DEPARTMENT OF THE NAVY
SOUTHWEST DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
1220 PACIFIC HIGHWAY
SAN DIEGO CA 92132-5190

5090
Ser 5CEN.MB/721
December 18, 2003

Ms. Beatrice Griffey
California Environmental Protection Agency
California Regional Water Quality Control Board
Mitigation & Cleanup Unit
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Mr. Tayseer Mahmoud
California Environmental Protection Agency
Department of Toxic Substance Control
Office of Military Facilities
5796 Corporate Avenue
Cypress, CA 90603

Mr. Martin Hausladen
U. S. Environmental Protection Agency
Region IX, Code SFD-8-B
75 Hawthorne Street
San Francisco, CA 94105-3901

Dear Ms. Griffey, Mr. Mahmoud, and Mr. Hausladen:

The Department of Navy is proud to present the enclosed "Draft Final Operable Unit 4 Feasibility Study for Sites 1D, 1E-1, 1H, and 30". Per section 7.2(a) of the Federal Facilities Agreement, this document becomes final either after 30 days after receipt if dispute resolution is not invoked or as modified by decision of the dispute resolution process.

Should you have any questions, please call the Department of the Navy Remedial Project Manager, Mr. Mike Bilodeau, at (619) 532-3829.

Sincerely,

Kathie Beverly

KATHIE BEVERLY
Environmental Business Line
Team Leader
By direction of the Commander

5090
Ser 5CEN.MB/721
December 18, 2003

Enclosure: Draft Final Operable Unit 4 Feasibility Study for Sites 1D, 1E-1, 1H, and 30 at Marine Corps Base Camp Pendleton, California

Copy to:
Commanding General
Assistant Chief of Staff, Environmental Security
Attn: Mr. Mark Bonsavage
Box 555008
U. S. Marine Corps Base
Camp Pendleton, CA 92055-5008

DRAFT FINAL

OPERABLE UNIT 4
FEASIBILITY STUDY FOR SITES 1D, 1E-1, 1H, AND 30
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

Volume I of II

Prepared For

NAVAL FACILITIES ENGINEERING COMMAND - SOUTHWEST DIVISION
1220 Pacific Highway, San Diego, CA 92132-5190

GSA Contract Number GS-10F-0179J
Delivery Order No. N68711-00-F7907

December 19, 2003

Prepared by

PARSONS
100 West Walnut Street
Pasadena, California 91124

DRAFT FINAL

OPERABLE UNIT 4
FEASIBILITY STUDY FOR SITES 1D, 1E-1, 1H, AND 30
MARINE CORPS BASE CAMP PENDLETON, CALIFORNIA

Prepared For

NAVAL FACILITIES ENGINEERING COMMAND - SOUTHWEST DIVISION
1220 Pacific Highway, San Diego, CA 92132-5190

GSA Contract Number GS-10F-0179J
Delivery Order No. N68711-00-F7907

Steve Griswold, R.G. #4649
Project Manager

Jim Goepel
Technical Director

December 19, 2003

Prepared by

PARSONS
100 West Walnut Street
Pasadena, California 91124

EXECUTIVE SUMMARY

This report presents the results of the Feasibility Study (FS) for the four sites within Operable Unit (OU) 4 at the Marine Corps Base Camp Pendleton, California (MCB Camp Pendleton or the Base). It summarizes additional site data that have been collected recently and provides potential remedial alternatives for each site. This report was prepared for the Naval Facilities Engineering Command, Southwest Division (SWDIV) under Government Services Agreement (GSA) Contract Number GS-10F-0179J, Delivery Order Number N68711-00-F7907.

Delivery of this document is pursuant to the MCB Camp Pendleton Federal Facilities Agreement (FFA) between the U.S. Environmental Protection Agency (USEPA), the California Environmental Protection Agency, Department of Toxic Substances Control (Cal/EPA DTSC), the San Diego Regional Water Quality Control Board (RWQCB), and the Department of Navy (DON). The FFA establishes a framework for implementing appropriate environmental response actions at the Base.

The purpose of an FS is to develop an appropriate range of waste management options and perform a detailed analysis of each option. It should be noted that the inclusion of a particular alternative in the FS does not necessarily suggest that the alternative is preferred or endorsed at this stage of the RI/FS process. Rather, an alternative is presented to compare the characteristics of each based on National Contingency Plan (NCP) criteria. A range of viable alternatives is addressed in the FS, in spite of their potential drawbacks, to allow for a full comparative analysis.

The following sites are addressed in this document:

- Site 1D – Refuse Burning Ground (20 Area)
- Site 1E-1 – Refuse Burning Ground (32 Area)
- Site 1H – Refuse Burning Ground (62 Area)
- Site 30 – Small Arms Firing Range Soil (31 Area).

As documented in the letter from the USEPA to SWDIV dated September 28, 2000 and in several FFA meeting notes (Parsons, 2000a, 2000b, 2000c), the FFA team decided that sufficient remedial investigation (RI) had been conducted for these sites. Contamination at these OU 4 sites was determined to pose a risk to human health and/or the environment, and therefore the sites require further action. Because the previous investigative studies were judged adequate for these sites, it was agreed that FS data would be collected for the purpose of developing remedial alternatives for each site. The fieldwork to collect supplemental soil and groundwater samples was conducted from August to October 2001. The field data were collected in accordance with the OU 4 Supplemental FS Field Sampling Plan (FSP), dated 22 March 2001.

Installation Restoration (IR) Site 22/23 Area Groundwater was included in the Draft version of this document but is not included in the Draft Final because the site has been moved to OU 5. Per the agreement reached at the FFA technical meeting on September 19, 2002, 22/23 Area Groundwater was moved from OU 4 to OU 5 to allow a more efficient execution of the OU 4 schedule and allow for additional data collection to support remedy selection. Specifically, additional sampling of 22/23 Area Groundwater is required to determine the possible presence of 1,2,3-trichloropropane (TCP) above the state action level. Refer to the Draft Final OU 5 FSP for additional details regarding planned sampling and data analysis (Parsons, 2003).

Contaminants present in soils at Sites 1D, 1H, and 30 are primarily metals, although dioxins also are present at the former refuse burning sites (1D, 1E-1, and 1H). This document

summarizes previous investigations and supplemental field investigation results. Based on the results, various potential remedial approaches are screened in the FS, which results in a set of alternatives for each site. In most cases, the remedial alternatives are refinements of or supplements to those in prior feasibility studies. As noted previously, the FS alternatives are evaluated against the criteria specified in the NCP and are provided to facilitate selection of appropriate remedies.

For the OU 4 sites with soil contamination, previously defined remedial goals (RGs) were used to develop the remedial alternatives. For human health protection, these RGs have been defined as the higher of the residential preliminary remediation goal (PRG) or background values. From an ecological perspective, soil RGs were defined as the higher of the ecological risk management goal or background concentration. The ecological risk management goal for each remedial chemical of concern (RCOC) was set as the most stringent preliminary limit of exposure (PLE) for the species of most concern at each site. The lower of the two values (i.e., human health and ecological) was then selected as the proposed RG for the RCOCs in soil ranging from the ground surface to a depth of 5 feet. The RG for human health protection was selected as the proposed RG for the RCOC in soils at depths ranging between 5 and 10 feet below ground surface (bgs).

The FS provides an analysis of the remedial alternatives available to clean up soil to the RGs. It provides the information needed by decision makers to select the best technically and economically feasible alternative to achieve the remedial action objectives (RAOs). Consistent with this approach, this FS focuses on cost-benefit issues such as risk reduction and impacts to beneficial use. However, it does not define final cleanup levels nor does it include an analysis aimed at selecting the final remedy. These decisions will be made during the Proposed Plan and Record of Decision (ROD) stages.

For Sites 1D, 1H, and 30, one of the remedial alternatives (Alternative 5) is "Soil Extraction, Backfill, Pretreatment, and On-Base Disposal." For this proposed alternative, identification of a specific disposal site is not necessary to meet the feasibility study requirements of evaluating the alternative. If DON chooses this as the preferred alternative, a specific on-Base disposal site would need to be located that meets statutory requirements. Therefore, an appropriate addendum document would be prepared to address disposal site compliance with applicable or relevant and appropriate requirements (ARARs), and specific pretreatment requirements, prior to preparation of the OU 4 Proposed Plan and implementation of this alternative.

The FS findings and proposed remedial alternatives are summarized below for each site.

ES.1 SITE 1D

Site 1D is a former refuse burning area located north of the intersection of Vandegrift Boulevard and Stuart Mesa Road, in the 20 Area. Chemicals of concern (COCs) detected in the past above their respective soil RGs include antimony, arsenic, chromium, copper, iron, lead, and zinc. The site is adjacent to the Santa Margarita River, within the floodplain that is subject to flooding during peak rainfall events (Kleinfelder, 1997).

The selected remedy for Site 1D in the OU 3 ROD (IT, 1999a) was excavation and removal of contaminated soils with on-Base disposal (Site 7, Corrective Action Management Unit [CAMU]). After the closure of the on-Base CAMU in April 2000, a decision was made to supplement the prior characterization of the site to refine the cost estimates and reevaluate the remedial options. Although the previous RI and FS for Site 1D had established that COCs pose a significant risk, the existing data set did not provide enough certainty regarding specific quantities and distribution of soil that exceed relevant thresholds.

Based on the data collected to date and the analyses documented in this report, the following conclusions were reached regarding Site 1D:

- The estimated volume of soils impacted above previously established RGs at Site 1D is approximately 31,300 cubic yards. The lateral extent of impacted soil is approximately 5 acres. The FS better defined the extent and volume of soil contamination that was originally identified in the OU 3 ROD (IT, 1999a).
- COCs detected in site soils above their respective RGs include antimony, arsenic, chromium, copper, iron, lead, zinc, and dioxins/furans. Lead is the COC that is most prevalent at Site 1D, and it serves as a good indicator for the presence of other site contaminants.
- The previous RI/FS (IT, 1998) indicated a potential threat to human health under a hypothetical residential scenario although the predicted cancer risk was likely overestimated due to subsequent changes in toxicological factors for beryllium and chromium. In addition to the human health risk outlined in the OU 3 RI/FS, the site poses an additional incremental risk of 6×10^{-5} caused by the presence of dioxins/furans in site soils.
- The previous ecological risk assessment (ERA) conducted at this site (SWDIV, 1996b) indicated that baseline conditions would not be protective of ecological receptors.
- Metals-contaminated soils, if left in place untreated at Site 1D, could pose a threat to groundwater underlying the site based on synthetic precipitation leaching procedure (SPLP) results.
- An area north of Site 1D contains items of archeological significance. Therefore, cultural resource monitoring will be required during any potential site remediation and/or further investigation activities.
- Coastal California gnatcatchers and least Bell's vireos were observed near Site 1D during the Biological Field Survey conducted in August 2001. No nests or nestlings were observed within the site boundary. Biological resource monitoring may be required during any potential site remediation and/or further investigation activities if conducted during the breeding season.

A technology screening was performed to identify potential remedial measures that would be effective in addressing the soil contamination. Based on the technology screening and evaluation of process options, the following alternatives were developed and evaluated in the FS:

Alternative 1D-1: No Action.

Alternative 1D-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment, Periodic Site Inspection/Monitoring). This alternative would restrict future land use at the site and limit physical access to the site by enforcing these land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. This alternative would also include periodic inspection, monitoring, and maintenance of the site to prevent unauthorized use and limit erosion of the existing soil cover.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization (S/S), and On-Base Reuse of Treated Soil. This alternative involves removal of contaminated soil by excavation, on-site ex situ treatment via incorporation in cold-mix asphalt product (a form of S/S) followed by on-Base use in road building, road maintenance, or other construction projects. A treatability study would be necessary to determine the suitability of specific

stabilizing reagents for the site conditions, the ability of the resultant asphalt to meet pavement specifications, and the effectiveness of the process in reducing the mobility of metal and dioxins/furans contaminants.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal. This alternative involves excavation of contaminated soils followed by on-site pretreatment of all the excavated soil to incorporate a chemical stabilizer, temporary storage and waste characterization sampling of the excavated soil stockpiles, confirmation sampling and analysis of the excavation areas, transportation of the excavated soil to an appropriate off-Base disposal facility, import and compaction of backfill material, and restoring the site to its original condition.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal. This alternative involves excavation of contaminated soils followed by confirmation sampling and analysis of the excavation areas, on-site pretreatment of a portion of the excavated soil to incorporate a chemical stabilizer, transportation of the excavated soil to a new on-Base CAMU disposal facility, import and compaction of backfill material, and restoring the site to its original condition. Because a specific CAMU location has not been identified at this time, there is uncertainty regarding the amount of waste pretreatment that will be needed. To account for this uncertainty, together with the waste characterization data of the impacted soil in place, it is estimated that from 25 percent to 75 percent of the excavated soil would require pretreatment. As a result, a range is provided for the associated costs for implementation of this alternative.

The costs for this alternative also reflect one eighth of the total capital and operation and maintenance (O&M) costs of a new CAMU facility. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate.

Table ES-1 provides a summary comparison of these remedial alternatives against the evaluation criteria in the NCP.

Table ES-1
Summary of Comparative Analysis for Site 1D

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	No[f]	Yes	Yes	Yes
Compliance with ARARs	No	No	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Low	High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	High	Moderate	Moderate
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	Moderate	High	Moderate
Cost ($ million)	0	0.36	9.06	10.31	6.67-7.94[g]

[a]No Action
[b]Institutional Controls
[c]Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil
[d]Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal
[e]Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
[f]Institutional controls would be protective of human health but not protective of ecological receptors
[g]Range based on 25 percent pretreatment to 75 percent pretreatment

Alternative 1D-1 would not meet ARARs, would not be protective of human health, and would not provide long-term effectiveness and permanence. No costs are associated with Alternative 1D-1.

Alternative 1D-2 would be protective of human health through use restrictions but would not be protective of ecological receptors.

Alternatives 1D-3, 1D-4, and 1D-5 would be protective of human health and the environment, meet ARARs, and provide a high degree of long-term effectiveness and permanence. Alternative 1D-3 provides the highest degree of treatment but would likely be more difficult to implement because it involves pilot testing and additional regulatory coordination to ensure ARAR compliance and requires close coordination with potential on-Base construction users of the stabilized material. Alternatives 1D-4 and 1D-5 would involve some pretreatment prior to disposal. Alternative 1D-4 would provide for the highest level of implementability; Alternative 1D-5 would likely be more difficult to implement because it is contingent on the siting, design, construction, availability, and adequate capacity of a CAMU facility within the time-frame of the projected remedial action schedule for Site 1D, as well as additional regulatory coordination.

The cost to reduce the human health risks and exposure pathways associated with site metals is estimated to be $355,000 for Alternative 1D-2. To achieve protectiveness of both human and ecological receptors, overall costs are estimated to be: $9,065,000 for Alternative 1D-3; $10,308,000 for Alternative 1D-4; and between $6,667,000 to $7,943,000 for Alternative 1D-5.

ES.2 SITE 1E-1

Site 1E-1 is a former refuse burning area located in 32 Area along MACS Road, approximately 3,000 feet from the Santa Margarita River. The site is a previously undiscovered extension of the burn pits comprising Site 1E, which was addressed in the OU 3 ROD (IT, 1999a). The selected remedy for Site 1E in the OU 3 ROD was excavation, on-Base disposal, and remedial backfill. Site 1E was excavated in 1999 and an estimated 59,085 cubic yards of contaminated soil removed to achieve clean closure.

Following the Site 1E cleanup, five burn pits southeast of the Site 1E excavation were identified in a 1970 aerial photograph. The five burn pits, designated as Site 1E-1, were closed, covered with native soil, and allowed to revert to natural vegetation. At some point after the burn pits were closed, the area was graded for the realignment of MACS Road, which now crosses over the former burn pits. The remains of one or possibly two of the burn pits are likely located underneath the existing road, but most of the burn material appears to have been dug out and disposed of at Site 1E.

Several metals were identified during the OU 3 RI/FS and ROD process as COCs at Site 1E, including aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, and zinc. The majority of the metals with concentrations exceeding residential and industrial soil PRGs were reported in shallow (0 to 5 feet) soil (IT, 1998).

Based on the data collected for the FS, the following conclusions were developed for Site 1E-1:

- Small (less than 3-inch-thick) pockets of ash and burn material were encountered at various depths in several borings, although no continuous layer of ash or waste was encountered. Although pockets of ash-darkened soil are present, most of the burn material appears to have been dug out and likely disposed of at Site 1E. The small, intermittent pockets of ash suggest that the remains of the burn material were mixed into the soils used at the time the burn pits were covered, or when the area was graded for the realignment of MACS Road.

- Only relatively minor soil contamination was found. No metals were detected above naturally occurring background in surface soil samples. Arsenic, chromium, and cobalt were detected at concentrations slightly above background values at depths greater than 10 feet. However, these metals are not believed to be site-related based on a weight-of-evidence approach that considered site history, the uncertainty in quantifying local background levels, and the spatial distribution of detected levels. Low concentrations of dioxins were detected in soil samples from all depths, which support the previous conclusion regarding possible mixing of soils at some time in the past. The dioxins, which are likely site-related as a result of waste burning activities, appear to be present at levels consistent with anthropogenic background for rural areas (USEPA, 2000e).

- A screening-level human health risk assessment (HHRA), based on maximum detected surface-soil concentrations, indicates a cumulative cancer risk to a hypothetical on-site receptor of 8×10^{-6}, with almost all of the risk (95 percent) attributable to arsenic. As discussed above, detected levels of arsenic at Site 1E-1 are likely naturally occurring and are not believed to be site-related. Excluding the contribution from arsenic, the incremental site-related residential cancer risk is 4×10^{-7}, which results primarily from the dioxins/furans. The cumulative noncancer hazard index (HI) is estimated to be less than the cumulative target HI goal of 1.0. In addition, the maximum detected lead concentration (6.1 milligram per kilogram [mg/kg]) is well below the USEPA residential soil PRG value of 400 mg/kg.

- There is minor uncertainty in the risk and hazard estimates because the results are based on maximum detected concentrations from soil samples collected at the surface. No other soil samples were collected in the upper 10 feet bgs; thus, it is possible that contamination is present but was not sampled. However, it is considered unlikely that significant undiscovered contamination is present. This conclusion is based on a weight-of-evidence approach considering that a judgmental sampling approach was used, which included borings located in the center of the former waste burn pits, soil samples collected where visible burn-ash residue was identified, and the relatively low concentrations of detected analytes, including dioxins, which appear to be present at concentrations consistent with rural background levels. Although one of the former pits could not be sampled due to terrain/accessibility, there is no evidence to suggest that the nature of residual waste in that pit would differ from the other four pits that were sampled.

- The results indicate there are no preliminary chemicals of potential ecological concern (COPECs) likely to pose unacceptable hazards to or induce adverse effects at the individual organism level for the special-status Pacific pocket mouse or the least Bell's vireo, or population-level effects on any of the representative receptors evaluated. A screening-level ERA concluded that baseline conditions would pose negligible risk to ecological receptors.

- Based on the SPLP analysis conducted during the FS, extractable concentrations of aluminum, iron, and vanadium are greater than corresponding water-quality goals and could theoretically pose a threat to groundwater. However, these metals were near or below their respective background values in soil. In addition, the site is estimated to be approximately 100 feet above groundwater. Therefore, risk to groundwater posed by these relatively low metals concentrations is considered extremely low. Other detected analytes (e.g., dioxins, pesticides, and diethyl phthalate) were detected at relatively low levels and are relatively immobile, and thus pose an insignificant threat to water quality resources.

In summary, there is little evidence of contamination in the upper 10 feet of soil at Site 1E-1. Although it is likely that localized areas of low-level dioxins may be present at the site, the levels do not appear to be significantly higher than anthropogenic background. Under current conditions, the site represents an insignificant threat to human health based on the conservative assumption that a resident would be located on site. Given current and reasonably foreseeable future land uses, it is highly unlikely that this site would be developed for residential purposes. Site 1E-1 also represents an insignificant threat to ecological receptors. Residual soil contamination below 10 feet does not represent an ongoing or future threat to water quality resources. Based on this evidence, further action is not warranted at Site 1E-1. Consequently, the remedial alternatives at Site 1E-1 were not identified or evaluated as part of this FS. It is recommended that Site 1E-1 be documented for no action in the OU 4 ROD.

ES.3 SITE 1H

Site 1H is a former refuse burning area located near the western perimeter of the Base in 62 Area, located approximately 1,200 feet north of San Mateo Road. This site was previously addressed in the draft RI/FS for Group D Sites (SWDIV, 1997) and was proposed for no further action. It was subsequently addressed in the draft OU 4 RI/FS (Parsons, 1999).

Site 1H is densely vegetated with a grade ranging from 2 to 7 percent and is currently covered by approximately 2 to 3 feet of soil over the buried materials.

Based on the data collected to date and the analyses documented in this report, the following conclusions were reached regarding Site 1H:

- The FS better defined the extent and volume of soil contamination that was originally identified in the 1997 and 1999 RI/FS reports (SWDIV, 1997; Parsons 1999).
- COCs detected in site soils above their respective residential soil PRGs include antimony, arsenic, chromium, copper, iron, lead, manganese, and dioxins/furans.
- The estimate for soils impacted above PRGs and where waste was encountered during drilling at Site 1H is approximately 10,800 cubic yards. The lateral extent of impacted soil is approximately 0.7 acre and extends from 5 to 15 feet bgs.
- Three different hypothetical future exposure scenarios were evaluated: an on-site resident, a non-intrusive industrial/commercial worker, and a military training receptor. The results of a screening-level HHRA indicate that Site 1H poses a potential threat to a hypothetical future residential receptor. It is also concluded that baseline conditions represent a potential threat to a hypothetical future non-intrusive industrial/commercial receptor at Site 1H. However, the risk to a hypothetical future non-intrusive industrial/commercial receptor is likely overestimated because of conservative assumptions outlined in Section 4.1.4. Any on-site military training involving contact with soils deeper than 3 feet may result in adverse health effects depending upon the nature of the exposure.
- The results of a screening-level ERA indicate that Site 1H does not represent a significant threat to ecological receptors. None of the estimated exposures to COPECs in soil at Site 1H results in effect-based hazard quotient (HQ) values greater than one. Therefore, there is no expectation that adverse ecological effects in receptors would occur.
- Based on SPLP analyses conducted as part of the FS, extractable concentrations of iron, lead, manganese, and zinc exceed their respective state and federal maximum

contaminant levels (MCLs). However, the threat to groundwater is believed to be negligible given the depth to groundwater (approximately 200 to 225 feet bgs) at Site 1H.

- Coastal California gnatcatchers were observed in the vicinity of Site 1H during the Biological Field Survey conducted in August 2001. No nests or nestlings were observed within the site boundary. Biological resource monitoring may be required during any potential site remediation and/or further investigation activities if conducted during the breeding season.

Because soil contaminants pose a potential threat to a hypothetical on-site resident, Site 1H was included in the FS to evaluate potential remedial strategies. A technology screening was performed to identify potential remedial measures that would be effective in addressing the soil contamination. Based on the technology screening and an evaluation of process options, the following alternatives were developed and evaluated in the FS:

Alternative 1H-1: No Action.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment, Periodic Site Inspection/Monitoring). This alternative would restrict future land use and limit physical access to the site through land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. This alternative would also include periodic inspection and monitoring of the site to prevent unauthorized use and limit erosion of the existing soil cover. The DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

Alternative 1H-3: Engineered Soil Cover, Monitoring/Maintenance, and Institutional Controls. This alternative involves construction of an approximately 1.4-acre engineered soil cover (i.e., an evapotranspiration [ET] cover) designed to provide long-term minimization of infiltration of liquids, function with minimum maintenance, promote drainage, minimize erosion or abrasion of the cover, accommodate settling and subsidence, and have a minimum permeability of 10^{-6} centimeter per second (cm/s). This alternative would also include institutional controls consisting of annual monitoring, operation, and maintenance to preserve or restore the physical integrity of the cap and land use restriction to limit physical access and ensure no breaching of the soil cap. Access roads would be maintained and improved as necessary.

Alternative 1H-4: Excavation, Backfill, and Off-Base Disposal. This alternative involves excavation of contaminated soils, confirmation sampling and analysis of the excavation areas, import and compaction of backfill material, temporary storage and waste characterization sampling of the excavated soil stockpiles, transportation of the excavated soil to an appropriate off-Base disposal facility, and restoring the site to its original condition.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal. This alternative involves excavation of contaminated soils followed by confirmation sampling and analysis of the excavation areas, import and compaction of backfill material, transportation of the excavated soil to a new on-Base CAMU disposal facility, and restoring the site to its original condition. The costs for this alternative also reflect one eighth of the total capital and O&M costs of a new CAMU facility. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate.

Table ES-2 provides a summary comparison of these remedial alternatives against the evaluation criteria in the NCP.

Table ES-2
Summary of Comparative Analysis for Site 1H

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	Yes	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Moderate	Moderate to High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	Low	Low	Low
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	High	High	Moderate
Cost ($ million)	0	0.25	1.24	2.63	2.47

[a]No Action
[b]Institutional Controls
[c]Capping with Engineered Soil Cover and Institutional Controls
[d]Soil Excavation, Backfill, and Off-Base Disposal
[e]Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-1 would not meet ARARs and would not be protective of human health. Alternative 1H-1 also would not provide long-term effectiveness and permanence. No costs are associated with Alternative 1H-1.

Alternatives 1H-2, 1H-3, 1H-4, and 1H-5 would be protective of human health and the environment and meet ARARs. Alternative 1H-2 would provide a moderate degree of long-term effectiveness and permanence. Alternative 1H-3 would provide a higher degree of long-term effectiveness through elimination of exposure pathways via capping. Alternatives 1H-4 and 1H-5 would provide additional protectiveness and permanence because they do not rely on institutional controls and would allow for unrestricted future land use. Alternative 1H-5 would likely be more difficult to implement because it is contingent on the siting, design, construction, availability, and adequate capacity of a CAMU facility within the time frame of the projected remedial action schedule for Site 1H, as well as significant regulatory coordination.

The cost to reduce the human health and ecological risks and exposure pathways associated with site contaminants is estimated to be $247,000 for Alternative 1H-2. To achieve the same level of protectiveness offered by Alternative 1H-2 would require overall costs of $1,240,000 for Alternative 1H-3. To achieve a higher level of protectiveness and unrestricted future land use, Alternative 1H-4 would cost $2,629,000 and Alternative 1H-5 would cost $2,466,000.

ES.4 SITE 30

Site 30 is located in 31 Area, approximately 1,300 feet west of the intersection of Stuart Mesa Road and MACS Road. The site consists of soil fill material dumped near a dirt road that contains bullets and bullet fragments from a 31 Area small arms firing range (Kleinfelder, 1997).

The recommended action for Site 30 in the OU 3 Engineering Evaluation/Cost Analysis (EE/CA) (Kleinfelder, 1997) was "hot spot" excavation/removal to remove significantly contaminated soil, for an estimated volume of approximately 25,000 cubic yards (IT, 1998). The subsequent Site 30 EE/CA (OHM 1999), which was prepared to further evaluate remedial options, refined the estimated total volume of contaminated soil at approximately 15,600 cubic yards. After closure of the on-Base CAMU in April 2000, a decision was made to supplement the prior

characterization of the site to allow for greater certainty of volume and cost estimates for the various alternatives.

The previously established COCs at Site 30 are antimony, arsenic, chromium, cobalt, copper, lead, and manganese (IT, 1998). Based on the Site 30 EE/CA, the extent of significant metals-impacted soil appeared to be confined to the central part of the site (Kleinfelder, 1997).

Based on the data collected to date and the analyses documented in this report, the following conclusions were reached regarding Site 30:

- Based on the supplemental FS data, the estimated volume of soils impacted above previously established RGs at Site 30 is approximately 15,600 cubic yards. The lateral extent of impacted soils is approximately 400 feet by 700 feet, and the depth of impacted soils varies from approximately 1 foot to 5 feet bgs.
- COCs detected in site soils above their respective RGs include antimony, arsenic, chromium, cobalt, copper, and lead. Manganese, a COC from previous studies, was not detected in the supplemental FS samples above its RG and therefore will not be retained as a COC. Lead is the most predominant and widespread COC at Site 30 and was also detected at the highest concentrations. Lead serves as a good indicator for the presence of other contaminants.
- The conclusions of the HHRA and ERA performed as part of a prior remedial investigation were found to be valid although the predicted cancer risk was likely overestimated due to subsequent changes in toxicological factors for beryllium and chromium The site poses a threat to a hypothetical future on-site resident. Baseline conditions at Site 30 are not protective of ecological receptors (IT, 1998).
- Concentrations of lead at the site do not appear to correlate to particle size (i.e. soil size particles without visible lead fragments may also have high lead concentrations).
- No explosives or explosive residues were present in Site 30 soils.
- Site 30 is located near a suspected cultural resources site (Native American/ Archeological sites). Although no Native American or archeological artifacts were encountered during supplemental FS data collection, this issue must be considered in any future potential site remediation. Since the contamination lies within the previous fill material, it is anticipated that any artifacts would be encountered at depths below where remediation would likely occur.
- Metals-contaminated soils, if left in place untreated at Site 30, could pose a threat to groundwater underlying the site based on SPLP results.
- Any site disturbance (e.g., soil excavation) would need to be scheduled around the nesting and breeding season in order to minimize impacts to ecological receptors.

Because soil contaminants pose a potential risk to human and ecological receptors and groundwater, Site 30 was included in the FS to evaluate potential remedial strategies. A technology screening was performed to identify potential remedial measures that would be effective in addressing the soil contamination. Based on the technology screening and an evaluation of process options, the following alternatives were developed and evaluated in the FS:

<u>Alternative 30-1: No Action.</u>

<u>Alternative 30-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment, Periodic Site Inspection/Monitoring).</u> This alternative would restrict future land

use at the site and limit physical access to the site by enforcing these land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. This alternative would also include periodic inspection, monitoring, and maintenance of the site to prevent unauthorized use and limit erosion of the existing soil cover.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil. This alternative would involve removal of contaminated soil by excavation, on-site ex situ treatment via incorporation in cold-mix asphalt product (a form of S/S) followed by on-Base use in road building, road maintenance, or other construction projects. A treatability study would be necessary to determine the suitability of specific stabilizing reagents for the site conditions, the ability of the resultant asphalt to meet pavement specifications, and the effectiveness of the process in reducing the mobility of metal contaminants.

Alternative 30-4: Excavation, Backfill, Pretreatment, and Off-Base Disposal. This alternative would involve excavation of contaminated soils, confirmation sampling and analysis of the excavation areas, import and compaction of backfill material, followed by on-Base pretreatment of all the excavated soil to incorporate a chemical stabilizer, temporary storage and waste characterization sampling of the excavated soil stockpiles, transportation of the excavated soil to an appropriate off-Base disposal facility, and restoring the site to its original condition.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal. This alternative involves excavation of contaminated soils followed by confirmation sampling and analysis of the excavation areas, import and compaction of backfill material, on-site pretreatment of a portion of the excavated soil to incorporate a chemical stabilizer, transportation of the excavated soil to a new on-Base CAMU disposal facility, and restoring the site to its original condition. Because a specific CAMU location has not been identified at this time, there is uncertainty regarding the amount of waste pretreatment that will be needed. To account for this uncertainty, together with the waste characterization data of the impacted soil in place, it is estimated that from 25 percent to 75 percent of the excavated soil would require pretreatment. As a result, a range will be provided for the associated costs for implementation of this alternative.

The costs for this alternative also reflect one eighth of the total capital and O&M costs of a new CAMU facility. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate.

Table ES-3 provides a summary comparison of these remedial alternatives against the evaluation criteria in the NCP.

Alternative 30-1 would not meet ARARs and would not be protective of human health and the environment. Alternative 30-1 also does not provide long-term effectiveness and permanence. No costs are associated with Alternative 30-1.

Alternative 30-2 would be protective of human health but not protective of ecological receptors. Because of its location within the floodplain and the potential for flooding to expose additional contaminated soils, this alternative provides minimal long-term effectiveness and permanence for ecological receptors. Based on the screening risk assessment results, this alternative would not comply with location-specific requirements of the Endangered Species Act of 1973.

Table ES-3
Summary of Comparative Analysis for Site 30

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	No[f]	Yes	Yes	Yes
Compliance with ARARs	No	No	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Low	High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	High	Moderate	Moderate
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	Moderate	High	Moderate
Cost ($ million)	0	0.36	4.74	5.73	3.99-4.62[g]

[a]No Action
[b]Institutional Controls
[c]Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil
[d]Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal
[e]Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
[f]Protective of human health but not protective of ecological receptors
[g]Range based on 25 percent pretreatment to 75 percent pretreatment

Alternatives 30-3, 30-4, and 30-5 would be protective of human health and the environment, meet ARARs, and provide a high degree of long-term effectiveness and permanence. Alternative 30-3 would likely be more difficult to implement because it involves pilot testing and additional regulatory coordination to ensure ARAR compliance and requires close coordination with potential on-Base construction users of the stabilized material. Alternative 30-3 provides the highest degree of treatment, and Alternatives 30-4 and 30-5 involve some pretreatment prior to disposal. Alternative 30-4 provides for the highest level of implementability. Alternative 30-5 would likely be more difficult to implement because it is contingent on the siting, design, construction, availability, and adequate capacity of a CAMU facility within the time frame of the projected remedial action schedule for Site 30, as well as additional regulatory coordination.

