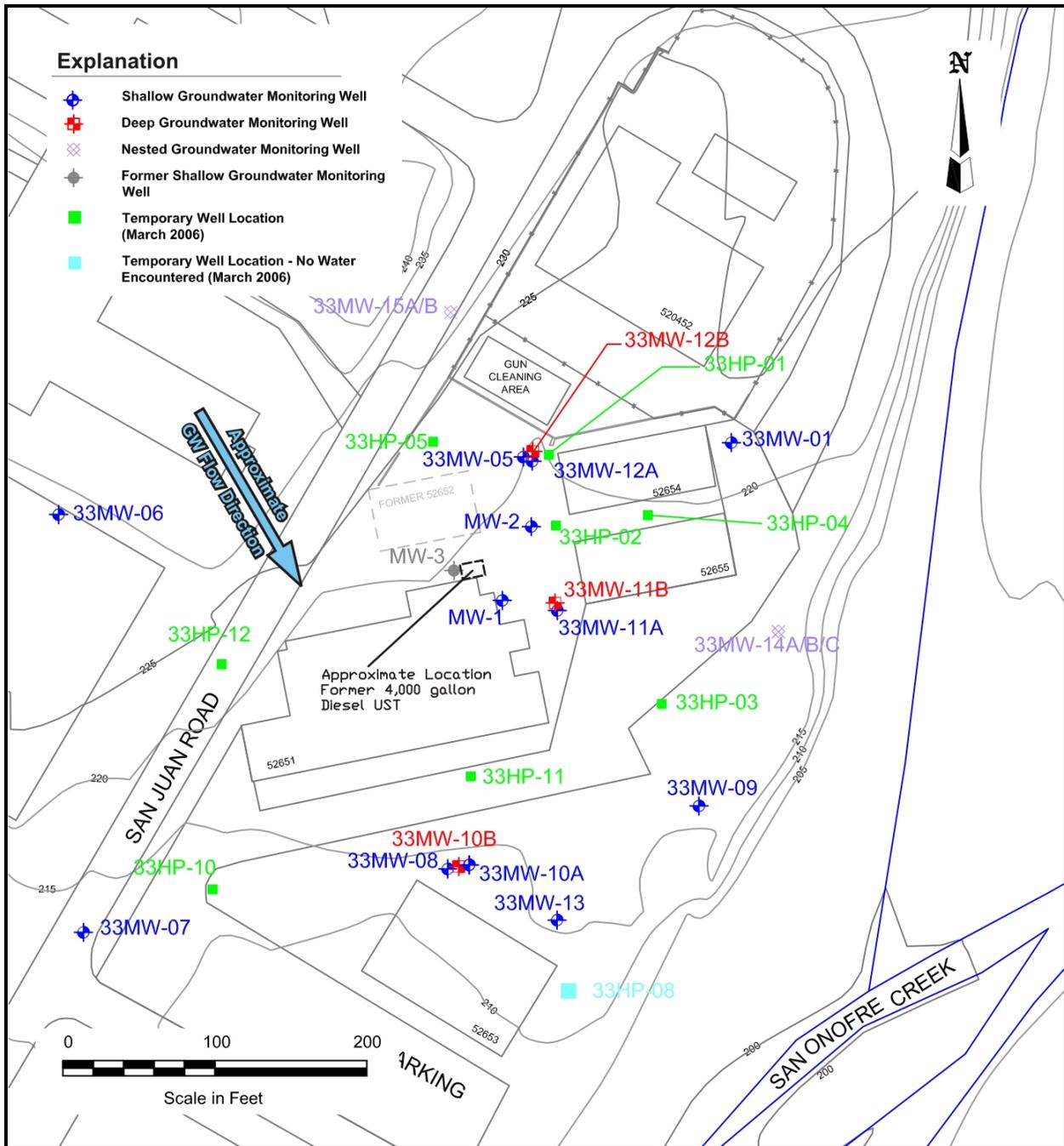


Figure 2. Map of Site 33

Table 1. Overview of Previous Investigations at Site 33

Investigation	Date	Findings
Group D RI Field Investigation	1995 and 1996	<ul style="list-style-type: none"> • Arsenic was detected at concentrations exceeding risk-based residential preliminary remediation goals (r-PRGs) in soil • No VOCs or semivolatile organic compounds (SVOCs) were detected in soil at concentrations exceeding r-PRGs • PCE was detected in groundwater at a maximum concentration of 620 µg/L, exceeding the MCL of 5 µg/L
Site 52652 Site Assessment	1998	<ul style="list-style-type: none"> • The extent of petroleum hydrocarbons in soil was determined to be limited to an area approximately 25 feet west-southwest and 15 feet south-southeast of the former UST • The extent of petroleum hydrocarbons in groundwater was determined to be within a 5-foot radius of the former UST
Phase 2 RI Field Investigation	April through December 1998	<ul style="list-style-type: none"> • The soil analytical data indicated that soil contaminants pose a minimal threat to human health and the environment, therefore, no further action was recommended for soil • Further evaluation of groundwater was recommended based on elevated concentrations of PCE in groundwater
2001 - 2002 RI Field Investigation	December 2001 to January 2002	<ul style="list-style-type: none"> • VOCs in soil gas were highest in the vicinity of the outfall from the gun cleaning area (see Figure 2) • Groundwater results indicated that maximum VOC concentrations were consistent with previous findings with the exception of some vertical and lateral migration • Metals in San Onofre Creek sediments are generally consistent with background soil concentrations (NAVFAC Southwest, 1996)
2003 Supplemental RI Field Investigation	February to March 2003	<ul style="list-style-type: none"> • Groundwater results indicate that maximum VOC concentrations remain consistent with previous findings • VOCs (including PCE, TCE, and benzene) detected in upgradient (33MW-04) and cross-gradient (33MW-06) wells in the December 2001 sampling event were not detected in 2003

2.1.2 Site Location. MCB Camp Pendleton is located in northern San Diego County, California. Surrounding communities include San Clemente to the northwest, Oceanside to the south, and Fallbrook to the east. The Base is bordered on the west by the Pacific Ocean and encompasses 17 miles of relatively undisturbed coastline. Rolling hills and valleys range inland an average of 10 to 12 miles. The Base occupies approximately 125,000 acres of land and is the Marine Corps' primary amphibious training center (Parsons, 2008). Site 33 is located in the 52 Area in the northwestern portion of MCB Camp Pendleton (Figure 1). The site is approximately 900 feet northeast of the intersection of Basilone Road and San Juan Road (Parsons, 2008).

2.1.3 Site Characteristics. Land use in the vicinity of Site 33 consists of activities associated with skills training and Marine combat training. Structures in the immediate vicinity were used for gun cleaning (the gun cleaning area associated with the historic solvent release), storage of equipment (i.e., gas masks) associated with chemical/biological warfare training (Building 52654 [demolished]), martial arts training (Building 52655 [demolished]), sniper training (Building 52651) and the 52 Area Armory (Building 520452). Other structures in the vicinity include medical and dental facilities, administration, supply and storage buildings, troop training facilities, and barracks housing military personnel during training at the school for infantry. Military and civilian personnel are present in the immediate vicinity of

the site on a daily basis. East and south of the site is the San Onofre Creek, and north of the site is an undeveloped hill that is classified as a maneuver area.

The nearest designated troop housing area is approximately 2 miles west of the site and the nearest family housing is located approximately 3.5 miles west of the site (Barrett Resource Group, 2006). The nearest Base production well is approximately 3.5 miles south-southwest of Site 33. While designated as drinking water in the Basin Plan, future use of groundwater in the immediate site vicinity is considered improbable based on the hydrogeologic conditions at the site (e.g. low yield and high total dissolved solids of groundwater). The area around the buildings is mostly paved and supports no vegetation. The areas north, east, and south of the site (along the creek bed) are undeveloped and support native vegetation (Parsons, 2008). Future land use of Site 33 will likely remain the same. The two Quonset Huts, Buildings 52654 and 52655, are slated for demolition this year and new buildings are planned to replace them within several years. Therefore, the likelihood of future residential use is considered low given current development plans and current land use in the vicinity of the site (Parsons, 2008).

Based on the data obtained from the site, including the 2006 investigation, shallow subsurface geology at Site 33 primarily consists of alluvium overlying yellow to greenish gray/dark gray claystone/siltstone/sandstone bedrock of the Santiago Formation. Alluvial soils at Site 33 predominately consist of gravelly clay and clayey gravel with cobbles and boulders. The locations of geologic cross sections for Site 33 are shown on Figure 3 and cross sections are presented in Figures 4 and 5.

The alluvium typically extends from surface to a depth of between 10 and 12 feet below ground surface (bgs), and extends to a maximum depth of 20 feet bgs at up-slope (upgradient) locations outside the "source area". The alluvium is underlain by weakly to moderately cemented sedimentary bedrock. Alluvial soils at Site 33 generally consist of gravelly clay and clayey gravel, and minor layers of sands and silt. Gravel, cobbles, and boulders are generally found below depths of approximately 2 feet. Well graded gravel was encountered in alluvial material at well 33MW-14A/B/C, which is close to the San Onofre Creek Channel, and down-slope (downgradient) of the source area. In general, the gravelly component of the alluvium typically occurs within 2 feet of ground surface, and large boulders were encountered in the upper five feet of nearly all recent borings.

Most of the groundwater present at MCB Camp Pendleton occurs in the alluvium-filled river valleys on the Base. All groundwater that is extracted for public use occurs in these river valleys. Although Site 33 is located in close proximity to the San Onofre Creek, which is an alluvial river valley located south/southeast of the site, there is a limited amount of groundwater underlying the site itself due to the predominately fine-grained deposits. As shown on Figure 2, groundwater at the site flows in the southeasterly direction with an average gradient of 0.07 ft/ft.

The groundwater occurs in the alluvium deposits and in specific water bearing zones of the underlying Santiago Formation. The alluvial zone is a very low yielding water bearing zone, largely consisting of gravelly clay or clayey gravel. The alluvium is hydraulically connected to the Santiago Formation. Within the Santiago Formation, there are distinct water bearing zones or lenses, and there are also zones within the Santiago Formation that appear dry, and yield little or no water. As such, individual water bearing beds or zones of the Santiago Formation appear to have limited vertical hydraulic connectivity. Some of the sandstone layers encountered below the water table did not yield water to temporary wells even after several hours.

2.1.4 Release or Threatened Release into the Environment of a Hazardous Substance or Pollutant or Contaminant. As previously stated, various environmental investigations have indicated the presence of elevated concentrations of VOCs, specifically PCE, in groundwater at Site 33. It is

suspected that the PCE release is a result of past runoff from the gun cleaning area at Site 33. PCE concentrations range as high as 13,000 µg/L, which is approximately 8 percent of PCE's pure-phase solubility, suggesting that there is some potential for dense nonaqueous phase liquid (DNAPL) to be present in the subsurface at Site 33. The total dissolved PCE mass within the plume is estimated to be 2.00 kg. Figure 3 depicts the locations of geologic cross sections A-A' and B-B' and the extent of PCE concentrations in groundwater based groundwater results from the 2006 RI/FS field investigation (Parsons, 2008). Figures 4 and 5 present geologic cross sections A-A' and B-B', respectively. The vertical extent of PCE in groundwater is also depicted for the PCE plume transect that corresponds to each cross section location. Releases of PCE to the environment are estimated to have occurred approximately 30 years ago and are no longer occurring.

2.1.5 NPL Status. MCB Camp Pendleton was placed on the National Priorities List (NPL) on November 15, 1989. Groundwater and soils on-site were found to be impacted with organic and inorganic constituents resulting from past waste disposal practices. The DON has been conducting and implementing the Installation Restoration (IR) Program at MCB Camp Pendleton since the early 1980s in accordance with the Federal Facilities Agreement (FFA). The DON's cleanup efforts have been in conjunction with U.S. EPA Region 9; the Regional Water Quality Control Board, San Diego Region (RWQCB); and the State of California Environmental Protection Agency's (Cal-EPA) Department of Toxic Substances Control (DTSC) through a FFA signed in 1990 (U.S. EPA, 1990).

2.2 Other Actions to Date

The following sections outline the site-specific activities that have been conducted in the past and/or are being conducted at the present time at Site 33.

2.2.1 Previous Actions. One UST formerly used to store diesel fuel was removed from a location near former Building 52652 (Ninyo & Moore, 1998).

2.2.2 Current Actions. Currently there are no actions being undertaken at Site 33.

2.3 State and Local Authorities' Roles

The following sections summarize the role of state and local agencies at Site 33.

2.3.1 State and Local Actions to Date. CERCLA gives the president authority to conduct CERCLA response actions in enumerated situations. Federal EO 12580 delegates to the DoD the president's authority to undertake CERCLA response actions. Congress further outlined this authority in its Defense Environmental Restoration Program (DERP) Amendments, which can be found at 10 USC §2701-2705. Both CERCLA §120(f) and 10 USC §2705 require Marine Corps/DON facilities to ensure that state and local officials are given the timely opportunity to review and comment on Marine Corps/DON response actions. CERCLA §120 further requires DON to apply state removal and remedial action law requirements at its facilities. Accordingly, DTSC and the RWQCB have provided technical advice, comments, and concurrence during the environmental investigative and removal phases of Site 33.

2.3.2 Potential for Continued State and Local Response. The DTSC and RWQCB have provided technical advice, comments, and concurrence with the environmental investigations conducted at Site 33 and will continue to do so throughout the removal action and IR process.

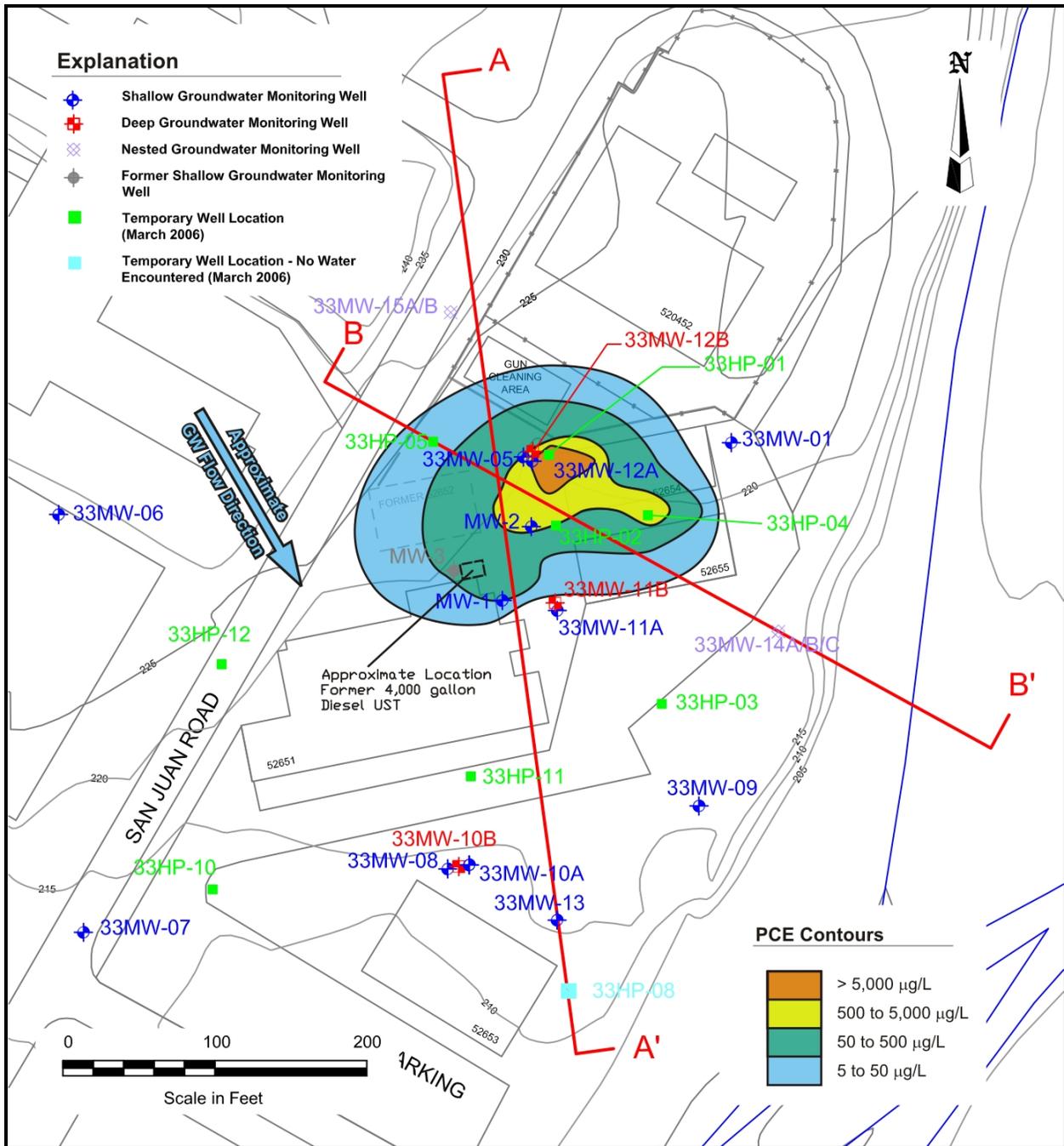
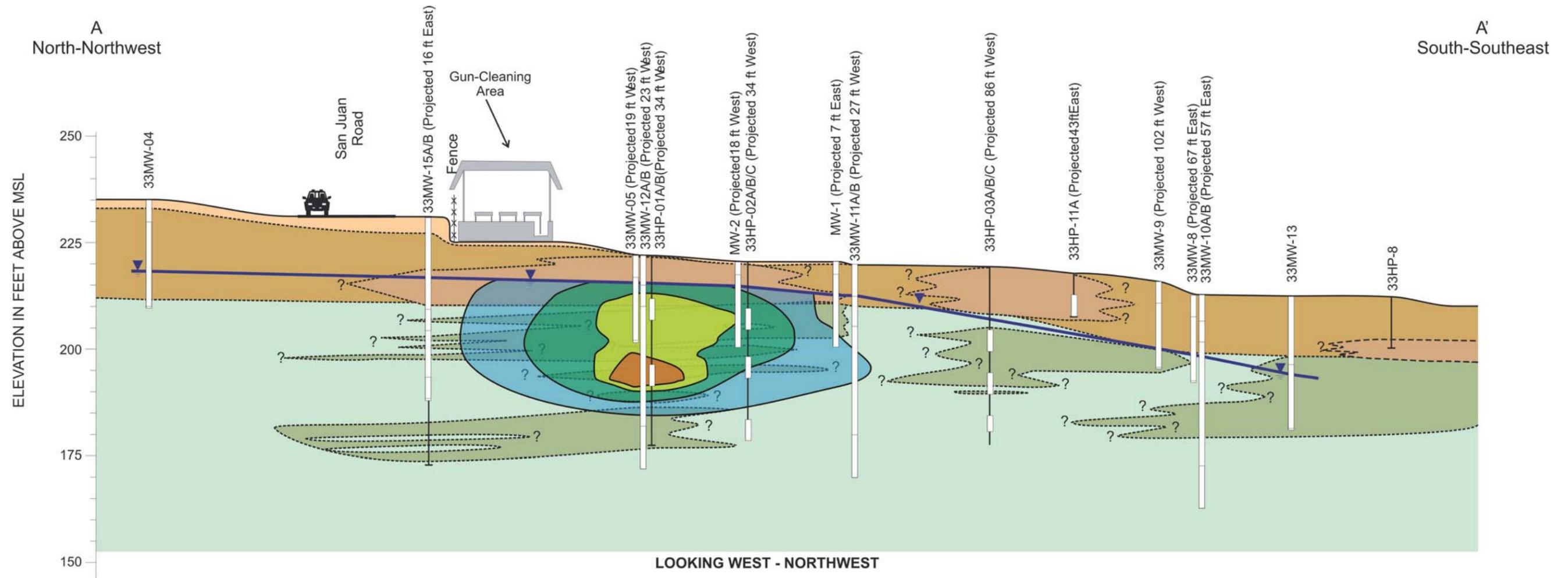


Figure 3. Site Map Showing the Lateral Extent of PCE in Groundwater and the Locations of Geologic Cross Sections A-A' and B-B'



Legend

- Predominantly GravellyClay/GravellySilt/GravellySand(GC/GM/GP)
- Predominantly Sand/SiltySand(SP/SM/SC)
- Predominantly Silt/Clay(ML/CL)
- Santiago Formation: Predominantly Sand/SiltySand(SP/SM/SC)
- Santiago Formation: Predominantly Silt/Clay(ML/CL)
- Inferred GeologicContact
- Approximate Water Table (August 2006)(Basedon Shallow Wells)

PCE Contours

- > 5,000 µg/L
- 500 to 5,000 µg/L
- 50 to 500 µg/L
- 5 to 50 µg/L

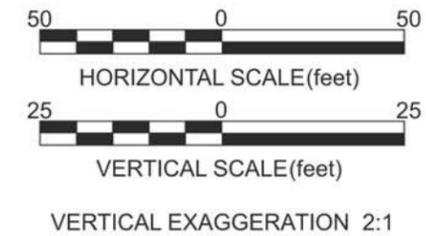
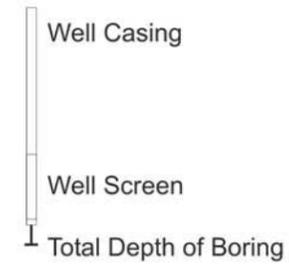


Figure 4. Geologic Cross Section A-A'