The cost to reduce the human health and ecological risks and exposure pathways associated with site metals is estimated to be $355,000 for Alternative 30-2. To achieve a higher level of protectiveness than offered by Alternative 30-2 would require overall costs of $4,735,000 for Alternative 30-3; $5,728,000 for Alternative 30-4; and between $3,986,000 to $4,622,000 for Alternative 30-5.

TABLE OF CONTENTS

		Page
ES.1	SITE 1D	ii
ES.2	SITE 1E-1	v
ES.3	SITE 1H	vii
ES.4	SITE 30	ix
1.0	INTRODUCTION	1-1
1.1	Purpose and Objectives of the Feasibility Study	1-2
1.2	Report Organization	1-2
1.3	General Site Location and Description	1-2
1.4	Applicable or Relevant and Appropriate Requirements and Guidance to be Considered	1-3
1.5	Risk Assessment Issues	1-4
1.6	Naturally Occurring Background Metals	1-4
1.7	Development of Remediation Goals	1-6
2.0	SITE 1D	2-1
2.1	Background Information	2-1
2.1.1	Site Description and History	2-1
2.1.2	Site Conditions	2-2
2.1.3	Nature and Extent of Contamination	2-2
2.1.4	Human Health Risk Assessment	2-6
2.1.5	Ecological Risk Assessment	2-7
2.1.6	Conclusions of the Supplemental FS	2-7
2.2	Development of Remedial Action Objectives	2-8
2.2.1	Chemicals of Concern	2-8
2.2.2	Exposure Routes/Receptors of Concern	2-8
2.2.3	Proposed Remediation Goals	2-8
2.2.4	Remedial Action Objectives	2-9
2.3	Identification of General Response Actions	2-9
2.4	Identification and Screening of Technology Types and Process Options	2-9
2.4.1	No Action	2-10
2.4.2	Institutional Action	2-11
2.4.3	Containment	2-11
2.4.4	Removal	2-11
2.4.5	Disposal	2-12
2.4.6	In Situ Treatment	2-12
2.4.7	Ex Situ Treatment	2-14
2.5	Evaluation of Technology Process Options	2-16
2.5.1	No Action	2-17
2.5.2	Institutional Action	2-17
2.5.3	Containment	2-18
2.5.4	Removal	2-18
2.5.5	Disposal	2-18
2.5.6	In Situ Treatment	2-18
2.5.7	Ex Situ Treatment	2-19
2.5.8	Summary of Process Option Selection	2-19
2.6	Development and Detailed Analysis of Remedial Alternatives	2-20
2.6.1	Overview of Detailed Analysis and Nine NCP Evaluation Criteria	2-20

2.6.2 Description of Remedial Alternatives 2-23
2.6.3 Detailed Analysis of Site 1D Remedial Alternatives 2-30
2.7 Comparative Analysis of Alternatives 2-40
2.7.1 Overall Protection of Human Health and the Environment 2-40
2.7.2 Compliance With ARARs 2-41
2.7.3 Long-Term Effectiveness and Permanence 2-41
2.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment 2-41
2.7.5 Short-Term Effectiveness 2-41
2.7.6 Implementability 2-41
2.7.7 Cost 2-42
2.7.8 Summary of Comparative Analysis 2-42
3.0 SITE 1E-1 3-1
3.1 Background Information 3-1
3.1.1 Site Description and History 3-1
3.1.2 Site Conditions 3-2
3.1.3 Nature and Extent of Contamination 3-2
3.1.4 Human Health Risk Assessment 3-9
3.1.5 Ecological Risk Assessment 3-10
3.1.6 Conclusions of the Supplemental FS 3-12
4.0 SITE 1H 4-1
4.1 Background Information 4-1
4.1.1 Site Description and History 4-1
4.1.2 Site Conditions 4-1
4.1.3 Nature and Extent of Contamination 4-2
4.1.4 Human Health Risk Assessment 4-5
4.1.5 Ecological Risk Assessment 4-7
4.1.6 Conclusions of Supplemental FS 4-9
4.2 Development of Remedial Action Objectives 4-9
4.2.1 Chemicals of Concern 4-10
4.2.2 Exposure Routes/Receptors of Concern 4-10
4.2.3 Proposed Remediation Goals 4-10
4.2.4 Remedial Action Objectives 4-10
4.3 Identification of General Response Actions 4-10
4.4 Identification and Screening of Technology Types and Process Options 4-11
4.4.1 No Action 4-12
4.4.2 Institutional Action 4-12
4.4.3 Containment 4-12
4.4.4 Removal 4-12
4.4.5 Disposal 4-13
4.4.6 In Situ Treatment 4-13
4.4.7 Ex Situ Treatment 4-15
4.5 Evaluation of Technology Process Options 4-18
4.5.1 No Action 4-19
4.5.2 Institutional Action 4-19
4.5.3 Containment 4-19
4.5.4 Removal 4-20
4.5.5 Disposal 4-20
4.5.6 In Situ Treatment 4-20
4.5.7 Ex Situ Treatment 4-20
4.5.8 Summary of Process Option Selection 4-20
4.6 Development and Detailed Analysis of Remedial Alternatives 4-21

4.6.1 Overview of Detailed Analysis and Nine NCP Evaluation Criteria 4-21
4.6.2 Description of Remedial Alternatives 4-21
4.6.3 Detailed Analysis of Site 1H Remedial Alternatives 4-26
4.7 Comparative Analysis 4-35
4.7.1 Overall Protection of Human Health and the Environment 4-35
4.7.2 Compliance With ARARs 4-35
4.7.3 Long-Term Effectiveness and Permanence 4-36
4.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment 4-36
4.7.5 Short-Term Effectiveness 4-36
4.7.6 Implementability 4-36
4.7.7 Cost 4-37
4.7.8 Summary of Comparative Analysis 4-37
5.0 SITE 30 5-1
5.1 Background Information 5-1
5.1.1 Site Description and History 5-1
5.1.2 Site Conditions 5-2
5.1.3 Nature and Extent of Contamination 5-3
5.1.4 Human Health Risk Assessment 5-8
5.1.5 Ecological Risk Assessment 5-9
5.1.6 Conclusions of Supplemental FS 5-10
5.2 Development of Remedial Action Objectives 5-11
5.2.1 Chemicals of Concern 5-11
5.2.2 Exposure Routes/Receptors of Concern 5-11
5.2.3 Proposed Remediation Goals 5-11
5.2.4 Remedial Action Objectives 5-11
5.3 Identification of General Response Actions 5-11
5.4 Identification and Screening of Technology Types and Process Options 5-12
5.4.1 No Action 5-13
5.4.2 Institutional Action 5-13
5.4.3 Containment 5-13
5.4.4 Removal 5-14
5.4.5 Disposal 5-14
5.4.6 In Situ Treatment 5-15
5.4.7 Ex Situ Treatment 5-16
5.5 Evaluation of Technology Process Options 5-19
5.5.1 No Action 5-20
5.5.2 Institutional Action 5-20
5.5.3 Containment 5-20
5.5.4 Removal 5-20
5.5.5 Disposal 5-21
5.5.6 In Situ Treatment 5-21
5.5.7 Ex Situ Treatment 5-21
5.5.8 Summary of Process Option Selection 5-22
5.6 Development and Detailed Analysis of Remedial Alternatives 5-22
5.6.1 Overview of Detailed Analysis and Nine NCP Evaluation Criteria 5-23
5.6.2 Description of Remedial Alternatives 5-23
5.6.3 Detailed Analysis of Site 30 Remedial Alternatives 5-29
5.7 Comparative Analysis 5-40
5.7.1 Overall Protection of Human Health and the Environment 5-40
5.7.2 Compliance With ARARs 5-40
5.7.3 Long-Term Effectiveness and Permanence 5-40

5.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment 5-41
5.7.5 Short-Term Effectiveness 5-41
5.7.6 Implementability 5-41
5.7.7 Cost 5-42
5.7.8 Summary of Comparative Analysis 5-42
6.0 REFERENCES 6-1

LIST OF TABLES
(following text after each section)

Table 2-1 Site 1D, Lead Detected in Soil
Table 2-2 Site 1D, Metals Results in Soil
Table 2-3 Site 1D, Metals Compared to Remediation Goals in Soil
Table 2-4 Site 1D, SVOCs Detected in Soil
Table 2-5 Site 1D, Dioxins and Furans Detected in Soil
Table 2-6 Site 1D, SPLP Metals Results Compared to MCLs and Tap Water PRGs
Table 2-7 Site 1D, Summary of Human Health Screening-Level Evaluation
Table 2-8 Site 1D, Summary of Detailed Analysis of Alternatives

Table 3-1 Site 1E-1, VOCs Detected in Soil
Table 3-2 Site 1E-1, SVOCs Detected in Soil
Table 3-3 Site 1E-1, Dioxins and Furans Detected in Soil
Table 3-4 Site 1E-1, Total Petroleum Hydrocarbons Detected in Soil
Table 3-5 Site 1E-1, Pesticides Detected in Soil
Table 3-6 Site 1E-1, Metals Detected in Soil
Table 3-7 Site 1E-1, SPLP Metals Compared to MCLs and Tap Water PRGs
Table 3-8 Site 1E-1, Summary of Human Health Screening-Level Evaluation

Table 4-1 Site 1H, Dioxins and Furans Detected in Soil
Table 4-2 Site 1H, Metals Detected in Soil
Table 4-3 Site 1H, Metals Detected in Soil in Previous Investigations (SWDIV, 1997and IT, 1998)
Table 4-4 Site 1H, SPLP Metals Compared to MCLs and Tap Water PRGs
Table 4-5 Site 1H, Summary of Human Health Screening-Level Evaluation
Table 4-6 Site 1H, Summary of Detailed Analysis of Alternatives

Table 5-1 Site 30, Lead Detected in Soil
Table 5-2 Site 30, Metals Detected in Soil
Table 5-3 Site 30, Metals Detected Compared to Remediation Goals in Soil
Table 5-4 Site 30, SPLP Results Compared to MCLs and Tap Water PRGs
Table 5-5 Site 30, Summary of Human Health Screening-Level Evaluation
Table 5-6 Site 30, Summary of Detailed Analysis of Alternatives

LIST OF FIGURES
(following tables after each section)

Figure 1-1 Locations of Base Areas and OU 4 Supplemental FS Sites

Figure 2-1 Site 1D, Location Map
Figure 2-2 Site 1D, 1970 Aerial Photograph with OU 4 Supplemental FS Grid
Figure 2-3 Site 1D, Sampling Locations
Figure 2-4 Site 1D, Lead Detected above RG, from 0 to 1 ft bgs
Figure 2-5 Site 1D, Lead Detected above RG, from 1 to 3 ft bgs
Figure 2-6 Site 1D, Lead Detected above RG, from 3 to 5 ft bgs and deeper
Figure 2-7 Site 1D, Distribution of Metals Above RGs and Visible Ash Encountered
Figure 2-8 Site 1D, Distribution of Metals Detected Above RGs By Deepest Depth
Figure 2-9 Site 1D, Generalized Cross Sections
Figure 2-10 Site 1D, Initial Screening of Technologies for Soil
Figure 2-11 Site 1D, Evaluation of Process Options for Soil

Figure 3-1 Site 1E-1, Location Map
Figure 3-2 Site 1E-1, 1970 Aerial Photograph with Site and Boring Locations
Figure 3-3 Site 1E-1, Soil Boring Location Map
Figure 3-4 Site 1E-1, Generalized Cross Section

Figure 4-1 Site 1H, Location Map
Figure 4-2 Site 1H, Soil Boring Location Map
Figure 4-3 Site 1H, Generalized Cross Section
Figure 4-4 Site 1H, Soil Sampling Results
Figure 4-5 Site 1H, Initial Screening of Technologies for Soil
Figure 4-6 Site 1H, Evaluation of Process Options for Soil

Figure 5-1 Site 30, Location Map
Figure 5-2 Site 30, Sampling Locations
Figure 5-3 Site 30, Lead Detected in Soil, from 0 to 1 ft bgs
Figure 5-4 Site 30, Lead Detected in Soil, from 1 to 3 ft bgs
Figure 5-5 Site 30, Lead Detected in Soil, from 3 to 5 ft bgs
Figure 5-6 Site 30, Distribution of Metals Above RGs and Visible Lead Fragments
Figure 5-7 Site 30, Distribution of Metals Above RGs By Deepest Depth
Figure 5-8 Site 30, Generalized Cross Sections
Figure 5-9 Site 30, Initial Screening of Technologies for Soil
Figure 5-10 Site 30, Evaluation of Process Options for Soil

LIST OF APPENDICES

Appendix A	Applicable and Relevant and Appropriate Requirements (ARARs)
Appendix B	Biological Survey Report
Appendix C	Relevant Site-Specific Information Collected by Others
C1	Site 1D
C2	Site 1E-1
C3	Site 1H
C4	Site 30
Appendix D	Supplemental FS Investigation Field Data
D1	Site 1D Grid Logs
D2	Site 1E-1 Boring Logs
D3	Site 1H Boring Logs
D4	Site 30 Grid Logs
D5	Site 30 Geotechnical Results
Appendix E	Correlation Analysis
E1	Site 1D
E2	Site 30
Appendix F	Data Quality Assessment
Appendix G	Chain-of-Custody and Cooler Receipt Forms
G1	Site 1D
G2	Site 1E-1
G3	Site 1H
G4	Site 30
Appendix H	Validated Analytical Data
H1	Site 1D
H2	Site 1E-1
H3	Site 1H
H4	Site 30
Appendix I	Human Health Risk Assessment Method
I1	Site 1D
I2	Site 1E-1
I3	Site 1H
I4	Site 30
Appendix J	Ecological Risk Assessment Method
J1	Site 1E-1
J2	Site 1H
Appendix K	Cost of Remedial Alternatives
K1	Site 1D
K2	Site 1H
K3	Site 30
Appendix L	Site 1H, Designated Level Methodology for Waste Classification and Cleanup Level Determination
Appendix M	Responses to Agency Comments on Draft OU 4 Supplemental Feasibility Study for Sites 1D, 1E-1, 1H, 30, and 22/23 Area Groundwater, Marine Corps Base Camp Pendleton, California, Issued 17 April 2002

ABBREVIATIONS AND ACRONYMS

µg/dL	microgram per deciliter
µg/kg	microgram per kilogram
µg/L	microgram per liter
µmho/cm	micromho per centimeter
AFCEE	Air Force Center for Environmental Excellence
AL	action level
amsl	above mean sea level
AOC	area of contamination
AM	action memorandum
APCD	Air Pollution Control District
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ASTM	American Society for Testing and Materials
ATTIC	Alternative Treatment Technology Information Center
BACT	best available control technology
BAF	Bioaccumulation factor
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, total xylenes
°C	degree Celsius
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Administration
Camp Pendleton	United States Marine Corps Base, Camp Pendleton
CAMU	Corrective Action Management Unit
CAO	cleanup and abatement order
CAP	corrective action program
CCC	California Coastal Commission
CCR	California Code of Regulations
CDD	chlorinated dibenzodioxin
CDF	chlorinated dibenzofuran
CDFG	California Department of Fish and Game
CDM	California Division of Mines
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIWMB	California Integrated Waste Management Board
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	contract laboratory program
CLU-IN	Hazardous Waste Cleanup Information
cm/s	centimeter per second
CO_2	carbon dioxide
COC	chemical of concern
COEC	chemical of ecological concern
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CRDL	contract-required detection limit
CSM	conceptual site model

ABBREVIATIONS AND ACRONYMS

CTR	California Toxics Rule
CU	characterization unit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DCA	dichloroethane
DCE	Dichloroethene
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DHS	(California) Department of Health Services
DIPE	di isopropyl ether
DI	de-ionized
DLM	designated level methodology
DLR	detection limit for purposes of reporting
DNAPL	dense nonaqueous phase liquid
DO	dissolved oxygen
DoD	U.S. Department of Defense
DOI	U.S. Department of the Interior
DON	U.S. Department of the Navy
DOT	U.S. Department of Transportation
DPDO	Defense Property Disposal Office
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control (Cal/EPA)
EDXRF	energy dispersive x-ray fluorescence
EE/CA	engineering evaluation/cost analysis
EP	extraction procedure
EPC	exposure point concentration
ERA	ecological risk assessment
ESA	Endangered Species Act
ET	evapotranspiration
ETBE	ethyl tert-butyl ether
°F	degree Fahrenheit
FFA	Federal Facility Agreement
FML	flexible membrane liner
FR	Federal Register
FS	feasibility study
FSP	field sampling plan
ft/d	feet per day
GC	gas chromatography
GC/MS	gas chromatography/mass spectrometer
GIS	geographic information system
gpd	gallon per day
gpm	gallon per minute
GRA	general response action
GSA	Government Services Agreement
H&S	health and safety
H_2O_2	hydrogen peroxide
HDPE	high density polyethylene

ABBREVIATIONS AND ACRONYMS

HEAST	health effects summary table
HHRA	human health risk assessment
HI	hazard index
HpCDD	heptachlorodibenzo-p-dioxin
HpCDF	heptachlorodibenzofuran
HQ	hazard quotient
HSC	(California) Health and Safety Code
HSP	health and safety plan
HSWA	Hazardous and Solid Waste Amendment
HxCDD	hexachlorodibenzo-p-dioxin
HxCDF	hexachlorodibenzofuran
IARC	International Agency for Research of Cancer
IAS	initial assessment study
IDW	investigation derived waste
IEUBK	Integrated Exposure Uptake Biokinetic
ILCR	incremental lifetime cancer risk
IR	Installation Restoration
IRIS	integrated risk information system
IRP	Installation Restoration Program
IT	International Technology Corporation
J&E	Johnson and Ettinger
$KMnO_4$	potassium permanganate
LCS	laboratory control standards
LDR	land disposal restrictions
LTMP	long-term monitoring plan
LUFT	leaking underground fuel tank
MCB	Marine Corps Base
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
MDL	method detection limit
MEK	methyl ethyl ketone
mg/kg	milligram per kilogram
mg/L	milligram per liter
MIBK	methyl isobutyl ketone
MNA	monitored natural attenuation
MOA	memorandum of agreement
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
MTBE	methyl tert-butyl ether
MTR	minimum technology requirements
NAAQS	National Ambient Air Quality Standards
NaOH	sodium hydroxide
NCP	National Contingency Plan
ND	no detection
NEESA	Naval Energy and Environmental Support Activity
NEPA	National Environmental Policy Act
ng/kg	nanogram per kilogram
NHPA	National Historic Preservation Act
NOAEL	no observed adverse effect level

ABBREVIATIONS AND ACRONYMS

NOEL	no observed effect level
NPL	National Priority List
NPWCSD	Navy Public Works Center, San Diego
NSR	New Source Review
NTU	nephelometric turbidity unit
O&M	operation and maintenance
O_3	ozone
OCDD	octachlorodibenzo-p-dioxin
OCDF	octachlorodibenzofuran
OEHHA	Office of Environmental Health Hazard Assessment
OHM	OHM Remediation Services Corporation
ORP	oxidation/reduction potential
OU	Operable Unit
PAH	polynuclear/polycyclic aromatic hydrocarbon
Parsons	Parsons, Inc.
PCA	tetrachloroethane
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzodioxin
PCDF	polychlorinated dibenzofuran
PEA	Preliminary Endangerment Assessment
PeCDD	pentachlorodibenzo-p-dioxin
PeCDF	pentachlorodibenzofuran
pg/g	picograms per gram
pH	negative $\log_{10}$ of hydrogen ion concentration
PID	photo ionization detector
PLE	permissible limit of exposure or preliminary limit of exposure (App. J)
POC	point of compliance
POTW	publicly owned treatment works
ppb	part per billion
ppb(v)	part per billion by volume
ppbw	part per billion by weight
PPE	personal protective equipment
ppm	part per million
PQL	practical quantitation limit
PRG	preliminary remediation goal
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
QAPP	quality assurance project plan
QC	quality control
RAGS	Risk Assessment Guidance for Superfund
RAO	remedial action objective
RAP	remedial action plan
RCOC	remedial chemical of concern
RCRA	Resource Conservation and Recovery Act
RG	remediation goal
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
ROD	Record of Decision
ROM	rough order-of-magnitude

ABBREVIATIONS AND ACRONYMS

RPM	remedial project manager
r-PRG	residential preliminary remediation goal
RTV	reference toxicity values
RWQCB	Regional Water Quality Control Board
S/S	solidification/stabilization
SAP	sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
SCAQMD	Southern California Air Quality Management District
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SMCL	secondary maximum contaminant level
SOP	standard operating procedure
SPLP	synthetic precipitation leaching procedure
SSL	soil screening level
STLC	soluble threshold limit concentration
SUF	site use factor
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWDA	Solid Waste Disposal Act
SWDIV	Southwest Division Naval Facilities Engineering Command
SWRCB	California State Water Resources Control Board
T	2,4,5-trichlorophenoxyacetic
TP	2,4,5,-trichlorophenoxy-alpha-propanoic-acid
TAME	tert-amyl ether
TBA	tert-butyl alcohol
TBC	to be considered
TCA	trichloroethane
TCDD	tetrachlorodibenzo-*p*-dioxin
TCDF	tetrachlorodibenzofuran
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TCP	trichloropropane
TDS	total dissolved solids
TEF	toxicity equivalency factor
TEQ	toxicity equivalent
TMDL	total maximum daily load
TOC	total organic carbon
TPH	total petroleum hydrocarbons
TPH-D	total petroleum hydrocarbons as diesel
TPH-G	total petroleum hydrocarbons as gasoline
TSCA	Toxic Substances Control Act
TTLC	total threshold limit concentration
TTU	transportable treatment unit
UCL	upper confidence limit
USC	United States Code
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

ABBREVIATIONS AND ACRONYMS

USGS	U.S. Geological Survey
UST	underground storage tank
UTL	upper tolerance limit
UTS	universal treatment standards
UV	ultraviolet
VC	vinyl chloride
VGAC	vapor-phase granular activated carbon
VISITT	Vendor Information System for Innovative Treatment Technologies
VOC	volatile organic compound
WET	wet extraction test
WHO	World Health Organization
WMA	waste management area
WQO	water quality objective
WSRA	Wild and Scenic Rivers Act

1.0 INTRODUCTION

Parsons Inc. (Parsons) has prepared this Feasibility Study (FS) report for the Operable Unit (OU) 4 sites at the Marine Corps Base Camp Pendleton, California (MCB Camp Pendleton or the Base) (Figure 1-1). This document was prepared for the Naval Facilities Engineering Command, Southwest Division (SWDIV) under Government Services Agreement (GSA) Contract Number GS-10F-0179J, Delivery Order Number N68711-00-F7907.

Delivery of this document is pursuant to the MCB Camp Pendleton Federal Facility Agreement (FFA) between the U.S. Environmental Protection Agency (USEPA), the California Environmental Protection Agency, Department of Toxic Substances Control (Cal/EPA DTSC), the San Diego Regional Water Quality Control Board (RWQCB), and the Department of Navy (DON). The FFA establishes a framework for implementing appropriate environmental response actions at the Base.

As documented in the letter from the USEPA to SWDIV dated September 28, 2000, and in accordance with the agreement reached at the 5 October 2000 FFA Project Management meeting, a number of sites previously included in OU 3 and OU 4 were reorganized into OU 4 and a new OU 5 to facilitate an expedited schedule. Four sites with sufficient remedial investigation (RI) data, but requiring supplemental field data to refine the FS, were assigned to OU 4. The current OU 4 sites are Sites 1D, 1E-1, and 30, which were reassigned from OU 3 (USEPA, 2000c; Parsons, 2000a), and Site 1H, already in OU 4. Contamination at these OU 4 sites was determined to pose a risk to human health or the environment, and therefore requires further action. Because the existing RI data and previously completed risk analysis were judged adequate for these sites, the remedial project managers (RPMs) agreed that the supplemental field data would be collected to refine the development of appropriate remedial actions for each site.

The supplemental field sampling plan (FSP) for OU 4 (Parsons, 2001a) documents the technical approach and data quality objectives (DQOs) that guided the collection of additional field data to support this FS. The previous Quality Assurance Project Plan (QAPP) was also updated for the new OU 4 field work and provided separately (Parsons, 2001b). The OU 4 FSP supplements the existing MCB Camp Pendleton work plan dated January 27, 1998 (Parsons, 1998). Comments and suggestions provided by the agencies during FFA meetings were incorporated into the field sampling and analytical program. This includes meetings conducted: 20 June 2000 (Site 1H), 17 and 18 July 2000 (Parsons, 2000b, Site 1H), 28 and 29 August 2000 (Parsons, 2000c, Site 1H), 5 October, 2000 (Parsons, 2000d, all Sites), 8 February, 2001 (Parsons, 2001c, Sites 1D and 30), 17 May 2001 (Parsons, 2001d, Sites 1E-1, and 1H), and 25 July 2001 (Parsons, 2001e, Sites 1E-1 and 30). In addition, agency comments were incorporated into the FSP in accordance with the Response to Agency Comments on the Draft OU 4 FSP and QAPP dated March 21, 2001.

Further discussion regarding specific sampling objectives and rationale is provided in each site-specific section.

This FS provides summary discussions of the conditions, environmental setting, and RI results and recommendations for each OU 4 site. However, this document does not duplicate all of the information provided in the previous RI/FS documents. Detailed site descriptions, histories, regional and site-specific environmental information, and results of previous investigations and risk assessments are incorporated by reference. Previous studies and reports concerning each site are provided in each site-specific section of this document.

1.1 Purpose and Objectives of the Feasibility Study

The purpose of this FS is to develop and evaluate remedial action alternatives for each of the OU 4 sites that comply with applicable and relevant and appropriate requirements (ARARs), are protective of human health and the environment, and can be implemented in a cost-effective manner. Except for Site 1E-1, all the OU 4 sites were the subjects of a previous FS in which remedial alternatives were developed and evaluated. Remedial alternatives previously developed for each site are presented in detail in each site-specific section.

The main objectives of the FS report are as follows:

- Present the supplemental field investigation data and assess current site conditions.
- Recalculate and refine the estimated volumes of contaminated soil requiring remediation at Sites 1D, 1E-1, 1H, and 30.
- Update the human health and ecological risk assessments for each site.
- Revise and update the ARARs analysis for each site.
- Refine the remedial action objectives for each site, if necessary.
- Reevaluate remedial technologies and process options and update the technology-screening matrix for each site.
- Develop final remedial alternatives for each site.

Supplemental site characterization data were collected to meet these objectives as outlined in the Draft Final OU 4 FSP. The overall sampling strategy at each site was developed using the USEPA's DQO process.

1.2 Report Organization

Section 1 introduces the report including information on OU site designations, purpose and objectives of the FS, site locations and descriptions, and environmental setting. Sections 2 through 5 provide site-specific information for each of the four OU 4 sites, including site history, local hydrogeological and ecological settings, and summary of previous investigations. These sections also summarize the activities and results of the supplemental field investigation and provide a reevaluation of the nature and extent of contamination based on the new data. These sections also document the results of the FS for each site, including site-specific ARARs evaluation, development of remedial action objectives (RAOs), screening of technologies and process options, and development and detailed analysis of remedial alternatives. Section 6 lists the references cited throughout the report.

Appendices to this document contain supporting information including the ARARs evaluation (Appendix A); a biological survey report (Appendix B); relevant site-specific information collected by others (Appendix C); supplemental FS field data (Appendix D); a correlation analysis (Appendix E); a data quality assessment (Appendix F); the chain-of-custody forms (Appendix G); the validated analytical laboratory data (Appendix H); a human health risk calculations (Appendix I); the ecological risk calculations (Appendix J); the remedial alternative cost estimates (Appendix K); designated level methodology for waste classification (Appendix L); and responses to agency comments on the draft OU 4 Supplemental FS (Appendix M).

1.3 General Site Location and Description

MCB Camp Pendleton is located almost entirely in northern San Diego County, California (Figure 1-1), approximately halfway between the cities of Los Angeles and San Diego.

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.

Base areas and the locations of the four OU 4 sites are shown on Figure 1-1. Sites 1D, 1E-1, and 30 are located in the southeastern portion of the Base, and Site 1H is located in the northwestern portion of the Base.

Construction of MCB Camp Pendleton began in March 1942, and President Franklin D. Roosevelt dedicated the Base in September 1942. It was designated as a permanent Base in October 1944. It currently supports more than 36,000 military personnel and employs approximately 4,600 civilians (Innis-Tennebaum Architects, Inc., 1990).

Land use within the perimeter of the Base consists of airfield operations, maneuver and impact areas, troop and family housing, recreation areas, and out-leased areas used by various entities (e.g., San Onofre Nuclear Generating Station and agriculture). Most of the land within MCB Camp Pendleton is open and undeveloped and directly supports the training mission of the Base. Developed areas of the Base are isolated from one another by large areas of essentially undeveloped land used for training and maneuvers. The largest concentration of development is at the Headquarters Area in the southeast corner of the Base. The second largest concentration is the housing areas in the southwest corner of the Base, near the Oceanside Gate (Innis-Tennebaum Architects, Inc., 1990).

Additional information on land use in specific areas of the Base and expected future land use at MCB Camp Pendleton and in surrounding communities is presented in the MCB Camp Pendleton Master Plan (Innis-Tennebaum Architects, Inc., 1990).

1.4 Applicable or Relevant and Appropriate Requirements and Guidance to be Considered

In performing this FS and subsequent remedial actions (if needed) for Sites 1D, 1E-1, 1H, and 30, the Navy is required to comply with ARARs within the framework of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Superfund Amendments and Reauthorization Act (SARA) and the National Contingency Plan (NCP).

Applicable requirements are federal and state regulatory requirements that directly and fully address or regulate the hazardous substance, pollutant, contaminant, action being taken, or other circumstance at a CERCLA site. Relevant and appropriate requirements are federal and state human health and environmental regulatory requirements that address problems or situations similar to those encountered at CERCLA sites. They are appropriate to the circumstances of release or threatened release such that their use is well suited to the particular site. Relevant and appropriate requirements are intended to carry the same weight as applicable requirements.

In addition, advisories, criteria, or guidance developed by the USEPA and other federal, state, or local agencies are designated as "to be considered" (TBC). TBCs generally fall into three categories: health effects information with a high degree of credibility (e.g., risk doses), technical information on how to perform or evaluate site investigations or response actions, and policy. TBCs are considered when ARARs do not exist or are not sufficient to protect human health and the environment at a CERCLA site. Because they are not promulgated and are not legally binding, they do not carry the same weight as ARARs. However, in some circumstances, TBCs may be considered along with ARARs when determining the necessary level of cleanup to

protect human health or the environment. The potential ARARs/TBCs identified for each of the OU 4 FS sites are evaluated in detail in Appendix A.

1.5 Risk Assessment Issues

Previous human health risk assessments have characterized the baseline risks for several of the sites addressed in this OU 4 FS, including Sites 1D, 1H, and 30 in the OU 3 RI/FS (IT, 1998). This OU 4 FS includes a baseline human health risk assessment (HHRA) for Sites 1E-1 and 1H and reviews and updates the risk assessments for Sites 1D and 30 to incorporate any changes in site characterization data or refinements to this risk assessment process (e.g., changes in toxicity reference values) that could alter the previous conclusions.

Cancer risk is expressed in terms of the chance of contracting cancer over a human's lifetime due to exposure to site chemicals, and is called the incremental lifetime cancer risk (ILCR). A risk of 1 out of a million means that one additional person out of a group of 1 million may develop cancer as a result of exposure to a chemical. USEPA considers a risk of less than 1×10^{-6} to be protective of human health and uses this value as the point of departure. The USEPA also has developed a risk management range represented by 10^{-6} to 10^{-4} as the "target range" within which the agency strives to manage risks as part of a Superfund cleanup. An ILCR above 10^{-4} (e.g., 10^{-3}) generally requires remedial action.

When it has been decided that action will be taken, USEPA has expressed a preference for cleanups that achieve the more protective end of the range (i.e., 10^{-6}), although waste management strategies achieving risk reductions anywhere within the range may be deemed acceptable. Furthermore, the upper boundary of the risk management range is not a discrete line at 1×10^{-4}, although USEPA generally uses this threshold in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified on site-specific conditions, including any uncertainties regarding the nature and extent of contamination and associated risks. Therefore, in certain cases, USEPA may consider a residual risk slightly greater than 1×10^{-4} to be protective (USEPA, 1991a).

Noncancer health effects are evaluated in terms of a hazard index (HI; the ratio of the actual or potential level of exposure to an acceptable level of exposure). USEPA uses an HI of 1 to be acceptable for noncancer health effects. Noncancer HI values significantly above 1 indicate a potential for adverse effects.

For lead, a concentration of 10 micrograms per deciliter (µg/dL) of blood is used to define an adverse impact.

Baseline ecological threats at the OU 4 sites have been characterized as part of previous ecological risk assessments (ERA) for Sites 1D, 1E, 1H, and 30 (IT, 1998; Parsons, 1999; SWDIV, 1996a; SWDIV, 1997). These assessments also included the development of screening-level soil cleanup levels that would be protective of ecological receptors. These chemical-specific/species-specific cleanup levels, termed permissible limits of exposure (PLEs), have been used to develop the remedial goals for the OU 4 soil sites. The ERAs for the OU 4 sites were updated as necessary to incorporate the findings of the field sampling.

1.6 Naturally Occurring Background Metals

The determination of which metals are site related and which are naturally occurring was based on a statistical evaluation, site scoping information, the regional occurrence of these metals in background, and their spatial site distribution relative to other detected analytes. This section describes the statistical approaches used to characterize the range of naturally occurring background metals. Site-specific discussions of this evaluation are presented in Sections 2 through 5.

Four different background soil regimes have been previously defined and characterized at MCB Camp Pendleton. These are the Las Flores Basin, Marine Terrace Deposits, the Santa Margarita Basin, and the San Luis Rey Basin. Except for Site 1H, all of the OU 4 sites are located within the Santa Margarita Basin. Surface and near-surface (0 to 5 feet bgs) soil background levels were characterized in all four areas to support evaluation of ecological impacts. In addition, background levels were also characterized for the 0 to 10 feet bgs soil interval in the Santa Margarita Basin and San Luis Rey Basin areas to support hypothetical future residential land use scenarios. Additional information regarding background soil sampling locations and the associated statistical methodology are presented in Appendix J of the Group C Draft Final RI (SWDIV, 1996b) and Appendix P of the Group D Draft Final RI (SWDIV, 1997). Background metals data were used to estimate 95th percentiles of the arithmetic mean based on the approach recommended by Gilbert (1987), assuming the data are lognormally distributed. By definition, the 95th percentile is the data value that is greater than or equal to 95 percent of the data values (USEPA, 2000f). Percentiles can be used to represent the upper range of background concentrations. These estimated 95th percentile background concentrations are in Appendix C.

Upper tolerance limits (UTLs) on percentile estimates have also been used and recommended by USEPA (1989c, 1992c) when determining whether there is statistically significant evidence of contamination. By definition (USEPA, 1989c and 2000f), "A tolerance interval establishes a concentration range that is constructed to contain a specified proportion (P%) of the population with a specified confidence coefficient, Y. The proportion of the population included, P, is referred to as the coverage. The probability with which the tolerance interval includes the proportion P% of the population is referred to as the tolerance coefficient." USEPA (1989b) recommends 95 percent coverage and a tolerance coefficient of 95 percent when calculating tolerance intervals. The 95 percent upper tolerance limit is defined for the purpose of this report as the upper tolerance limit on the tolerance interval assuming a 95 percent coverage and a 95 percent tolerance coefficient (i.e., the 95 percent UTL contains 95 percent of the distribution with a probability of 95 percent).

The "bootstrap" method (Efron, 1981), a nonparametric method recommended by USEPA (1997c), was used to calculate 95 percent UTLs. The bootstrap method is a computer-based replacement method for assigning measures of accuracy to statistical estimates (Efron and Tibshirani, 1993). It does not require assumptions regarding the statistical distribution of the underlying population (Efron, 1981). Bootstrap 95 percent UTLs, with a minimum coverage probability of 95 percent, were calculated as follows:

1. Randomly re-sample the data set with replacement;
2. Estimate the 95th percentile of the re-sampled data set;
3. Perform steps one and two 3,000 times and create a new data set of 3,000 re-sampled 95th percentiles; and
4. Estimate the 95th percentile of the new data set.

The 95th percentile estimated in Step 4 is the 95 percent UTL of the original data set. This is hereafter referred to as the 95 percent UTL background concentration. This value was estimated to be 9.4 milligrams per kilogram (mg/kg) for arsenic and 37 mg/kg for lead for the 0 to 10 feet bgs soil interval. A more detailed description of the bootstrap method is provided by the USEPA (USEPA, 1997c).

A slightly different approach was used at Site 1H. This site is located in the 62 Area, outside of the Santa Margarita Basin. As a result, there is some uncertainty in assuming that Santa

Margarita Basin background values are representative of the site. However, Santa Margarita Basin background values have previously been used for decision-making at sites in the 62 Area. This includes Sites 2F and 34 that were addressed in the Draft Final RI for Group D Sites (SWDIV, 1997). For Sites 1H and 2F, which is located approximately 300 hundred feet west of Site 1H, two background borings were advanced, and soil samples were collected at 1, 5, and 10 feet bgs (IT, 1998).

The use of Santa Margarita Basin background values for Site 1H, together with the use of the maximum detected arsenic concentration (10.9 mg/kg) in the Site 2F background data, is consistent with the approach used in previous RI reports for Site 1H. The use of these data for establishing background levels at Site 1H is appropriate for the following reasons:

- The Santa Margarita background data set is the largest and most comprehensive of the various background data sets at the Base.
- The six background soil samples for Site 2F were collected in an area immediately adjacent to Site 1H. This area would have near-identical soils and there appears to be no anthropogenic influences that would bias the results.
- Metals concentrations in the background soil samples appear to be consistent with naturally occurring levels based on background studies performed for other soil regimes at Camp Pendleton. This general consistency is expected given that the regional geology is likely consistent across much of Camp Pendleton with La Jolla Group bedrock present throughout both the Santa Margarita and San Mateo Basins (equivalent to Santiago and Silverado Formations in adjacent Orange County).
- Metals concentrations in the six background soils samples for Site 2F appear to be internally consistent, which suggests these data are from the same population.

Based on these considerations, it was determined that this approach was adequate for remedial decision making and that additional site-specific background data for Site 1H were unnecessary.

1.7 Development of Remediation Goals

This report presents RAOs for each OU 4 FS site designed to protect human health and the environment. These RAOs specify the remedial chemicals of concern (RCOCs), exposure routes and receptors, and acceptable contaminant concentrations or range of concentrations for each exposure route. The RAOs provide the basis for developing remediation goals for each site contaminant and medium and remedial action alternatives designed to meet those goals.

This section describes the general approach used in establishing remediation goals for soil and groundwater media at the OU 4 FS sites. Site-specific remediation goals are presented in Sections 2 through 5 of this report.

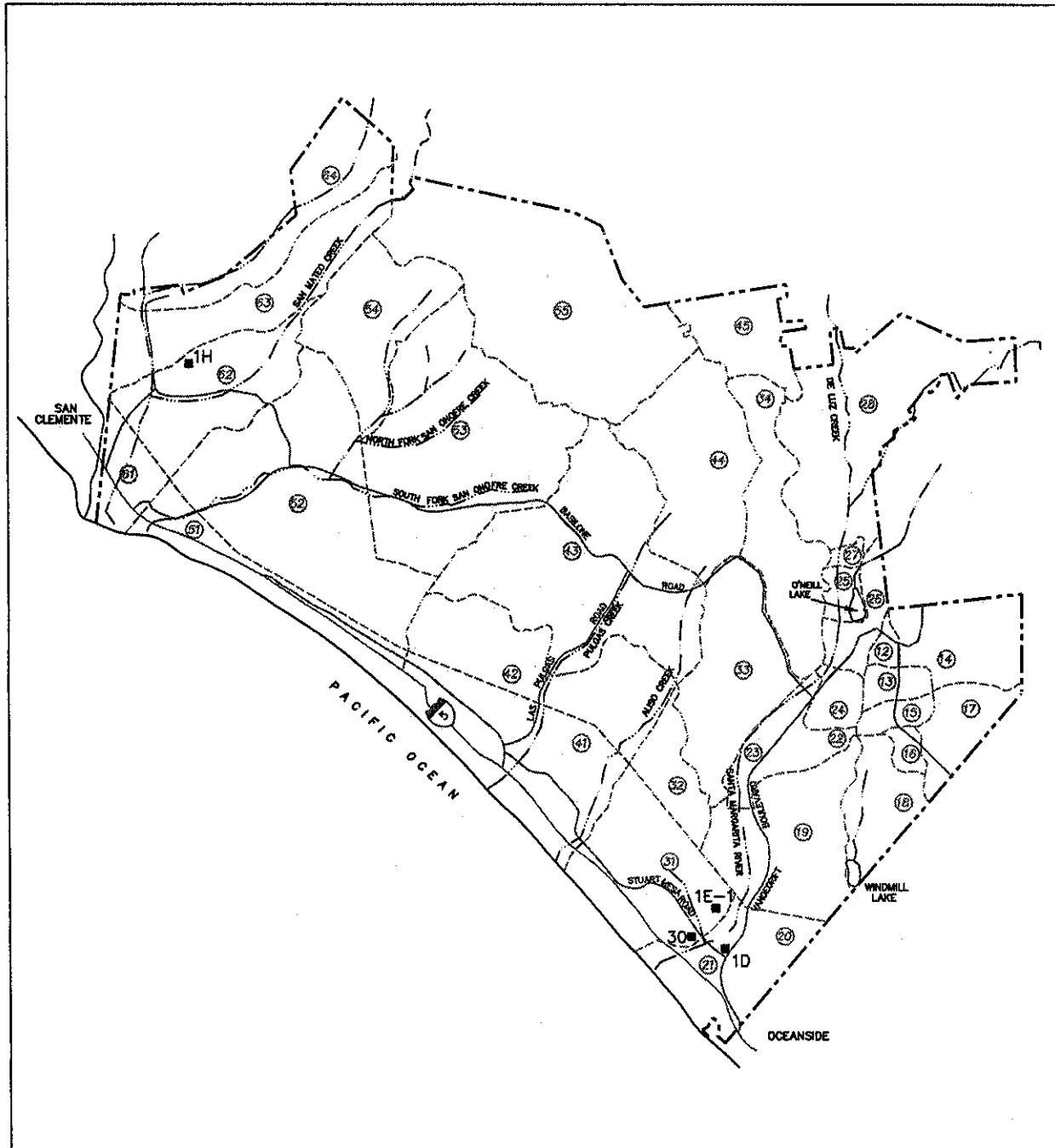
Remediation goals were previously established in prior FS documents for the subject sites. The remedial alternatives outlined in this FS are based on these previously established remedial goals. The following text describes the development of remedial goals for soil at the current OU 4 sites.

Remediation goals for both human health and ecological concerns for soil RCOCs were developed based on contaminant concentrations detected in the upper 5 feet of soil because human and ecological receptors can potentially be exposed to soil contaminants in this depth interval. For soil between 5 and 10 feet bgs, remediation goals were developed only for the protection of human health because an exposure pathway to soil contaminants does not exist for ecological receptors at depths greater than 5 feet bgs (IT, 1998).

For each RCOC, the corresponding human health risk-based standard (e.g., preliminary remediation goals [PRGs] under a hypothetical residential scenario) was compared to the estimated 95th percentile background concentration. The higher of the residential PRG and background value was considered as the remediation goal for human health protection. From an ecological perspective, the goal was selected by comparing the background value to an appropriate ecological risk management goal and again retaining the greater of the two values. The ecological risk management goal for each RCOC was set as the most stringent PLE for the species of greatest concern at each site. The lower of the two values (i.e., human health and ecological) was then selected as the proposed remediation goal for the RCOCs in soil ranging from the ground surface to a depth of 5 feet bgs. The remediation goal for human health protection was selected as the proposed remediation goal for the RCOC in soils at depths ranging between 5 and 10 feet bgs.

For groundwater protection at soil-contaminated sites, synthetic precipitation leaching procedure measurements of residual soils were compared to groundwater quality objectives (i.e., maximum contaminant levels) to characterize the potential for long-term leaching of contaminants to groundwater. Remediation goals that involve cleanup to naturally occurring background levels are assumed protective of groundwater resources.

This Page is Intentionally Blank



LEGEND

MAJOR AREA BOUNDARIES

ROADS AND HIGHWAYS

CREEKS AND STREAMS

MCB CAMP PENDLETON BOUNDARY

(53) MAJOR AREA DESIGNATION

21 ■ OU 4 SITE LOCATION

N

0 15,000 30,000

SCALE IN FEET

SOURCE: IT, INC.

Figure 1-1

Locations of Base Areas and OU 4 Supplemental FS Sites

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\camppendleton\ou4fs\FSReport\1-1.dwg

2.0 SITE 1D

Site 1D is a former refuse burning area of approximately 23 acres located north of the intersection of Vandegrift Boulevard and Stuart Mesa Road, in the 20 Area (Figure 2-1). Chemicals of concern (COCs) historically detected above their respective soil remediation goals (RGs) include antimony, arsenic, chromium, copper, iron, lead, and zinc. The development of RGs for Site 1D was based on the results of previous human and ecological risk assessments that were documented in the OU 3 RI/FS (IT, 1998). The site is adjacent to the Santa Margarita River, within the floodplain, which is subject to flooding during peak rainfall events (Kleinfelder, 1997).

The selected remedy for Site 1D in the OU 3 Record of Decision (ROD) (IT, 1999a) was excavation and removal with on-Base disposal (Site 7, Corrective Action Management Unit [CAMU]). After the closure of the on-Base CAMU in April 2000, a decision was made to perform additional characterization of the site to refine the cost estimates and reevaluate the remedial options. As mentioned in Section 1.0, the site was reassigned from OU 3 to OU 4 for inclusion in this FS.

The purpose of this FS was to obtain specific additional data to facilitate the remedy evaluation process, assess the nature and extent of contamination in soil, and evaluate the threat to groundwater. Background information and site conditions are detailed in the following sections.

2.1 Background Information

Although this FS provides a summary of site conditions, it does not repeat all the information provided in previous documents regarding detailed site descriptions, histories, regional and site-specific environmental information, or results of previous investigations and risk assessments. This information is incorporated by reference as appropriate and is documented in the following reports:

- Draft Final Remedial Investigation Report for Group C Sites (SWDIV, 1996b).
- Draft Final Remedial Investigation and Feasibility Study for Operable Unit 3 (IT, 1998).
- Draft Engineering Evaluation/Cost Analysis (EE/CA) for Sites 1D/1003, 1E/1004, 30, and 35 (Kleinfelder, 1997).
- Energy Dispersive X-Ray Fluorescence Field Investigation Report, Sites 1A, 1D, 1E, 1F, and 2A (SWDIV, 1998a).
- Record of Decision, Operable Unit 3 (IT, 1999a).
- Draft Final Remedial Design and Remedial Action Work Plan for Operable Unit 3, Sites 1A, 2A, 1D, 1E, and 1F (OHM, 1999).
- Biological Assessments for Sites 1A, 1D, 1E, 1F, 2A, and 30 (IT, 1999b).
- [Archeological] Monitoring and Discovery Plan for Six Waste Remediation Areas (LSA, 2000).
- Draft Final Field Sampling Plan for OU 4 Supplemental Feasibility Study (Parsons, 2001a).

2.1.1 Site Description and History

Site 1D is one of nine refuse burning grounds used from 1942 through the early 1970s to burn refuse generated by Base operations (IT, 1998; Kleinfelder, 1997). Until 1970, all refuse at the

Base was disposed of by burning; however, no information is available on the specific years of operation or the amount of refuse disposed of at each burning ground. The burning ground boundary at Site 1D was estimated in the OU 3 ROD to be approximately 400 feet long and 220 feet wide, and the total estimated volume of impacted soil was approximately 40,000 cubic yards (IT, 1998). The approximate area of the active portion of Site 1D can be seen in an aerial photo taken in 1970 (Figure 2-2).

The Base refuse burning areas were closed between the late 1960s and 1971. Site 1D was closed, covered with native soil, and allowed to revert to natural vegetation (IT, 1998). Visual inspection in 1984 revealed no evidence of environmental contamination (NEESA, 1984). However, the cover material has since eroded and refuse has been exposed. Areas of stressed vegetation and stained soil have also been observed (IT, 1998).

2.1.2 Site Conditions

Relatively flat land surrounds the site to the north and west. Plateaus to the south and east rise 150 feet above the site. Box Canyon Landfill (Installation Restoration [IR] Site 7) is 1,500 feet northeast of the site. The Twin Lakes Sewage Disposal Plant is south of the site across Stuart Mesa Road (Figure 2-1). Railroad tracks and an unpaved road run along the northern side of the site. The railroad tracks are inactive and are overgrown with vegetation. The Santa Margarita River is approximately 150 feet north of the site.

Site 1D is on the south edge of the alluvial plain in the lower portion of the Santa Margarita Basin. The geology of the basin consists of stream-deposited younger and older Quaternary alluvium overlying bedrock of the San Mateo Formation. Site 1D is underlain by older alluvium consisting of interbedded, fine to coarse-grained, unconsolidated to poorly consolidated sand, silt, and gravel interspersed with clay lenses.

The regional groundwater flow direction in the valley-fill aquifer is to the west (IT, 1999a). Groundwater at Site 1D ranges from 6 to 10 feet below ground surface (bgs) and flows northwest towards the Santa Margarita River.

Vegetative habitats at Site 1D include disturbed and California sagebrush series. The disturbed habitat is mostly bare ground, sparsely covered with mustard and tree tobacco. The California sagebrush series includes black and white sages, coyote brush, and castor bean. Herbaceous species include clover and annual grass. Ice plant grows in open patches throughout the site. Surveys at Site 1D for three federal-listed endangered or threatened species were conducted in 1996 and 1997. Coastal California gnatcatchers were observed at Site 1D during the 1997 surveys. Least Bell's vireos were identified in riparian vegetation adjacent to the Santa Margarita River in 1996 surveys, but none was observed at the site. Pacific pocket mice were not observed at or in the vicinity of Site 1D (IT, 1998).

Coastal California gnatcatchers and least Bell's vireos were observed in the vicinity of Site 1D during the Biological Field Survey conducted in August 2001 (Appendix B). No nests or nestlings were observed within the site boundary, and fieldwork was conducted as scheduled.

Although no cultural resources were previously recorded within Site 1D, there is one area, approximately 50 feet north of the railroad tracks, that contains prehistoric items. This site contains one mano, one hammer-stone, one hammer-scraper, at least four flakes, and pieces of marine shell (LSA, 2000). Because of this site, archeological monitoring is required during any investigation and/or remediation activities conducted at Site 1D (LSA, 2000).

2.1.3 Nature and Extent of Contamination

The previously established COCs at Site 1D are antimony, arsenic, chromium, copper, iron, lead, and zinc (IT, 1998). The development of soil RGs for Site 1D was based on the results of

previously performed human and ecological risk assessments that were documented in the OU 3 RI/FS (IT, 1998). The soil RG values represent the more stringent of the chemical-specific residential soil PRGs and the ecological PLEs. In cases where this value is less than the upper range of naturally occurring levels, the background concentration (i.e., 95 percent UTL) was established as the RG.

Based on the RI/FS for OU 3, the extent of significant metals-impacted soil appeared to be confined to the north and north-central portion of the site (IT, 1998). Data from previous investigations are included in Appendix C1.

Groundwater sampling at Site 1D was documented in the Draft Final RI Report for Group C Sites (SWDIV, 1996b). Three wells were installed and sampled. The results of the groundwater sampling were summarized in the OU 3 ROD (IT, 1999a). The potential risks due to groundwater exposure were also evaluated in the OU 3 ROD (IT, 1999a). Because groundwater was determined to not require action, the OU 4 FS focused on better defining the volume of soil waste requiring remediation at Site 1D.

Although a review of the existing data for Site 1D had established that COCs were present in soil above RGs, the existing data set did not provide enough certainty regarding specific quantities of soil that exceed relevant thresholds. The following decision questions were used to define the required sampling for the FS from the DQO process:

- What is the lateral and vertical extent of COCs in soil?
- What is the approximate volume of impacted soil?
- What is the approximate volume of soil above Resource Conservation and Recovery Act (RCRA)-hazardous waste limits?
- What is the volume of soil above California-designated limits?
- What is the impact of COC-impacted soils on risk to human health and environment, including threat to groundwater?

Based on these questions, the sampling was to be considered complete if the soil sampling results bounded the lateral and vertical extent of COCs in soil.

2.1.3.1 FS Sampling

The FS sampling at Site 1D was conducted from 27 August to 28 September 2001. The following sections describe the supplemental field data collection, which was conducted in accordance with the Draft Final OU 4 Supplemental FS FSP and QAPP (Parsons, 2001a and 2001b).

2.1.3.1.1 Soil Sampling

To adequately address the decision questions for the site, soil sampling was conducted using a systematic sampling grid, and each cell in the grid was referred to as a characterization unit (CU). Enough CUs were proposed to allow for acceptable certainty in remedial cost estimates and alternatives analysis in the FS. Borings were advanced using a Geoprobe® rig or by hand auger in locations the Geoprobe® rig could not be used due to terrain or ecological constraints. Samples were collected in accordance with the procedures outlined in the Draft Final FSP and QAPP (Parsons, 2001a and 2001b). Boring logs for each CU are included in Appendix D1.

Soil sampling at Site 1D focused on the upper 5 feet because this is the exposure interval of concern for ecological receptors. Although deeper soils could be contacted under a residential exposure scenario, future residential development is considered highly unlikely for this site

given its location within the floodplain. Also, as stated in the OU 3 ROD (IT, 1999a), most of the contamination at the site has been detected in the surface or near-surface soil.

Each CU covered a 75-foot by 75-foot area; their locations are shown on Figure 2-3. The original grid layout included 134 CUs; however, some of these locations could not be sampled due to the presence of utilities and Vandergrift Boulevard. As a result, the final grid layout only included 110 CUs. A total of 330 borings were advanced in the 110 CUs; this included 255 Geoprobe® borings and 75 hand auger borings. Three random borings were advanced in each CU, and samples were collected at intervals of 0.0 to 0.5, 2.0 to 2.5, and 4.0 to 4.5 feet bgs. To obtain a representative sample from each depth, one discrete sample was collected from each of the three random boring locations within each CU. The discrete samples were then mixed together to form a composite sample to represent that CU.

To evaluate further the possible presence of waste below 5 feet, 82 of the 330 borings were advanced deeper than 5 feet bgs, and sample cores were visually inspected for the presence of debris, ash, or discoloration. Visual evidence of waste was present in the following cells: C6, D4, E8, F8, H8, and I7. Therefore, deeper samples for composite were collected and analyzed at those locations.

2.1.3.1.2 Soil Analytical Program

Based on the detailed correlation analysis between historical levels of lead and the other COCs (Parsons 2001a, Appendix B), it was determined that all samples containing non-lead COCs (i.e., antimony, arsenic, chromium, copper, iron, and zinc) at concentrations above their respective RGs also contained lead above its RG. Therefore, at Site 1D, lead (SW6010B) was used as an indicator analyte for the composited soil samples collected from each CU.

To confirm the appropriateness of using lead as an indicator analyte, 5 percent of the total samples collected were analyzed for the full suite of metals (SW6010B/7000 series). The results of the correlation analysis are included in Appendix E and in the discussion of the metals results.

Semivolatile organic compounds (SVOC) and dioxins/furans were analyzed for on samples having visual evidence of burn materials or ash, as noted on the logs included in Appendix D1.

SPLP (SW1312) analyses were performed on the same set of samples analyzed for the full suite of metals to determine their leachability potential and any associated threat to underlying groundwater. Toxicity characteristic leaching procedure (TCLP) (SW1311) analyses were also performed on these samples to estimate the amount of soil that would be designated as RCRA-hazardous waste if excavated and transported off site for disposal.

2.1.3.2 FS Results

The analytical results obtained from the FS soil investigation at Site 1D are presented in this section along with a discussion of the nature and extent of contamination. The discussions presented in this section are based on validated analytical data. The data quality assessment is presented in Appendix F. Chain-of-custody and cooler receipt forms for samples collected at Site 1D are provided in Appendix G1. Validated analytical data for Site 1D are provided in Appendix H1. Sampling locations are shown on Figure 2-3.

Metals

A total of 363 soil samples (330 primary samples plus 33 field duplicates) were collected for lead analysis in August and September 2001. Lead was detected above the previously established RG of 29 mg/kg in 94 of the 363 samples (Table 2-1).

The 17 soil samples analyzed for the full suite of metals and TCLP analysis are shown on Table 2-2. Metals detected above their respective RGs include antimony, arsenic, chromium, copper, iron, lead, and zinc (Table 2-3). The horizontal distributions of metals above their RGs are shown on Figures 2-4 (0 to 1 feet bgs), 2-5 (1 to 3 feet bgs), and 2-6 (3 to 5 feet bgs or deeper as indicated). Deeper sampling was conducted based on visual observations in the field. When it appeared that native soil was reached, the sampling was discontinued. This method allows for close approximation of the total volume of contaminated soil sufficient for FS alternative costing.

A correlation analysis was performed to confirm the appropriateness of using lead as an indicator analyte, and the results for antimony, arsenic, and zinc showed a 100 percent correlation with lead (Appendix E1). Out of the set of 17 samples, only one lead sample (1D-A07-B, 2.2 mg/kg at 2.0 to 2.5 feet bgs) was below the RG where chromium (59.6 mg/kg), copper (29.5 mg/kg), and iron (31,200 mg/kg) were above their respective RGs (33, 26, and 26,459 mg/kg, respectively) for a 94 percent positive correlation.

SVOCs

The sampling locations where ash or burn material was encountered and the horizontal distribution are shown on Figure 2-7. The results of the 13 soil samples analyzed for SVOCs, based on the presence of ash or burn material in the borings, are shown on Table 2-4. SVOCs were only detected in one sample (1D-D04-C) and included benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, fluoranthene, and pyrene. Only benzo(a)pyrene and benzo(b)fluoranthene were detected above their respective residential soil PRGs.

Dioxins/Furans

Based on the SVOC results and the presence of ash, seven samples were analyzed for dioxins/furans, and these results are shown on Table 2-5. The dioxins and furans detected included 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD), 1,2,3,7,8-pentachlorodibenzo-p-dioxin (PeCDD), 1,2,3,6,7,8-hexachlorodibenzo-p-dioxin (HxCDD), 1,2,3,4,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (HpCDD), 1,2,3,4,6,7,8,9-octachlorodibenzo-p-dioxin (OCDD), 2,3,7,8-tetrachlorodibenzofuran (TCDF), 1,2,3,7,8-pentachlorodibenzofuran (PeCDF), 2,3,4,7,8-PeCDF, 1,2,3,6,7,8-hexachlorodibenzofuran (HxCDF), 1,2,3,7,8,9-HxCDF, 1,2,3,4,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-heptachlorodibenzofuran (HpCDF), 1,2,3,4,7,8,9-HpCDF, and 1,2,3,4,6,7,8,9-octachlorodibenzofuran (OCDF). The impact of these results is discussed in the HHRA (Section 2.1.4).

2.1.3.2.1 Soil Volume Cleanup Estimate

The total volume of contaminated soil above RGs at Site 1D is estimated at approximately 31,300 cubic yards, which is a 21.8 percent reduction compared to the OU 3 ROD estimate of 40,000 cubic yards for the site. The horizontal distribution of metals above their previously established RGs at the deepest depth in each CU is shown on Figure 2-8. Figure 2-9 shows vertical distribution of contaminated soil.

2.1.3.2.2 Groundwater Impact Evaluation

Based on the potential threat to groundwater, SPLP (SW1312) analysis was conducted for the full suite of metals (Table 2-6) and was performed on a selected subset of soil samples to determine leachability potential and any associated threat to underlying groundwater. Samples that exhibited a range of lead concentrations were chosen for SPLP analysis, rather than simply choosing the samples with the highest concentrations. This was done to evaluate the leaching

potential of soils that might be left in place at the site and to determine the migration potential in highly contaminated areas.

The results from SPLP analyses conducted during the FS investigations indicate that extractable concentrations of aluminum, antimony, cadmium, chromium, iron, lead, manganese, vanadium, and zinc are above their respective MCLs or California Action Levels (Table 2-6). Metals-contaminated soils, if left in place untreated at Site 1D, would likely pose a threat to groundwater underlying the site based on SPLP results. In the four samples (1D-C13-B, 1D-G10-B, 1D-H08-C, and 1D-L06-C) where no metals were detected above their respective RGs in the total threshold limit concentration (TTLC) analysis, the SPLP results for aluminum, iron, lead, manganese, and vanadium were still above their respective MCLs or California Action Levels (Table 2-6). This may represent background conditions for these metals.

Furthermore, it is highly unlikely that either dioxins/furans or SVOCs would represent a threat to water quality. The primary SVOCs of interest, polycyclic aromatic hydrocarbons (PAHs), along with dioxins/furans, are highly immobile in the environment and have extremely low water solubility. Consequently, their potential to migrate and impact either surface water (through runoff) or groundwater (through leaching) appears extremely unlikely.

2.1.4 Human Health Risk Assessment

An HHRA was previously performed for the soil exposure pathway at Site 1D as part of the OU 3 RI/FS (IT, 1998). The assessment evaluated exposure resulting from incidental ingestion of soil, dermal contact with contaminated soil, and inhalation of contaminated fugitive dust. The assessment consisted of calculating the total risk and hazard by comparing maximum detected concentrations of all analytes to residential soil PRG values. Based on this comparison, the total residential soil risk was estimated to be 2×10^{-4} and the total hazard was estimated to be 11.6 (see Table 2-7). However, the calculation of the total hazard index incorrectly included lead in the summation. Excluding lead, the total hazard index is 3.1.

The risk and hazard from naturally occurring background was calculated separately. The difference was presented as the site-related risk and hazard. Discounting the risk contributed by background metals, the site-related ILCR and hazard index were estimated to be 3×10^{-5} and 10.1, respectively (IT, 1998) (1.6 without lead). Arsenic was the primary contributor to cancer risk while antimony and chromium were the primary contributors to the noncancer hazard. The assessment concluded that baseline conditions at the site represent a potential threat to hypothetical future residents.

The maximum historical lead concentration (1,100 mg/kg) exceeded both the USEPA and Cal/EPA residential screening criteria (IT, 1998). Organic compounds were minor contributors to overall risk and hazard.

The OU 3 RI/FS HHRA methodology and assumptions were reviewed to determine their appropriateness for use in decision making for this OU 4 FS. The review indicated that there have been no subsequent changes in toxicological data, calculation methodologies, exposure assumptions, or exposure point concentrations that would alter the original conclusion that the site poses a threat to a hypothetical future on-site resident. However, the review indicated that risk from chromium (2×10^{-4}) and beryllium (7×10^{-6}) was significantly overestimated in the original OU 3 risk assessment. The chromium risk was overestimated due to the assumption that all detected total chromium was hexavalent and the use of the subsequently withdrawn CAL-modified hexavalent chromium PRG (0.2 mg/kg). The beryllium risk was overestimated because it was calculated using a soil beryllium PRG value based on an oral slope factor that

has since been withdraw from the USEPA's Integrated Risk Information System (IRIS) database.

Soil sampling data collected as part of this FS indicated the presence of dioxins/furans in site soils. These compounds had not previously been analyzed for and their presence was not assumed in the original OU 3 assessment. A screening-level assessment, based on maximum detected concentrations (Appendix I), indicates that dioxins/furans would pose an additional incremental risk (i.e., above the previously determined level) of approximately 6×10^{-5} to a hypothetical residential receptor.

2.1.5 Ecological Risk Assessment

A baseline ERA for organisms potentially exposed to contaminants in Site 1D soil was conducted as part of the Group C RI Report. A full discussion of the technical approach and methodology used in the baseline ERA was included in the draft final Group C RI (SWDIV, 1996b) and summarized in the draft final RI/FS for OU 3 (IT, 1998).

Habitat at Site 1D consists primarily of California sagebrush series interspersed with areas of open, disturbed habitat (IT, 1998). The representative species selected for the ecological risk assessment were plants, terrestrial invertebrates, California mouse, California quail, and coastal California gnatcatcher (IT, 1998).

In the baseline ERA, concentrations of inorganic chemicals in soil were compared with background values for the Santa Margarita Basin (IT, 1998). Concentrations of 13 inorganic compounds that exceeded the available background values were retained for the initial ecological risk screening (IT, 1998). The risk assessment presented the PLEs for each metal of concern. The PLEs for birds and mammals were modified based on the size of the area of concern and the foraging range for each representative species (IT, 1998). The ERA concluded that five metals (antimony, copper, iron, lead, and zinc) were present at Site 1D in concentrations that could be directly toxic to ecological receptors or could bioaccumulate in the wildlife food chain (IT, 1998). The PLEs established in the ERA are shown in Appendix C1. Based on the results of the field data collected for the FS, the same five metals (antimony, copper, iron, lead, and zinc) were present in concentrations exceeding the PLEs. In addition to these metals, dioxins/furans likely pose an additional incremental threat to ecological receptors. Since the previously performed ERA concluded that baseline conditions pose an unacceptable threat to ecological receptors, a reevaluation to address dioxins/furans would not change the overall conclusion. Therefore, an expanded ERA was determined to be unnecessary because the results of the previous ERA, documented in the Group C RI Report (SWDIV, 1996b), are adequate to support decision making at this site.

2.1.6 Conclusions of the FS

The data collected for the FS led to the following conclusions:

- The estimated volume of soils impacted above previously established RGs at Site 1D is approximately 31,300 cubic yards. The lateral extent of impacted soil is approximately 5 acres. The FS better defined the extent and volume of soil contamination that was originally identified in the OU 3 ROD (IT, 1999a).
- COCs detected in site soils above their respective RGs include antimony, arsenic, chromium, copper, iron, lead, zinc, and dioxins/furans. Lead is the COC that is most prevalent at Site 1D, and it serves as a good indicator for the presence of other site contaminants.
- The previous RI/FS (IT, 1998) indicated a potential threat to human health under a hypothetical residential scenario although the predicted cancer risk was likely

overestimated due to subsequent changes in toxicological factors for beryllium and chromium. In addition to the human health risk outlined in the OU 3 RI/FS, the site poses an additional incremental risk of 6×10^{-5} caused by the presence of dioxins/furans in site soils.