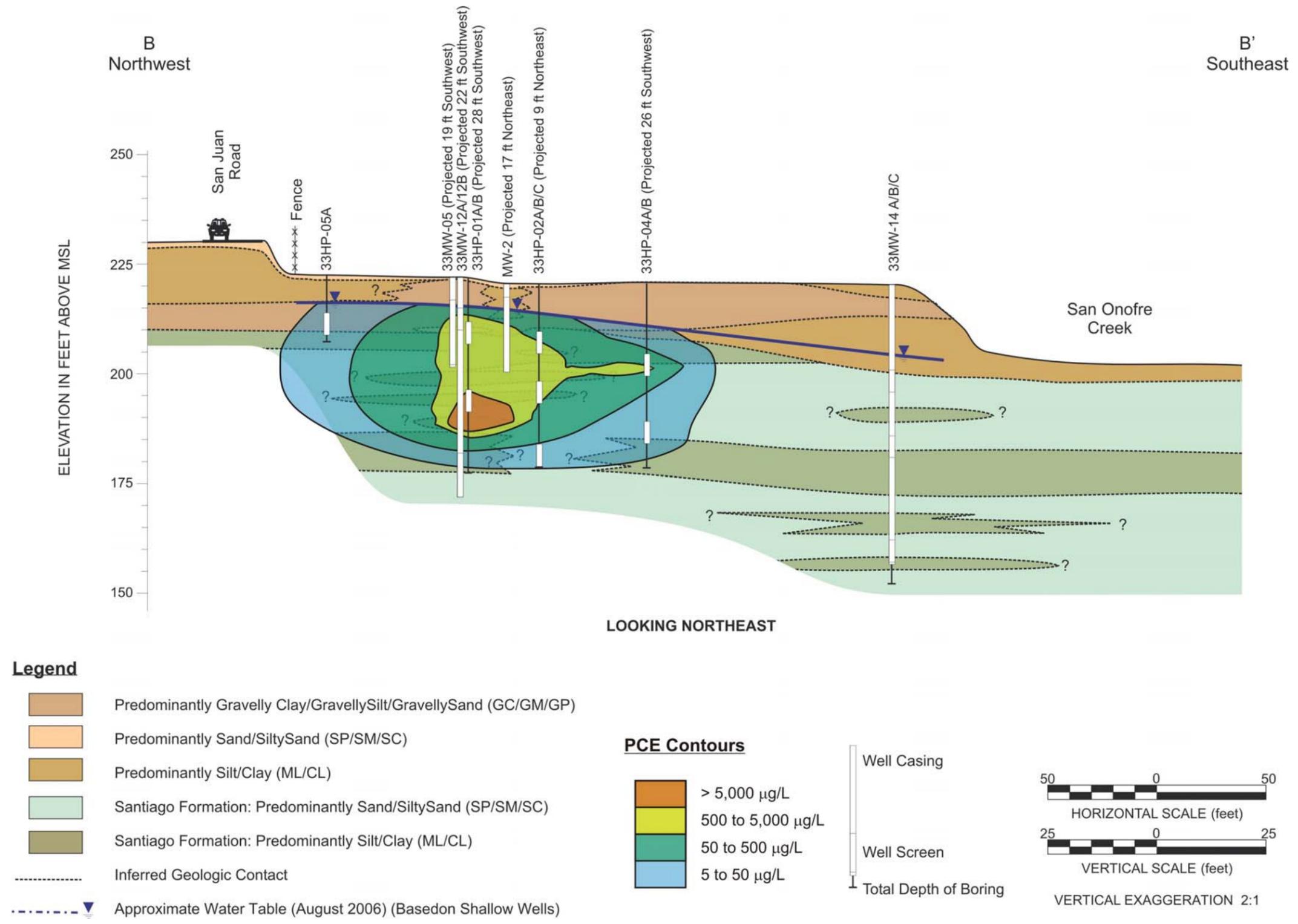


Figure 5. Geologic Cross Section B-B'

Section 3.0: THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

In accordance with the NCP, the following threats must be considered in determining the appropriateness of a removal action (40 CFR §300.415(b)(2)):

- Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations, animals, or food chains;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;
- Hazardous substances, pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers that may pose a threat of release;
- High levels of hazardous substances, pollutants or contaminants in soils largely at or near the surface that may migrate or be released;
- Weather conditions that may cause hazardous substances, pollutants or contaminants to migrate or be released;
- Threat of fire or explosion;
- The availability of other appropriate federal or state response mechanisms to respond to the release; and
- Other situations or factors that may pose threats to public health, welfare or the environment.

3.1 Threats to Public Health or Welfare

Two of the eight threats listed above potentially apply to the current conditions at Site 33 regarding a threat to public health or welfare:

- Actual or potential exposure to hazardous substances, pollutants or contaminants by nearby populations, animals, or food chains;
- Actual or potential contamination of drinking water supplies or sensitive ecosystems;

Historic activities in the gun cleaning area at Site 33 have resulted in elevated concentrations of VOCs, primarily PCE, in groundwater. During the most recent groundwater monitoring event, PCE concentrations range from below detectable concentrations to approximately 13,000 µg/L and would pose a risk to human health if groundwater at the site were used as a drinking water source. While the aquifer is designated as a potential drinking water source, it is unlikely that site groundwater would be used for domestic purposes based on the hydrogeologic conditions at the site (low yield and high total dissolved solids (TDS) of groundwater at the site). In addition, soil vapor results have indicated that elevated concentrations of VOCs, primarily PCE, are present in soil vapor at concentrations up to approximately 50,000 µg/m³. The VOCs present in soil vapor would likely pose a significant threat to human health due to intrusion of vapors to indoor air, if a building having certain construction characteristics were built over the PCE plume at Site 33.

3.2 Threats to the Environment

Based on a site-specific ecological risk assessment, there are no significant threats to the environment at or near Site 33 (Parsons, 2008).

Section 4.0: ENDANGERMENT DETERMINATION

Actual or threatened releases of pollutants and contaminants from this site, if not addressed by implementing the response action selected in this AM, may present an imminent endangerment to public health or welfare.

Section 5.0: PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed NTCRA will consist of source area removal, which will be achieved by conducting an excavation in the area of the highest concentrations of PCE in groundwater as well as installing an in situ bioreactor to address residual concentrations of PCE in groundwater. The proposed excavation will involve removing vadose zone and saturated soil and will include dewatering activities. Excavated soil will be disposed of off-site, the excavation will be backfilled with clean material, and the site will be restored.

5.1 Removal Action Objectives

The proposed action is expected to remove significant PCE mass from the subsurface and address residual PCE mass which will substantially reduce risks to human health and groundwater resources at Site 33. The following RAOs were developed for the proposed action:

- Reduce the overall risk to human health and the environment by remediating the area of highest concentrations of PCE in the subsurface; and
- Protect the beneficial uses and water-quality objectives of the lower San Onofre Creek.

5.2 Proposed Action

The proposed removal excavation involves excavating within the footprint depicted on Figures 6 and the vertical extent depicted on Figure 7 (i.e., to approximately 32 ft bgs). This corresponds to a 0.19 acre area and an approximate volume of 10,180 cubic yards (19,100 tons). The excavation will be advanced within the proposed lateral and vertical limits using heavy earthmoving equipment, such as a track-mounted excavator and track- or wheeled-loaders. During soil removal, the excavation would progress vertically and laterally to remove soil to achieve the excavation extent depicted in Figures 6 and 7. It is likely that shoring will be used to support the excavation sidewalls. At Site 33, shoring will be required in certain areas of the excavation due to the proximity of site features (e.g., the concrete pad formerly used for gun cleaning and Building 52651). As shown in Figure 3, the sidewall will be sloped along the eastern edge of the excavation to allow equipment access to the excavation area. Also sloping in this area is favorable because there is sufficient space such that the sloped area will not impact existing site features.

Since excavation will be extended below the water table, it will be necessary to dewater the excavation area and manage water that may separate from the saturated soil after removal. All wastewater will be treated by carbon adsorption and will be discharged to the on-Base sanitary sewer. Approximately 1,250,000 gallons of wastewater are anticipated over the duration of the excavation.

Bioreactor Installation

While the excavation is open, a bioreactor will be installed at the bottom of the excavation. Bioreactor installation will include backfilling the excavation area with porous backfill material (such as pea gravel), organic mulch, and possibly other carbon substrates (e.g., vegetable oil, sodium lactate). The purpose of the bioreactor is to enhance biological activity for the cometabolic dehalogenation of any remaining PCE. While the excavation is expected to address a majority of PCE mass, the bioreactor will function as a polishing step to degrade PCE mass remaining within and upgradient of the source area. Subsequent maintenance of the bioreactor would include future injections of organic material every five years after bioreactor installation. However, under the planned NTCRA, action would be limited to the

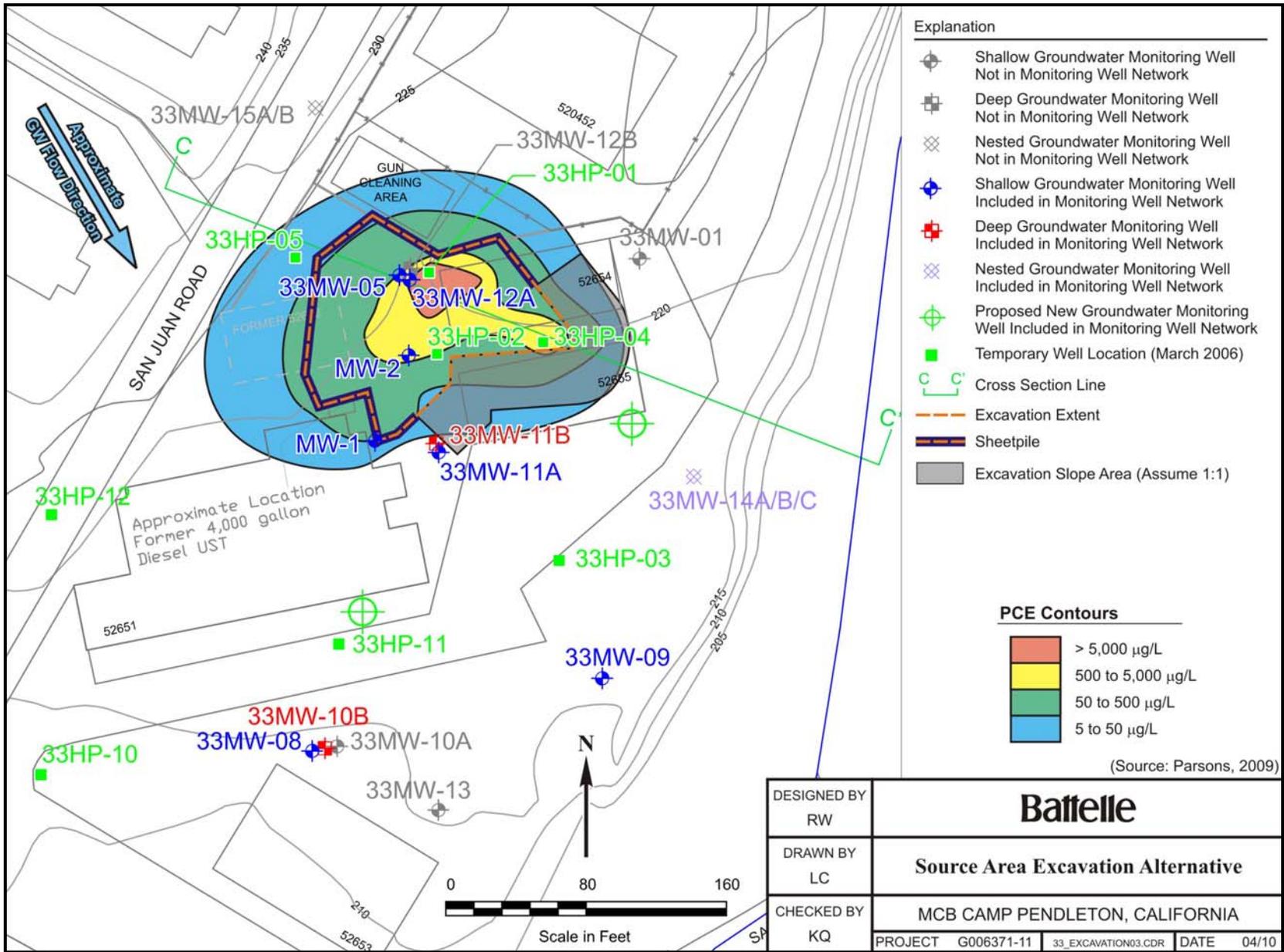


Figure 6. Map of Site 33 Depicting the Horizontal Extent of Alternative 33-4: Source Area Removal Excavation and Enhanced Bioremediation

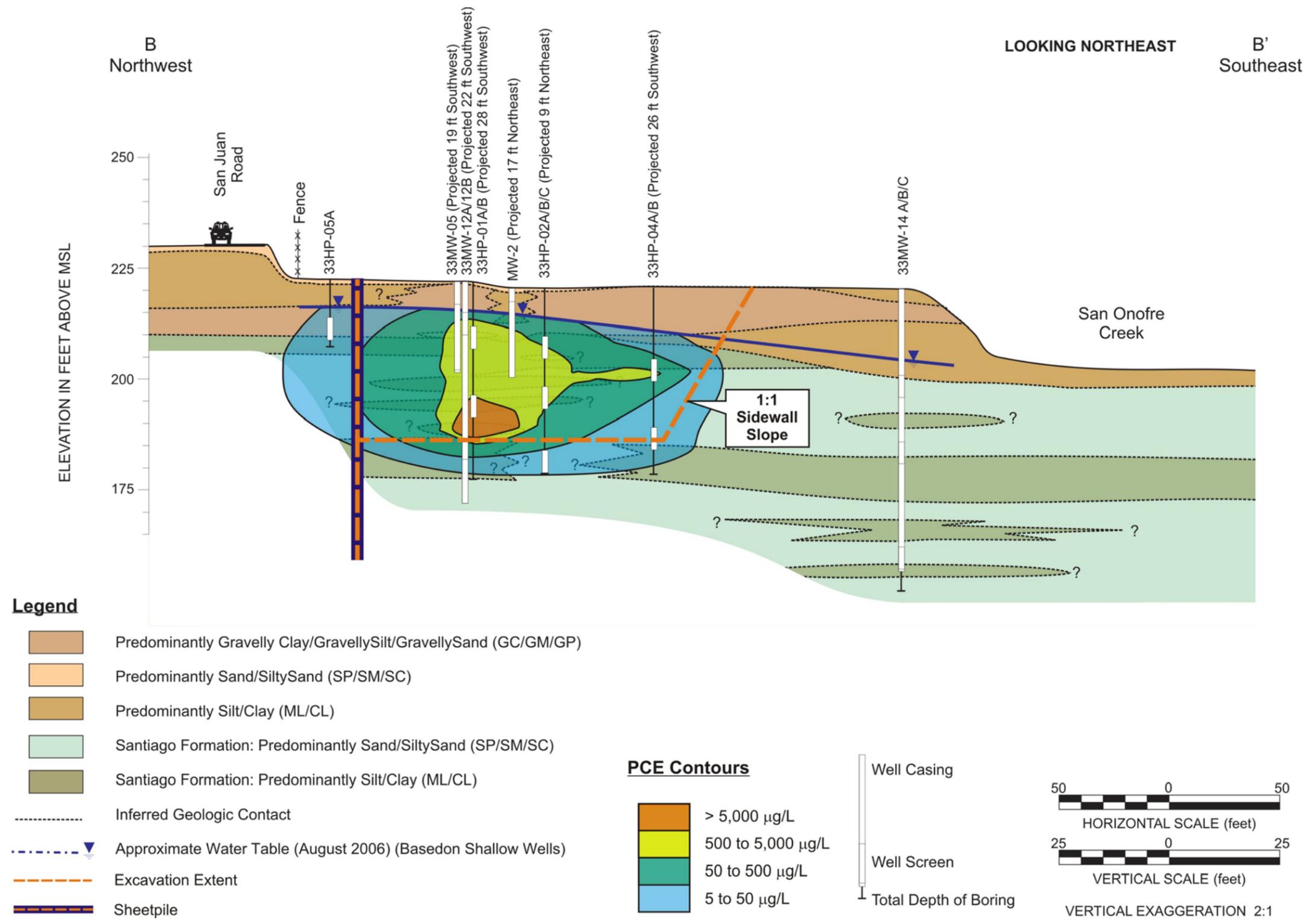


Figure 7. Cross Section of Site 33 Depicting the Vertical Extent of Alternative 33-4: Source Area Removal Excavation and Enhanced Bioremediation

initial construction of the bioreactor and initial substrate addition. Subsequent injections would be implemented as part of future remedial action.

Temporary Storage of Excavated Soil Stockpiles

During the removal action, the excavation and stockpile areas will be delineated with barricades, caution tape, and warning signs to restrict unauthorized access to these areas. A medium-sized tracked excavator (Caterpillar[®] 235 or equivalent) will be used to excavate the soil and place it in small stockpiles adjacent to the working face of the excavation. Large-capacity front-end loaders will transfer the soil from the stockpile to 23-ton end dump trucks for transport and disposal after the stockpiles have been analyzed and the waste is characterized. Stockpiles would remain on-site until the laboratory analyses are received. Plastic sheeting will be used to protect the ground surface beneath the loading area to prevent leaching from the excavated soils. The stockpiles would be periodically wetted and regularly monitored to ensure control of fugitive dust emissions. Stockpiles will be covered with Visqueen plastic sheeting and secured with sand bags.

Sampling and Analysis of Soil Stockpiles for Waste Characterization

Composite soil samples will be collected from soil stockpiles for waste characterization purposes. Based on the historic soil and groundwater data available for the site, stockpile samples will be analyzed for a full suite of VOCs and California Administrative Manual (CAM) 17 metals using the Toxicity Characteristic Leaching Procedure (TCLP) (SW-1311), as described in U.S. EPA Publication SW-846, the California Waste Extraction Test (WET) analysis (22 California Code of Regulations [CCR] Chapter 11), and total soil concentrations. Total soil concentrations will be compared to the total threshold limit concentrations (TTLC) and the results of the WET analyses would be compared to the soluble threshold limit concentrations (STLCs) to determine if the waste classifies as California-hazardous. Likewise, the results from the TCLP tests would be compared to the TCLP criteria to determine if the waste classifies as Resource Conservation and Recovery Act (RCRA)-hazardous. Using these results and appropriate regulations governing classification of hazardous waste, each soil stockpile would be classified as RCRA-hazardous, California-hazardous, or nonhazardous waste.

Transportation of the Excavated Material to an Off-Base Disposal Facility

Based on the results of waste characterization activities, the excavated material will be transported to an appropriate off-site landfill. All required placards would be placed on vehicles prior to leaving the site. All federal and California Department of Transportation (DOT) guidelines and regulations would be followed.

Import and Compaction of Backfill Material

A licensed land surveyor will survey the final spatial limits of the excavation prior to placement and compaction of backfill. Prior to placement of backfill, the exposed bottom of the excavation would be moisture conditioned and the excavation backfilled with imported clean soil. The backfill material will then be compacted. Compaction tests will be performed during the backfill operation to document the percent relative compaction of the soil.

Site Restoration

Site restoration activities will include backfilling the site to the original surface contours and revegetating the work area with native flora to restore habitat and minimize erosion.

5.2.1 Effectiveness. The proposed excavation will result in the incidental removal of 1.78 kg of dissolved PCE mass, which equates to a 90% reduction in total dissolved PCE mass; excavation dewatering activities are also expected to increase the overall reduction in dissolved mass at Site 33. In addition, the excavation will remove areas of significantly elevated concentrations of PCE in groundwater. PCE concentrations of 13,000 µg/L represent approximately 8% of the dissolved phase solubility of PCE, which may indicate the presence of DNAPL sources. The planned excavation extent may also result in the removal of DNAPL that may be serving as a continuing source of PCE mass to groundwater. Lastly, the installation of the bioreactor will provide a polishing step which is expected to address residual PCE mass upgradient (i.e., underneath the wash pad) and within the source area.

Source area removal excavation will provide a high degree of effectiveness and permanence because contaminants are removed from the subsurface and replaced with clean, imported soil. In addition, the installation of an in situ bioreactor will support long-term effectiveness via enhanced biodegradation of PCE in groundwater. Implementation of the proposed action is not expected to result in any significant adverse environmental impacts, although some disruption could occur for site workers during relocation of utilities and excavation activities. A site-specific Site Safety and Health Plan (SSHP) would be prepared and implemented. Area monitoring would be conducted to ensure safety and health of nearby workers. Field personnel participating in the sampling activity would wear personal protective equipment (PPE) as specified in the SSHP. Short-term effectiveness is rated moderate for this alternative. The proposed action would permanently remove and/or destroy the majority of contaminant mass at the site and provide a polishing mechanism to treat the remaining mass.

5.2.2 Implementability. The proposed action is readily implementable because excavation and disposal is a relatively mature technology and several contractors can provide the necessary equipment, materials, and labor to excavate and dispose of the contaminated soil. In addition, the removal of Buildings 52654 and 52655, which were discussed as a deterrent to this proposed action in the Final RI/FS Report (Parsons 2008), significantly increases the implementability of Alternative 33-4. As shown in Figure 6, sheetpiling will be installed along certain portions of the lateral excavation extent. Specifically, sheetpiling will be installed adjacent to the gun cleaning pad and Building 52651 and will total an approximate linear distance of 250 ft. Furthermore, licensed disposal facilities capable of accepting the contaminated soil currently exist within the State of California. There is a potential that some of the excavated material will qualify as RCRA and/or California hazardous waste; therefore, stockpiled waste will need to be characterized prior to off-site disposal. During the excavation, monitoring would be conducted to ensure that conditions in the breathing zone are protective of site workers. The construction of the bioreactor can also be easily implemented, but would require Base approval to use the modified backfill material. Once the modified backfill material has been approved, the bioreactor would be installed by amending porous backfill with organic mulch and other carbon substrates. Specific technical challenges include relocating utilities and potentially having to work in close proximity to nearby buildings and the wash pad during excavation.

5.2.3 Cost. The proposed action includes excavating 10,180 cubic yards of source area soils and the installation, operation and maintenance of a bioreactor. The capital costs associated with this alternative include excavation, off-site transportation and disposal, preparation of a work plan, sampling and analysis plan, quality assurance project plan, health and safety plan, and long-term monitoring plan. The operation and maintenance (O&M) cost includes operation and maintenance of the bioreactor, labor, maintenance, material, shipping, analysis, waste disposal, data validation, and report preparation. The total cost for implementing the source area removal excavation and bioreactor installation is \$6,642,721. Table 2 provides a summary of the costs associated with the source area removal excavation and bioreactor installation.

Table 2. Cost Summary for Removal Action Alternatives

Description	Cost
<i>Source Area Removal Excavation and Bioreactor Installation</i>	
Task 1. Planning, Direction, Oversight, Scheduling, and Meetings	\$120,700.00
Task 2. Mobilization	\$55,200.00
Task 3. Utility Clearance, Utility Relocation, and Well Abandonment	\$63,400.00
Task 4. Excavation, Shoring, Stockpiling and Soil Loading	\$2,148,709.00
Task 5. Off Site Disposal of Excavated Soil	\$1,682,870.00
Task 6. Analytical Services (Sampling and Waste Classification)	\$78,911.00
Task 7. Injection Well Installation and Groundwater Monitoring Well Replacement	\$85,961.00
Task 8. Backfill	\$993,250.00
Task 9. Reporting	\$43,000.00
<i>Other Direct Costs (5%)</i>	\$263,600.00
<i>Contingency (20%)</i>	\$1,107,120.00
<i>Groundwater and Vapor Extraction and Treatment</i>	
Task 1. Planning, Direction, Oversight, Scheduling, and Meetings	\$123,500.00
Task 2. Mobilization	\$31,200.00
Task 3. Utility Clearance, Utility Relocation, and Well Abandonment	\$58,260.00
Task 4. Installation of Vapor Extraction and Groundwater Treatment Systems	\$489,725.00
Task 5. Operation and Maintenance of Treatment Systems	\$548,890.00
Task 6. Vapor Extraction System Monitoring and Reporting	\$360,900.00
Task 7. Groundwater Treatment System Monitoring and Reporting	\$920,800.00
<i>Other Direct Costs (5%)</i>	\$126,664.00
<i>Contingency (20%)</i>	\$531,988.00
<i>Air Sparging Containment</i>	
Task 1. Planning, Direction, Oversight, Scheduling, and Meetings	\$114,000.00
Task 2. Mobilization	\$28,000.00
Task 3. Utility Clearance, Utility Relocation, and Well Abandonment	\$110,930.00
Task 4. Trench Excavation, Stockpiling and Disposal of Groundwater from Dewatering	\$416,555.00
Task 5. Off Site Disposal of Excavated Soil	\$123,820.00
Task 6. Analytical Services (Soil and Groundwater Waste Classification)	\$35,903.00
Task 7. Well Installation	\$47,650.00
Task 8. Backfill	\$105,500.00
Task 9. Reporting	\$32,800.00
Task 10. System O&M	\$244,890.00
<i>Other Direct Costs (5%)</i>	\$63,002.00
<i>Contingency (20%)</i>	\$264,610.00

5.2.4 Contribution to Remedial Performance. The proposed excavation will result the incidental removal of 1.78 kg of dissolved PCE mass, which equates to a 90% reduction in total dissolved PCE mass; excavation dewatering activities are also expected to increase the overall reduction in dissolved mass at Site 33. In addition, the excavation will remove areas of significantly elevated concentrations of PCE in groundwater. PCE concentrations of 13,000 µg/L represent approximately 8% of the dissolved phase solubility of PCE, which may indicate the presence of DNAPL sources. The planned excavation extent may also result in the removal of DNAPL that may be serving as a continuing source of PCE mass

to groundwater. Lastly, the installation of the bioreactor will provide a polishing step which is expected to address residual PCE mass upgradient (i.e., underneath the wash pad) and within the source area.