- The previous ecological risk assessment (ERA) conducted at this site (SWDIV, 1996b) indicated that baseline conditions would not be protective of ecological receptors.
- Metals-contaminated soils, if left in place untreated at Site 1D, could pose a threat to groundwater underlying the site based on SPLP results.
- An area north of Site 1D contains items of archeological significance. Therefore, cultural resource monitoring will be required during any potential site remediation and/or further investigation activities.
- Coastal California gnatcatchers and least Bell's vireos were observed near Site 1D during the Biological Field Survey conducted in August 2001 (Appendix B). No nests or nestlings were observed within the site boundary. Biological resource monitoring may be required during any potential site remediation and/or further investigation activities if conducted during the breeding season.

2.2 Development of Remedial Action Objectives

The purpose of this FS is to refine the characterization of the site, and, based on this refined characterization, develop and evaluate remedial action alternatives for each of the OU 4 sites that comply with ARARs, are protective of human health and the environment, and can be implemented in a cost-effective manner.

As discussed in Section 1.4, in accordance with the framework of CERCLA, NCP, and SARA, the RI/FS and subsequent remedial activities conducted at Site 1D must comply with federal and state ARARs. The ARARs/TBC that might apply to Site 1D are discussed in detail in Appendix A. USEPA guidance (USEPA, 1988b) requires that remedial action objectives (RAOs) be developed during the initial phase of the FS and be used as the framework for developing the remedial alternatives. The remainder of this section addresses the soil contamination at Site 1D that requires remediation based on the site characterization data collected to date.

2.2.1 Chemicals of Concern

As discussed in Section 2.1.3.2, seven metals were detected in soil samples above their respective RGs during the OU 4 FS: antimony, arsenic, chromium, copper, iron, lead, and zinc (Table 2-3). All seven of these metals were classified as RCOCs in the OU 3 ROD (IT, 1999a) and are also classified as RCOCs for this FS. Table 2-3 presents the metal RCOCs and their associated RGs for Site 1D. Dioxins and furans are also classified as RCOCs. Table 2-5 lists the dioxins/furans and the associated 2,3,7,8-TCDD total toxicity equivalents.

2.2.2 Exposure Routes/Receptors of Concern

Sections 2.1.4 and 2.1.5 summarize the exposure routes and receptors of concern.

2.2.3 Proposed Remediation Goals

The development of soil RGs for Site 1D uses RGs previously established as part of human and ecological risk assessments that were documented in the OU 3 RI/FS (IT, 1998). The soil RG values represent the more stringent of the chemical-specific residential soil PRGs and the ecological PLEs. In cases where this value is less than the upper range of naturally occurring levels, the background concentration for the Santa Margarita Basin (i.e., the estimated 95th percentile background concentration) was established as the RG.

Dioxins and furans were also found to represent a potential threat to human and ecological receptors at Site 1D. Dioxins and furans at this site will be remediated to ambient levels. Based on the conceptual site model and soil analytical results, it is likely that other contaminants (e.g., lead) will serve as a good indicator compound for dioxins and furans. However, confirmation sampling will be necessary as part of remedy implementation to demonstrate the adequacy of the cleanup. Results of numerous scientific studies have shown that dioxins and furans occur at trace levels in most soils. Based on a compilation of these studies, the USEPA reported the mean background urban and rural soil concentrations for dioxins (in terms of 2,3,4,8-TCDD toxicity equivalents [TEQ] and the 1989 International toxicity equivalent factors [TEFs]) of 13.4 and 4.1 nanograms per kilogram (ng/kg), respectively (USEPA, 2000h). Based on this information, and given that the site is located in a non-urban area, the soil remediation goal for dioxins is 4.1 ng/kg (0.000004 mg/kg).

2.2.4 Remedial Action Objectives

The RAOs for the Site 1D soil contamination are defined below:

- Minimize exposure (inhalation/dermal contact/ingestion) by humans and ecological receptors to chemicals in soil at concentrations exceeding RGs (shown in Tables 2-3 and 2-5).
- Protect the beneficial uses and water quality objectives of the lower Santa Margarita River Basin.

The evaluations of remedial alternatives for the site address different means of achieving these RAOs.

2.3 Identification of General Response Actions

General response actions (GRAs) represent general classes of technologies that have common characteristics in the way they address the risk posed by contaminated soil (i.e., the RAOs). GRAs considered for Site 1D include the following:

- No Action: No further remedial action for the contaminated soil.
- Institutional Action: Minimal activity that includes administrative and physical measures to restrict site access with no active remediation of the contaminated soil.
- Containment: Physical measures such as capping to restrict soil contaminant migration (e.g., wind erosion, surface runoff) or waste movement.
- Removal: Removal (i.e., mechanical excavation) of contaminated soil.
- Treatment (in situ and ex situ): Physical, chemical, and biological measures that would reduce toxicity, mobility, or volume of a contaminant or waste by altering the physical or chemical properties of the contaminants and/or media.
- Disposal: Placement of treated or untreated waste soil in a temporary or permanent, pre-engineered, controlled environment (i.e., landfill) that would restrict contaminant migration and eliminate exposure routes.

2.4 Identification and Screening of Technology Types and Process Options

The objective of this section is to identify remedial technologies and process options for application for soil remediation at Site 1D. This objective is accomplished using a variety of information including previous investigations, remedial actions at other sites, references developed by the USEPA for application at National Priority List (NPL) sites, USEPA

computerized technology databases (Alternative Treatment Technology Information Center [ATTIC], Version 1.0; Vendor Information System for Innovative Treatment Technologies [VISITT], Version 2.0; and Hazardous Waste Cleanup Information [CLU-IN]), and standard engineering references.

For each GRA discussed above, one or more potentially applicable remedial technologies were identified. The goal of the screening process is to evaluate a large number of technologies to identify the ones that are potentially implementable for soil remediation and under the specific Site 1D conditions. In this step, both process options and entire technology types can be eliminated based on technical effectiveness and/or implementability considerations. Information on site characteristics and contaminant types and concentrations was used to eliminate technology types and process options that are neither applicable nor effectively implementable at the site.

The remedial technologies identified and evaluated in the previous feasibility studies performed for Site 1D (IT, 1998) served as the starting point for the list of technology options evaluated in this FS report. These evaluations were revised as appropriate to reflect current site conditions and technology updates. In addition, relevant new technologies were included in the evaluation. A summary of the technologies considered in this FS follows:

- Institutional Action
  - Access Restrictions
  - Fencing
- Containment
  - Capping
- Removal
  -
  - Excavation
- Disposal
  - Landfill
  - Backfilling
- In Situ Physical/Chemical Treatment
  - Soil Flushing
  - S/S
  - In Situ Vitrification
- In Situ Biological Treatment
  - Phytoremediation
- Ex Situ Physical/Chemical Treatment
  - Soil Washing
  - Acid Extraction
  - S/S
  - Chemical Oxidation - Reduction
  - Vitrification
- Ex Situ Thermal Treatment
  - Thermal Desorption
  - Incineration

Figure 2-10 lists the GRAs for the Site 1D soil contamination, identifies the remedial technologies and process types for each response action, and summarizes the screening results for each technology and process. The following sections describe the technologies and process options under each GRA, along with the rationale for retaining or eliminating each technology.

2.4.1 No Action

The no action response was retained for consideration during the development and analysis of alternatives as required by the NCP (40 Code of Federal Regulations [CFR] 300.430[e][6]). The no action response does not provide any additional remediation, containment, or security measures to reduce potential risk to human health or the environment at Site 1D.

2.4.2 Institutional Action

Institutional action refers to administrative and physical actions taken to reduce or eliminate risks to public health and the environment by controlling exposure pathways rather than removing contaminants or controlling and reducing their mobility, toxicity, or volume. For soil, institutional action such as access restrictions and fencing are typically considered during the initial screening of technologies to limit exposure of potential human receptors. Institutional actions alone would not be effective because soils at Site 1D pose a risk to ecological receptors as well as to humans and groundwater. The reasonably anticipated future land use at Site 1D is neither residential nor industrial given its location in an ecologically sensitive area prone to flooding. Thus, land use and access restrictions would effectively limit future development and physical access to the site and were retained for further evaluation. Fencing or barriers may be effective in preventing certain ecological receptors (e.g., larger mammals) from accessing the site and contacting site contaminants and was also retained for further evaluation. However, DON's position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

2.4.3 Containment

Containment actions for soil contamination are intended to isolate RCOCs from potential human and/or ecological contact and to protect unimpacted media by reducing or eliminating the migration of RCOCs from soil to groundwater or surface water systems. The containment option typically is capping (e.g., an asphalt, concrete, or engineered soil cap). At Site 1D occasional flooding and erosion problems in the area would necessitate an extensive surface water diversion system that makes long-term cap protection and maintenance infeasible. Therefore, this technology was not retained for further consideration in developing remedial alternatives.

2.4.4 Removal

Removal actions are intended to remove soils containing RCOCs. The removal option considered for soil at Site 1D is excavation.

Under this process option, the contaminated soil is excavated and removed from the site, and the excavated area is backfilled with clean imported soil and compacted to required standards. Excavation is generally followed by treatment and/or disposal of the contaminated soil. This option is particularly suited for source removal. A frequent practice is to excavate and remove "hot spots" in combination with other measures such as containment (i.e., capping) of less-contaminated soils. Worker health and safety concerns weigh heavily in the decision to remove highly toxic or reactive waste material.

Other factors considered include contaminant mobility, feasibility of on-site containment or in situ treatment, depth of contamination, and the cost of disposing of the waste or rendering it nonhazardous after excavation.

Air monitoring is usually required for this option to demonstrate the effectiveness of dust suppression measures to minimize contaminant exposure potential to workers and off-site receptors. Mechanical excavation using heavy equipment such as a backhoe is feasible at Site 1D because the vertical extent of contamination is very shallow (approximately 4 to 6.5 feet bgs) and covers a relatively small area (approximately 219,000 square feet). However, the potential for degradation of sensitive ecological habitat and worker exposure to contamination from implementing this option exists at Site 1D. Appropriate coordination with agencies and implementation of biological monitoring and appropriate mitigation measures would be required. Excavation is readily implementable and was retained for further consideration in evaluating the remedial options for this site.

2.4.5 Disposal

This GRA involves disposal of excavated contaminated soil in an appropriate landfill. Two process options were considered under this GRA: on-Base landfilling and off-Base landfilling. These two options are evaluated below.

2.4.5.1 On-Base Landfilling

This process option involves disposal of excavated soil in an on-Base landfill. MCB Camp Pendleton is currently in the planning stages of developing a new on-base CAMU facility for the purpose of consolidating wastes from the various IR sites. Pretreatment of soils would be considered as part of this technology option and would be performed at an on-Base transportable treatment unit (TTU) to stabilize the waste soil prior to hauling it to the CAMU disposal facility. Characterization samples would be collected from excavated stockpiles to determine contaminant concentrations prior to disposal. This process option is potentially applicable and was retained for further evaluation.

2.4.5.2 Off-Base Landfilling

Off-Base landfilling is another process option for disposal of excavated soil. Pretreatment of soils would be considered as part of this technology and would be performed at an on-Base TTU to stabilize the waste soil prior to shipping it to the off-Base disposal facility. Waste characterization testing would need to be performed during excavation to determine whether the soil exhibits hazardous characteristics that would control the selection of an appropriate disposal facility. Landfilling of hazardous waste has become increasingly difficult and expensive and is regarded as a less desirable option. However, this process option is potentially applicable and was retained for further evaluation.

2.4.6 In Situ Treatment

This GRA encompasses remedial technologies and process options that are designed to treat contaminated soil in place. The main advantage of in situ treatment is that it allows the soil to be treated without being excavated and transported to an off-site disposal facility, resulting in significant cost savings. However, in situ treatment generally requires longer timeframes and there is less certainty about the uniformity of treatment because of the variability in soil characteristics and the difficulty in verifying the efficacy of the process. In situ treatment technologies evaluated for contaminated soil at Site 1D fall into two broad groups: physical/chemical and biological. Physical/chemical treatment is typically cost effective and can be completed in shorter timeframes than biological treatment. Some technologies combine both physical and chemical treatment processes.

2.4.6.1 Physical/Chemical Treatment

This process option uses the physical/chemical properties of the contaminants or contaminated media to destroy (i.e., chemically convert the contaminants to innocuous compounds), separate, or contain the contamination. Three process options were evaluated under this GRA: soil flushing, solidification/stabilization (S/S), and in situ vitrification.

2.4.6.1.1 In Situ Soil Flushing

In situ soil flushing extracts the contaminants from soil with water or other suitable aqueous solution. Soil flushing is accomplished by passing the extraction fluid through in-place soils using an injection or infiltration process. Soil flushing uses the contaminant's solubility in liquid to separate it from the soil. Surfactants may be added to the flushing solution to increase the contaminant's solubility. Contaminants are leached with the extraction fluid into the underlying groundwater, which is then extracted and treated above ground to appropriate standards prior to recycling or release to local publicly owned treatment works (POTWs) or receiving streams.

Although this technology appears suitable for treatment of metals in high-soil-permeability conditions similar to those at Site 1D, it has no applicability at this site because it would introduce contaminants into the groundwater, which is not a contaminated medium. Therefore, this technology was not retained for further consideration in developing remedial alternatives.

2.4.6.1.2 In Situ Solidification/Stabilization

In situ S/S reduces the mobility of contaminants in soil through both physical and chemical means. In situ solidification seeks to trap or immobilize contaminants within their "host" medium (i.e., soil), instead of removing them through chemical or physical means. This process option works by changing the physical properties of the contaminated soil, rendering it solid (with high structural integrity), and making the contaminants less prone to mobilization via leaching (USEPA, 1986). The solubility of soil contaminants is reduced by encapsulating the contaminants in a solidifying reagent, thereby reducing the surface area exposed to leaching, and/or by coating the contaminated soil with low-permeability materials (USEPA, 2000b).

In situ stabilization treatment processes are intended to convert contaminants to less mobile forms through chemical or thermal interactions. The addition and mixing of stabilizing agents can be achieved either by flooding the ground surface with a liquid stabilizing agent or by allowing it to percolate into the subsurface and react with the target contaminant. Stabilizing agents in either liquid or dry form also can be introduced and mixed with subsurface soil via auger mixing (USEPA, 1997a).

In situ S/S limits the mobility of the contaminants, but it does not reduce contaminant concentrations per se. Its effectiveness is highly dependent on homogenous mixing, which can be difficult to ensure in clay-rich soil environments or where the soil contains significant debris (USEPA, 1997a). Grout injection bottom barriers (i.e., impermeable horizontal subsurface barriers) can be used to prevent vertical migration by providing a floor of impermeable material beneath the contaminated soil via directional drilling with forced grout injection. Bottom barriers may be necessary at Site 1D because groundwater is very shallow (6 to 10 feet bgs). In situ technologies also require long-term maintenance (of greater importance for Site 1D, which may be subject to flooding and erosion), post-cure testing, and implementation of land use restrictions. Because of these limitations, this technology was not retained for further consideration in developing remedial alternatives.

2.4.6.1.3 In Situ Vitrification

This technology treats metal-contaminated soil using heat, usually applied through electrical power, to melt the soil at extremely high temperatures (typically 2,900° to 3,600°F). The molten soil forms a stable glass and crystalline structure with very low leaching characteristics that immobilizes the inorganic contaminants by entrapping them or chemically incorporating them in the melt. Because this technology does not destroy many of the metal contaminants but rather traps them inside the matrix, it is often applied to highly concentrated characteristic hazardous waste to meet applicable disposal requirements. There are several disadvantages with this technology. The high temperatures associated with this process produce emissions of toxic vapor from relatively volatile metals (i.e., mercury and lead) that must be captured and treated, the resulting solidified matrix may hinder future site use and necessitate the use of site access restrictions, implementation entails long-term maintenance, and the technology is energy intensive and costly. Because of these concerns, this technology is impractical for application at Site 1D and was therefore excluded from further consideration.

2.4.6.2 Biological Treatment (Phytoremediation)

Phytoremediation is an emerging technology that uses plants to remove, transfer, stabilize, or degrade chemical contaminants in soil, sediment, or groundwater. There are various

applications of phytoremediation technologies; the most appropriate application to Site 1D is enhanced rhizosphere biodegradation, which takes place in the soil immediately surrounding plant roots. Natural substances released by plant roots supply nutrients to soil microorganisms enhancing their biological activity. Plant roots also loosen the soil and then die, leaving paths for transport of water and aeration. This process facilitates the movement of soil moisture water to the surface zone.

Research has shown that plants can be used to treat most classes of compounds including metals. Plant species are selected on the basis of their potential to evapotranspirate groundwater, the degradative enzymes they produce, their growth rate and yield, the depth of their root zone, and their ability to bioaccumulate contaminants. Although certain plants allow uptake from deeper zones, phytoremediation is best suited for use in soils that are within 2 to 3 feet bgs and are contaminated with intermediate concentrations of organic waste. Considering the few demonstrated successful applications of this technology to treat heavy metals, the long timeframe required to achieve cleanup goals, the relatively high concentrations of lead in soil at Site 1D, and the limited effectiveness of this technology in soil deeper than 3 feet, phytoremediation was excluded from further consideration for this site.

2.4.7 Ex Situ Treatment

The main advantage of ex situ treatment is that it generally requires less time, and there is greater certainty about the uniformity of treatment because of the ability to monitor and thoroughly mix the contaminated soil. Ex situ treatment, however, requires excavation of the contaminated soil to the ground surface for treatment and subsequent disposal of the treated soil at an appropriate facility or beneficial reuse as fill or construction material. Compared to in situ treatment, these ex situ options lead to increased costs and engineering support for treatment equipment, permitting, and material handling and disposal. Ex situ treatment technologies that were evaluated for metal-contaminated soil at Site 1D fall into two broad groups: physical/chemical and thermal.

2.4.7.1 Physical/Chemical Treatment

Soil washing, acid extraction, S/S, and vitrification were considered as potentially applicable ex situ physical/chemical treatment options.

2.4.7.1.1 Ex Situ Soil Washing

Soil washing is a water-based volume reduction process for scrubbing soils ex situ to remove contaminants. This process removes heavy metals from soil by suspending them in the wash solution, or by concentrating them into a smaller volume of soil through particle size or gravity separation. Washing processes that separate the fine clay and silt particles from the coarser sand and gravel particle can effectively separate and concentrate the contaminants into a smaller volume of soil that can undergo further treatment/disposal. The wash water can be augmented with pH adjustment, a leaching agent, or a chelating agent. The contaminated water generated from the process also requires further treatment. Soil washing is generally considered a media transfer technology and is ineffective in achieving cleanup goals when used alone. This process option has seen limited use in the United States. Because of these issues, it was eliminated from further consideration.

2.4.7.1.2 Ex Situ Acid Extraction

Acid extraction uses acidic (hydrochloric acid) reagents to extract heavy metal contaminants from soils. In this process, soil is first mechanically screened to remove coarse solids. Because metals are generally found on the finer soil particles such as clays and humic material, the fine soil particles containing the bulk of the metals are separated in this process, thus considerably

reducing the mass of contaminated soil requiring further treatment. Hydrochloric acid is then thoroughly mixed with the separated fine soil in the extraction unit. Residence times generally range between 10 and 40 minutes depending on the soil type, contaminants, and contaminant concentrations. The soil-extraction mix is continuously pumped out of the mixing tank and the soil and extractant separated using hydrocyclones. The resulting "cleaned" soil is then filtered, rinsed, dried, and disposed of or reused. Any residual acid in the treated soil also must be neutralized. The extraction solution and rinse water are typically hazardous and can be regenerated using commercially available precipitants, such as sodium hydroxide (NaOH) or lime, along with a flocculent that removes the metals and reforms the acid. The removed heavy metals are concentrated in a form that is suitable for recovery. These residues often require additional treatment such as S/S or vitrification. Offgases from the process also require collection and treatment. Elevated temperatures associated with the process raise concerns of toxic metallic vapor emissions, which can be difficult to control.

This process option is applicable for organic materials but only partially oxidizes the metals that constitute the soil RCOCs at Site 1D. Meeting stringent heavy metal cleanup criteria (i.e., California wet extraction test [WET]) may prove uneconomical. Capital costs can be relatively high, and the technology is typically economical only at larger sites. In addition, hazards associated with the handling of acids and residues following extraction suggest that implementation of this process option could be difficult. For these reasons, acid extraction was eliminated from further consideration.

2.4.7.1.3 Ex Situ Solidification/Stabilization

Solidification refers to techniques that encapsulate the waste in a monolithic solid of high structural integrity. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. In ex situ S/S, contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization). There are many innovations of this technology; most of them modifications of proven processes directed at encapsulating or immobilizing the contaminants by processing the contaminated soil. Ex situ S/S is often accomplished by mixing the excavated soil with stabilizing agents or binders, such as pozzolan/Portland cement, phosphate, lime, soluble silicates, sulfur-based additives, or proprietary agents to limit the solubility of metals or detoxify them. Following S/S, the treated soil may be eligible for use as construction fill material. Metals-impacted soil can also be stabilized and recycled by mixing with stabilizing reagents, organic emulsions, and aggregate to form cold-mixed asphalt, which can be used as a commercially viable construction material.

Ex situ S/S has a demonstrated effectiveness in reducing the mobility and toxicity of metals, is a comparatively low-cost option, and offers the potential for beneficial on-Base use of treated soil. Implementability of this technology has been demonstrated at similar military installations and is therefore retained for further consideration in developing remedial alternatives.

2.4.7.1.4 Ex Situ Vitrification

Ex situ vitrification processes are stabilization/solidification methods that employ heat between 1,900° to 3,600°F to melt and convert waste materials into a glass matrix (USEPA, 1997a). The high temperatures destroy organic constituents with very few by-products. Inorganics such as heavy metals are incorporated into a stable, relatively strong, and durable glass structure that is very resistant to leaching and has mechanical and chemical properties similar to granite. Vitrification is an energy-intensive and costly technology, not readily implementable, and difficult to ensure homogeneous melting and control emissions of toxic vapors of the relatively volatile metals

(i.e., lead) of concern at Site 1D. Therefore, this technology is impractical for Site 1D and was excluded from further consideration.

2.4.7.2 Thermal Treatment

Thermal processes use heat to increase the volatility (separate); burn, decompose or detonate (destroy); or melt (immobilize) the contaminants. Thermal desorption and incineration were considered as potentially applicable ex situ thermal treatment process options and are evaluated below.

2.4.7.2.1 Ex Situ Thermal Desorption

Thermal desorption is a separation technology that uses heat in a controlled environment to volatilize and remove contaminants from the soil. The technology is not designed to destroy organics. A carrier gas or vacuum system transports volatilized water and organics to an off-gas treatment system. The gas used can be air or an inert gas such as nitrogen. Indirect heating is applied to avoid combustion. The temperature range is usually 300° to 1,200°F (lower than that of incineration), although higher temperatures can be used with an inert gas (USEPA, 1997a). Because the operating temperature for this technology is typically far below the boiling point of metals, it is generally ineffective for metals. In addition, volatilization of the relatively volatile metals (i.e., mercury and lead) and generation of toxic fumes could pose operational and worker safety difficulties. Therefore, thermal desorption was eliminated from further consideration.

2.4.7.2.2 Ex Situ Incineration

Incineration, which can be implemented on or off site, refers to a thermal treatment that destroys organic contaminants by oxidizing them at high temperatures. The two most important parameters for effective destruction of contaminants are temperature and residence time (Freeman, 1989). These two parameters are different for different incineration process designs. The two most commonly used designs are fluidized bed and rotary kiln incinerators. Incineration could be applicable for treatment of organics and diesel contamination, but it is ineffective for treatment of metals because a large percentage of the relatively volatile metals (e.g., lead and mercury) would be emitted as toxic vapors that are difficult to control. Another problem with incineration of metals is that they are not completely destroyed and generally are present in the ash residue, which may require additional treatment and disposal. Finally, because metals have little heat recovery value, system operation is ineffective, costly, and impractical. Therefore, incineration was eliminated from further consideration.

2.5 Evaluation of Technology Process Options

Technologies and process options judged to be potentially viable in the previous section for Site 1D contaminated soil are reviewed according to three criteria: effectiveness, implementability, and cost. These criteria are briefly discussed below.

- **Effectiveness.** The effectiveness evaluation focuses on the following elements:
  - Potential effectiveness of process options for handling the estimated areas or volumes of media and meeting the RGs identified in the RAOs
  - Potential impacts to human health and the environment during the construction and implementation phase
  - Reliability and proven effectiveness of the process with respect to the contaminants and conditions at the site

- **Implementability.** The initial technology screening eliminated technology types or process options that were clearly ineffective or unworkable at the site. This evaluation addresses both the technical and institutional feasibility of implementing each process including the following institutional aspects:
  - Ability to obtain necessary permits and rights-of-way for off-site actions
  - Availability of necessary equipment and skilled workers to implement the technology
  - Availability (including capacity) of treatment, storage, and disposal services
- **Cost.** Cost plays a limited role in the screening of technologies at this phase. Relative capital and operation and maintenance (O&M) costs are considered rather than absolute costs. For this evaluation, the cost analysis is based on engineering judgment. Each technique is evaluated as to whether costs are low, moderate, or high relative to other process options in the same technology type. The greatest cost consequences in site remediation are usually associated with the degree to which different technology types are used. Using different process options within a technology type usually has a less significant effect on cost than the use of different technology types. A technology process option can be eliminated on the basis of cost only if other process options within the same technology type are comparably effective and implementable but have a much lower cost.

Figure 2-11 lists all the technologies and process options that passed the initial screening in the previous section. Based on the above criteria, the process options were evaluated relative to other processes within the same technology type to select a representative process option to be included in a remedial alternative. At this stage of the FS, the emphasis is on the effectiveness of each option; implementability and cost are of lesser importance. Each criterion is rated as low, moderate, or high relative to the technologies within the same process option. The results of the evaluation are discussed in the following sections and are summarized in Figure 2-11.

2.5.1 No Action

The evaluation of the no action option for soil contamination at Site 1D is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. The effectiveness is rated low because both human and ecological receptors could be exposed to the contaminated soil. RAOs are not achieved.	Low
Implementability	No equipment, skilled workers, or permits are required.	High
Cost	No cost is associated with no action.	High

The no action option is retained for incorporation into remedial action alternatives, as required by the NCP, and will be used as a baseline for comparison of other options.

2.5.2 Institutional Action

Access/use restrictions and fencing were retained for further evaluation. Access restriction involves limiting site access and future use/development by amending the Base Master Plan.

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. Access restriction would effectively reduce the human health exposure pathway, but it would be only partially effective to protect ecological receptors.	Low to Moderate
Implementability	Readily implementable. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.	Moderate to High
Cost	Low capital or O&M costs.	High

Access and use restrictions are further retained for incorporation into the remedial action alternatives.

2.5.3 Containment

No containment technologies were retained after the initial screening phase.

2.5.4 Removal

The evaluation of the removal option for soil contamination at Site 1D is summarized as follows:

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs but it does not reduce contaminant mobility or toxicity without treatment.	High
Implementability	Necessary equipment and skilled labor typically available. Requires agency approval, Base coordination, and health and safety (H&S) planning.	Moderate to High
Cost	High capital costs, low O&M costs	Moderate

The removal option is an important strategic option available to support remedial actions at Site 1D and is retained for further consideration in the development of remedial alternatives.

2.5.5 Disposal

Both the on-Base CAMU and off-Base disposal site landfilling of excavated soil options were retained from the initial screening phase.

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment to stabilize waste prior to disposal.	High
Implementability	Necessary equipment and skilled labor typically available. Off-Base disposal of hazardous waste is considered a worst-case alternative and is becoming an increasingly difficult and expensive option. The on-Base CAMU facility offers a relatively less expensive disposal option.	Moderate to High
Cost	Off-Base disposal site: High capital and low O&M costs On-Base CAMU: Moderate capital and moderate O&M costs.	Moderate

Land disposal, both on- and off-Base, is an important strategic technology option available to support remedial actions at Site 1D and is retained for further consideration in the development of remedial alternatives.

2.5.6 In Situ Treatment

No in situ treatment technologies were retained after the initial screening phase.

- **Implementability.** The initial technology screening eliminated technology types or process options that were clearly ineffective or unworkable at the site. This evaluation addresses both the technical and institutional feasibility of implementing each process including the following institutional aspects:
  - Ability to obtain necessary permits and rights-of-way for off-site actions
  - Availability of necessary equipment and skilled workers to implement the technology
  - Availability (including capacity) of treatment, storage, and disposal services
- **Cost.** Cost plays a limited role in the screening of technologies at this phase. Relative capital and operation and maintenance (O&M) costs are considered rather than absolute costs. For this evaluation, the cost analysis is based on engineering judgment. Each technique is evaluated as to whether costs are low, moderate, or high relative to other process options in the same technology type. The greatest cost consequences in site remediation are usually associated with the degree to which different technology types are used. Using different process options within a technology type usually has a less significant effect on cost than the use of different technology types. A technology process option can be eliminated on the basis of cost only if other process options within the same technology type are comparably effective and implementable but have a much lower cost.

Figure 2-11 lists all the technologies and process options that passed the initial screening in the previous section. Based on the above criteria, the process options were evaluated relative to other processes within the same technology type to select a representative process option to be included in a remedial alternative. At this stage of the FS, the emphasis is on the effectiveness of each option; implementability and cost are of lesser importance. Each criterion is rated as low, moderate, or high relative to the technologies within the same process option. The results of the evaluation are discussed in the following sections and are summarized in Figure 2-11.

2.5.1 No Action

The evaluation of the no action option for soil contamination at Site 1D is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. The effectiveness is rated low because both human and ecological receptors could be exposed to the contaminated soil. RAOs are not achieved.	Low
Implementability	No equipment, skilled workers, or permits are required.	High
Cost	No cost is associated with no action.	High

The no action option is retained for incorporation into remedial action alternatives, as required by the NCP, and will be used as a baseline for comparison of other options.

2.5.2 Institutional Action

Access/use restrictions and fencing were retained for further evaluation. Access restriction involves limiting site access and future use/development by amending the Base Master Plan.

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. Access restriction would effectively reduce the human health exposure pathway, but it would be only partially effective to protect ecological receptors	Low to Moderate
Implementability	Readily implementable. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands	Moderate to High
Cost	Low capital or O&M costs.	High

Access and use restrictions are further retained for incorporation into the remedial action alternatives

2.5.3 Containment

No containment technologies were retained after the initial screening phase.

2.5.4 Removal

The evaluation of the removal option for soil contamination at Site 1D is summarized as follows:

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs but it does not reduce contaminant mobility or toxicity without treatment.	High
Implementability	Necessary equipment and skilled labor typically available. Requires agency approval, Base coordination, and health and safety (H&S) planning.	Moderate to High
Cost	High capital costs, low O&M costs	Moderate

The removal option is an important strategic option available to support remedial actions at Site 1D and is retained for further consideration in the development of remedial alternatives.

2.5.5 Disposal

Both the on-Base CAMU and off-Base disposal site landfilling of excavated soil options were retained from the initial screening phase.

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment to stabilize waste prior to disposal.	High
Implementability	Necessary equipment and skilled labor typically available. Off-Base disposal of hazardous waste is considered a worst-case alternative and is becoming an increasingly difficult and expensive option. The on-Base CAMU facility offers a relatively less expensive disposal option.	Moderate to High
Cost	Off-Base disposal site: High capital and low O&M costs. On-Base CAMU: Moderate capital and moderate O&M costs.	Moderate

Land disposal, both on- and off-Base, is an important strategic technology option available to support remedial actions at Site 1D and is retained for further consideration in the development of remedial alternatives.

2.5.6 In Situ Treatment

No in situ treatment technologies were retained after the initial screening phase

2.5.7 Ex Situ Treatment

S/S for metals in soil was the ex situ treatment process option retained after the initial screening of technologies. Ex situ S/S assumes the excavation of metals-impacted soil.

This option is favorably rated for the treatment of metals in soil, including lead, at a wide range of sites and installations. S/S is the second most frequently implemented source control technologies at Superfund remedial sites, surpassed only by soil vapor extraction (USEPA, 2000b). Based on the evaluation above, this technology process option has been retained for incorporation into the remedial action alternatives. This process option is further evaluated below.