These actions are expected to significantly decrease the time required to reduce PCE concentrations and achieve cleanup goals for groundwater. Additionally, because groundwater is likely serving as a source of VOC mass to the vadose zone, soil vapor concentrations are also expected to decrease as conditions improve in groundwater.

5.3 Description of Alternative Technologies

In addition to the evaluation of the proposed action, several other treatment technologies were evaluated in the Final EE/CA for Site 33 (Battelle, 2010). These alternative treatment technologies include the following and are discussed in detail in this Section:

- No action
- Air sparging
- Groundwater and soil vapor extraction and treatment

5.3.1 No Action. Under the no action alternative, no action of any kind would be undertaken. The NCP requires that a no action alternative be retained for detailed evaluation as a baseline against which the other alternatives are compared. Existing monitoring wells would be secured and locked to prevent illegal disposal or tampering, however, no remediation or sampling of the groundwater would be conducted. The no action alternative includes no treatment and no control of exposure pathways. Under this alternative, short and long-term risks would be unacceptable if contaminated groundwater were used for domestic purposes. Therefore, this alternative does not provide adequate protection of human health if the groundwater in the plume area were to be used as drinking water in the future.

Effectiveness. No removal actions would be implemented under the no action alternative; therefore, effectiveness during implementation cannot be evaluated.

Implementability. This alternative is not rated because no action would be taken.

Cost. No costs are associated with this alternative.

5.3.2 Air Sparging Containment System. This alternative involves installing an air sparging trench that would be used to prevent off-site migration of contamination. A 300-foot long × 3-foot wide × 25-foot deep air sparging trench (containing pea gravel or other coarse-grained permeable material) would be installed under the road and parking area south of buildings 52651 and 52655. A soil vapor extraction (SVE) system would be implemented to remove vapor phase contamination generated during the operation of the air sparging system. Air sparging is particularly advantageous because the system would not have to be turned on unless it is determined that significant migration of contaminants has occurred. The air sparging trench is favorable because it provides an engineered control to limit the migration of PCE mass offsite, if natural attenuation processes do not adequately control migration.

Effectiveness. Field activities associated with this alternative include installation of an air sparging containment system as well as additional groundwater monitoring wells. While no significant adverse effects are expected, it would be necessary to relocate utilities. The implementation of this alternative would be dependant on the ability of natural attenuation processes to effectively control the plume. In the event that the air sparging containment system is required, it is likely that air sparging would effectively control plume migration.

Implementability. Air sparging systems have been successfully installed and operated for many years and have even proven successful at other sites at MCB Camp Pendleton. In addition, there is an adequate amount of unoccupied space to the south of Buildings 52561 and 52655 which is the anticipated location of the air sparging system. Sparge wells would be screened relatively shallow (approximately 25 to 30 feet below ground surface) and could be readily installed using available drilling and/or direct push techniques.

Cost. The capital costs associated with constructing the air sparging containment system, preparation of a work plan, sampling and analysis plan, quality assurance project plan, health and safety plan, and long-term monitoring plan. The O&M costs include labor, operation of the air sparging system, maintenance, material, shipping, analysis, waste disposal, data validation, and report preparation. The costs for operating the air sparging containment system will only be incurred in the event that natural attenuation processes do not sufficiently stabilize the PCE plume. If it is determined necessary, the total cost for implementing the air sparging containment system is \$1,587,660. Table 2 provides a summary of the costs associated with implementing the air sparging containment system.

5.3.3 Groundwater and Soil Vapor Extraction and Treatment. This alternative involves actively removing contaminant mass by extracting groundwater and soil gas from the subsurface. Conventional vertical extraction wells and a series of SVE wells would be used to pump groundwater and soil gas from the saturated and vadose zones, respectively. VOCs would be removed from both groundwater and soil gas prior to discharging each media. Concentrations in the waste stream are likely to decrease quickly, therefore carbon adsorption would be the most cost-effective, long-term VOC mass removal technology.

Effectiveness. The groundwater and soil vapor extraction and treatment would actively reduce contaminant mass and would also provide some degree of hydraulic containment. The implementation of this alternative would result in the overall reduction of contaminant mass in the subsurface and would likely increase the ability of natural attenuation processes to effectively control contaminant migration and over time degrade PCE in groundwater to levels that meet MCLs.

Implementability. This alternative is moderately implementable and would result in little impact to nearby buildings and utilities. Closely spaced wells would be installed in large-diameter boreholes by a bucket auger, which would reduce the detriment of a cobble layer to well installation. However, overly large boulders could still preclude the installation of wells within certain locations on the site. There is adequate space for the treatment system and equipment and services are readily available. While the occurrence of cobbles and boulders in the upper 10 to 12 feet could preclude the installation of wells in certain areas of the site (i.e., locations that overly large boulders), there are no other significant impediments to this approach. Therefore, Alternative 33-3 is considered moderately implementable.

Cost. It is estimated that 10 groundwater extraction wells would be installed and operated as well as six horizontal SVE wells. The capital costs include construction of the extraction and treatment system, preparation of a work plan, sampling and analysis plan, quality assurance project plan, and health and safety plan. The O&M cost includes operation and maintenance of the groundwater and SVE and treatment system, labor, maintenance, material, shipping, analysis, waste disposal, data validation, and report preparation. The total cost for implementing groundwater and SVE and treatment is \$3,191,927. Table 2 provides a summary of the costs associated with implementing the groundwater and SVE system.

5.4 Applicable or Relevant and Appropriate Requirements

Section 300.415(j) of the NCP provides that removal actions must attain applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the exigencies of

the situation. Section 300.5 of the NCP defines *applicable* requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines *relevant and appropriate* requirements as cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental, state environmental, or facility siting laws that, although not “applicable” to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well suited to the particular site.

Because CERCLA on-site response actions do not require permitting, only substantive requirements are considered as possible ARARs. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record keeping and enforcement are not ARARs for CERCLA actions confined to the site.

In accordance with U.S. EPA (1988) guidance, ARARs generally are divided into three categories: chemical-specific, location-specific, and action-specific requirements. These classifications were developed to aid in the identification of ARARs, as some ARARs do not fall precisely into one category or another. ARARs are identified on a site-specific basis for remedial actions where CERCLA authority is the basis for cleanup.

The DON identified federal and State of California ARARs for the NTCRA planned at Site 33 from the body of regulations, requirements, and guidance that govern removal actions. In preparing the ARARs analysis (Appendix A), the DON undertook the following measures, consistent with CERCLA and the NCP:

- Reviewed potential state ARARs for similar removal action excavation projects to determine whether they satisfy CERCLA and NCP criteria that must be met in order to constitute state ARARs;
- Evaluated and compared federal ARARs and their state counterparts to determine whether state ARARs are more stringent than the federal ARARs; and
- Reached a conclusion as to which federal and state ARARs are the most stringent and/or “controlling” ARARs for the planned excavation activities.

5.5 Project Schedule

All fieldwork associated with the removal excavation will be conducted from March 2011 to June 2011. A Gantt chart providing a detailed breakdown of each individual task associated with the removal excavation has been provided in Figure 8.

5.6 Estimated Costs

The total cost to achieve this objective includes costs associated with planning and reporting activities, site preparation, excavation, bioreactor installation, stockpiling, transportation and disposal of waste soil, backfilling, site restoration, and after action reporting. Estimated costs for each activity and the total cost for removal action implementation are summarized in Table 2.



Figure 8. Schedule of Source Area Removal Excavation and Bioreactor Installation Field Activities at Site 33

**Section 6.0: EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE
DELAYED OR NOT TAKEN**

If action should be delayed or not taken, the extent of PCE in groundwater could potentially increase which will likely result in a larger plume. If the plume is allowed to migrate without active remediation, the dissolved PCE mass will spread out over a larger area, such that the proposed excavation volume and areal extent would not achieve the same level of effectiveness described in Section 5.2. In addition, if DNAPL sources are present, delaying the excavation may result in the migration of DNAPL, increases in the total dissolved PCE mass, as well as increases in PCE mass present in soil gas.

Section 7.0: PUBLIC INVOLVEMENT AND PARTICIPATION

This AM was made available for a 30 day public review and comment period from May 10, 2010 to June 8, 2010. Prior to the start of the public review period, an announcement of the planned NTCRA and associated public comment period was made available in the *North County Times* and online at the *Scout Newspaper* one week before the public comment period began. Nearby residents and interested parties were encouraged to submit written comments on the AM during the 30-day comment period, however, no comments were received. A copy of the report is available at the MCB Camp Pendleton Information Repositories, located at:

Oceanside Public Library

330 N Coast Hwy
Oceanside, CA 92054
(760) 435-5600

Environmental Security Office

Building 22165
MCB Camp Pendleton, CA 92055-5008
(760) 725-9744

Section 8.0: OUTSTANDING POLICY ISSUES

There are no outstanding policy issues at Site 33.

Section 9.0: RECOMMENDATION

This decision document presents the selected removal action for Site 33 at MCB Camp Pendleton, which was developed in accordance with CERCLA as amended and is consistent with the NCP. This AM provides information relating to the selection of the proposed action at Site 33. Based on the results of the comprehensive evaluation of alternatives conducted in the Final Site 33 EE/CA (Battelle, 2010), four removal action alternatives were identified in this AM, including:

- No action
- Air sparging
- Groundwater and soil vapor extraction and treatment
- Source area excavation and bioreactor installation

Of the four alternatives, source area excavation and bioreactor installation was selected as the proposed action. This alternative provides the highest level of effectiveness because it will permanently remove DNAPL that may serve as a continuing source, result in the incidental removal of a majority of dissolved VOC mass, and provides the bioreactor as a polishing step to address residual mass. While the overall cost for implementing this alternative is the highest, the immediate and permanent removal of potential sources and the reduction in contaminant mass will significantly reduce the time required to achieve cleanup goals for groundwater. Furthermore, this alternative is readily implementable and will achieve the RAOs developed for this removal action at Site 33.



N.F. Marano, Colonel
United States Marine Corps
Commanding Officer
Marine Corps Base Camp Pendleton

8 July 2010
Date

Section 10.0: REFERENCES

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APPENDIX A

**APPLICABLE AND RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)
FOR THE NON-TIME CRITICAL REMOVAL ACTION AT SITE 33**

CHEMICAL-SPECIFIC ARARS

Table 1. Federal Chemical-Specific^a ARARs by Medium at Site 33

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
GROUNDWATER				
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]-300[j]-26)^c National primary drinking water standards are health-based standards for public water systems (MCLs).	Public water system.	40 CFR 141.61(a)	Relevant and Appropriate	Site 33 groundwater is considered a drinking ground water source; therefore, the MCL for PCE and its degradation products (i.e., TCE, cis-1,2-DCE, trans-1,2-DCE, and vinyl chloride) are relevant and appropriate. Not an ARAR for PCE since the MCLG is zero. However, an ARAR for daughter products of PCE degradation for cis-1,2-DCE and trans-1,2-DCE. SMCLs are federal contaminant levels intended as guidelines for the states. Because they are not enforceable, federal SMCLs are not ARARs.
MCLGs pertain to known or anticipated adverse health effects (also known as recommended MCLs).	Public water system.	40 CFR § 141.50(a)	Relevant and Appropriate	
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system.	40 CFR § 143.3	Not an ARAR	
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901-6991[j])^c Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste	CCR Title 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste is hazardous.
Groundwater protection standards: Owners/operators of RCRA treatment, storage, or disposal facilities must comply with conditions in this section that are designed to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern set forth under Cal. Code Regs. tit. 22, § 66264.94 in the uppermost aquifer underlying the waste management area of concern at the POC.	A regulated unit that receives or has received hazardous waste before 26 July 1982 or regulated units that ceased receiving hazardous waste prior to 26 July 1982 where constituents in or derived from the waste may pose a threat to human health or the environment.	CCR Title 22, § 66264.94, except 66264.94(a)(2) and 66264.94(b)	Relevant and Appropriate	Not applicable since Site 33 is not a regulated unit. Relevant and appropriate because some pollutants of concern are RCRA regulated parameters. Background concentrations were determined to be NOT technologically and economically feasible. The lowest achievable concentration at Site 33 is the MCL. However, background levels will most likely be met over time throughout the entire plume.

Table 1. Federal Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation^b	ARAR Determination	Comments
The POC is a vertical surface located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit.	Hazardous waste treatment or disposal.	CCR Title 22, § 66264.95	Relevant and Appropriate	Relevant and appropriate for cleanup levels for the sites.
Comprehensive Environmental Response, Compensation, and Liability Act (42 USC, ch. 103, §§ 9601–9675)^c				
ACLs using a point of exposure beyond the facility boundary.	Known or projected points of entry from groundwater to surface water.	CERCLA Section 121(d)(2) (B)(ii) 42 USC, ch. 103, § 9621	Not an ARAR	Applicable as outlined under prerequisites. Allows a risk-based approach to setting alternative concentration limits based on a surface water discharge pathway. Not necessary since no surface water at Site 33.
Clean Water Act of 1977, as Amended (33 USC, ch. 26, §§ 1251–1387)^c				
National Ambient Water Quality Criteria.	Discharges to waters of the United States and groundwater.	33 USC § 1314(a) and 42 U.S.C. § 9621(d)(2) 64 Fed. Reg. 19,781 (22 April 1999)	Not an ARAR	Site 33 groundwater chemicals of concern have MCLs and ambient water quality criteria are not necessary.
SOIL				
Resource Conservation and Recovery Act (42 USC, ch. 82, §§ 6901–6991[i])^c				
Defines RCRA hazardous waste. A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste.	CCR Title 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether waste soil, if generated, is hazardous.

Table 1. Federal Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
AIR				
Clean Air Act (42 U.S.C., ch. 85, §§ 7401–7671)^c				
Provisions of SIP approved by US EPA under Section 110 of CAA.	Major sources of air pollutants.	42 USC § 7401; portions of 40 C.F.R. § 52.220 applicable to San Diego APCD	Applicable	See pertinent specific provisions of the SIP below
No person shall discharge into the atmosphere from any single source of emissions, for more than 3 minutes in any 60-minute period, any air contaminant that is darker than number 1 on the Ringlemann chart.	Discharge of any air contaminant other than uncombined water vapor.	APCD Rule 50(d)(1)	Applicable	Applicable to emissions that may be caused by soil movement and storage for Site 33

Notes:

^a many action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables

^b only the substantive provisions of the requirements cited in this table are ARARs

^c statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs; specific ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered ARARs.

Acronyms/Abbreviations:

ARAR	applicable or relevant and appropriate requirement	NPDES	National Pollutant Discharge Elimination System
BAT	best available technology	OU	operable unit
BCPCT	best conventional pollution control technology	PCB	polychlorinated biphenyl
CAA	Clean Air Act	POC	point of compliance
CCR	<i>California Code of Regulations</i>	ppm	parts per million
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	ppmw	parts per million by weight
CFR	<i>Code of Federal Regulations</i>	pt.	part
ch.	chapter	R3M	Range Rule Risk Methodology
COC	chemical of concern	RAO	remedial action objective
CWA	Clean Water Act	RCRA	Resource Conservation and Recovery Act
DoD	Department of Defense	RWQCB	(California) Regional Water Quality Control Board San Diego Region
DON	Department of the Navy	§	section
Fed. Reg.	<i>Federal Register</i>	SIP	State Implementation Plan
LDR	land disposal restriction	SMCL	secondary maximum contaminant level

Table 1. Federal Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

MCL	maximum contaminant level	subpt.	subpart
MCLG	maximum contaminant level goal	TBC	to be considered
NAAQS	National Ambient Air Quality Standards (primary and secondary)	TCLP	toxicity characteristic leaching procedure
		tit.	title
NCP	National Oil and Hazardous Substances Pollution Contingency Plan	U.S.C.	<i>United States Code</i>
		U.S. EPA	United States Environmental Protection Agency
		UXO	unexploded ordnance
		VOC	volatile organic compound

Table 2. State Chemical-Specific^a ARARs by Medium at Site 33

Requirement	Prerequisite	Citation^b	ARAR Determination	Comments
GROUNDWATER, SURFACE WATER, SOIL, SEDIMENTS, AND AIR				
Cal/EPA Department of Toxic Substances Control^c				
Definition of “non-RCRA hazardous waste.”	Waste.	CCR Title 22, § 66261.22(a)(3) and (4), § 66261.24(a)(2)–(a)(8), § 66261.101, § 66261.3(a)(2)(C) or § 66261.3(a)(2)(F)	Applicable	Substantive provisions are applicable for determining whether a waste is a non-RCRA hazardous waste.
State MCL list.	Source of drinking water.	CCR Title 22, §64444	Not an ARAR	The state MCLs are not more stringent than the Federal MCLs for Site 33 groundwater chemicals of concern.

Table 2. State Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
State and Regional Water Quality Control Boards^c				
<p>Authorizes the SWRCB and RWQCB to establish in water quality control plans beneficial uses and numerical and narrative standards to protect both surface water and groundwater quality. Authorizes regional water boards to issue permits for discharges to land or surface or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality.</p>		<p>Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act)</p>	<p>Applicable</p>	<p>The DON accepts the substantive provisions of §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act as enabling legislation, as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the Basin Plan for the San Diego Region, as ARARs.</p>
		<p>Cal. Water Code, div. 7, § 13304</p>	<p>Not an ARAR</p>	<p>Section 13304 does not constitute an ARAR because it does not itself establish or contain substantive environmental “standards, requirements, criteria or limitations” (CERCLA Section 121) and is not in itself directive in intent. In addition, Section 13304 is not more stringent than the substantive requirements of the state and federal ARARs identified in this table.</p>
<p>Describes the water basins in San Diego establishes beneficial uses of groundwater and surface water, establishes WQOs, including narrative and numerical standards, establishes implementation plans to meet WQOs and protect beneficial uses, and incorporates statewide water quality control plans and policies.</p>		<p>Water Quality Control Plan for the San Diego Basin (9) (Basin Plan) (Cal. Water Code § 13240) Chapters 2 and 3</p>	<p>Applicable</p>	<p>Substantive requirements pertaining to beneficial uses and WQOs are state ARARs for the surface water and groundwater components of this response action.</p>

Table 2. State Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
<p>Establishes the policy that high-quality waters of the state “shall be maintained to the maximum extent possible” consistent with the “maximum benefit to the people of the State.” It provides that whenever the existing quality of water is better than that required by applicable water quality policies, such existing high-quality water will be maintained until it has been demonstrated to the state that any change will be consistent with maximum benefit to the people of the state, will not unreasonably affect present and anticipated beneficial use of such water, and will not result in water quality less than that prescribed in the policies. It also states that any activity that produces or may produce a waste or increased volume or concentration of waste and that discharges or proposes to discharge to existing high-quality waters will be required to meet waste-discharge requirements that will result in the best practicable treatment or control of the discharge.</p>		<p>Statement of Policy With Respect to Maintaining High Quality of Waters in California, SWRCB Res. 6816</p>	<p>Not an ARAR</p>	<p>Not an ARAR for existing contamination or further migration of existing contaminant plumes in groundwater. No new discharges are proposed.</p>

Table 2. State Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation ^b	ARAR Determination	Comments
<p>Describes requirements for RWQCB oversight of investigation and cleanup and abatement activities resulting from discharges of hazardous substances. RWQCB may decide on cleanup and abatement goals and objectives for the protection of water quality and beneficial uses of water within each region. Establishes criteria for “containment zones” where cleanup to established water-quality goals is not economically or technically practicable.</p>		<p>Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304, SWRCB Res. 92-49</p>	<p>Not an ARAR</p>	<p>Not an ARAR for groundwater cleanup if CCR Title 22, § 66264.94(c) is determined to be a federal ARAR because SWRCB Res. 92-49 is not more stringent</p>
<p>Incorporated into all regional board basin plans. Designates all groundwater and surface waters of the state as drinking water except where the TDS is greater than 3,000 ppm, the well yield is less than 200 gpd from a single well, the water is a geothermal resource or in a water conveyance facility, or the water cannot reasonably be treated for domestic use using either best management practices or best economically achievable treatment practices.</p>		<p>SWRCB Res. 88-63 (Sources of Drinking Water Policy)</p>		
<p>Establishes concentration limits for cleanup actions, including groundwater, surface water, and the unsaturated zones for other than hazardous waste at background. Allows a higher cleanup limit (but not to exceed MCLs) if background is not technically or economically achievable.</p>		<p>CCR Title 27, §§ 20380(a); 20400(a), (c), (d), (e), and (g)</p>	<p>Not an ARAR</p>	<p>Not more stringent than federal regulations at CCR Title 22, § 66264.94.</p>

Table 2. State Chemical-Specific^a ARARs by Medium at Site 33 (Continued)

Requirement	Prerequisite	Citation^b	ARAR Determination	Comments
Establishes concentration limits for cleanup actions, including groundwater, surface water, and the unsaturated zones for hazardous waste at background. Allows a higher cleanup limit (but not to exceed MCLs) if background is not technically or economically achievable.		CCR Title 23, §§ 2550(a); 2550.4(d), (e), and (f)	Not an ARAR	CCR Title 23, § 2550(a) addresses in general applicability of other standards in Chapter 15 and does not contain standards itself. CCR Title 23, §§ 2550.4(d), (e), and (f) are not more stringent than federal ARARs at CCR Title 22, § 66264.94.
Definitions of designated waste, nonhazardous waste, and inert waste.		CCR Title 27, §§ 20210, 20220, and 20230	Applicable	Substantive provisions are applicable for classifying waste for off site disposal.