Criterion	Evaluation	Rating
Effectiveness	S/S is a proven process that reduces contaminant mobility and toxicity through treatment. Metals-impacted soil have been successfully stabilized by incorporation in cold-mix asphalt and used as construction fill or recycled road-building material. Generally requires treatability studies to optimize treatment effectiveness and meet RAOs.	High
Implementability	Implementability has been demonstrated at similar military installations and necessary equipment, skilled labor, and treatment additives are generally available. On-Base treatment requires adequate space for treatment and staging. On-Base use of treated soil as road construction material requires agency approvals and coordination with Base construction managers. High volume may be difficult to use on Base.	Moderate to High
Cost	Costs for this process include treatability studies, excavation, equipment, capital costs for stabilizing reagents and binders, and post-treatment testing. Costs compare favorably to the other ex situ treatment processes being evaluated for Site 1D soil and are considered moderate.	Moderate

2.5.8 Summary of Process Option Selection

As illustrated in Figure 2-11, all the process options evaluated for remediation of heavy metal contamination in soil at Site 1D are summarized below:

- The no action response is retained as required by the NCP.
- Access/use restrictions and periodic site inspection/monitoring are selected as institutional actions.
- Mechanical excavation is the selected process to remove contaminated soil from the site.
- Ex situ S/S is selected as the treatment option.
- On-Base disposal at a new CAMU facility and off-Base landfilling at a permitted hazardous waste facility were both retained as viable disposal options.

The selected process options provide the basis for the development of alternatives as discussed in the following section.

2.6 Development and Detailed Analysis of Remedial Alternatives

Guidance for the development of remedial alternatives for Site 1D was obtained from the following sources:

- 40 CFR 300 (NCP)
- Section 121 of SARA
- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988b)
- Navy/Marine Corps Installation Restoration Manual (DON, 1992)

As recommended by USEPA guidance (USEPA, 1988b) and the NCP, acceptable engineering practices that relate to site-specific conditions were considered during development of the remedial action alternatives. The alternatives developed satisfy the requirements of 40 CFR 300.430(e), which specifies that alternatives be developed to include no action, institutional actions, little to no treatment alternatives, and alternatives that reduce the toxicity, mobility, or volume of contaminants, to the extent practical.

The process options selected for Site 1D in the previous section were assembled into specific alternatives representing possible remedies for the soil contamination at the site. Because of the limited number of process options retained for further consideration, few potential remedial alternatives are appropriate for Site 1D. Therefore, screening of alternatives was not necessary for Site 1D. All the alternatives developed were carried forward into the detailed analysis.

2.6.1 Overview of Detailed Analysis and Nine NCP Evaluation Criteria

CERCLA remedial actions must satisfy the following statutory analysis requirements, as addressed in the ROD and supported by the FS:

- Protect human health and the environment
- Attain ARARs (or provide grounds for invoking a waiver)
- Be cost-effective
- Use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable
- Satisfy the preference for treatment that reduces contaminant toxicity, mobility, or volume as a principal element or explain why it does not.

CERCLA requirements emphasize evaluating the following long-term effectiveness and related considerations for remedial action alternatives:

- Long-term uncertainties associated with land disposal
- Goals, objectives, and requirements of the Solid Waste Disposal Act (SWDA)
- Persistence, toxicity, and mobility of hazardous substances and their constituents and propensity to bioaccumulate
- Short- and long-term potential for adverse health effects from human exposure
- Long-term maintenance costs

- Potential for future additional remedial action costs if the remedial action alternative were to fail
- Potential threat to human health and the environment associated with excavation, transportation, and disposal or containment.

Nine evaluation criteria were developed under the NCP to select a site remedy from remedial action alternatives to address the CERCLA requirements and considerations listed above, as well as additional technical and policy considerations. The nine criteria are divided into two threshold criteria, five balancing criteria, and two modifying criteria, as summarized below. The NCP requires that a detailed evaluation of each alternative address each of the nine criteria. The nine NCP criteria are listed below and briefly described in the following paragraphs.

Nine NCP Evaluation Criteria for Detailed Analysis of Alternatives

Threshold Criteria	• Overall protection of human health and the environment • Compliance with ARARs
Balancing Criteria	• Long-term effectiveness and permanence • Reduction of toxicity, mobility, or volume through treatment • Short-term effectiveness • Implementability • Cost
Modifying Criteria	• State acceptance • Community acceptance

2.6.1.1 Overall Protection of Human Health and the Environment

The analysis evaluates how the remedial action alternative reduces the risk to human health and the environment from potential exposure pathways, using treatment, engineering, or institutional controls. This evaluation also examines whether alternatives pose any unacceptable cross-media impacts.

2.6.1.2 Compliance with ARARs

This analysis evaluates the ability of each alternative to attain the promulgated federal and state chemical-, action-, and location-specific ARARs. If an ARAR cannot be met, the analysis of the alternative must provide the grounds for a statutory waiver.

2.6.1.3 Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence are evaluated with respect to the magnitude of residual risk and the adequacy and reliability of controls used to manage the remaining waste (untreated waste and treatment residuals) over the long term. Alternatives that offer the highest degree of long-term effectiveness are those that leave little or no waste on site, thus eliminating long-term maintenance and monitoring and minimizing reliance on institutional controls.

2.6.1.4 Reduction of Toxicity, Mobility, and Volume through Treatment

This evaluation relates to the CERCLA guidance in preferring a remedial action that reduces the toxicity, mobility, or volume of hazardous substances. The analysis addresses the expected

performance of treatment technologies used by considering the amount of waste treated or destroyed, the irreversibility of the treatment process, and the type and quantity of residuals resulting from the treatment process.

2.6.1.5 Short-Term Effectiveness

Short-term effectiveness addresses the effectiveness of an alternative to protect human health and the environment during construction and implementation of a remedy. It considers:

- Protection of the surrounding community during remedial actions
- Protection of workers during remedial actions
- Environmental impacts from implementing the action
- Time required to achieve cleanup goals

2.6.1.6 Implementability

This evaluation examines the technical and administrative feasibility of implementing an alternative and the availability of necessary goods and services. Technical factors to be assessed include:

- Ease and reliability of initiating construction and operations
- Reliability of the technology
- Ease of undertaking additional remedial actions, if necessary
- Ability to monitor effectiveness of the remedy
- Ability to obtain approvals from other agencies
- Coordination with other agencies
- Availability of off-site treatment, storage and disposal services capacity
- Availability of necessary equipment and specialists
- Availability of prospective technologies

Where proven technologies are proposed, an assessment of technical feasibility examines the performance history of the technologies in direct applications, or considers the expected performance for similar applications. For innovative technologies, protocols for prospective or on-going treatability studies to demonstrate performance are presented.

2.6.1.7 Cost

The cost estimates presented in this report are rough order-of-magnitude (ROM) estimates ranging from plus 50 to minus 30 percent of the actual cost. This is the level-of-accuracy dictated by USEPA guidance for developing the cost estimate. Estimates are based on a variety of information, including quotes from local suppliers, generic unit costs, vendor information, conventional cost estimating guides, and previous experience. The costs were prepared using available information to provide guidance in project evaluation and implementation. Uncertainties in estimating volumes of contaminated soil could affect the estimated costs.

Capital costs include those expenditures required to implement a remedial action. Both direct and indirect costs are considered in developing capital cost estimates. Direct costs include construction costs or expenditures for equipment, labor, and materials required to implement a

remedial action. Indirect costs include engineering, permitting (as required), construction management, and other services necessary to carry out a remedial action.

Annual O&M costs, which include labor, maintenance materials, energy, and purchased services, also were estimated. The estimates also include those O&M costs that may be incurred even after the initial remedial activity is complete (e.g. long-term monitoring).

2.6.1.8 State Acceptance

This assessment reflects the state's preferences or concerns about the alternatives.

2.6.1.9 Community Acceptance

This assessment reflects the community's apparent preferences among or concerns about the alternatives. This section presents a detailed analysis of the four remedial alternatives developed for Site 1D and described below. The detailed analysis of remedial alternatives consists of evaluating each selected alternative against the nine NCP evaluation criteria. All four alternatives were selected for the detailed analysis.

2.6.2 Description of Remedial Alternatives

Alternatives were developed to address the RCOCs for Site 1D listed in Tables 2-3 and 2-5. As illustrated in Figure 2-8, the estimated total area of metal contamination above previously established RGs is approximately 231,000 square feet. The impacted soils extend to approximately 5 feet bgs. The estimated total in-place volume of impacted soil is 31,300 cubic yards.

The following four alternatives were developed for remediation of contaminated soil at Site 1D:

- Alternative 1D-1: No action
- Alternative 1D-2: Institutional controls (site access restrictions with Base Master Plan Amendment, periodic site inspection/monitoring)
- Alternative 1D-3: Soil excavation, backfill, ex situ S/S, and on-Base reuse of treated soil
- Alternative 1D-4: Soil excavation, backfill, pretreatment, and off-Base disposal
- Alternative 1D-5: Soil excavation, backfill, pretreatment, and on-Base disposal.

Each alternative is described in detail in the following sections.

2.6.2.1 Alternative 1D-1: No Action

The NCP (40 CFR 300.430[e][6]) requires that a no action alternative be evaluated. Under this alternative, no further action would be taken to control or clean up the soil contamination at Site 1D to reduce potential risks to human health and the environment. The no action alternative involves no remediation of soils and results in no disturbance to the existing environment.

2.6.2.2 Alternative 1D-2: Institutional Controls (site access restrictions with Base Master Plan Amendment; periodic site inspection/monitoring)

This alternative implements institutional controls at Site 1D to reduce the risk to human health and the environment by controlling and monitoring exposure pathways rather than removing or controlling the risk source. Institutional actions refer to measures other than engineering control and treatment technologies. The institutional actions in Alternative 1D-2 include implementing restrictions on the site's future development and use, as well as periodic site inspection/monitoring of the site to prevent unauthorized use.

The intent of the land use restrictions is to limit activities that would increase the potential for exposure of receptors to buried materials. Future use of Site 1D for residential or industrial purposes would be controlled by enforcing these land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. To limit erosion and reduce the potential for exposure of human and ecological receptors to the buried materials, the site would be inspected periodically during the rainy season for evidence of erosion. If required, measures would be implemented to limit or control site erosion.

Alternative 1D-2 represents minimal administrative actions and physical measures to restrict site access in order to temporarily reduce and control exposure risks, but it does not involve any active remediation of the contaminated soil to eliminate exposure risk. Site monitoring is expected to continue as long as wastes remain at the site.

2.6.2.3 Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil

Alternative 1D-3 involves the excavation of impacted site soil, on-site ex situ treatment via incorporation in cold-mix asphalt product (a form of S/S) followed by on-Base use in road building, road maintenance, or other construction projects. The logistics associated with the implementation of Alternative 1D-3 including utilities will be addressed in a Remedial Action Work Plan for the site. The sighting, location, and excavation for utilities are therefore not discussed in detail in this document. Before implementing Alternative 1D-3, a treatability study would be necessary to determine the suitability of specific stabilizing reagents for the site conditions, including optimal formulation of emulsion and stabilizing reagents, appropriate mix ratios, quantities of aggregate needed, ability of the resultant asphalt to meet pavement specifications, and the effectiveness of the process in reducing the mobility of metal contaminants. At Site 1D, the initial phase of this remedial alternative would involve the excavation of an estimated 31,300 cubic yards of soil containing metals at concentrations exceeding previously established RGs. A detailed analysis of excavation, which is an integral part of Alternative 1D-4, is presented in Section 2.6.2.4. Given the relatively shallow depths involved (the majority of the impacted soil is confined to depths of 0 to 5 feet bgs), the metals-impacted soil at Site 1D could be excavated with conventional mechanical means such as backhoes, excavators, and loaders. The implementation of appropriate mitigation measures and coordination with the U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) would be required to minimize and avoid habitat disruptions during all site activities. Additional coordination with the State Historic Preservation Officer (SHPO) and appropriate Native American groups would be needed to comply with the Archeological and Historic Preservation Act. Shoring would not be necessary, and the open excavation would be secured until it is backfilled with clean imported fill. Once excavated, the untreated soil would be temporarily stockpiled at an on-site staging and treatment area, tentatively identified as the flat-lying, approximately 300- by 600-foot area northeast of Stuart Mesa Road. While the stockpiled soils await treatment, the staging area would be secured to prevent entry and inadvertent exposure to Base personnel.

Following excavation of individual grids to the assumed lateral limits and target depth, confirmation samples would be collected for laboratory analysis. Confirmation sampling would be performed shortly after a grid has been excavated, so that, to the extent possible, sampling would be performed concurrent with excavation. The confirmation sampling and analysis would extend approximately 2 weeks beyond the completion of all excavation. The RCOCs for this site are metals and dioxins/furans; therefore, confirmation samples would be analyzed for total metals concentrations and dioxins/furans and the results compared to the remedial goals established for the cleanup. For purposes of estimating costs, an average of five confirmation samples would be collected from each 75- by 75-foot grid. Along the perimeters of the

excavation area, some of these samples would be collected from the excavation sidewalls or slopes and the bottom of the excavation area. Based on the analytical results from the confirmation samples, the excavation would be backfilled or extended laterally and/or vertically until the cleanup goals are achieved. If additional excavation were required, additional confirmation sampling and analysis would be performed until the cleanup goals are met.

A licensed land surveyor would survey the final spatial limits of the excavation after confirmation sampling and analysis and before placement and compaction of backfill. After excavation and confirmation sampling had been completed on a few contiguous grids, placement of backfill and compaction would be initiated. To the maximum extent possible, backfill and compaction would be performed concurrently with excavation and confirmation sampling. The backfill and compaction would extend approximately 2 weeks beyond the completion of all confirmation sampling and analysis. Before placement of backfill, the exposed bottom of the excavation would be moisture conditioned and the excavation backfilled with imported clean soil. All backfill material would be placed in lifts, moisture conditioned, and compacted. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours, surveyed, and revegetated to restore habitat and to minimize erosion.

Alternative 1D-3 involves the on-site, ex situ treatment of impacted soils via incorporation in cold-mix asphalt. This technology, which is a form of S/S, is effective in reducing the mobility of the metallic contaminants that have been documented in Site 1D soil. Although ex situ stabilization via incorporation in cold-mix asphalt is most commonly used to treat metals-impacted soil, its effectiveness in reducing the leachability and mobility of organic contaminants (notably petroleum hydrocarbons and their constituent compounds) has been repeatedly demonstrated at other cleanup sites. Based on gross similarities of these organic contaminants, the technology may also be effective in reducing the mobility of dioxins/furans in soil. Treatability testing would be necessary to confirm its applicability to the contaminants at Site 1D. Depending on the outcome of treatability testing, a pozzolan- or cement-based stabilizing reagent may be used. Untreated, excavated soil (which has been stockpiled) would be loaded, screened (for particles and clasts with diameters greater than 3 inches), and conveyed to a pug mill where it would be mixed with a stabilizing reagent(s), aggregate, and organic emulsion in the appropriate ratio to form a cold-mix asphalt product. Mixing ratios at similar remediation sites often involve a mixture of 50 to 60 percent untreated soil, 30 to 40 percent aggregate, 2 to 5 percent stabilizing reagent, and 5 percent organic emulsion. Because the process results in a commercially viable product, soil treatment in Alternative 1D-3 may qualify as recycling under applicable federal and state laws and regulations and exemptions from certain hazardous waste management requirements.

The particles and clasts with diameters greater than 3 inches (i.e., cobbles and/or boulders) would be temporarily stockpiled at the site until remedial efforts are complete. These particles/clasts cannot be placed in the S/S treatment unit and would be washed and reused as backfill at the site. Particles/clasts that are partially cemented soil from the site would be crushed and sent through the treatment unit.

Depending on the textural properties of the excavated soil, additional screening (after processing with a 3-inch screen) may be necessary prior to treatment to ensure compatibility with applicable specifications for sub-base, base, or finish course paving materials. For example, California Department of Transportation (DOT) specifications often require that aggregate base course meet the following general grain size criteria: (percent passing by weight) - 1 ¾-inch sieve – 100 percent, No. 4 sieve (4.75 millimeter [mm] or the Unified Soil Classification System [USCS] division between coarse sand and gravel) - <60 percent, and No. 40 sieve (0.425 mm or the USCS division between fine and medium sand) - <50 percent. The

screened coarse material from this process would be treated in the same fashion as the cobbles and boulders retained during the initial screening.

The treated soil, which is now permanently incorporated into a commercially viable asphalt product, would be temporarily stockpiled, sampled, and analyzed using leachability and other laboratory tests to confirm treatment effectiveness. The asphalt product also would be sampled and mechanically tested to ensure its suitability as paving material. Once confirmed, the asphalt would be transported for use in on-Base road building, road maintenance, or construction projects.

Use of stabilized soil to fill the remedial excavation at Site 1D was not included in Alternative 1D-3 due to the potential for post-treatment soil volume increases and associated difficulties in ensuring proper grading following backfilling. Without engineered storm water controls, such as the construction of dikes or levees at Site 1D (which lies in a floodplain), on-site use as replacement backfill could pose risks due to the potential for future flooding, erosion, and subsequent contact by human or ecological receptors.

2.6.2.4 Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 1D-4 addresses remediation of contaminated soils exceeding the RGs through excavation, on-Base chemical stabilization, and off-Base disposal. The logistics associated with the implementation of Alternative 1D-4 including utilities would be addressed in a Remedial Action Work Plan for the site. The sighting, location, and excavation for utilities are therefore not discussed in detail in this document. The following elements are associated with Alternative 1D-4:

- Excavation of impacted soil
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material
- Treatment of a portion of the excavated soil to incorporate chemical stabilizer (Portland cement Type I through V) by pug mill
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles for waste characterization
- Transportation of the excavated soil to an off-Base disposal facility
- Site restoration.

Based on the volume of material (approximately 31,300 cubic yards) exceeding the RGs cited in Section 2.1.3.2, approximately 46,950 tons would require excavation from Site ID. The excavation area is an irregularly shaped area measuring roughly 800 by 600 feet (Figure 2-7). Within this area, approximately 231,000 square feet (5.3 acres) is impacted with COCs above site RGs. Based on the data and waste classification discussed in Appendix K1, approximately 29,400 cubic yards (44,000 tons) of the excavated soil would be classified as California-hazardous or nonhazardous waste, and approximately 1,900 cubic yards (2,800 tons) would classify as RCRA-hazardous waste prior to treatment.

Heavy earthmoving equipment, such as a track-mounted excavator and track- or wheeled-loaders would be used to excavate the impacted soil within the lateral limits. During soil removal, the excavation would progress vertically and laterally to remove the areas of identified soil contamination exceeding the RGs. The excavation sidewalls would be sloped at 1.5:1 (horizontal:vertical) to maintain slope stability and avoid the use of shoring.

Following excavation of individual grids to the assumed lateral limits and target depth, confirmation samples would be collected for laboratory analysis. Confirmation sampling would be performed shortly after excavation of a grid has been completed, so that, to the extent possible, sampling would be performed concurrent with excavation. The confirmation sampling and analysis would extend approximately 2 weeks beyond the completion of all excavation. The RCOCs for this site are metals; therefore, confirmation samples would be analyzed for total metals concentrations and the results compared to the remedial goals established for the cleanup. To estimate costs, an average of five confirmation samples would be collected from each 75- by 75-foot grid. Along the perimeters of the excavation area, some of these samples would be collected from the excavation sidewalls or slopes and from the bottom of the excavation area. Based on the analytical results from the confirmation samples, the excavation would be backfilled or extended laterally and/or vertically until the cleanup goals are achieved. If additional excavation were required, additional confirmation sampling and analysis would be performed until the cleanup goals are met.

A licensed land surveyor would survey the final spatial limits of the excavation after confirmation sampling and analysis and prior to placement and compaction of backfill. After excavation and confirmation sampling had been completed on a few contiguous grids, placement of backfill and compaction would be initiated. To the maximum extent possible, backfill and compaction would be performed concurrently with excavation and confirmation sampling. The backfill and compaction would extend approximately 2 weeks beyond the completion of all confirmation sampling and analysis. Prior to placement of backfill, the exposed bottom of the excavation would be moisture conditioned and the excavation backfilled with imported clean soil. All backfill material would be placed in lifts, moisture conditioned, and compacted. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours, surveyed, and revegetated to restore habitat and to minimize erosion.

An on-Base TTU would be used to stabilize the California-hazardous soil to nonhazardous status and the RCRA-hazardous soil chemically to California-hazardous prior to off-Base transport and disposal. None of the material would be classified or manifested as RCRA waste (i.e., would not be "D008-listed" for lead) and would not be subject to the universal treatment standards (UTSs) of the land disposal restrictions (LDRs). Bench-scale and/or pilot testing would be required to determine the proper mixture of soil and Portland cement. The testing would have to account for variations in soil types and would likely need to be performed both prior to field implementation and as the excavation proceeds.

The chemical stabilization of the soil would be implemented using a vender-supplied TTU, which would consist of a pug mill to mix the reagents (Portland cement) and soil. A pug mill consists of heavy-duty steel blades arranged on a rotary shaft powered by a high torque engine. The TTU consists of a hopper, screens (to remove unsuitably sized material), conveyor belts between the hopper and pug mill, the pug mill and containment unit, and a conveyor belt equipped with a swinging arm designed to deposit treated soil into discrete 500-ton stockpiles. In using the TTU, the soil would first be placed into the hopper of the treatment unit using the heavy equipment. The screens would then remove particles or clasts with diameters greater than approximately 3 inches. A conveyor belt would then transfer the material to the pug mill for mixing with Portland cement. The treated soil would then be transferred onto the final conveyor equipped with a swinging arm to deposit the soil into discrete 500-ton stockpiles.

The particles and clasts with diameters greater than 3 inches (i.e., cobbles and/or boulders) would be temporarily stockpiled at the site until remedial efforts are complete. These particles/clasts cannot be placed in the S/S treatment unit and would be washed and reused as

backfill at the site or transported off site for disposal. Particles/clasts that are partially cemented soil from the site would be crushed and sent through the treatment unit.

During the remedial action, the excavation, the TTU, and the treated stockpile areas would be delineated with barricades, caution tape, and warning signs to restrict unauthorized access to these areas. Potential exposure and protection procedures for site workers would be addressed in a site-specific health and safety plan. The risk of exposure for site personnel to soil contaminants would be minimized by proper selection of personal protective equipment (PPE); establishing support, contaminant reduction, and exclusion zones; application of suppressants to reduce dust emissions in the excavation and at the TTU and stockpile areas; and monitoring dust using direct-reading instruments. Detailed field procedures for the management and maintenance of an open excavation area and temporary soil stockpile would be provided in the remedial action documents.

A medium-sized tracked excavator (Caterpillar 235 or equivalent) would 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 would then transfer the soil from the stockpile to the TTU hopper, which would be located within the exclusion zone and nearby the excavation. Plastic sheeting would be required to protect the ground surface beneath the hopper and the swinging arm of the conveyor belt (depositing the treated 500-ton stockpiles). Each treated stockpile would remain on the plastic until it was transported off Base.

Prior to transport, the composite stockpiles samples would be collected and the analytical results would then be used to characterize and classify the waste. Based on topographic maps of the area immediately surrounding the site, sufficient open space is available near the excavations to operate the TTU and serve as a staging area for the treated stockpiles. Based on the throughput of the TTU, this alternative would proceed at an average rate of approximately 400 cubic yards (600 tons) per day, resulting in a 79-working-day duration. The cost estimate in Appendix K1 is based on 5-day work weeks (8 hour per day), resulting in 112 calendar days (or approximately 16 weeks).

Stockpiles would be in continuous motion during excavation, treatment, and loading of materials for disposal. However, at the end of each day, stockpiles would be covered with Visqueen (plastic) sheeting and secured with sand bags. Additionally, stockpiles would be placed on plastic to protect underlying soils.

The ability of the treated soil to produce fugitive dust would be greatly diminished because the cured Portland cement would act to bind the soil particles and reduce dust emissions. The treated stockpiles would be periodically wetted and regularly monitored to ensure control of fugitive dust emissions. Depending upon dust monitoring results and/or weather forecasts, plastic sheeting might be employed to cover the stockpiles of treated soil and control dust emissions, while the soil is being profiled for disposal.

In preparing this alternative, soil that would be excavated and eventually treated was first subjected to a waste classification procedure based on the FS data (Appendix K1). However, if this alternative were implemented, then waste classification (prior to manifesting, transport, and disposal) would need to be determined based on the results of post-treatment stockpile sampling and analysis. Based on the concentrations of compounds detected at the site only lead has concentrations that would exceed hazardous waste characterization/classification levels. Therefore, stockpile samples would be analyzed for soluble lead by the following two test procedures: the TCLP (SW1311), as described in USEPA Publication SW 846, and the California WET analysis (22 California Code Regulations [CCR] Chapter 11). The results for 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 RCRA hazardous. Using these results and appropriate regulations governing classification of hazardous waste, each 500-ton soil stockpile would be classified as RCRA-hazardous, California-hazardous, or nonhazardous waste. Logistic considerations permitting, it may be possible to perform some of the testing in an iterative manner so that the results from WET analyses would be compared to STLC levels prior to analysis by TCLP.

For estimating purposes, it is assumed that, upon excavation and treatment, all nonhazardous soil would be transported to the Waste Management Bradley Facility in Tujunga, California, and all California-hazardous soil would be transported to Waste Management's Kettleman Hills Facility in Kettleman City, California for disposal. Each transport truck is expected to haul permanently 18 cubic yards (24 tons) of soil to the disposal facility. To ensure that trucks do not exceed the public highway weight limits, calibrated portable scales would be placed on site and operated by a certified weigh master. An average rate of 15 minutes per transport truck is estimated for loading, weighing, and tarping; therefore, 32 trucks could be loaded in each 8-hour shift. However, this exceeds the 600-ton daily capacity of the TTU day, so that only 25 trucks would be needed per shift. Transportation and waste profiling of the excavated soil would occur concurrently with excavation/treatment and require approximately 79 working days.

The total duration of the remedial action is expected to be 26 calendar weeks, based on an excavation and treatment rate of 400 cubic yards (600 tons) per day and concurrent transportation and disposal at a matching rate of 400 cubic yards (600 tons) per day. The mobilization would require 1 week. Excavation, treatment, stockpiling (including sampling), and transportation would require approximately 16 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately another 2 weeks. Site cleanup and restoration (final grade check, surveying, and revegetation) would require another 4 weeks.

2.6.2.5 Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 1D-5 is nearly the same as Alternative 1D-4, except that contaminated soils would be disposed of at a new on-Base CAMU disposal facility instead of shipped off Base. The following elements are associated with Alternative 1D-5:

- Excavation of impacted soil
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material
- Treatment of a portion of the excavated soil to incorporate chemical stabilizer (Portland cement Type I through V) by pug mill
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles for waste characterization
- Hauling of the excavated soil to an on-Base CAMU disposal facility
- Site restoration.

Soil excavation, pretreatment of excavated soil to incorporate chemical stabilizer, temporary stockpile storage, waste characterization, confirmation sampling, backfilling, and site restoration activities would be conducted exactly as detailed in Alternative 1D-4. Upon excavation and pretreatment, all contaminated soil would be hauled to the on-Base CAMU facility for disposal.

Because a specific CAMU location has not been identified at this time, there is uncertainty regarding the amount of waste pretreatment that will be needed. To account for this uncertainty, together with the waste characterization data of the impacted soil in place, it is estimated that from 25 percent to 75 percent of the excavated soil would require pretreatment As a result, a range will be provided for the associated costs for implementation of this alternative.

For cost estimating purposes, it is assumed that each transport truck would safely haul 18 cubic yards (24 tons) of soil per trip to a CAMU facility. An average rate of 15 minutes per truck is estimated for loading, weighing, and tarping. Based on the excavation, treatment, hauling, and disposal rate of 400 cubic yards (600-ton per day), a total of 25 truck-trips per day to a CAMU facility would be needed.

The mobilization would require 1 week. Excavation, stockpiling (including sampling), and transportation would require approximately 16 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately another 2 weeks. Site cleanup and restoration (final grade check, surveying, and revegetation) would require 4 weeks. The total duration of the remedial action is expected to be no more than 25 calendar weeks.

Currently an operational CAMU does not exist at MCB Camp Pendleton. The implementation of this alternative would be contingent upon the siting, design, and construction of a 10 to 15 acre CAMU. A new CAMU facility would be available to accept waste from Site 1D in 3 to 4 years.

For this proposed alternative, identification of a specific disposal site is not necessary to meet the feasibility study requirements of evaluating the alternative. If DON chooses this as the preferred alternative, a specific on-Base disposal site would need to be located that meets statutory requirements. Therefore, an appropriate addendum document would be prepared to address disposal site compliance with ARARs, and specific pre-treatment requirements, prior to preparation of the OU 4 Proposed Plan and implementation of this alternative.

2.6.3 Detailed Analysis of Site 1D Remedial Alternatives

This section presents a detailed analysis of the four remedial alternatives that were developed for Site 1D. The detailed analysis of remedial alternatives consists of evaluating each selected alternative against the seven of the nine NCP evaluation criteria (state and community acceptance will be evaluated in the future). The objective of the detailed analysis is to present and interpret the relevant information necessary to select the most appropriate and cost-effective remedy for a site to meet the RAOs. The detailed analysis is designed to provide decision makers with sufficient information to compare the alternatives, select an appropriate remedy for the site, and demonstrate conformance with the CERCLA remedy selection requirements in the ROD (Table 2-8). All four alternatives for Site 1D were selected for the detailed analysis.

2.6.3.1 Overall Protection of Human Health and the Environment

An analysis of how well each alternative meets overall protection of human health and the environment is provided below.

Alternative 1D-1: No Action

The no action alternative includes no treatment and no control of exposure pathways. Under this alternative, the potential long-term risks would be the same as those calculated in the baseline HHRA and the ecological risk assessment and would not be protective of human health and the environment. In addition, soil lead concentrations result in unacceptable blood

lead levels for both a hypothetical resident and an industrial/commercial worker. SPLP analytical results for Site 1D indicate that existing metal contamination in the soil could pose a threat to groundwater. However, the site is located in the floodplain and the cover could wash out if the area was flooded. Based on the site conditions, the no action alternative would not be protective of human health and the environment.

Alternative 1D-2: Institutional Controls

Under current conditions, Alternative 1D-2 would provide for control of exposure pathways through land use restrictions and periodic site inspections and monitoring. However, because the site is located in the floodplain, the current cover and contaminants could eventually wash out and potentially impact surface soil and water if the area is flooded. Therefore, this alternative would provide only limited short-term protection to human health and the environment since human and ecological receptors could still come in contact with contaminated surface and near-surface soils in the event of a flood.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

Alternative 1D-3 would be protective of human and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed, transported off site, and backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment. Removed soil would be treated via S/S. Through the use of stabilizing reagents in the asphalt incorporation and mixing process, Alternative 1D-3 would chemically bind metals within the asphalt matrix. Once stabilized and incorporated in cold-mix asphalt, the mobility of metal RCOCs would be reduced to acceptable levels, which would be demonstrated by post-treatment leachability testing. Depending on the stabilizing reagent involved, the bioavailability of certain residual metals may also be reduced. Under Alternative 1D-3, human health and the environment would also be protected by ensuring that the residual metals are permanently encapsulated and bound within the asphalt, thereby mitigating human or ecological exposures and/or leaching from pavement. To ensure uniformity and demonstrate that this criterion is met, the treated soil (now asphalt) would be subjected to confirmation sampling and laboratory testing at a prescribed frequency. The treated soil would be used at an on-Base construction project.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 1D-4 would protect human and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed, transported off Base, and backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 1D-5 would protect human and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed and hauled away to a CAMU facility, and the excavation backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment, and protective of groundwater quality.

2.6.3.2 Compliance with ARARs

An analysis of how well each alternative complies with ARARs is provided below.

Alternative 1D-1: No Action

No action-specific ARARs are identified for the no action alternative because no action is taken. Based on the previously performed screening-level ERA, Alternative 1D-1 would not comply with location-specific requirements of the Endangered Species Act. In addition, Alternative 1D-1 would not comply with site-specific water quality objectives and beneficial uses since the site is located within a floodplain.

Alternative 1D-2: Institutional Controls

Because elevated levels of lead would remain at the site, post-closure care is required. Alternative 1D-2 partially meets this requirement by providing use restrictions and site monitoring/maintenance for surface soil erosion. Based on the previously performed screening-level ERA, Alternative 1D-2 would not comply with location-specific requirements of the Endangered Species Act. In addition, Alternative 1D-2 would not comply with site-specific water quality objectives and beneficial uses since the site is located within a floodplain.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Resources are known to exist near the site, so excavation activities would be monitored for potential identification of unknown resources because these resources have been recorded in the area. San Diego APCD rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. Soils would be wetted, covered with a synthetic material, or soil polymer to meet the air requirements.

Pilot testing would be necessary to determine the technology and demonstrate that the chosen technology would comply with pertinent performance-based regulatory criteria. Depending on the specific input materials, the stabilization process employed, and the end use, metals- and dioxins/furans-impacted soil (which might otherwise be treated as characteristic RCRA-hazardous waste) that have been stabilized via mixing and incorporation in cold-mix asphalt may meet the definition of a "recyclable material" under federal laws and regulations (40 CFR 261.2 and 261.6©). In general, when hazardous waste is treated to produce end products that are applied to or placed upon the ground, the products are regarded as having been "used in a manner constituting disposal" and are subject to a variety of hazardous waste management requirements under 40 CFR Part 266, Subpart C. These requirements notwithstanding, Subpart C also allows exemptions for products that have undergone a permanent chemical reaction so as to become inseparable. Previous interpretations by the USEPA Office of Solid Waste indicated that soil stabilization by asphalt incorporation may meet this condition.

Although recycling exemptions are also embodied in state laws and regulations (CA HSC Sec. 25143.2, and 22 CCR Sec. 66266.20), in many instances the exemptions may not apply to RCRA-hazardous waste (refer to CA HSC Sec. 25143.2 (e)(1)). Based on previous correspondence from DTSC's Resource Recovery Section, the equipment used during soil stabilization via asphalt incorporation (i.e., pug mill, hoppers, conveyors, etc.) may have to be permitted as a TTU under permit-by-rule, which would govern the recycling/asphalt incorporation process. Discussions with remediation vendors confirmed the local availability of more than one recycling unit that is currently permitted as a TTU. Although the actual treatment process may be performed under permit-by-rule, the temporary on-site storage of soil awaiting stabilization, which in its untreated state may be construed as RCRA-hazardous waste, could

require the issuance of a hazardous waste storage permit. Such a permit might be necessary if the on-site waste staging area meets the definition of a hazardous waste "storage facility" under state law, which includes on-site hazardous waste storage for more than 90 days, on-site hazardous waste storage (for any duration) other than in an approved container, tank, or containment building, and off-site storage at a facility that is not a transfer station (CA HSC Section 25123.3 (b)). For other soil stabilization technologies that do not result in a recyclable end product or material (and therefore, may not be eligible for one or more of the recycling exemptions discussed above), on-site treatment of soils containing hazardous concentrations of metals could require permitting based on recent conversations with DTSC's Permitting Branch. Permitting requirements could include limitations on the location and means of on-Base reuse of treated soil as well as long-term monitoring requirements.

State Assembly Bill AB2784 also prohibits land disposal of waste containing greater than 350 mg/kg lead at a facility other than a Class I hazardous waste disposal facility. The S/S process discussed in Alternative 1D-3 does not significantly change the total concentration of metals such as lead, and the use of stabilized soil containing lead at concentrations greater than 350 mg/kg in cold-mix asphalt might have to be accompanied by either a determination that the resultant asphalt represents a recycled "product" and not a regulated waste (CA HSC Section 25143 et seq.) or a DTSC land disposal variance, RWQCB-approved amendments to the facility (installation) waste discharge requirements, and other local agency amendments to the facility's solid waste permit to allow disposal of land (CA HSC Section 25157.8). Assuming that the aforementioned regulatory and permitting requirements for the recycled product are satisfied, Alternative 1D-3 would comply with RCRA closure with no post-closure care requirements.

It is likely that Alternative 1D-3 would also comply with action- and location-specific requirements of the Endangered Species Act, although coordination with USFWS and CDFG would be required. Additional coordination with SHPO and appropriate Native American groups would be needed to comply with the Archeological and Historic Preservation Act.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 1D-4 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Although no resources are known to exist at the site, excavation activities would be monitored for potential identification of unknown cultural resources because these resources have been recorded in the area. San Diego Air Pollution Control District (APCD) Rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. Soils would be wetted and covered with a synthetic material or soil polymer to meet the air requirements.

It is likely that Alternative 1D-4 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Additional coordination with SHPO and appropriate Native American groups would be needed to comply with the Archeological and Historic Preservation Act.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 1D-5 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Although no resources are known to exist at Site 1D, excavation activities would be monitored

for potential identification of unknown cultural resources because these resources have been recorded in the area. San Diego APCD Rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. To meet this requirement, soils would be wetted and covered with a synthetic material or soil polymer to meet the air requirements.

It is likely that Alternative 1D-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Additional coordination with SHPO and appropriate Native American groups would be needed to comply with the Archeological and Historic Preservation Act. In order for this alternative to be developed and selected, the proposed site and design of the CAMU would need to comply with ARARs identified in Appendix A, including CAMU requirements set forth in 40 CFR 264.552 and CCR Title 22, Section 66264.552.

2.6.3.3 Long-Term Effectiveness and Permanence

An analysis of the long-term effectiveness and permanence for each alternative is provided below.

Alternative 1D-1: No Action

The risks associated with the no action alternative were evaluated in the baseline human and ecological risk assessments. This alternative would not provide actions or controls to reduce existing contaminant concentrations or risks to human health or the environment. As a result, the reliability and adequacy of actions or controls is not evaluated for no action. No action is not considered to provide long-term effectiveness and permanence because contaminated material would remain at the site. The site is located in the floodplain and no action also does not prevent the possible erosion of existing soil cover.

Alternative 1D-2: Institutional Controls

This alternative would be effective in controlling potential human exposure to buried material and would limit future site development. Alternative 1D-2 would require long-term maintenance and would provide a degree of effectiveness through limiting exposure and site uses. However, given the site's location within the floodplain and the potential for flooding to expose contaminated soils, this alternative does not provide long-term effectiveness and permanence for human or ecological receptors.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

This alternative would provide high long-term effectiveness and permanence. Removal and on-Base disposition of the contaminated soil would result in acceptable levels of residual soil contamination from both a human and ecological perspective. Removal of impacted soil and stabilization using reagents such as pozzolans, cement, and/or phosphate additives result in the permanent chemical conversion of metal and dioxins/furans RCOCs to more stable and less toxic forms. Long-term reductions in the mobility of metals and dioxins/furans RCOCs, as measured by routine leachability tests, have been demonstrated for this technology. Long-term leaching of metals from treated soil due to acidic precipitation, which can be a potential long-term issue at sites in the northeast U.S., is not judged a concern at Site 1D. Removal and on-Base reuse of the solidified/stabilized soil may not result in unacceptable levels of residual soil contamination for human, ecological, and water quality perspective. All contaminated soil if encountered below 5 feet will be excavated and removed from the site to protect water quality.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

This alternative would provide a high degree of long-term effectiveness and permanence because contaminants are removed from the site and the contaminated soil is replaced with clean import soil. The excavation of contaminated soil provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. Removal and off-site disposition of the contaminated soil would result in acceptable levels of residual soil contamination from both a human and ecological perspective.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

This alternative would provide a high degree of long-term effectiveness and permanence because contaminants are removed and the contaminated soil is replaced with clean import soil. The excavation of contaminated soil provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. Removal and on-Base disposal of the contaminated soil at a new CAMU facility would result in acceptable levels of residual soil contamination at this site from both a human and ecological perspective.

2.6.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

An analysis of the reduction of toxicity, mobility, or volume through treatment for each alternative is presented below.

Alternative 1D-1: No Action

Because active treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 1D-2: Institutional Controls

Because treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The effectiveness of ex situ stabilization via asphalt mixing and incorporation in reducing the mobility of the metal RCOCs present at Site 1D has been demonstrated at a wide range of remediation sites. Alternative 1D-3 is ranked high. Leachability of metals such as arsenic, chromium, lead, and zinc often are reduced by three to four orders of magnitude. Depending on the mix ratio employed, the asphalt product produced in Alternative 1D-3 may result in an increase in volume on the order of 100 percent.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 1D-4 involves chemical stabilization of the soil on Base prior to off-Base transport and disposal. Although an increase in volume of soil is realized, there is a moderate reduction in mobility observed with this alternative.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 1D-5 involves on-Base stabilization pretreatment to a portion of the contaminated soil on Base prior to disposal to an on-Base CAMU facility. Although an increase in volume of soil is realized, there is moderate reduction in mobility observed with this alternative.

2.6.3.5 Short-Term Effectiveness

An analysis of the short-term effectiveness for each alternative is provided below.

Alternative 1D-1: No Action

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

Alternative 1D-2: Institutional Controls

Implementation of use restrictions is administrative and presents no short-term effectiveness issues. Implementation of Alternative 1D-2 is not expected to result in any significant adverse environmental impacts. Site 1D has already been disrupted by episodic vehicle traffic and implementation of Alternative 1D-2 would not result in any significant impact to vehicle traffic in the area of the site.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The short-term effectiveness for Alternative 1D-3 is rated moderate. A site-specific sampling plan and a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation and treatment.

Heavy equipment operated at the site would conform to California Occupational Safety and Health Administration (Cal/OSHA) specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported to the selected on-Base treatment staging area to be determined in the field in covered trucks. Before leaving the site, trucks would be thoroughly inspected to ensure that no loose contaminated soil is present on the outside of the trucks that could present a hazard to the public. Traffic accidents could occur in the course of soil transportation. In the case of a traffic accident, the risk to the public would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate PPE, where applicable.

Implementation of Alternative 1D-3 is not expected to result in any significant, adverse environmental impacts. The area in Site 1D subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Field personnel participating in the excavation, treatment, and sampling activities would wear PPE as specified in the health and safety plan. The remedial activities in this alternative are expected to be completed in less than 1 year.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

The short-term effectiveness for Alternative 1D-4 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation and pretreatment.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported to the selected off-Base disposal facility in covered trucks traveling on pubic highways. Prior to leaving the site, trucks would be thoroughly inspected to ensure that no loose contaminated soil,

which could present a hazard to the public, is present on the outside of the trucks. Traffic accidents associated with driving public highways could occur in the course of soil transportation. In the case of a traffic accident, the risk to the public would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate PPE, where applicable.

Implementation of Alternative 1D-4 is not expected to result in any significant adverse environmental impacts. The area in Site 1D subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Field personnel participating in the excavation, treatment, and sampling activities would wear PPE, as specified in the health and safety plan. The remedial activities in this alternative are expected to be completed in less than 1 year.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

The short-term effectiveness for Alternative 1D-5 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation, treatment, and handling.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported to a new CAMU disposal facility in covered trucks traveling on Base roads. Prior to leaving the area, trucks would be thoroughly inspected to ensure that no loose contaminated soil, which could present a health hazard, is present on the outside of the trucks. In the case of a traffic accident, human health risk would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate PPE, where applicable.

Implementation of Alternative 1D-5 is not expected to result in any significant adverse environmental impacts. The area in Site 1D subject to remediation has already been disrupted by vegetation removal activities. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Field personnel participating in the excavation, treatment, and sampling activities would wear PPE, as specified in the health and safety plan.

2.6.3.6 Implementability

An analysis of the implementability of each alternative is provided below.

Alternative 1D-1: No Action

No implementability concerns are posed by this alternative because no action would be taken.

Alternative 1D-2: Institutional Controls

Institutional actions comprising this alternative are readily implementable. Modifications to the Base Master Plan are administrative in nature. The Base would have primary responsibility for implementing this alternative and possesses the authority and capability to establish appropriate safeguards and to monitor and enforce compliance. Existing staff within the Base Environmental Security Office coordinate all on-Base construction activities to ensure appropriate environmental review. Institutional controls for IR sites are maintained on a central geographic information system (GIS) that is readily accessible. Furthermore, the 5-year review process provides an additional level of review to ensure that the site is not used inappropriately.

Implementation of Alternative 1D-2 would require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with requirements of the Endangered Species Act. Based on the previously performed screening-level ERA, it is unlikely that these agencies would allow this alternative to be implemented because it would not be protective of ecological receptors. In addition, the DON's position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

Alternative 1D-3 is ranked moderate to implement because of the pilot testing and associated regulatory approval that would be needed. Excavation and pretreatment management of impacted soils uses standard equipment and labor skills and is readily implementable. Ex situ stabilization also uses commonly available equipment (hoppers, conveyors, pug mills, generators, loaders, etc.) and labor, although the availability of the stabilizing reagent employed could range from widely available (e.g., fly ash and cement) to average availability in the instance of a more specialized, proprietary reagent. Efficient on-Base use of the treated soil requires coordination with installation construction projects, which could pose implementability problems due to the large volume of soil.

Implementation of Alternative 1D-3 would also require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with requirements of the Endangered Species Act. In addition, cultural resources coordination (SHPO and Native American groups) will be required. This would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work; performance of short-term biological monitoring prior to, during, and after construction activities; and long-term biological monitoring and habitat restoration measures.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Implementability is ranked high for Alternative 1D-4. Excavation and disposal of contaminated soil at an off-Base disposal facility are readily implementable. Several firms can provide the necessary equipment, materials, and labor to excavate and dispose of the contaminated soil. Licensed disposal facilities capable of accepting the contaminated soil currently exist within California.

Because the majority of the impacted soil would be permanently removed from the site, future soil remedial activities are not expected to be necessary. Collecting and screening confirmation samples during excavation would be used to evaluate the effectiveness of soil excavation.

Implementation of Alternative 1D-4 would require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with

requirements of the Endangered Species Act. In addition, cultural resources coordination (SHPO and Native American groups) will be required. This review process would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 1D-5 is dependent on the siting, design, and construction of a new on-Base CAMU. Factors affecting the implementability of an on-Base CAMU include the time required to conduct siting studies and to design and construct the facility (estimated to take 3 to 4 years to complete), compliance with the CAMU disposal unit regulations under RCRA, availability of 10 to 15 acres of land to locate a CAMU, and placement of institutional controls on a CAMU location in the Base Master Plan. Given that the Base mission is to support training, any area with a land use restriction would limit that function.

Excavation, treatment, and disposal of contaminated soil at a new on-Base CAMU disposal facility can be easily implementable with current technology. All the necessary equipment, materials, and labor are readily available. Because the majority of the impacted soil would be removed from the site, future soil remediation activities at Site 1D are not expected to be necessary. Collecting and screening confirmation samples during excavation would be used to evaluate the effectiveness of excavation. All the necessary equipment, materials, and labor are readily available.

The DON will be required to meet the substantive requirements of all necessary permits. Implementation of Alternative 1D-5 would require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with requirements of the Endangered Species Act. In addition, cultural resources coordination (SHPO and Native American groups) will be required. This review process would take 6 to 12 months and would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work; performance of short-term biological monitoring prior to, during, and after construction activities; and long-term biological monitoring and habitat restoration measures.

Based on the above factors, Alternative 1D-5 is rated moderate.

2.6.3.7 Cost

A summary of the costs is provided below.

Alternative 1D-1: No Action

No costs are associated with Alternative 1D-1.

Alternative 1D-2: Institutional Controls

The total cost of Alternative 1D-2 is estimated to be approximately $355,000. This cost covers the administrative costs for implementation of use restrictions and future inspection/reporting costs of the site surface, annual reporting costs, and 5-year review with subsequent reporting. If institutional controls were implemented, there would be indirect costs associated with the Base not being able to use the property for training and other purposes. This potential loss of land use is not quantified in this document, but is considered as a factor in evaluating implementability of institutional controls as a remedial alternative. A cost estimate and present worth analysis, including inspection/reporting costs, is provided in Appendix K1.

Alternative 1D-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The estimated capital cost of Alternative 1D-3 to achieve RAOs is estimated at $9,065,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; ex situ treatment; confirmation sampling and laboratory analysis; transportation of treated soil to a reuse site; excavation backfill with clean soil; surveying; and site restoration. In addition, the cost estimate includes removal of soils below five feet bgs where COCs are reported above RGs. Because the costs would be incurred over a short period (i.e., less than 1 year), a net present worth was not calculated for this alternative. The estimated capital costs are presented in Appendix K1.

Alternative 1D-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

The cost for Alternative 1D-4 is estimated at $10,308,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation, backfilling with clean soil, and stockpiling; on-Base pretreatment of all excavated soil to incorporate chemical stabilizer; confirmation sampling and laboratory analysis; waste characterization; transportation and disposal of contaminated soil at a California hazardous waste disposal facility; surveying; and site restoration. A breakdown of the cost estimate is provided in Appendix K1.

Alternative 1D-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Since the required amount of pretreatment is dependent on the specific location of an on-Base disposal facility, a range is provided for the associated costs based on 25 percent pretreatment to 75 percent pretreatment. The cost to implement Alternative 1D-5 is estimated between $6,667,000 to $7,943,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; on-Base pretreatment of a portion of excavated soil to incorporate chemical stabilizer; confirmation sampling and laboratory analysis; waste characterization; hauling and disposal of contaminated soil at a new on-Base CAMU site; excavation backfill with clean soil; surveying; and site restoration.

The cost also includes an allocated portion of the total construction and O&M costs associated with a new CAMU. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate. Thus, the cost of Alternative 1D-5 includes $625,000 in capital costs toward a new CAMU, and $98,000 in O&M costs earmarked for maintaining and monitoring a CAMU over 30 years. A breakdown of the cost estimate is provided in Appendix K1.

The closure and design requirements for a CAMU are such that there should be no unacceptable risks to humans or the environment resulting from exposure to hazardous waste or hazardous constituents. The CAMU closure requirements are specified in 40 CFR §264.552(e)(5) for leaving waste in place. The use of a 30-year time frame assumption is common in calculating long-term O&M costs using present value analysis.

2.7 Comparative Analysis of Alternatives

This section provides a comparative evaluation of Alternatives 1D-1 through 1D-4 relative to the NCP criteria and discusses the relative advantages and disadvantages of the alternatives.

2.7.1 Overall Protection of Human Health and the Environment

Alternative 1D-1 would leave contamination in place that poses a potential threat for future human health and ecological exposure. Alternative 1D-2 provides control of exposure pathways

and is protective of human health but is only partially effective for ecological receptors. Alternatives 1D-3, 1D-4, and 1D-5 would provide protection of human health and ecological receptors through removal of impacted soils.

2.7.2 Compliance With ARARs

Based on the previously performed screening-level ERA, Alternatives 1D-1 and 1D-2 would not comply with location-specific requirements of the Endangered Species Act. It is likely that Alternatives 1D-3, 1D-4, and 1D-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS, SHPO, and CDFG would be required. Pilot testing of Alternative 1D-3 would be necessary to ensure compliance with ARARs governing disposal/reuse of stabilized materials.

2.7.3 Long-Term Effectiveness and Permanence

Alternative 1D-1 is rated low for long-term effectiveness and permanence because no measures or controls are associated with this alternative. Alternative 1D-2 would require long-term maintenance and would provide a degree of long-term effectiveness through limiting exposure and site uses, but it provides minimal long-term effectiveness and permanence for ecological receptors. For Alternatives 1D-3, 1D-4, and 1D-5, the measures and controls implemented would reduce the potential for future human health exposure, and no future actions would be necessary. Alternatives 1D-4 and 1D-5 would provide a high degree of long-term effectiveness and permanence because they involve removal of the contaminated soils from the Base and disposal at either an off-Base or an on-Base facility.

2.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment

Alternatives 1D-1 and 1D-2 are rated low for this evaluation criterion. Alternative 1D-3 includes on-site treatment. This alternative is rated highly effective in reducing mobility and toxicity through ex situ stabilization via asphalt mixing. This effectiveness has been demonstrated at a wide range of remediation sites with metal leachability reductions of 3 or 4 orders of magnitude. Alternatives 1D-4 and 1D-5 include on-Base stabilization pretreatment prior to disposal to limit the leachability of contaminants. Stabilization reduces the mobility and toxicity of contaminants but increases the overall volume of resulting treated soil; therefore, this criterion is rated moderate for Alternatives 1D-4 and 1D-5.

2.7.5 Short-Term Effectiveness

This criterion is not rated for Alternative 1D-1 because it does not involve any actions that would disturb the site. The short-term effectiveness of Alternative 1D-2 is expected to be the greatest of the four alternatives, because minimal site activities would occur. For Alternatives 1D-3, 1D-4, and 1D-5, the potential for short-term dust exposure and possible short-term disruptions of ecological habitats exists during excavation, transportation, and hauling and disposal. The potential for short-term impacts associated with traffic and dust would be somewhat greater with Alternatives 1D-3 and 1D-5 due to the presence of the on-Base stabilization and the increased amount of on-Base truck traffic compared to Alternative 1D- 4.

2.7.6 Implementability

This criterion is not rated for Alternative 1D-1 because no activities would be conducted under this alternative. Alternatives 1D-2 and 1D-4 are readily implementable and involve commonly performed operations. Alternative 1D-2 is considered easier to implement because activities are largely administrative. However, given that the Base mission is to support training, any area with a land use restriction would limit that function and this potential loss of land use causes Alternative 1D-2 to be rated moderate.

Alternative 1D-4 is ranked high for implementability because all components of this alternative are readily implementable. Equipment, materials, and labor for Alternatives 1D-3, 1D-4, and 1D-5 are easily available, and all three alternatives involve commonly performed remedial operations. Excavation and treatment for Alternatives 1D-3, 1D-4, and 1D-5 uses standard equipment and labor skills and is readily implementable. Stabilizing reagents range from widely available off the shelf reagents, such as fly ash, cement, etc., to less common, more specialized proprietary reagents.

Alternative 1D-3 is ranked moderate to implement because of the pilot testing and associated regulatory coordination that would be needed, as well as the on-Base coordination required to use the treated soil as part of Base construction projects. Alternative 1D-5 is ranked moderate to implement because it would require 10 to 15 acres of available land to locate a new CAMU facility and 3 to 4 years to site, design, and construct the CAMU; compliance with the disposal requirements of an on-Base CAMU; significant regulatory coordination; and O&M funding uncertainty.

2.7.7 Cost

No cost is associated with Alternative 1D-1. Alternative 1D-2 is less expensive than Alternatives 1D-3, 1D-4, and 1D-5, with an estimated cost of $355,000. Alternatives 1D-3 and 1D-5 provide medium cost alternatives of $9,065,000 and between $6,667,000 to $7,943,000. Alternative 1D-4 is the most expensive remedial alternative, with an estimated cost of $10,308,000.

2.7.8 Summary of Comparative Analysis

The results of the comparative analysis for Site 1D are summarized below.

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	No[f]	Yes	Yes	Yes
Compliance with ARARs	No	No	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Low	High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	High	Moderate	Moderate
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	Moderate	High	Moderate
Cost ($ million)	0	0.36	9.06	10.31	6.67-7.94[g]

[a]No Action
[b]Institutional Controls
[c]Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil
[d]Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal
[e]Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
[f]Institutional controls would be protective of human health but not protective of ecological receptors
[g]Range based on 25 percent pretreatment to 75 percent pretreatment

Alternative 1D-1 does not meet ARARs and would not be protective of human health or the environment. Alternative 1D-1 also does not provide long-term effectiveness and permanence. No costs are associated with Alternative 1D-1.

Alternative 1D-2 would be protective of human health through use restrictions but would not be protective of ecological receptors. The potential for longer term adverse ecological impacts is

increased due to the site's vulnerability to flooding, which could mobilize or expose subsurface soil contamination that is not currently available for contact with ecological receptors.

Alternatives 1D-3, 1D-4, and 1D-5 would be protective of human health and the environment, meet ARARs, and provide a high degree of long-term effectiveness and permanence. Alternative 1D-3 provides the highest degree of treatment, but would likely be more difficult to implement because it involves pilot testing and additional regulatory coordination to ensure ARAR compliance and requires close coordination with potential on-Base construction users of the stabilized material. Alternatives 1D-4 and 1D-5 would both involve some pretreatment prior to disposal. Alternative 1D-4 has the highest ranking for implementibility; Alternative 1D-5 would also be more difficult to implement because it would require 3 to 4 years to site, design, and construct an on-Base CAMU, require more regulatory involvement, long-term O&M, and the loss of current land use with institutional controls placed on a new CAMU location.

The cost to reduce the human health and ecological risks and exposure pathways associated with site metals, with restricted land use, is estimated to be $355,000 for Alternative 1D-2. To achieve a higher level of protectiveness and unrestricted future land use, Alternative 1D-3 would require overall costs of $9,065,000 and Alternative 1D-4 overall costs of $10,308,000. To achieve the same higher level of protectiveness as Alternatives 1D-3 and 1D-4, but with restricted future land use for a CAMU location, Alternative 1D-5 would require overall costs between $6,667,000 to $7,943,000.

THIS PAGE IS INTENTIONALLY BLANK

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-A05-A	0.0 - 0.5	27-Sep-01	mg/kg	1	4.1
1D-A05-B	2.0 - 2.5	27-Sep-01	mg/kg	1	1.7
1D-A05-C	4.0 - 4.5	27-Sep-01	mg/kg	1	1.6
1D-A06-A	0.0 - 0.5	27-Sep-01	mg/kg	1	5.2
1D-A06-B	2.0 - 2.5	27-Sep-01	mg/kg	1	1.8
1D-A06-C	4.0 - 4.5	27-Sep-01	mg/kg	1	2.3
1D-A07-A	0.0 - 0.5	25-Sep-01	mg/kg	1	29.6 J
1D-A07-A (D)	0.0 - 0.5	25-Sep-01	mg/kg	1	14.3 J
1D-A07-B	2.0 - 2.5	25-Sep-01	mg/kg	4	2.2
1D-A07-C	4.0 - 4.5	25-Sep-01	mg/kg	1	2.4 J
1D-A08-A	0.0 - 0.5	25-Sep-01	mg/kg	1	13.5 J
1D-A08-B	2.0 - 2.5	25-Sep-01	mg/kg	1	5.5 J
1D-A08-C2	4.0 - 4.5	25-Sep-01	mg/kg	1	2.7 J
1D-B01-A	0.0 - 0.5	28-Sep-01	mg/kg	1	15.4 J
1D-B01-B	2.0 - 2.5	28-Sep-01	mg/kg	1	1.7 J
1D-B01-B (D)	2.0 - 2.5	28-Sep-01	mg/kg	1	2 J
1D-B01-C	4.0 - 4.5	28-Sep-01	mg/kg	1	1.3 J
1D-B02-A	0.0 - 0.5	28-Sep-01	mg/kg	1	8.4 J
1D-B02-B	2.0 - 2.5	28-Sep-01	mg/kg	1	2.1 J
1D-B02-C	4.0 - 4.5	28-Sep-01	mg/kg	1	1.4 J
1D-B03-A	0.0 - 0.5	28-Sep-01	mg/kg	1	9.3 J
1D-B03-B	2.0 - 2.5	28-Sep-01	mg/kg	1	1.4 J
1D-B03-C	4.0 - 4.5	28-Sep-01	mg/kg	1	1.7 J
1D-B04-A	0.0 - 0.5	28-Sep-01	mg/kg	1	14.6 J
1D-B04-B	2.0 - 2.5	28-Sep-01	mg/kg	1	2.3 J
1D-B04-C	4.0 - 4.5	28-Sep-01	mg/kg	1	1.2 J
1D-B05-A	0.0 - 0.5	27-Sep-01	mg/kg	1	19.1
1D-B05-A (D)	0.0 - 0.5	27-Sep-01	mg/kg	1	12
1D-B05-B	2.0 - 2.5	27-Sep-01	mg/kg	1	3.6
1D-B05-C	4.0 - 4.5	27-Sep-01	mg/kg	1	4.1
1D-B06-A	0.0 - 0.5	25-Sep-01	mg/kg	1	12.7 J
1D-B06-B	2.0 - 2.5	25-Sep-01	mg/kg	1	2.5 J
1D-B06-C	4.0 - 4.5	25-Sep-01	mg/kg	1	2.3 J
1D-B07-A	0.0 - 0.5	25-Sep-01	mg/kg	1	12.1 J
1D-B07-A (D)	0.0 - 0.5	25-Sep-01	mg/kg	1	10.3 J
1D-B07-B	2.0 - 2.5	25-Sep-01	mg/kg	1	4 J
1D-B07-C	4.0 - 4.5	25-Sep-01	mg/kg	1	4.3 J
1D-B08-A	0.0 - 0.5	25-Sep-01	mg/kg	1	7.4 J
1D-B08-B	2.0 - 2.5	25-Sep-01	mg/kg	1	3.1 J
1D-B08-C	4.0 - 4.5	25-Sep-01	mg/kg	1	1.7 J
1D-B09-A	0.0 - 0.5	25-Sep-01	mg/kg	1	12.8 J
1D-B09-B	2.0 - 2.5	25-Sep-01	mg/kg	1	4.7 J
1D-B09-C	4.0 - 4.5	25-Sep-01	mg/kg	1	5 J

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-B10-A	0.0 - 0.5	24-Sep-01	mg/kg	1	23.8
1D-B10-B	2.0 - 2.5	24-Sep-01	mg/kg	1	7.4
1D-B10-C	4.0 - 4.5	24-Sep-01	mg/kg	1	5
1D-C01-A	0.0 - 0.5	27-Sep-01	mg/kg	1	6.8
1D-C01-B	2.0 - 2.5	27-Sep-01	mg/kg	1	3.3
1D-C01-C	4.0 - 4.5	27-Sep-01	mg/kg	1	2.2
1D-C01-C (D)	4.0 - 4.5	27-Sep-01	mg/kg	1	1.5
1D-C02-A	0.0 - 0.5	28-Sep-01	mg/kg	1	12.6 J
1D-C02-B	2.0 - 2.5	28-Sep-01	mg/kg	1	1.3 J
1D-C02-C	4.0 - 4.5	28-Sep-01	mg/kg	1	1.3 J
1D-C03-A	0.0 - 0.5	05-Sep-01	mg/kg	10	**606 J**
1D-C03-B	2.0 - 2.5	05-Sep-01	mg/kg	1	**78.6 J**
1D-C03-B (D)	2.0 - 2.5	05-Sep-01	mg/kg	5	**375 J**
1D-C03-C	4.0 - 4.5	05-Sep-01	mg/kg	1	14.1 J
1D-C04-A	0.0 - 0.5	05-Sep-01	mg/kg	20	**1550 J**
1D-C04-B	2.0 - 2.5	05-Sep-01	mg/kg	10	**831**
1D-C04-C	4.0 - 4.5	05-Sep-01	mg/kg	10	**510**
1D-C05-A	0.0 - 0.5	05-Sep-01	mg/kg	10	**644**
1D-C05-B	2.0 - 2.5	05-Sep-01	mg/kg	20	**983**
1D-C05-C	4.0 - 4.5	05-Sep-01	mg/kg	1	2.6
1D-C06-A	0.0 - 0.5	06-Sep-01	mg/kg	1	**936 J**
1D-C06-B	2.0 - 2.5	06-Sep-01	mg/kg	1	**331 J**
1D-C06-C	6.0 - 6.5	06-Sep-01	mg/kg	1	**319 J**
1D-C07-A	0.0 - 0.5	06-Sep-01	mg/kg	1	**4200 J**
1D-C07-B	2.0 - 2.5	06-Sep-01	mg/kg	1	**1150 J**
1D-C07-B (D)	2.0 - 2.5	06-Sep-01	mg/kg	1	**1310 J**
1D-C07-C	4.0 - 4.5	06-Sep-01	mg/kg	1	**692 J**
1D-C08-A	0.0 - 0.5	06-Sep-01	mg/kg	1	**408 J**
1D-C08-B	2.0 - 2.5	06-Sep-01	mg/kg	1	**310 J**
1D-C08-C	4.0 - 4.5	06-Sep-01	mg/kg	1	**316 J**
1D-C09-A	0.0 - 0.5	06-Sep-01	mg/kg	1	24 J
1D-C09-B	2.0 - 2.5	06-Sep-01	mg/kg	1	7.5 J
1D-C09-C	4.0 - 4.5	06-Sep-01	mg/kg	1	2 J
1D-C09-C (D)	4.0 - 4.5	06-Sep-01	mg/kg	1	1.9 J
1D-C10-A	0.0 - 0.5	24-Sep-01	mg/kg	1	5.7
1D-C10-B	2.0 - 2.5	24-Sep-01	mg/kg	1	1.4
1D-C10-C	4.0 - 4.5	24-Sep-01	mg/kg	1	**43.5**
1D-C11-A	0.0 - 0.5	24-Sep-01	mg/kg	1	9.5
1D-C11-B	2.0 - 2.5	24-Sep-01	mg/kg	1	3.9
1D-C11-C	4.0 - 4.5	24-Sep-01	mg/kg	1	2.7
1D-C12-A	0.0 - 0.5	24-Sep-01	mg/kg	1	10.1
1D-C12-B	2.0 - 2.5	24-Sep-01	mg/kg	1	2.9
1D-C12-C	4.0 - 4.5	24-Sep-01	mg/kg	1	1.8