Notes:

- a. many action-specific ARARs contain chemical-specific limitations and are addressed in the action-specific ARAR tables
- b. only the substantive provisions of the requirements cited in this table are ARARs
- c. statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs; specific ARARs are addressed in the table below each general heading; only pertinent substantive requirements of specific citations are considered ARARs

Acronyms/Abbreviations:

ARAR	applicable or relevant and appropriate requirement
CCR	<i>California Code of Regulations</i>
Cal/EPA	California Environmental Protection Agency
Cal. Water Code	<i>California Water Code</i>
CERCLA and Liability Act	Comprehensive Environmental Response, Compensation, and Liability Act
div.	division
DON	Department of the Navy
Gpd	gallons per day
MCL	maximum contaminant level
NPDES	National Pollutant Discharge Elimination System
OU	operable unit
ppm	parts per million
RCRA	Resource Conservation and Recovery Act

Res.	Resolution
RWQCB	(California) Regional Water Quality Control Board
§	section
SIP	State Implementation Plan
SWRCB	(California) State Water Resources Control Board
TDS	total dissolved solids
tit.	title
WQO	water quality objective

LOCATION-SPECIFIC ARARS

Table 3. Federal Location-Specific ARARs for Site 33

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470–470x-6)^b					
Historic project owned or controlled by federal agency	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing on the National Register of Historic Places.	Property included in or eligible for the National Register of Historic Places.	16 USC § 470–470x-6 36 CFR pt. 800 40 CFR § 6.301(b)	Not an ARAR	Site 33 is not included on or eligible for the Register of Historic Places.
Archaeological and Historic Preservation Act (16 U.S.C. § 469–469c-1)^b					
Within area where action may cause irreparable harm, loss, or destruction of significant artifacts	Construction on previously undisturbed land would require an archaeological survey of the area. Data recovery and preservation would be required if significant archaeological or historical data were found on-site. The responsible official or Secretary of the Interior is authorized to undertake data recovery and preservation.	Regulated alteration of terrain caused as a result of a federal construction project or federally licensed activity or program where action may cause irreparable harm, loss, or destruction of significant artifacts.	16 USC § 469–469c-1 40 CFR § 6.301(c)	Not an ARAR	Site 33 is a developed area. Previous surveys of the Base have not indicated Site 33 as a concern for archaeological resources.
Archaeological Resources Protection Act of 1979, as Amended (16 U.S.C. § 470aa–470mm)^b					
Archaeological resources on federal land	Prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such action is conducted pursuant to a permit.	Archaeological resources on federal land.	Pub. L. No. 96-95 16 USC § 470aa–470mm	Not an ARAR	No archaeological resources have been identified. Site 33 is a developed site and there is no data indicating the presence of archaeological resources.

Table 3. Federal Location-Specific ARARs for Site 33 (Continued)

Location	Requirement	Prerequisite	Citation^a	ARAR Determination	Comments
Exec. Order No. 11990, Protection of Wetlands^b					
Wetland	Action to minimize the destruction, loss, or degradation of wetlands.	Wetland meeting definition of Section 7.	40 CFR § 6.302(a)	Not an ARAR	Site 33 is upgradient of the San Onofre Creek however, the proposed action is not expected to affect the wetlands.
Exec. Order No. 11988, Floodplain Management^b					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values	Action that will occur in a floodplain (i.e., lowlands) and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFT § 6.302(b) 40 CFR pt. 6, app. A, excluding § 6(a)(2), 6(a)(4), and 6(a)(6)	Not an ARAR	Site 33 is not located in a floodplain; therefore, not an ARAR.
Clean Water Act of 1977, as Amended, Section 404 (33 U.S.C. § 1344)^b					
Wetland	Action to prohibit discharge of dredged or fill material into wetland without permit	Wetland as defined by Exec. Order No. 11990 Section 7.	33 USC § 1344	Not an ARAR	No dredging or fill proposed.
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])^b					
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	CCR Title 22, § 66264.18(b)	Not an ARAR	Site 33 is not located in a floodplain; therefore, not an ARAR
Wild and Scenic Rivers Act (16 U.S.C. §§ 1271–1287)^b					
Within area affecting national wild, scenic, or recreational river	Avoid taking or assisting in action that will have direct adverse effect on scenic rivers.	Activities that affect or may affect any of the rivers specified in 16 U.S.C. § 1276(a).	16 USC §§ 1271-1287	Not an ARAR	None of the listed rivers are at MCB Camp Pendleton.

Table 3. Federal Location-Specific ARARs for Site 33 (Continued)

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
Fish and Wildlife Coordination Act (16 U.S.C. §§ 661–666c)^b					
Area affecting stream or other water body	Action taken should protect fish or wildlife.	Diversion, channeling, or other activity that modifies a stream or other water body and affects fish or wildlife.	16 USC § 662	Not an ARAR	No diversion, channeling, or other activity to modify a stream or water body is proposed.
Rivers and Harbors Act of 1899 (33 U.S.C. §§ 401–413)^b					
Navigable waters	Permits required for structures or work in or affecting navigable waters.	Activities affecting navigable waters.	33 USC § 403 33 CFR § 322	Not an ARAR	Site 33 is not located near the coast.
Endangered Species Act of 1973 (16 U.S.C. §§ 1531–1543)^b					
Habitat upon which endangered species or threatened species depend	Federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of critical habitat. The Endangered Species Committee may grant an exemption for agency action if reasonable mitigation and enhancement measures such as propagation, transplantation, and habitat acquisition and improvement are implemented.	Determination of effect upon endangered or threatened species or its habitat. Critical habitat upon which endangered species or threatened species depend.	16 USC § 1536(a), (h)(1)(B)	Not an ARAR	Although San Onofre Creek, downgradient to Site 33, has known arroyo toad habitat, the proposed action is not expected to affect the habitat.

Table 3. Federal Location-Specific ARARs for Site 33 (Continued)

Location	Requirement	Prerequisite	Citation^a	ARAR Determination	Comments
Migratory Bird Treaty Act of 1972 (16 U.S.C. §§ 703–712)^b					
Migratory bird area	Protects almost all species of native migratory birds in the U.S. from unregulated “take,” which can include poisoning at hazardous waste sites.	Presence of migratory birds.	16 USC § 703	Not an ARAR	Not an ARAR at Site 33 because no migratory birds have been observed in the vicinity and there is no habitat present at the site.
Marine Mammal Protection Act (16 U.S.C. §§ 1361–1421h)^b					
Marine mammal area	Protects any marine mammal in the U.S. except as provided by international treaties from unregulated “take.”	Presence of marine mammals.	16 USC § 1372(a)(2)	Not an ARAR	Site 33 is not located near marine water bodies.
Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended (16 U.S.C. §§ 1801–1882)^b					
Fishery under management	Provides for conservation and management of specified fisheries within specified fishery conservation zones.	Presence of managed fisheries.	16 USC §§ 1801–1882	Not an ARAR	Site 33 is not is located near managed fisheries.
National Wildlife Refuge System Administration Act of 1996 (16 U.S.C. § 668dd–668ee)^b					
Wildlife refuge	No person shall take any animal or plant on any national wildlife refuge, except as authorized under 50 C.F.R. § 27.51. The disposing or dumping of wastes is prohibited.	Area designated as part of National Wildlife Refuge System.	16 USC § 668dd–668ee Substantive provisions of 50 CFR § 27.11–27.97	Not an ARAR	Site 33 is not within a wildlife refuge.
Wilderness Act (16 U.S.C. §§ 1131–1136)^b					
Wilderness area	Area must be administered in such a manner as will leave it unimpaired as wilderness and preserve its wilderness character.	Federally owned area designated as wilderness area.	16 USC §§ 1131–1136 50 CFR §§ 35.1–35.14	Not an ARAR	Site 33 is not within a wilderness area.

Table 3. Federal Location-Specific ARARs for Site 33 (Continued)

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
Coastal Zone Management Act (16 U.S.C. §§ 1451–1464)^b					
Within coastal zone	Conduct activities in a manner consistent with approved state management programs.	Activities affecting the coastal zone including lands thereunder and adjacent shore land.	16 USC § 1456(c) 15 CFR § 930	Not an ARAR	Site 33 is not within the coastal zone.
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])^b					
Within salt dome formation, underground mine, or cave	Placement of noncontainerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement.	CCR Title 22, § 66264.18(c)	Not an ARAR	No salt domes or underground mines or caves have been identified at Site 33.
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage, or disposal of hazardous waste prohibited.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	CCR Title 22, § 66264.18(a)	Not an ARAR	Site 33 is not within 200 feet of a Holocene fault.

Notes:

- a. Only the substantive provisions of the requirements cited in this table are ARARs.
- b. Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs: specific ARARs are addressed in the table below each general heading: only substantive requirements of the specific citations are considered ARARs.

Acronyms/Abbreviations:

app.	appendix
ARAR	applicable or relevant and appropriate requirement
CCC	California Coastal Commission
CCR	<i>California Code of Regulations</i>
CFR	<i>Code of Federal Regulations</i>
DON	Department of the Navy
Exec. Order No.	executive order number
FEMA	Federal Emergency Management Agency
pt.	part
Pub. L. No.	public law number
RCRA	Resource Conservation and Recovery Act
§	section
US	United States
USC	<i>United States Code</i>

Table 4. State Location-Specific ARARs

Location	Requirement	Prerequisite	Citation ^a	ARAR Determination	Comments
California Endangered Species Act (Cal. Fish & Game Code §§ 2050–2116)^b					
Endangered species habitat	No person shall import, export, take, possess, or sell any endangered or threatened species or part or product thereof.	Threatened or endangered species determination on or before 01 January 1985 or a candidate species with proper notification.	Cal. Fish & Game Code § 2080	Not an ARAR	The arroyo toad is not California listed species. The proposed action is not expected to affect endangered species.
Other California Fish and Game Requirements					
	Prohibits the passage of enumerated substances or materials into waters of the state deleterious to fish, plant life, or birds.		Fish and Game Code section 5650 (a) and (f)	Not an ARAR	Proposed action is not expected to allow passage of substances to waters of the state.
	Prohibits the taking of birds and mammals, including the taking by poison.		Fish and Game Code section 3005(a)	Not an ARAR	The proposed action is not expected to affect the protected species.
	It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided		Fish and Game Code section 3503	Not an ARAR	The proposed action is not expected to affect the protected species.
	It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided		Fish and Game Code section 3503.5	Not an ARAR	The proposed action is not expected to affect the protected species.

Table 4. State Location-Specific ARARs (Continued)

Location	Requirement	Prerequisite	Citation^a	ARAR Determination	Comments
	It is unlawful to take non-game birds except as provided.		Fish and Game Code section 3800(a)	Not an ARAR	The proposed action is not expected to affect the protected species.
	A fur-bearing mammal may be taken only with a trap, a firearm, bow and arrow, poison under a proper permit, or with the use of dogs.		Fish and Game Code section 4002	Not an ARAR	The proposed action is not expected to affect the protected species.
	Non-game mammals may not be taken or possessed except as provided.		Fish and Game Code section 4150	Not an ARAR	The proposed action is not expected to affect the protected species.

Notes:

- a. Only the substantive provisions of the requirements cited in this table are ARARs
- b. Statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs; specific ARARs follow each general heading; only substantive requirements of the specific citations are considered ARARs.

Acronyms/Abbreviations:

ARAR	applicable or relevant and appropriate requirement
CCR	<i>California Code of Regulations</i>
Cal. Fish & Game Code	<i>California Fish and Game Code</i>
Cal. Pub. Res. Code	<i>California Public Resources Code</i>
CCC	California Coastal Commission
DON	Department of the Navy
§	section

ACTION-SPECIFIC ARAR

Table 5. Federal Action-Specific ARARs

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Resource Conservation and Recovery Act (42 USC §§ 6901–6991[i])*					
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generator of waste.	CCR Title 22, § 66262.10(a), 66262.11	Applicable	Applicable for operations where waste soil or groundwater is generated. The determination of whether groundwater and/or wastes generated during remedial activities, such as soil cutting from well installation and treatment residues, are hazardous will be made at the time the wastes are generated.
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	CCR Title 22, § 66264.13(a) and (b)	Applicable	Applicable for characterizing generated waste soil or groundwater.
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers in accordance with § 66262.171–178 or in tanks, on drip pads, inside buildings, is labeled and dated, etc.	Accumulate hazardous waste.	CCR Title 22, § 66262.34	Applicable	Applicable for any operation where hazardous waste is generated and stored in containers. Generated waste soil or groundwater that has the potential to be hazardous waste will be handled as hazardous during characterization. Waste determined to be hazardous will be disposed of within 90 days.

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Container storage	Containers of RCRA hazardous waste must be: <ul style="list-style-type: none"> • maintained in good condition, • compatible with hazardous waste to be stored, and • closed during storage except to add or remove waste. 	Storage of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere, in a container.	CCR Title 22, § 66264.171, .172, .173	Applicable	Applicable for temporary storage of soil or groundwater waste during characterization or, if hazardous, prior to off-site disposal. Temporary storage requirements may be modified by 264.553 below.
	Inspect container storage areas weekly for deterioration.		CCR Title 22, § 66264.174	Applicable	Applicable for temporary storage of soil or groundwater waste during characterization or, if hazardous, prior to off-site disposal. Temporary storage requirements may be modified by 264.553 below.
	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment of least a 24-hour, 25-year storm plus 10 % of the aggregate volume of all containers or the volume of the largest container, whichever is greater. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system. Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.	Storage in a container of RCRA hazardous waste not meeting small-quantity generator criteria before treatment, disposal, or storage elsewhere.	CCR Title 22, § 66264.175(a) and (b)	Applicable	Applicable for temporary storage of soil or groundwater waste during characterization or, if hazardous, prior to off-site disposal. Temporary storage requirements may be modified by 264.553 below.
			CCR Title 22, § 66264.177	Applicable	Applicable for temporary storage of soil or groundwater waste during characterization or, if hazardous, prior to off-site disposal. Temporary

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Tank system	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.		CCR Title 22, § 66264.178	Applicable	storage requirements may be modified by 264.553 below. Applicable for temporary storage of soil or groundwater waste during characterization or, if hazardous, prior to off-site disposal. Temporary storage requirements may be modified by 264.553 below. Substantive provisions are applicable for temporary storage or treatment of groundwater in a tank.
Tank system	In order to prevent the release of hazardous waste or hazardous constituents to the environment, secondary containment shall be provided for tanks that is designed, installed, and operated to prevent any migration of wastes or accumulated liquid out of the system to the soil, groundwater or surface water at any time during the use of the tank system; and capable of detecting and collecting releases and accumulated liquids until the collected material is removed.		CCR Title 22, § 66264.193	Applicable	
Clean closure	Remove or decontaminate all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste.	Staging pile closure	CCR Title 22, § 66264.258(a)	Applicable	Applicable for the closure of temporary staging piles.

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
	Minimize the need for further maintenance controls and minimize or eliminate, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to groundwater or surface water or to the atmosphere.	Staging pile closure	CCR Title 22, § 66264.111(a)	Applicable	Applicable for the closure of temporary staging piles.

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Container storage	Minimize the need for further maintenance controls and minimize or eliminate, to the extent necessary to protect human health and the environment, postclosure escape of hazardous waste, hazardous constituents, leachate, contaminated rainfall or runoff, or waste decomposition products to groundwater or surface water or to the atmosphere.	Staging pile closure	CCR Title 22, § 66264.111(a)	Applicable	Applicable for the closure of temporary staging piles.
	Alternative requirements that are protective of human health or the environment may replace design, operating, or closure standards for temporary tanks and container storage areas.			CCR Title 22, § 66264.553(b), (d), (e), and (f)	Applicable
Staging piles	Allows generators to accumulate solid remediation waste in a U.S. EPA-designated pile for storage only, up to 2 years, during remedial operations without triggering LDRs.	Hazardous remediation waste temporarily stored in piles.	40 CFR § 264.554(d)(1)(i–ii) and (d)(2), (h), (i), (j), and (k)	Applicable	Applicable for soil excavated and staged prior to characterization and off-site disposal.
Monitoring	Owners/operators of RCRA surface impoundment, waste pile, land treatment unit, or landfill shall conduct a monitoring and response program for each regulated unit.	Surface impoundment, waste pile, land treatment unit, or landfill for which constituents in or derived from waste in the unit may pose a threat to human health or the environment.	CCR Title 22, § 66264.91(a)(1), (2), (3), (4), (b), and (c), except as it cross-references permit requirements	Relevant and Appropriate	Relevant and appropriate for Site 33 monitoring.

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Point of compliance	The POC is a vertical surface, located at the hydraulically downgradient limit of the waste management area that extends through the uppermost aquifer underlying the regulated unit.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.95(a) and (b)	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.
Monitoring	Requirements for monitoring groundwater, surface water, and the vadose zone.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.97[b][1][A], [b][1][D][1] and [2], [b][4]–[7], [e][6], [12][A] and [B], [13], and [15]	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.
	Requirements for a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.98[e][1]–[5], [i], [j], [k][1]–[3], [4][A] and [D],[5], [7][C]and[D],[n][1],[2][B] and [C])	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.
	Requirements for an evaluation monitoring program.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.99[b], [e][1]– [6], [f][3], and [g]	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.

Table 5. Federal Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
Corrective action	The owner or operator shall establish and implement, in conjunction with the corrective action measures, a water quality monitoring program that will demonstrate the effectiveness of the corrective action program and be effective in determining compliance with the water quality protection standard and in determining the success of the corrective action measures under subsection (c) of this section.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.100(d)	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.
Completion of response action	The corrective action program is complete when compliance with the water quality standard is demonstrated based on the results of sampling and analysis for all constituents of concern for a period of 1 year.	Hazardous waste treatment, storage, or disposal facility.	CCR Title 22, § 66264.100(g)(1)	Relevant and Appropriate	Not applicable because the site is not a hazardous waste management unit. Relevant and appropriate for groundwater monitoring for Site 33.
Discharge of storm water	Owners and operators of construction activities must be in compliance with discharge standards.	Construction disturbing 1 or more acres.	CWA Section 402 (33 USC ch. 26, § 1342); 40 CFR § 122.44(k)(2) and (4)	Applicable	Substantive provisions for BMPs and the storm water management plan to implement them are applicable.
Discharge to Sanitary Sewer	Pretreatment requirements for discharge to a publicly owned treatment works (POTW)		CWA 307 (33 USC 1251 et seq); 40 CFR § 403	Applicable	Substantive provisions are applicable for the discharge of treated groundwater to the sewer that flows to the San Onofre Sewage Treatment Plant (11).
Discharge of VOC to air			APCD Rule 20.4	Applicable	Substantive provisions are applicable for the handling and treatment of groundwater.

Table 5. Federal Action-Specific ARARs (Continued)

Note:

* statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader. Listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs; specific ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered ARARs.

Acronyms/Abbreviations

A	applicable	PCB	polychlorinated biphenyl
ARAR	applicable or relevant and appropriate requirement	PM ₁₀	particulate matter, less than 10 micrometers in diameter
BAAQMD	Bay Area Air Quality Management District	POC	point of compliance
BACT	best available control technology	ppm	parts per million
BDAT	best demonstrated available technology	ppm _w	parts per million by weight
CAA	Clean Air Act	pt.	part
CAMU	corrective action management unit	Pub. L. No.	public law number
CCR	<i>California Code of Regulations</i>	RA	relevant and appropriate
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	RAO	remedial action objective
CFR	<i>Code of Federal Regulations</i>	RCRA	Resource Conservation and Recover Act
ch.	chapter	RI	remedial investigation
CWA	Clean Water Act	§	section
DON	Department of the Navy	SCAQMD	South Coast Air Quality Management District
EE/CA	Engineering Evaluation/Coast Analysis	SDAPCD	San Diego Air Pollution Control Act
°F	degrees Fahrenheit	SDWA	Safe Drinking Water Act
FS	feasibility study	SIP	State Implementation Plan
IR	Installation Restoration (Program)	subpt.	Subpart
kg/day	kilograms per day	TBC	to be considered
LAER	lowest achievable emission rate	TCE	trichloroethene
LDR	land disposal restriction	TSCA	Toxic Substances Control Act
MCAS	Marine Corps Air Station	UIC	underground injection control
MCL	maximum contaminant level	US	United States
mg/dscm	milligrams per dry standard cubic meter	USC	<i>United States Code</i>
NAAQS	National Ambient Air Quality Standards (primary and secondary)	USDW	underground source of drinking water
NPDES	National Pollutant Discharge Elimination System	USEPA	United States Environmental Protection Agency
OU	operable Unit	VOC	volatile organic compound

Table 6. State Action-Specific ARARs

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
State Water Resources Control Board and Regional Water Quality Control Board*					
Excavation and Stockpiling	Implement BMPs to minimize discharges to surface water, develop and implement a stormwater pollution prevention plan, and monitor stormwater discharges.	Construction disturbing 1 or more acres.	SWRCB Order No. 99-08-DWQ (General Construction Activity Storm Water Permit)	To be Considered	Substantive provisions of BMPs, SWPPP and monitoring are TBC guidance for complying with federal and State water quality ARARs.
Discharge of VOC to air	Any new or modified portable emission unit which has any increase in its potential to emit and which unit has a post-project potential to emit 10 pounds per day or more of particulate matter (PM10), NOx, VOC, or oxides of sulfur (SOx) shall be equipped with Best Available Control Technology (BACT) for each such air contaminant.		APCD Rule 20.4(d)(i)	Not an ARAR	Not an ARAR for this remedial action since there is no potential for 10 pounds per day of VOCs since the estimated total quantity of PCE is 2 pounds.
Discharge of VOC to air	The increase in maximum incremental cancer risk at every receptor location is equal to or less than one in one million for any project for which new, relocated, or modified emission units that increases maximum incremental cancer risk are		APCD Rule 1200	Applicable	Substantive provisions are applicable for the handling and treatment of groundwater. The potential for increasing cancer risk and whether T-BACT is necessary will be determined during the remedial design.

Table 6. State Action-Specific ARARs (Continued)

Action	Requirement	Prerequisite	Citation	ARAR Determination	Comments
	not equipped with T-BACT; and (ii) Except as provided in (d)(1)(iii), the increase in maximum incremental cancer risk at every receptor location is equal to or less than 10 in one million for any project for which all new, relocated, or modified emission units that increases maximum incremental cancer risk are equipped with T-BACT.				

Notes:

- * statutes and policies, and their citations, are provided as headings to identify general categories of ARARs for the convenience of the reader; listing the statutes and policies does not indicate that the DON accepts the entire statutes or policies as ARARs; specific ARARs are addressed in the table below each general heading; only substantive requirements of the specific actions are considered ARARs.

Acronyms/Abbreviations

A	applicable	LDR	land disposal restriction
APCD	Air Pollution Control District	mg/L	milligrams per liter
AQMD	Air Quality Management District	NAWQC	National Ambient Water Quality Control
ARAR	applicable or relevant and appropriate requirement	PM ₁₀	particulate matter, less than 10 micrometers in diameter
BAT	best available technology	ppm	parts per million
BPT	best practicable treatment	Prop.	Proposition
CAI	closed, abandoned, or inactive	RA	relevant and appropriate
CCR	<i>California Code of Regulations</i>	RAO	removal action objective
Cal/EPA	California Environmental Protection Agency	RCRA	Resource conservation and Recovery Act
Cal. Fish & Game Code	<i>California Fish and Game Code</i>	Res.	Resolution
Cal. Health & Safety Code	<i>California Health and Safety Code</i>	RI	remedial investigation
Cal. Pub. Res. Code	<i>California Public Resources Code</i>	RWQCB	Regional Water Quality Control Board San Diego
Cal. Water Code	<i>California Water Code</i>	§	section

Table 6. State Action-Specific ARARs (Continued)

CAMU	corrective action management unit	SCAQMD	South Coast Air Quality Management District
CEQA	California Environmental Quality Act	SIP	State Implementation Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act	SWAT	Solid Waste Assessment Test
CFR	<i>Code of Federal Regulations</i>	SWRCB	(California) State Water Resources Control Board
Ch.	Chapter	T-BACT	best available control technology for toxics
CWA	Clean Water Act	TBC	to be considered
div.	division	tit.	Title
DON	Department of the Navy	TPH	total petroleum hydrocarbons
DTSC	(Cal/EPA) Department of Toxic Substances Control	USC	<i>United States Code</i>
EE/CA	engineering evaluation/cost analysis	UST	underground storage tank
FS	feasibility study	VOC	volatile organic compound
		WQO	water quality objective