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-C13-A	0.0 - 0.5	24-Sep-01	mg/kg	1	10.8
1D-C13-B	2.0 - 2.5	24-Sep-01	mg/kg	4	5.7
1D-C13-C	4.0 - 4 5	24-Sep-01	mg/kg	1	3.3
1D-C14-A	0.0 - 0.5	24-Sep-01	mg/kg	1	21.4
1D-C14-B	2.0 - 2.5	24-Sep-01	mg/kg	1	17.4
1D-C14-C	4.0 - 4.5	24-Sep-01	mg/kg	1	3.8
1D-C15-A	0.0 - 0.5	24-Sep-01	mg/kg	1	14.4
1D-C15-B	2.0 - 2 5	24-Sep-01	mg/kg	1	5.3
1D-C15-C	4.0 - 4.5	24-Sep-01	mg/kg	1	2.2
1D-D01-A	0.0 - 0.5	05-Sep-01	mg/kg	1	16.9
1D-D01-B	2.0 - 2.5	05-Sep-01	mg/kg	1	3.3
1D-D01-C	4.0 - 4.5	05-Sep-01	mg/kg	1	4.3
1D-D02-A	0.0 - 0.5	05-Sep-01	mg/kg	1	**71.1**
1D-D02-B	2.0 - 2.5	05-Sep-01	mg/kg	1	7.1
1D-D02-C	4.0 - 4.5	05-Sep-01	mg/kg	1	15.8
1D-D03-A	0.0 - 0.5	05-Sep-01	mg/kg	10	**541**
1D-D03-B	2.0 - 2.5	05-Sep-01	mg/kg	1	**221**
1D-D03-C	4.0 - 4.5	05-Sep-01	mg/kg	1	7.8
1D-D04-A	0.0 - 0.5	05-Sep-01	mg/kg	10	**485**
1D-D04-B	2.0 - 2.5	05-Sep-01	mg/kg	20	**942**
1D-D04-C	4.0 - 6.5	05-Sep-01	mg/kg	1	**263**
1D-D05-A	0.0 - 0.5	06-Sep-01	mg/kg	5	**284**
1D-D05-B	2.0 - 2.5	06-Sep-01	mg/kg	4	**856**
1D-D05-C	4.0 - 4.5	06-Sep-01	mg/kg	1	**51.7**
1D-D06-A	0.0 - 0.5	06-Sep-01	mg/kg	1	**159**
1D-D06-B	2.0 - 2.5	06-Sep-01	mg/kg	1	**213**
1D-D06-B (D)	2.0 - 2.5	06-Sep-01	mg/kg	10	**621**
1D-D06-C	4.0 - 4.5	06-Sep-01	mg/kg	1	19.1
1D-D07-A	0.0 - 0.5	06-Sep-01	mg/kg	10	**474**
1D-D07-B	2.0 - 2.5	06-Sep-01	mg/kg	1	**155**
1D-D07-C	4.0 - 4.5	06-Sep-01	mg/kg	1	1.7
1D-D08-A	0.0 - 0.5	06-Sep-01	mg/kg	1	**101**
1D-D08-B	2.0 - 2.5	06-Sep-01	mg/kg	1	2.6
1D-D08-C	4.0 - 4.5	06-Sep-01	mg/kg	1	1.3
1D-D09-A	0.0 - 0.5	06-Sep-01	mg/kg	1	8.9
1D-D09-B	2.0 - 2.5	06-Sep-01	mg/kg	1	5.3
1D-D09-B (D)	2.0 - 2.5	06-Sep-01	mg/kg	1	9.9
1D-D09-C	4.0 - 4.5	06-Sep-01	mg/kg	1	< 1
1D-D10-A	0.0 - 0.5	06-Sep-01	mg/kg	1	7.8
1D-D10-B	2.0 - 2.5	06-Sep-01	mg/kg	1	< 0.83
1D-D10-C	4.0 - 4.5	06-Sep-01	mg/kg	1	3

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-D11-A	0.0 - 0.5	06-Sep-01	mg/kg	1	21.4 J
1D-D11-B	2.0 - 2.5	06-Sep-01	mg/kg	1	3.7 J
1D-D11-B (D)	2.0 - 2.5	06-Sep-01	mg/kg	1	11.3 J
1D-D11-C	4.0 - 4.5	06-Sep-01	mg/kg	1	3.7 J
1D-D12-A	0.0 - 0.5	24-Sep-01	mg/kg	1	18.7
1D-D12-B	2.0 - 2.5	24-Sep-01	mg/kg	1	4.4
1D-D12-C	4.0 - 4.5	24-Sep-01	mg/kg	1	4.5
1D-D13-A	0.0 - 0.5	24-Sep-01	mg/kg	1	11.1
1D-D13-B	2.0 - 2.5	24-Sep-01	mg/kg	1	4.2
1D-D13-C	4.0 - 4.5	24-Sep-01	mg/kg	1	4.8
1D-D14-A	0.0 - 0.5	24-Sep-01	mg/kg	1	29
1D-D14-B	2.0 - 2.5	24-Sep-01	mg/kg	1	3.7
1D-D14-C	4.0 - 4.5	24-Sep-01	mg/kg	1	3.2
1D-E01-A	0.0 - 0.5	27-Aug-01	mg/kg	1	20.4 J
1D-E01-B	2.0 - 2.5	27-Aug-01	mg/kg	1	1.9 J
1D-E01-C	4.0 - 4.5	27-Aug-01	mg/kg	1	2.1 J
1D-E02-A	0.0 - 0.5	27-Aug-01	mg/kg	1	10.9 J
1D-E02-B	2.0 - 2.5	27-Aug-01	mg/kg	1	2.4 J
1D-E02-C	4.0 - 4.5	27-Aug-01	mg/kg	1	13.4 J
1D-E03-A	0.0 - 0.5	27-Aug-01	mg/kg	1	31.6 J
1D-E03-B	2.0 - 2.5	27-Aug-01	mg/kg	1	2.8 J
1D-E03-C	4.0 - 4.5	27-Aug-01	mg/kg	1	3.1 J
1D-E03-C (D)	4.0 - 4.5	27-Aug-01	mg/kg	1	3.6 J
1D-E04-A	0.0 - 0.5	27-Aug-01	mg/kg	1	15.8 J
1D-E04-B	2.0 - 2.5	27-Aug-01	mg/kg	1	1.9 J
1D-E04-C	4.0 - 4.5	27-Aug-01	mg/kg	1	1.7 J
1D-E05-A	0.0 - 0.5	27-Aug-01	mg/kg	1	19.5 J
1D-E05-A (D)	0.0 - 0.5	27-Aug-01	mg/kg	1	16 J
1D-E05-B	2.0 - 2.5	27-Aug-01	mg/kg	1	6 J
1D-E05-C	4.0 - 4.5	27-Aug-01	mg/kg	1	< 0.58 J
1D-E06-A	0.0 - 0.5	28-Aug-01	mg/kg	1	19.2
1D-E06-B	2.0 - 2.5	28-Aug-01	mg/kg	1	9
1D-E06-C	4.0 - 4.5	28-Aug-01	mg/kg	1	25.1
1D-E07-A	0.0 - 0.5	28-Aug-01	mg/kg	1	19.7
1D-E07-B	2.0 - 2.5	28-Aug-01	mg/kg	1	18.6
1D-E07-C	4.0 - 4.5	28-Aug-01	mg/kg	1	8.4
1D-E08-A	0.0 - 0.5	28-Aug-01	mg/kg	1	33.4
1D-E08-B	3.0 - 3.5	28-Aug-01	mg/kg	1	< 0.75
1D-E08-C	6.0 - 6.5	28-Aug-01	mg/kg	1	< 0.99
1D-E09-A	0.0 - 0.5	28-Aug-01	mg/kg	1	7.3
1D-E09-A (D)	0.0 - 0.5	28-Aug-01	mg/kg	1	3.1
1D-E09-B	2.0 - 2.5	28-Aug-01	mg/kg	1	2.5
1D-E09-C	4.0 - 4.5	28-Aug-01	mg/kg	1	10

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-E10-A	0.0 - 0.5	06-Sep-01	mg/kg	1	1.8 J
1D-E10-B	2.0 - 2.5	06-Sep-01	mg/kg	1	< 0.47 J
1D-E10-B (D)	2.0 - 2.5	06-Sep-01	mg/kg	1	< 0.41 J
1D-E10-C	4.0 - 4.5	06-Sep-01	mg/kg	1	< 0.45 J
1D-E11-A	0.0 - 0.5	28-Aug-01	mg/kg	1	21.9
1D-E11-B	2.0 - 2.5	28-Aug-01	mg/kg	1	4
1D-E11-C	4.0 - 4.5	28-Aug-01	mg/kg	1	6 J
1D-E12-A	0.0 - 0.5	24-Sep-01	mg/kg	1	25.5
1D-E12-B	2.0 - 2.5	24-Sep-01	mg/kg	1	3.6
1D-E12-C	4.0 - 4.5	24-Sep-01	mg/kg	1	3.8
1D-E13-A	0.0 - 0.5	24-Sep-01	mg/kg	1	18.4
1D-E13-B	2.0 - 2.5	24-Sep-01	mg/kg	1	4
1D-E13-C	4.0 - 4.5	24-Sep-01	mg/kg	1	3.5
1D-F01-A	0.0 - 0.5	27-Aug-01	mg/kg	1	8.8 J
1D-F01-B	2.0 - 2.5	27-Aug-01	mg/kg	1	1.4 J
1D-F01-C	4.0 - 4.5	27-Aug-01	mg/kg	1	< 1.1 J
1D-F02-A	0.0 - 0.5	27-Aug-01	mg/kg	1	**45.7**
1D-F02-B	2.0 - 2.5	27-Aug-01	mg/kg	10	**1070**
1D-F02-C	4.0 - 4.5	27-Aug-01	mg/kg	1	**116**
1D-F02-C (D)	4.0 - 4.5	27-Aug-01	mg/kg	1	**111**
1D-F03-A	0.0 - 0.5	27-Aug-01	mg/kg	1	**96.8**
1D-F03-B	2.0 - 2.5	27-Aug-01	mg/kg	5	**440**
1D-F03-C	4.0 - 4.5	27-Aug-01	mg/kg	1	**145**
1D-F04-A	0.0 - 0.5	27-Aug-01	mg/kg	1	9.9
1D-F04-B	2.0 - 2.5	27-Aug-01	mg/kg	1	**35.2**
1D-F04-C	4.0 - 4.5	27-Aug-01	mg/kg	1	**55.3**
1D-F05-A	0.0 - 0.5	27-Aug-01	mg/kg	1	29
1D-F05-A (D)	0.0 - 0.5	27-Aug-01	mg/kg	1	19.1
1D-F05-B	2.0 - 2.5	27-Aug-01	mg/kg	1	2.2
1D-F05-C	4.0 - 4.5	27-Aug-01	mg/kg	1	2
1D-F06-A	0.0 - 0.5	28-Aug-01	mg/kg	1	**60.6 J**
1D-F06-B	2.0 - 2.5	28-Aug-01	mg/kg	1	< 0.9 J
1D-F06-C	4.0 - 4.5	28-Aug-01	mg/kg	1	< 1 J
1D-F07-A	0.0 - 0.5	28-Aug-01	mg/kg	1	18.5 J
1D-F07-B	2.0 - 2.5	28-Aug-01	mg/kg	1	1.4 J
1D-F07-C	4.0 - 4.5	28-Aug-01	mg/kg	1	2.7 J
1D-F08-A	0.0 - 0.5	28-Aug-01	mg/kg	1	11.3 J
1D-F08-B	3.0 - 3.5	28-Aug-01	mg/kg	1	3.1 J
1D-F08-C	6.0 - 6.5	28-Aug-01	mg/kg	1	7.8 J
1D-F09-A	0.0 - 0.5	28-Aug-01	mg/kg	1	**63.6 J**
1D-F09-B	2.0 - 2.5	28-Aug-01	mg/kg	1	12.9 J
1D-F09-B (D)	2.0 - 2.5	28-Aug-01	mg/kg	1	**228 J**
1D-F09-C	4.0 - 4.5	28-Aug-01	mg/kg	1	7.1 J

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-F10-A	0.0 - 0.5	07-Sep-01	mg/kg	1	2.9 J
1D-F10-B	2.0 - 2.5	07-Sep-01	mg/kg	1	1.8 J
1D-F10-C	4.0 - 4.5	07-Sep-01	mg/kg	1	3.4 J
1D-F11-A	0.0 - 0.5	28-Aug-01	mg/kg	1	688 J
1D-F11-B	2.0 - 2.5	28-Aug-01	mg/kg	1	155 J
1D-F11-C	4.0 - 4.5	28-Aug-01	mg/kg	1	405 J
1D-F12-A	0.0 - 0.5	24-Sep-01	mg/kg	1	56.9
1D-F12-A (D)	0.0 - 0.5	24-Sep-01	mg/kg	1	37.6
1D-F12-B	2.0 - 2.5	24-Sep-01	mg/kg	1	4.2
1D-F12-C	4.0 - 4.5	24-Sep-01	mg/kg	1	20
1D-G01-A	0.0 - 0.5	31-Aug-01	mg/kg		< 2.4
1D-G01-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 1.5
1D-G01-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 1
1D-G02-A	0.0 - 0.5	30-Aug-01	mg/kg	1	669
1D-G02-B	2.0 - 2.5	30-Aug-01	mg/kg	1	175
1D-G02-C	4.0 - 4.5	30-Aug-01	mg/kg	1	1.8
1D-G02-C (D)	4.0 - 4.5	30-Aug-01	mg/kg	1	1.5
1D-G03-A	0.0 - 0.5	30-Aug-01	mg/kg	1	68.3
1D-G03-B	2.0 - 2.5	30-Aug-01	mg/kg	1	136
1D-G03-C	4.0 - 4.5	30-Aug-01	mg/kg	1	14.5
1D-G04-A	0.0 - 0.5	30-Aug-01	mg/kg	1	153
1D-G04-B	2.0 - 2.5	30-Aug-01	mg/kg	1	47.9
1D-G04-C	4.0 - 4.5	30-Aug-01	mg/kg	1	4
1D-G04-C (D)	4.0 - 4.5	30-Aug-01	mg/kg	1	3.2
1D-G05-A	0.0 - 0.5	30-Aug-01	mg/kg	1	258
1D-G05-B	2.0 - 2.5	30-Aug-01	mg/kg	1	98.6
1D-G05-C	4.0 - 4.5	30-Aug-01	mg/kg	1	190
1D-G06-A	0.0 - 0.5	07-Sep-01	mg/kg	1	345 J
1D-G06-B	2.0 - 2.5	07-Sep-01	mg/kg	1	170 J
1D-G06-C	4.0 - 4.5	07-Sep-01	mg/kg	1	< 0.82 J
1D-G07-A	0.0 - 0.5	29-Aug-01	mg/kg	4	244
1D-G07-B	2.0 - 2.5	29-Aug-01	mg/kg	1	294
1D-G07-B (D)	2.0 - 2.5	29-Aug-01	mg/kg	1	286
1D-G07-C	4.0 - 4.5	29-Aug-01	mg/kg	1	1.5
1D-G08-A	0.0 - 0.5	29-Aug-01	mg/kg	1	55.4
1D-G08-B	2.0 - 2.5	31-Aug-01	mg/kg	1	112
1D-G08-C	4.0 - 4.5	29-Aug-01	mg/kg	1	16.5
1D-G09-A	0.0 - 0.5	29-Aug-01	mg/kg	1	38.4
1D-G09-B	2.0 - 2.5	29-Aug-01	mg/kg	1	1.6
1D-G09-C	4.0 - 4.5	29-Aug-01	mg/kg	1	35.4

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-G10-A	0.0 - 0.5	29-Aug-01	mg/kg	1	12.4
1D-G10-A (D)	0.0 - 0.5	29-Aug-01	mg/kg	1	2.2
1D-G10-B	2.0 - 2.5	29-Aug-01	mg/kg	4	1.5
1D-G10-C	4.0 - 4.5	29-Aug-01	mg/kg	1	0.97
1D-G11-A	0.0 - 0.5	29-Aug-01	mg/kg	5	**815**
1D-G11-B	2.0 - 2.5	29-Aug-01	mg/kg	1	**418**
1D-G11-C	4.0 - 4.5	29-Aug-01	mg/kg	1	**742**
1D-H01-A	0.0 - 0.5	29-Aug-01	mg/kg	1	1.2
1D-H01-B	2.0 - 2.5	30-Aug-01	mg/kg	1	1.1
1D-H01-C	4.0 - 4.5	30-Aug-01	mg/kg	1	1.7
1D-H02-A	0.0 - 0.5	30-Aug-01	mg/kg	1	7.5
1D-H02-B	2.0 - 2.5	30-Aug-01	mg/kg	1	0.64
1D-H02-B (D)	2.0 - 2.5	30-Aug-01	mg/kg	1	0.39
1D-H02-C	4.0 - 4.5	30-Aug-01	mg/kg	1	0.93
1D-H03-A	0.0 - 0.5	30-Aug-01	mg/kg	1	**212**
1D-H03-B	2.0 - 2.5	30-Aug-01	mg/kg	1	1.4
1D-H03-C	4.0 - 4.5	30-Aug-01	mg/kg	1	2
1D-H04-A	0.0 - 0.5	30-Aug-01	mg/kg	1	**259 J**
1D-H04-B	2.0 - 2.5	07-Sep-01	mg/kg	1	**232 J**
1D-H04-C	3.0 - 3.5	07-Sep-01	mg/kg	1	**175 J**
1D-H05-A	0.0 - 0.5	07-Sep-01	mg/kg	1	1.8
1D-H05-B	2.0 - 2.5	30-Aug-01	mg/kg	1	1.3
1D-H05-C	4.0 - 4.5	30-Aug-01	mg/kg	1	1.9
1D-H06-A	0.0 - 0.5	30-Aug-01	mg/kg	1	**166**
1D-H06-B	2.0 - 2.5	30-Aug-01	mg/kg	1	0.87
1D-H06-C	4.0 - 4.5	30-Aug-01	mg/kg	1	**57.1**
1D-H07-A	0.0 - 0.5	30-Aug-01	mg/kg	1	3.4
1D-H07-A (D)	0.0 - 0.5	29-Aug-01	mg/kg	1	2.5
1D-H07-B	2.0 - 2.5	29-Aug-01	mg/kg	1	2.2
1D-H07-C	4.0 - 4.5	29-Aug-01	mg/kg	1	1.8
1D-H08-A	0.0 - 0.5	29-Aug-01	mg/kg	1	1.1
1D-H08-B	2.0 - 2.5	29-Aug-01	mg/kg	1	2
1D-H08-C	5.0 - 6.0	29-Aug-01	mg/kg	1	18.4
1D-H09-A	0.0 - 0.5	29-Aug-01	mg/kg	1	4.4
1D-H09-B	0.0 - 0.5	29-Aug-01	mg/kg	1	0.76
1D-H09-C	2.0 - 2.5	29-Aug-01	mg/kg	1	< 0.17
1D-H09-C (D)	4.0 - 4.5	29-Aug-01	mg/kg	1	1.9
1D-H10-A	0.0 - 0.5	29-Aug-01	mg/kg	1	1.9
1D-H10-B	2.0 - 2.5	31-Aug-01	mg/kg	1	14.8
1D-H10-C	4.0 - 4.5	31-Aug-01	mg/kg	1	1.9

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-I02-A	0.0 - 0.5	31-Aug-01	mg/kg	1	3.7
1D-I02-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 1.6
1D-I02-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 2
1D-I03-A	0.0 - 0.5	31-Aug-01	mg/kg	1	3
1D-I03-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 0.59
1D-I03-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 0.82
1D-I03-C (D)	4.0 - 4.5	31-Aug-01	mg/kg	1	< 1.6
1D-I04-A	0.0 - 0.5	31-Aug-01	mg/kg	1	12.9
1D-I04-B	2.0 - 2.5	31-Aug-01	mg/kg	1	13.5
1D-I04-C	4.0 - 4.5	31-Aug-01	mg/kg	1	7.7
1D-I05-A	0.0 - 0.5	31-Aug-01	mg/kg	1	13.8
1D-I05-B	2.0 - 2.5	31-Aug-01	mg/kg	1	17.4
1D-I05-C	4.0 - 4.5	31-Aug-01	mg/kg	1	15.3
1D-I05-C (D)	4.0 - 4.5	31-Aug-01	mg/kg	1	18
1D-I06-A	0.0 - 0.5	04-Sep-01	mg/kg	1	**103**
1D-I06-B	2.0 - 2.5	04-Sep-01	mg/kg	1	**50.1**
1D-I06-C	4.0 - 4.5	04-Sep-01	mg/kg	1	3.4
1D-I07-A	0.0 - 0.5	07-Sep-01	mg/kg	1	**247 J**
1D-I07-B	2.0 - 2.5	07-Sep-01	mg/kg	1	**79.1 J**
1D-I07-C	4.5 - 9.2	07-Sep-01	mg/kg	4	**97.9**
1D-I08-A	0.0 - 0.5	04-Sep-01	mg/kg	1	**60.5**
1D-I08-B	2.0 - 2.5	04-Sep-01	mg/kg	1	**611**
1D-I08-C	4.0 - 4.5	04-Sep-01	mg/kg	1	**133**
1D-I09-A	0.0 - 0.5	04-Sep-01	mg/kg	1	11
1D-I09-A (D)	0.0 - 0.5	04-Sep-01	mg/kg	1	13.2
1D-I09-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 1.7
1D-I09-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 2.7
1D-J05-A	0.0 - 0.5	31-Aug-01	mg/kg	1	**85.7**
1D-J05-A (D)	0.0 - 0.5	31-Aug-01	mg/kg	1	**193**
1D-J05-B	2.0 - 2.5	31-Aug-01	mg/kg	1	**382**
1D-J05-C	4.0 - 4.5	31-Aug-01	mg/kg	1	**1100**
1D-J06-A	0.0 - 0.5	07-Sep-01	mg/kg	1	**56.1 J**
1D-J06-B	2.0 - 2.5	07-Sep-01	mg/kg	1	2.3 J
1D-J06-C	4.0 - 4.5	07-Sep-01	mg/kg	1	2.1 J
1D-J07-A	0.0 - 0.5	31-Aug-01	mg/kg	1	3.4
1D-J07-A (D)	0.0 - 0.5	31-Aug-01	mg/kg	1	12
1D-J07-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 0.67
1D-J07-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 0.93
1D-J08-A	0.0 - 0.5	31-Aug-01	mg/kg	1	< 1.9
1D-J08-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 1.7
1D-J08-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 1

Table 2-1
Site 1D Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.3-6.3
		MDL:	mg/kg		0.039-1.5
		RG (0 to 5 ft):	mg/kg		29 [a]
1D-J09-A	0.0 - 0.5	31-Aug-01	mg/kg	1	< 2.1
1D-J09-B	2.0 - 2.5	31-Aug-01	mg/kg	1	< 0.84
1D-J09-C	4.0 - 4.5	31-Aug-01	mg/kg	1	< 1.1
1D-K05-A	0.0 - 0.5	04-Sep-01	mg/kg	1	17.8
1D-K05-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 1.1
1D-K05-B (D)	2.0 - 2.5	04-Sep-01	mg/kg	1	< 0.75
1D-K05-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 1.1
1D-K06-A	0.0 - 0.5	04-Sep-01	mg/kg	1	5.7
1D-K06-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 0.86
1D-K06-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 1.1
1D-K07-A	0.0 - 0.5	04-Sep-01	mg/kg	1	< 1.1
1D-K07-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 0.89
1D-K07-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 0.93
1D-K08-A	0.0 - 0.5	04-Sep-01	mg/kg	1	< 1.2
1D-K08-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 1.2
1D-K08-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 1.5
1D-L05-A	0.0 - 0.5	05-Sep-01	mg/kg	1	4.5 J
1D-L05-B	2.0 - 2.5	05-Sep-01	mg/kg	1	5.7 J
1D-L05-C	4.0 - 4.5	05-Sep-01	mg/kg	1	< 0.82 J
1D-L06-A	0.0 - 0.5	05-Sep-01	mg/kg	1	4.7 J
1D-L06-B	2.0 - 2.5	05-Sep-01	mg/kg	1	7.5 J
1D-L06-B (D)	2.0 - 2.5	05-Sep-01	mg/kg	1	3.5 J
1D-L06-C	4.0 - 4.5	05-Sep-01	mg/kg	1	4.9 J
1D-L07-A	0.0 - 0.5	05-Sep-01	mg/kg	1	2.7 J
1D-L07-B	2.0 - 2.5	05-Sep-01	mg/kg	1	1.2 J
1D-L07-C	4.0 - 4.5	05-Sep-01	mg/kg	1	< 1.1 J
1D-L08-A	0.0 - 0.5	04-Sep-01	mg/kg	1	3.4
1D-L08-B	2.0 - 2.5	04-Sep-01	mg/kg	1	< 1.5
1D-L08-C	4.0 - 4.5	04-Sep-01	mg/kg	1	< 1.3

mg/kg = milligrams per kilogram

<1 5 = not detected at indicated value

DF = Dilution Factor

J = Estimated value

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

RG = Remediation Goal

103 Concentration above RG

(D) = Duplicate Sample

a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV 1996b)

Table 2-2
Site 1D Metals Results in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
TTLC MDL:				mg/kg	0.81 - 1	0.071 - 0.36	0.076 - 0.39	0.039 - 0.2	0.0076 - 0.039	0.012 - 0.062	9.7 - 12	0.0066 - 0.034	0.021 - 0.11	0.082 - 0.41	0.69 - 0.89	0.039 - 1.5	0.97 - 1.2	0.077 - 0.098	0.032 - 0.16	0.028 - 0.14	1 - 1.3	0.087 - 0.44	0.014 - 0.072	29 - 36	0.051 - 0.26	0.014 - 0.072	0.036 - 0.18
TTLC PQL:				mg/kg	20 - 26	5.1 - 26	0.31 - 1.6	1 - 5.2	0.2 - 1	0.2 - 1	41 - 84	0.51 - 2.6	0.51 - 2.6	0.51 - 2.6	12 - 16	0.3 - 6.3	40 - 52	2 - 2.6	0.2 - 1	0.31 - 1.6	81 - 100	0.51 - 2.6	0.51 - 2.6	400 - 520	0.51 - 2.6	0.51 - 2.6	0.51 - 2.6
TCLP MDL:				µg/L	7.8	2.8	3	1.5	0.3	0.46	NR	0.26	0.82	3.2	6.8	1.6	9.6	0.74	1.2	1.1	9.8	3.4	0.56	280	2	0.54	1.4
TCLP PQL:				µg/L	200	20	10	20	4	4	NR	10	10	20	100	10	200	10	10	10	800	20	20	4000	20	20	20
RG (0 to 5 ft):				mg/kg	NA	8.8 [a]	4.3 [b]	NA	NA	NA	NA	33 [b]	NA	26 [a]	26459 [a]	29 [a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	111 [a]
RCRA Hazardous Waste TTLC Limit [c]:				mg/kg	NE	500	500	10,000	75	100	NE	500 [a]	8,000	2,500	NE	1,000	NE	NE	3,500	2,000	NE	100	500	NE	700	2,400	5,000
RCRA Hazardous Waste TCLP Limit [c]:				µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	NE	NE	NE	1,000	5,000	NE	NE	NE	NE
1D-A07-B	2.0 - 2.5	25-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	< 0.89 J	--	--	--	--	--	--	--	--	--	--	--
1D-A07-B	2.0 - 2.5	25-Sep-01	TTLC	mg/kg	9810	< 22	1.3 J1	238	< 0.88	< 0.88	2210 J	59.6	20.2	29.5	31200	< 0.89 J	6520	231	< 0.88	36	1810 J	< 2.2	< 2.2	611	< 2.2	48.4	32.4
1D-A07-B	2.0 - 2.5	25-Sep-01	TCLP	µg/L	483 J	< 20	< 10	NR	< 4	< 4	NR	3.1 J1	< 2.5	< 10.2	710	< 10	22200	81.2	< 10	15.2 J	3590	< 11.9	< 20	< 4000 J	< 20	2.2 J1	38.6
1D-C03-A	0.0 - 0.5	05-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	606 J	--	--	--	--	--	--	--	--	--	--	--
1D-C03-A	0.0 - 0.5	05-Sep-01	TTLC	mg/kg	12200	16.6	5.7	247	< 0.83	4.2	5340	32.8	11.1	1030	27700	431	4050	926	1.6	27.9	3130	0.61	2	< 410	< 2.1	38.4	1580
1D-C03-A	0.0 - 0.5	05-Sep-01	TCLP	µg/L	582	28.9	< 10	NR	< 4	88	NR	7.3	5.5	2820	160	358	8390	1640	< 10	53	12300	9.8	< 20	< 4000	< 20	< 20	13300
1D-C04-A	0.0 - 0.5	05-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	1550 J	--	--	--	--	--	--	--	--	--	--	--
1D-C04-A	0.0 - 0.5	05-Sep-01	TTLC	mg/kg	12500	20.8	5.2	239	< 0.84	3.6	8160	33.1	9.2	359	25200	909	3470	850	1.3	25.1	2610	0.88	2.9	183	< 2.1	34.9	1540
1D-C04-A	0.0 - 0.5	05-Sep-01	TCLP	µg/L	470	38.2	< 10	NR	< 4	44	NR	11	4.8	1360	194	811	13300	1300	< 10	44.7	12000	8.9	< 20	< 4000	< 20	1.4	10900
1D-C13-B	2.0 - 2.5	24-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	3.6	--	--	--	--	--	--	--	--	--	--	--
1D-C13-B	2.0 - 2.5	24-Sep-01	TTLC	mg/kg	16100	< 23	3.2	232	< 0.93	0.068	9320 J	28.7	14.3	20.7	25700	5.7	8040	481	< 0.93	12	5820 J	< 0.68	< 2.3	< 470	< 2.3	71	71.6
1D-C13-B	2.0 - 2.5	24-Sep-01	TCLP	µg/L	3190 J	< 20	< 4.7	NR	< 4	< 4	NR	107	< 1.6	< 16.5	4600	< 4.4	13100	219	< 1.6	14.3	10700	< 10.3	< 20	< 4000 J	< 20	15.9	59.2
1D-D05-B	2.0 - 2.5	06-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	607	--	--	--	--	--	--	--	--	--	--	--
1D-D05-B	2.0 - 2.5	06-Sep-01	TTLC	mg/kg	9430	34.2	8.1	282	< 0.83	5.9	8040	37.8	12.5	790	43200	856	2750	1320	2.2	41.8	2040	0.95	3	464	< 2.1	37.6	2170
1D-D05-B	2.0 - 2.5	06-Sep-01	TCLP	µg/L	916	56	< 10	NR	< 4	70.9	NR	8.6	5.7	1460	696	977	8930	2660	< 10	61.3	13200	8.9	< 20	< 4000	< 20	2	14800
1D-D06-B (D)	2.0 - 2.5	06-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	621	--	--	--	--	--	--	--	--	--	--	--
1D-D06-B (D)	2.0 - 2.5	06-Sep-01	TTLC	mg/kg	8090	6.3	3.7	110	< 0.81	1.3	4060	20.9	7.7	160	23100	274	2340	368	0.65	17.9	1370	0.51	0.73	< 400	< 2	24.6	481
1D-D06-B (D)	2.0 - 2.5	06-Sep-01	TCLP	µg/L	645	23.5	< 10	NR	< 4	12.8	NR	6.3	5.2	246	384	478	8670	1280	< 10	33.4	8540	< 20	< 20	< 4000	< 20	1.9	3720
1D-F02-B	2.0 - 2.5	27-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	1070	--	--	--	--	--	--	--	--	--	--	--
1D-F02-B	2.0 - 2.5	27-Aug-01	TTLC	mg/kg	6730	3.6	4.6	117	< 0.2	< 1.4	2110	20.8	7.4	140	29900	378	2740	280	< 3.6	30.6	2180 J	1.3	< 1.4	< 410	< 0.51	27.9	473
1D-F02-B	2.0 - 2.5	27-Aug-01	TCLP	µg/L	12600	38	22.1	NR	< 4	< 4	NR	5.6	< 10	141	1110	80.9	162	11.8	7.6	4.6	5230	< 20	< 20	< 4000	< 20	31.4	586
1D-F11-A	0.0 - 0.5	28-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	688 J	--	--	--	--	--	--	--	--	--	--	--
1D-F11-A	0.0 - 0.5	28-Aug-01	TTLC	mg/kg	10500	19.8	5.6	174	< 0.82	2.7	4920	27.5	8.4	1840	25200	294	1900	795	3.4	21.8	1220	1.2	9.8	115	< 2.1	28	887
1D-F11-A	0.0 - 0.5	28-Aug-01	TCLP	µg/L	679	52.4	< 10	NR	< 4	28.2	NR	4	4.7	953	249	1830	10900	950	< 10	52.3	8200	7.6	< 20	< 4000	< 20	1.3	5750
1D-G02-B	2.0 - 2.5	30-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	175	--	--	--	--	--	--	--	--	--	--	--
1D-G02-B	2.0 - 2.5	30-Aug-01	TTLC	mg/kg	4870	< 1.4	2.5	95.9	< 0.87	0.25	1640 J	9.2	5.4	43.1	12800	113	2790	195	< 0.45	6.6	2270 J	< 0.39	< 2.2	< 430	< 2.2	25.6	153
1D-G02-B	2.0 - 2.5	30-Aug-01	TCLP	µg/L	566 J	< 13	< 10	NR	< 4	10.4	NR	2.8	< 2.2	627	560	204	10900	490	< 1.2	22.7	6820	< 8.4	< 20	< 4000 J	< 20	2	13800
1D-G07-A	0.0 - 0.5	29-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	133	--	--	--	--	--	--	--	--	--	--	--
1D-G07-A	0.0 - 0.5	29-Aug-01	TTLC	mg/kg	13500	10.9	4.2	140	< 0.81	2.5	6770	28.7	7.9	283	21900	244	2690	697	0.81	22.1	1680	< 0.46	1.7	< 410	< 2	30	902
1D-G07-A	0.0 - 0.5	29-Aug-01	TCLP	µg/L	803	32.7	< 10	519	< 4	26.9	NR	4.3	< 2.9	470	285	98	9700	1860	< 10	42.6	14100	< 11.9	< 20	< 4000	< 1.2	2.2	6500
1D-G10-B	2.0 - 2.5	29-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	1.4	--	--	--	--	--	--	--	--	--	--	--
1D-G10-B	2.0 - 2.5	29-Aug-01	TTLC	mg/kg	8430	< 21	1.3	93.9	< 0.85	< 0.85	720	9.1	4.7	7.4	9470	1.5	2370	250	< 0.85	4.9	1420	< 2.1	< 2.1	< 420	< 2.1	22.2	21.1
1D-G10-B	2.0 - 2.5	29-Aug-01	TCLP	µg/L	466	< 20	< 10	201	< 4	< 4	NR	3	< 10	5	273	< 10	10200	205	< 10	14.8	2230	< 9.5	< 20	< 4000	< 2.3	2.5	32.4
1D-G11-A	0.0 - 0.5	29-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	618	--	--	--	--	--	--	--	--	--	--	--
1D-G11-A	0.0 - 0.5	29-Aug-01	TTLC	mg/kg	14000	34	7.7	267	< 1	6.2	8340	47	12.6	1510	50300	815	2640	1210	2.3	33.6	2100	0.72	4.6	876	< 2.6	31.5	2120
1D-G11-A	0.0 - 0.5	29-Aug-01	TCLP	µg/L	663	48.7	< 10	1150	< 4	54	NR	8	8.5	995	124	695	14100	2130	< 10	43.2	21400	< 7.9	< 20	< 4000	< 2.6	1.1	12100

Table 2-2
Site 1D Metals Results in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
TTLC MDL:				mg/kg	0.81 - 1	0.071 - 0.36	0.076 - 0.39	0.039 - 0.2	0.0076 - 0.039	0.012 - 0.062	9.7 - 12	0.0066 - 0.034	0.021 - 0.11	0.082 - 0.41	0.69 - 0.89	0.039 - 1.5	0.97 - 1.2	0.077 - 0.098	0.032 - 0.16	0.028 - 0.14	1 - 1.3	0.087 - 0.44	0.014 - 0.072	29 - 36	0.051 - 0.26	0.014 - 0.072	0.036 - 0.18
TTLC PQL:				mg/kg	20 - 26	5.1 - 26	0.31 - 1.6	1 - 5.2	0.2 - 1	0.2 - 1	41 - 84	0.51 - 2.6	0.51 - 2.6	0.51 - 2.6	12 - 16	0.3 - 6.3	40 - 52	2 - 2.6	0.2 - 1	0.31 - 1.6	81 - 100	0.51 - 2.6	0.51 - 2.6	400 - 520	0.51 - 2.6	0.51 - 2.6	0.51 - 2.6
TCLP MDL:				µg/L	7.8	2.8	3	1.5	0.3	0.46	NR	0.26	0.82	3.2	6.8	1.6	9.6	0.74	1.2	1.1	9.8	3.4	0.56	280	2	0.54	1.4
TCLP PQL:				µg/L	200	20	10	20	4	4	NR	10	10	20	100	10	200	10	10	10	800	20	20	4000	20	20	20
RG (0 to 5 ft):				mg/kg	NA	8.8 [a]	4.3 [b]	NA	NA	NA	NA	33 [b]	NA	26 [a]	26459 [a]	29 [a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	111 [a]
RCRA Hazardous Waste TTLC Limit [c]:				mg/kg	NE	500	500	10,000	75	100	NE	500 [e]	8,000	2,500	NE	1,000	NE	NE	3,500	2,000	NE	100	500	NE	700	2,400	5,000
RCRA Hazardous Waste TCLP Limit [d]:				µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	NE	NE	NE	1,000	5,000	NE	NE	NE	NE
1D-H08-C	5.0 - 6.0	29-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	18.4	--	--	--	--	--	--	--	--	--	--	--
1D-H08-C	5.0 - 6.0	29-Aug-01	TTLC	mg/kg	2870	< 21	0.6	41.5	< 0.83	< 0.83	617 J	5.5	2.3	3.6	4740	1.2	1040	87.7	< 0.3	4	672 J	< 2.1	< 2.1	< 410	< 2.1	12.1	12.2
1D-H08-C	5.0 - 6.0	29-Aug-01	TCLP	µg/L	868 J	< 20	< 10	NR	< 4	< 4	NR	4.3	< 3.8	< 10.5	629	< 1.8	3180	327	< 1.3	25.9	2750	< 11.1	< 20	< 4000 J	< 20	1.5	90.5
1D-I07-C	4.5 - 9.2	07-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	69.9 J	--	--	--	--	--	--	--	--	--	--	--
1D-I07-C	4.5 - 9.2	07-Sep-01	TTLC	mg/kg	4820	4.1	1.9	70.4	< 0.82	0.7	3430 J	11.7	4.3	94.1	11400	97.9	1720	218	< 0.53	9	1080 J	< 0.49	< 0.2	< 410	< 2	17.8	274
1D-I07-C	4.5 - 9.2	07-Sep-01	TCLP	µg/L	1220 J	< 17.1	< 10	NR	< 4	15.2	NR	6	< 2.2	594	1200	113	7020	1010	< 10	41.6	7830	< 14.5	< 20	< 4000 J	< 20	3.1	2650
1D-I08-B	2.0 - 2.5	04-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	611	--	--	--	--	--	--	--	--	--	--	--
1D-I08-B	2.0 - 2.5	04-Sep-01	TTLC	mg/kg	6450	9.5	3	102	< 0.82	2.2	2410	14.2	4.9	197	16900	197	1490	335	0.92	12	1000	< 2.1	1	121	< 2.1	16	770
1D-I08-B	2.0 - 2.5	04-Sep-01	TCLP	µg/L	1750	39.1	< 10	NR	< 4	25.6	NR	6.9	7.2	3070	1250	1580	6750	804	< 10	37.2	5090	2.9	< 20	< 4000	< 20	3.4	6990
1D-J05-C	4.0 - 4.5	31-Aug-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	1100	--	--	--	--	--	--	--	--	--	--	--
1D-J05-C	4.0 - 4.5	31-Aug-01	TTLC	mg/kg	12000	12.9 J	8.6	244	< 0.84	3.8	7760 J	32.4 J	14	850 J	48000 J	741 J	2260	765	< 1.5 J	31.9 J	1680 J	< 0.87	1.4	614	< 2.1	27.3	1350
1D-J05-C	4.0 - 4.5	31-Aug-01	TCLP	µg/L	1890 J	36	< 10	NR	< 4	31.8	NR	8.7	6.9	1360	2180	1880	6910	1270	< 10	52.6	9730	< 13.2	< 20	< 4000 J	< 20	3.5	8120
1D-L06-C	4.0 - 4.5	05-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	4.9 J	--	--	--	--	--	--	--	--	--	--	--
1D-L06-C	4.0 - 4.5	05-Sep-01	TTLC	mg/kg	8800	< 23	1.6	75.1	< 0.91	< 0.91	670 J	11.1	6.8	8.2	14200	2.9	3450	183	< 0.91	4.8	2730 J	< 2.3	< 2.3	< 460	< 2.3	33.9	34.8
1D-L06-C	4.0 - 4.5	05-Sep-01	TCLP	µg/L	2560 J	< 20	< 10	NR	< 4	< 4	NR	6	< 5.7	< 15.7	2880	< 4.2	6350	537	< 2.1	11.3	3620	< 12.3	< 20	< 4000 J	< 20	8.6	93.8

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
RG = Remediation Goal
TTLC Extraction Concentration above RG shown in BOLD
a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)
b) RG based on Background calculated for Human Health Risk Evaluation (SWDIV, 1996b)

-- = not analyzed for this compound
NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
TCLP analysis

c) Any waste is a hazardous waste if it contains a metal listed above at: 1) a total concentration that exceeds its Total Threshold Limit Concentration (TTLC) value; 2) a concentration, after a Waste Extraction Test (WET), that exceeds its Soluble Threshold Limit Concentration (STLC) value.
d) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), the extract from a representative sample of the waste contains any of the contaminants at concentrations equal to or greater than the respective value given in this table.
e) The TTLC value listed for chromium is the chromium IV value to be conservative; The chromium III (or compounds) TTLC value is 2,500 mg/kg

Table 2-3
Site 1D Metals Compared to Remediation Goals in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Antimony	Arsenic	Chromium	Copper	Iron	Lead	Zinc
		MDL:	mg/kg	0.071-0.36	0.076-0.39	0.0066-0.034	0.082-0.41	0.69-0.89	0.039-1.5	0.036-0.18
		PQL:	mg/kg	5.1-26	0.31-1.6	0.51-2.6	0.51-2.6	12-16	0.3-6.3	0.51-2.6
		RG (0 to 5 ft):	mg/kg	8.8 [a]	4.3 [b]	33 [b]	26 [a]	26459 [a]	29 [a]	111 [a]
1D-A07-B	2.0 - 2.5	25-Sep-01	mg/kg	--	--	--	--	--	< 0.89 J	--
1D-A07-B	2.0 - 2.5	25-Sep-01	mg/kg	< 22	1.3 J1	59.6	29.5	31200	2.2	32.4
1D-C03-A	0.0 - 0.5	05-Sep-01	mg/kg	--	--	--	--	--	606 J	--
1D-C03-A	0.0 - 0.5	05-Sep-01	mg/kg	16.6	5.7	32.8	1030	27700	431	1580
1D-C04-A	0.0 - 0.5	05-Sep-01	mg/kg	--	--	--	--	--	1550 J	--
1D-C04-A	0.0 - 0.5	05-Sep-01	mg/kg	20.8	5.2	33.1	359	25200	909	1540
1D-C13-B	2.0 - 2.5	24-Sep-01	mg/kg	--	--	--	--	--	3.6	--
1D-C13-B	2.0 - 2.5	24-Sep-01	mg/kg	< 23	3.2	28.7	20.7	25700	5.7	71.6
1D-D05-B	2.0 - 2.5	06-Sep-01	mg/kg	--	--	--	--	--	607	--
1D-D05-B	2.0 - 2.5	06-Sep-01	mg/kg	34.2	8.1	37.8	790	43200	856	2170
1D-D06-B (D	2.0 - 2.5	06-Sep-01	mg/kg	--	--	--	--	--	621	--
1D-D06-B (D	2.0 - 2.5	06-Sep-01	mg/kg	6.3	3.7	20.9	160	23100	274	481
1D-F02-B	2.0 - 2.5	27-Aug-01	mg/kg	--	--	--	--	--	1070	--
1D-F02-B	2.0 - 2.5	27-Aug-01	mg/kg	3.6	4.6	20.8	140	29900	378	473
1D-F11-A	0.0 - 0.5	28-Aug-01	mg/kg	--	--	--	--	--	688 J	--
1D-F11-A	0.0 - 0.5	28-Aug-01	mg/kg	19.8	5.6	27.5	1840	25200	294	887
1D-G02-B	2.0 - 2.5	30-Aug-01	mg/kg	--	--	--	--	--	175	--
1D-G02-B	2.0 - 2.5	30-Aug-01	mg/kg	< 1.4	2.5	9.2	43.1	12800	113	153
1D-G07-A	0.0 - 0.5	29-Aug-01	mg/kg	--	--	--	--	--	133	--
1D-G07-A	0.0 - 0.5	29-Aug-01	mg/kg	10.9	4.2	28.7	283	21900	244	902
1D-G10-B	2.0 - 2.5	29-Aug-01	mg/kg	--	--	--	--	--	1.4	--
1D-G10-B	2.0 - 2.5	29-Aug-01	mg/kg	< 21	1.3	9.1	7.4	9470	1.5	21.1
1D-G11-A	0.0 - 0.5	29-Aug-01	mg/kg	--	--	--	--	--	618	--
1D-G11-A	0.0 - 0.5	29-Aug-01	mg/kg	34	7.7	47	1510	50300	815	2120
1D-H08-C	5.0 - 6.0	29-Aug-01	mg/kg	--	--	--	--	--	18.4	--
1D-H08-C	5.0 - 6.0	29-Aug-01	mg/kg	< 21	0.6	5.5	3.6	4740	1.2	12.2
1D-I07-C	4.5 - 9.2	07-Sep-01	mg/kg	--	--	--	--	--	69.9 J	--
1D-I07-C	4.5 - 9.2	07-Sep-01	mg/kg	4.1	1.9	11.7	94.1	11400	97.9	274
1D-I08-B	2.0 - 2.5	04-Sep-01	mg/kg	--	--	--	--	--	611	--
1D-I08-B	2.0 - 2.5	04-Sep-01	mg/kg	9.5	3	14.2	197	16900	197	770
1D-J05-C	4.0 - 4.5	31-Aug-01	mg/kg	--	--	--	--	--	1100	--
1D-J05-C	4.0 - 4.5	31-Aug-01	mg/kg	12.9 J	8.6	32.4 J	850 J	48000 J	741 J	1350
1D-L06-C	4.0 - 4.5	05-Sep-01	mg/kg	--	--	--	--	--	4.9 J	--
1D-L06-C	4.0 - 4.5	05-Sep-01	mg/kg	< 23	1.6	11.1	8.2	14200	2.9	34.8

mg/kg = milligrams per kilogram
<2 = not detected at indicated value
J = Estimated value
RG = Remediation Goal
94.1 Concentration above RG
(D) = Duplicate Sample
-- = not analyzed for this compound
a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)
b) RG based on Background calculated for Human Health Risk Evaluation (SWDIV 1996b)

MDL = method detection limit range shown where applicable
PQL = practical quantification limit range shown where applicable

Table 2-4
Site 1D SVOCs Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Method	Units	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(g,h,i)perylene	Benzo(k)fluoranthene	Chrysene	Fluoranthene	Pyrene
			MDL:	µg/kg	51-200	42-420	33-230	36-150	40-280	33-160	40-160	54-220
			PQL:	µg/kg	510-2600	510-2600	510-2100	510-2100	510-2100	510-2100	510-2600	510-2100
			Residential Soil PRG:	µg/kg	620	62	620	NA	6,200	62,000	2,300,000	2,300,000
1D-C06-C	4.0 - 4.5	06-Sep-01	SW8270C	µg/kg	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000	< 2000
1D-C08-C	4.0 - 4.5	06-Sep-01	SW8270C	µg/kg	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000
1D-D04-C	4.0 - 6.5	05-Sep-01	SW8270C	µg/kg	400 J1	390 J1	640 J1	< 2100	330 J1	790 J1	260 J1	310 J1
1D-F03-C	4.0 - 4.5	27-Aug-01	SW8270C	µg/kg	< 730	< 730	< 730	< 730	< 730	< 730	< 730	< 730
1D-G03-B	2.0 - 2.5	30-Aug-01	SW8270C	µg/kg	< 520	< 520	< 520	< 520	< 520	< 520	< 520	< 520
1D-G07-B	2.0 - 2.5	29-Aug-01	SW8270C	µg/kg	< 530	< 530	< 530	< 530	< 530	< 530	< 530	< 530
1D-G07-B (D)	2.0 - 2.5	29-Aug-01	SW8270C	µg/kg	< 520	< 520	< 520	< 520	< 520	< 520	< 520	< 520
1D-G09-C	4.0 - 4.5	29-Aug-01	SW8270C	µg/kg	< 520	< 520	< 520	< 520	< 520	< 520	< 520	< 520
1D-G10-C	4.0 - 4.5	29-Aug-01	SW8270C	µg/kg	< 520	< 520	< 520	< 520	< 520	< 520	< 520	< 520
1D-H04-C	4.0 - 4.5	07-Sep-01	SW8270C	µg/kg	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510
1D-H08-C	5.0 - 6.0	29-Aug-01	SW8270C	µg/kg	< 520	< 520	< 520	< 520 J	< 520	< 520	< 520	< 520
1D-I07-C	4.0 - 4.5	07-Sep-01	SW8270C	µg/kg	< 510	< 510	< 510	< 510	< 510	< 510	< 510	< 510
1D-J05-C	4.0 - 4.5	31-Aug-01	SW8270C	µg/kg	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000	< 1000

µg/kg = micrograms per kilogram
PRG = preliminary remediation goal, residential soil
<520 = not detected at indicated value
J1 = Detected concentration is below the practical quantitation limit (PQL) but above the method detection limit (MDL)
(D) = Duplicate Sample

390 J1 Concentration above Residential Soil PRG
MDL = method detection limit range shown where applicable
PQL = practical quantification limit range shown where applicable

Table 2-5
Site 1D Dioxins and Furans Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Method	Units	1,2,3,4,6,7,8,9-OCDD	1,2,3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-HxCDF	1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	2,3,4,6,7,8-HxCDF	2,3,4,7,8-PeCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	2,3,7,8-TCDD Toxicity Equivalents (Including NDs)(1)
			MDL:	pg/g	3.29-3.31	2.49-2.51	1.39-1.41	1.99-2.01	2.69-2.71	1.79-1.81	1.79-1.81	1.49-1.51	1.69-1.71	2.19-2.21	4.78-4.82	1.89-1.91	1.79-1.81	3.19-3.21	1.79-1.81	0.64-0.64	0.77-0.77	NA
			PQL:	pg/g	0.9-6.3	0.8-5.2	0.5-2	0.3-1.1	0.3-1.4	0.3-0.9	0.2-0.6	0.3-0.9	0.2-0.6	0.3-0.9	0.3-0.7	0.3-0.6	0.2-0.5	0.2-0.6	0.2-0.4	0.2-0.4	0.1-0.4	NA
			Residential Soil PRG:	pg/g	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	3.9	NE	NE
1D-C06-C	4.0 - 4.5	06-Sep-01	8290	pg/g	844 J	311 J	289	652	37.9	21.4	404	43.9	145	58	6.9	23.9	81.5	149	150	5.6	309	221.3
1D-C08-C	4.0 - 4.5	06-Sep-01	8290	pg/g	751 J	200 J	291	648	32.8	30	440	57.3	164	84.4	11.1	33.5	100	202	203	7.5	57.1 J	246.0
1D-G03-B	2.0 - 2.5	30-Aug-01	8290	pg/g	277 J	137 J	78.9	144	11.4	5	79.8	9.4	29	14.5	2.1 *	NR	NR	34.0	NR	NR	NR	20.1
1D-G07-B	2.0 - 2.5	29-Aug-01	8290	pg/g	69.7 J	23.5 J	23.5	56.0	3.7	1.1	24.2	8.1	8.8	5.5	0.82	1.4	5.4	8.0	6.9	< 0.2	2.4	11.4
1D-G07-B (D)	2.0 - 2.5	29-Aug-01	8290	pg/g	99 J	29.6 J	31.0	51.0	3.6	2	23.7	10.2	9.5	8.4	2.3	3.1	7	12.2	11.5	1.1	5.1	17.1
1D-G09-C	4.0 - 4.5	29-Aug-01	8290	pg/g	217 J	11.3 J	35.5	19.6	1.8	0.88	11.3	2.4	4.6	2.5	0.51	1	3.3	6.0	5.2	< 0.4	2.3	7.5
1D-I07-C	4.0 - 4.5	07-Sep-01	8290	pg/g	1090 J	115 J	246	197	10.9	8.7	118	16	43.3	24.5	2.4	8.2	25.4	57.3	52.4	1.9 *	15.6	67.8

pg/g = picogram/gram
<2 = not detected at indicated value
ND = "Not Detected"
PRG = preliminary remediation goal, residential soil (USEPA, 2000a)
B = compound detected in the associated laboratory method blank
J = Estimated value reported is below the "reporting limit" and above the estimated detection limit.
(D) = Duplicate Sample
Toxicity equivalents were calculated using toxicity equivalency factors from CalEPA, 1996 and USEPA, 1989 (I-TEFs).
Mean rural background value for 2,3,7,8-TCDD toxicity equivalents is 4.1 pg/g (USEPA, 2000b).
(1) "Not-detected" congeners are included in the calculation of toxicity equivalents assuming they are present at the reporting limit.
* = Estimated Maximum Potential Concentration. EMPC values are calculated for compounds which fall outside the recommended primary/secondary ion ratio.
The EMPC value is calculated using the midpoint of the recommended ion ratio range.
NR = sample failed internal standard recovered, data is not reportable

7.5 Concentration above Residential Soil PRG
NA = Not available
NE = not established
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable

HxCDD = hexachlorodibenzo-p-dioxin
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran

Table 2-6
Site 1D SPLP Metals Results Compared to MCLs and Tap Water PRGs
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
		MDL:	µg/L	3.9	1.4	1.5	0.76	0.15	0.23	NA	0.13	0.41	1.6	3.4	0.78	4.8	0.37	0.61	0.54	4.9	1.7	0.28	140	0.99	0.27	0.7
		PQL:	µg/L	100	10	5	10	2	2	NA	5	5	10	50	5	100	5	5	5	400	10	10	2000	10	10	10
		MCL:	µg/L	200 [a]	6	50	1000	4	5	NE	50	NA	1300 [c]	300 [b]	15 [c]	NE	50 [a]	NE	100	NA	50	100 [a]	NA	2	15 [b]	5000 [a]
		PRG:	µg/L	36000	15	0.045	2600	73	18	NE	110	2200	1400	11000	NE	NE	880	180	730	NA	180	180	NA	2.6	260	11000
1D-A07-B	2.0 - 2.5	25-Sep-01	µg/L	3450 J	< 2.6	< 5	NR	< 2	< 2	NR	19.9	8.3	36.2	7310	11.2	2790	131	< 3.6	19.3 J	793	< 4.6	< 10	13200 J	< 10	31.2	160
1D-C03-A	0.0 - 0.5	05-Sep-01	µg/L	39900	137	16.3	NR	< 2	9.6	NR	93.1	24.4	941	49700	1270	8910	1260	7.2	72.1	6840	4.3 J1	8.5 J1	2440	< 10	102	4620
1D-C04-A	0.0 - 0.5	05-Sep-01	µg/L	11600	122	5.6	NR	< 2	1.7 J1	NR	20.4	5.8	151	13100	417	5160	194	4.2 J1	17.7	3220	< 10	1.8 J1	9880	< 10	28.2	718
1D-C13-B	2.0 - 2.5	24-Sep-01	µg/L	4690 J	< 1.8	< 2.9	NR	< 2	< 2	NR	6.4	< 2.8	14.2	6340	4.7 J1	1850	82.8	< 4.9	6.7 J	1330	< 4	< 10	19500 J	< 10	42.3	69.7
1D-D05-B	2.0 - 2.5	06-Sep-01	µg/L	504	24.6	< 5	NR	< 2	< 2	NR	9.4	< 5	22.3	514	24.9	2340	24.8	4.8 J1	12.3	2260	1.7 J1	< 10	4820	< 10	2 J1	107
1D-D06-B (D)	2.0 - 2.5	06-Sep-01	µg/L	4940	10.9	< 5	NR	< 2	1.3 J1	NR	10.6	3.3 J1	98.1	5470	166	2540	149	3.3 J1	11.2	1510	< 10	< 10	2690	< 10	13.7	467
1D-F02-B	2.0 - 2.5	27-Aµg-01	µg/L	8590	28.9	3.5 J1	NR	< 2	< 1.4	NR	20.3	6.1	186	18300	401	3150	245	< 3.5	18.6	1820	< 10	< 1.4	7670	< 10	25.7	843
1D-F11-A	0.0 - 0.5	28-Aµg-01	µg/L	20200	29.6	< 5	NR	< 2	2.3	NR	28.8	7.7	235	18800	168	5140	290	5.6	18.3	2420	1.7 J1	5.5 J1	3020	< 10	43.4	674
1D-G02-B	2.0 - 2.5	30-Aµg-01	µg/L	285 J	< 4.3	< 5	NR	< 2	< 2	NR	2.1 J1	< 5	32.2	352	85.3	4190	18.6	< 0.91	1.6 J	1950	< 2.8	< 10	6470 J	< 10	4 J1	113
1D-G07-A	0.0 - 0.5	29-Aµg-01	µg/L	135	9.5	< 5	46.5	< 2	0.4 J1	NR	2 J1	< 5	16.3	87.3	2.3 J1	3230	3.7 J1	3.1 J1	< 3.5	2460	< 10	< 10	7460	< 0.47	2.2 J1	22.6
1D-G10-B	2.0 - 2.5	29-Aµg-01	µg/L	83100	< 3.8	20.5	584	< 2	0.58 J1	NR	87.1	27.9	90.7	100000	22.1	15800	1480	0.43 J1	45.1	6120	< 3.7	< 10	9120	< 10	229	130
1D-G11-A	0.0 - 0.5	29-Aµg-01	µg/L	17300	73.1	< 11.2	299	< 2	6.4	NR	46.7	12.1	671	21200	740	5050	668	7.7	31.5	5790	< 10	7.7 J1	8860	< 10	47.5	2290
1D-H08-C	5.0 - 6.0	29-Aµg-01	µg/L	3100 J	< 1.5	< 1.7	NR	< 2	< 2	NR	30.8	4.8 J1	25.1	3220	14.3	1160	186	8.7	19.8 J	564	< 4.3	< 10	11700 J	< 10	15.7	403
1D-I07-C	4.5 - 9.2	07-Sep-01	µg/L	2410 J	< 10.5	< 5	NR	< 2	0.34 J1	NR	7.8	< 1.5	34.2	2250	32.1	3320	48.2	< 3.2	6.5 J	1700	< 3.6	< 10	10700 J	< 10	7.9 J1	167
1D-I08-B	2.0 - 2.5	04-Sep-01	µg/L	10900	15.9	< 5	NR	< 2	2 J1	NR	21.6	5 J1	127	8670	146	2720	176	2 J1	56.1	1280	2 J1	0.99 J1	6480	< 10	19	574
1D-J05-C	4.0 - 4.5	31-Aµg-01	µg/L	588 J	< 9.2	< 5	NR	< 0.19	< 2	NR	6.3	< 0.8	20	644	26	3270	22.4	< 8	3.9 J	2030	< 10	< 0.38	14900 J	< 10	2.3 J1	121
1D-L06-C	4.0 - 4.5	05-Sep-01	µg/L	2680 J	< 10	< 3.8	NR	< 2	0.36 J1	NR	21.7	4.1 J1	22.6	4810	16.9	1360	186	< 3.4	9.2 J	< 642	< 3.7	< 10	12500 J	< 10	29.6	91.4

µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
(D) = Duplicate Sample
PRG = preliminary remediation goal, drinking water (USEPA, 2000)
MCL = Maximum Contaminant Level

113 Concentration above MCL
NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit
PQL = practical quantification limit

a Secondary California Maximum Contaminant Level for drinking water (Title 22 CCR)
b Action Level (AL) = health-based advisory levels established by the California Department of Health Services (DHS) for chemicals in drinking water for which primary MCLs have not been adopted.
c Lead and copper are not regulated by MCLs, but in a Treatment Technique for water pipeline systems

Table 2-7
Site 1D Summary of Human Health Screening-Level Evaluation
OU 4 Supplemental FS, MCB Camp Pendleton, California

Exposure Scenario	Total Cancer Risk	Total Hazard Index
Hypothetical Residential Receptor (0 - 10 ft bgs)		
Antimony[a]	-	1.2
Arsenic[a]	2×10^{-5}	0.3
Chromium[a b]	2×10^{-4}	0.1
Lead[a]	-	8.5[c]
Other Detected Chemicals[a]	9×10^{-6}	1.6
Subtotal (metals)[a]	**2×10^{-4} (2×10^{-5})[c]**	**11.6[a] (3.1)[d]**
2,3,7,8-TCDD[e]	6×10^{-5}	-
Total (All COPCs)	**3×10^{-4} (8×10^{-5})[c]**	**11.6[a] (3.1)[d]**

[a] Source: SWDIV, 1997 (Draft Final RI Report for Group D Sites)

[b] The cancer risk estimate for chromium assumed that all detected chromium is hexavalent and is based on toxicity data that has been withdrawn by California. The actual cancer risk from chromium is likely less than 1×10^{-6}.

[c] The risk values shown in parentheses excludes beryllium and chromium (see text)

[d] A non-cancer hazard was calculated for lead and was incorrectly assumed to be additive to the hazard quotients for the other COPCs. The value shown in parentheses is the hazard index without lead.

[e] Source: Appendix I1 (see Tables I1-1 and I1-2)

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1 No Action	Alternative 1D-2 Institutional Controls	Alternative 1D-3 Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 1D-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 1D-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Overall Protection of Human Health and the Environment					
Human Health Protection	Provides no reduction in baseline risks. Existing soil contamination will remain. Not protective of human health.	Existing soil contamination will remain. Eliminates potential exposure by controlling site use. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs. Site would be backfilled with clean imported soil. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it in an off-base licensed disposal facility. Site would be backfilled with clean imported soil. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it at the on-Base CAMU facility. Site would be backfilled with clean imported soil. Protective of human health.
Environmental Protection	Soil contamination poses a risk to local habitats and potential ecological receptors. Existing soil contamination could pose a threat to groundwater. Site is located in the floodplain and the cover could wash out if the area was flooded. Not protective of the environment.	Soil contamination poses a risk to local habitats and potential ecological receptors. Existing soil contamination could pose a threat to groundwater. Site is located in the floodplain and the cover could wash out if the area was flooded. Not protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.
Compliance with ARARs					
Chemical-Specific ARARs	Does not comply with risk-based residential PRG or ecological risk ARARs.	Complies with risk-based residential PRG ARARs through use restrictions, but does not comply with ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1 No Action	Alternative 1D-2 Institutional Controls	Alternative 1D-3 Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 1D-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 1D-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Compliance with ARARs (continued)					
Location-Specific ARARs	Does not comply with location-specific ARARs of the Endangered Species Act and the Migratory Birds Act.	Does not comply with location-specific ARARs of the Endangered Species Act and the Migratory Birds Act.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.
Action-Specific ARARs	Does not comply with RCRA closure with no post-closure requirements (i.e., clean closure).	Does not comply with RCRA closure with no post-closure requirements (i.e., clean closure).	On-site construction would meet APCD emission ARARs. Recycled products would be required to meet applicable LDRs before reuse. Complies with RCRA closure with no post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.
Long-Term Effectiveness and Permanence					
Effectiveness to reduce risk	Existing risk will remain because the contamination will not be removed. Would not provide long-term effectiveness and permanence.	Would reduce risk by eliminating potential exposure to soil contaminants. Provides long-term effectiveness for human health protection as long as institutional controls are enforced. Provides minimal long-term effectiveness for ecological risk protection due to flooding potential.	Would reduce risk by excavating and removing all contaminated soil above action levels. Would result in acceptable levels of residual soil contamination from both a human and ecological perspective. Provides long-term effectiveness and permanence.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1	Alternative 1D-2	Alternative 1D-3	Alternative 1D-4	Alternative 1D-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Long-Term Effectiveness and Permanence (continued)					
Adequacy and Reliability of Controls	Provides no reliable or adequate controls for remaining contamination.	Institutional actions would adequately and reliably reduce human health exposure pathways and risks. However, site is subject to flooding and existing cover could wash out. Therefore, not protective of ecological receptors.	Excavation and off-site disposition/ recycling of treated excavated soil would adequately, reliably and permanently reduce human health exposure pathways and risks.	Excavation and off-base disposal will adequately, reliably, and permanently reduce human health exposure pathways and risks.	Excavation and on-base disposal at CAMU facility will adequately, reliably, and permanently reduce human health exposure pathways and risks.
Need for 5-Year Review	No review will be conducted.	A five-year review will be conducted.	No review will be conducted.	No review will be conducted.	No review will be conducted.
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Treatment Process Used	None.	None.	On-Base chemical S/S via asphalt mixing and incorporation.	On-Base chemical fixation/ solidification (TTU).	On-Base chemical fixation/ solidification (TTU).
Amount Destroyed or Treated	None.	None.	Approximately 29,000 cubic yards of (in-place) contaminated soil.	Approximately 29,000 cubic yards of (in-place) contaminated soil.	Approximately 29,000 cubic yards of (in-place) contaminated soil.
Reduction of Toxicity, Mobility, or Volume	None.	None.	Demonstrated reduction in mobility and toxicity at wide range of sites based on routine leachability tests. Increase in volume through stabilization.	Reduction of mobility but increase in volume through stabilization.	Reduction of mobility but increase in volume through stabilization.
Irreversible Treatment	None.	None.	Demonstrated long-term irreversibility of process.	Long-term irreversibility of stabilization is not well documented.	Long-term irreversibility of stabilization is not well documented.

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1 No Action	Alternative 1D-2 Institutional Controls	Alternative 1D-3 Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 1D-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 1D-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Reduction of Toxicity, Mobility, or Volume Through Treatment (continued)					
Type and Quantity of Residuals Remaining After Treatment	No treatment.	No treatment.	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).	Contaminant concentrations remaining in the soil would be at or below acceptable levels (i.e., remedial goals).	Contaminant concen-trations remaining in the soil would be at or below acceptable levels (i.e., remedial goals).
Statutory Preference for Treatment	Does not satisfy the statutory preference for treatment.	Does not satisfy the statutory preference for treatment.	Satisfies the statutory preference for treatment.	Partially satisfied because the soil will be treated on base before disposal.	Partially satisfied because the soil will be treated on base before disposal.
Short-Term Effectiveness					
Community Protection	Risk to community will remain the same as the baseline risk. Baseline human health risk (3×10^{-5}) is within USEPA's acceptable range; Arsenic primary contributor to cancer risk.	No risk to community from planned institutional actions.	Temporary increase in potential risks due to dust emissions from soil excavation, handling, moving, stockpiling, and treatment at on-Base location.	Temporary increase in potential risks due to dust emissions from soil, excavation, handling, treatment, transportation, and treatment at off-Base facility.	Temporary increase in potential risks due to dust emissions from soil, excavation, treatment, handling, hauling, and disposal at on-Base CAMU facility.
Worker Protection	Not applicable because no remedial action will be implemented.	Limited protection would be required during site erosion control maintenance activities.	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation and treatment (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation and off-site disposal (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation and on-site disposal (use of PPE and dust suppressants).

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

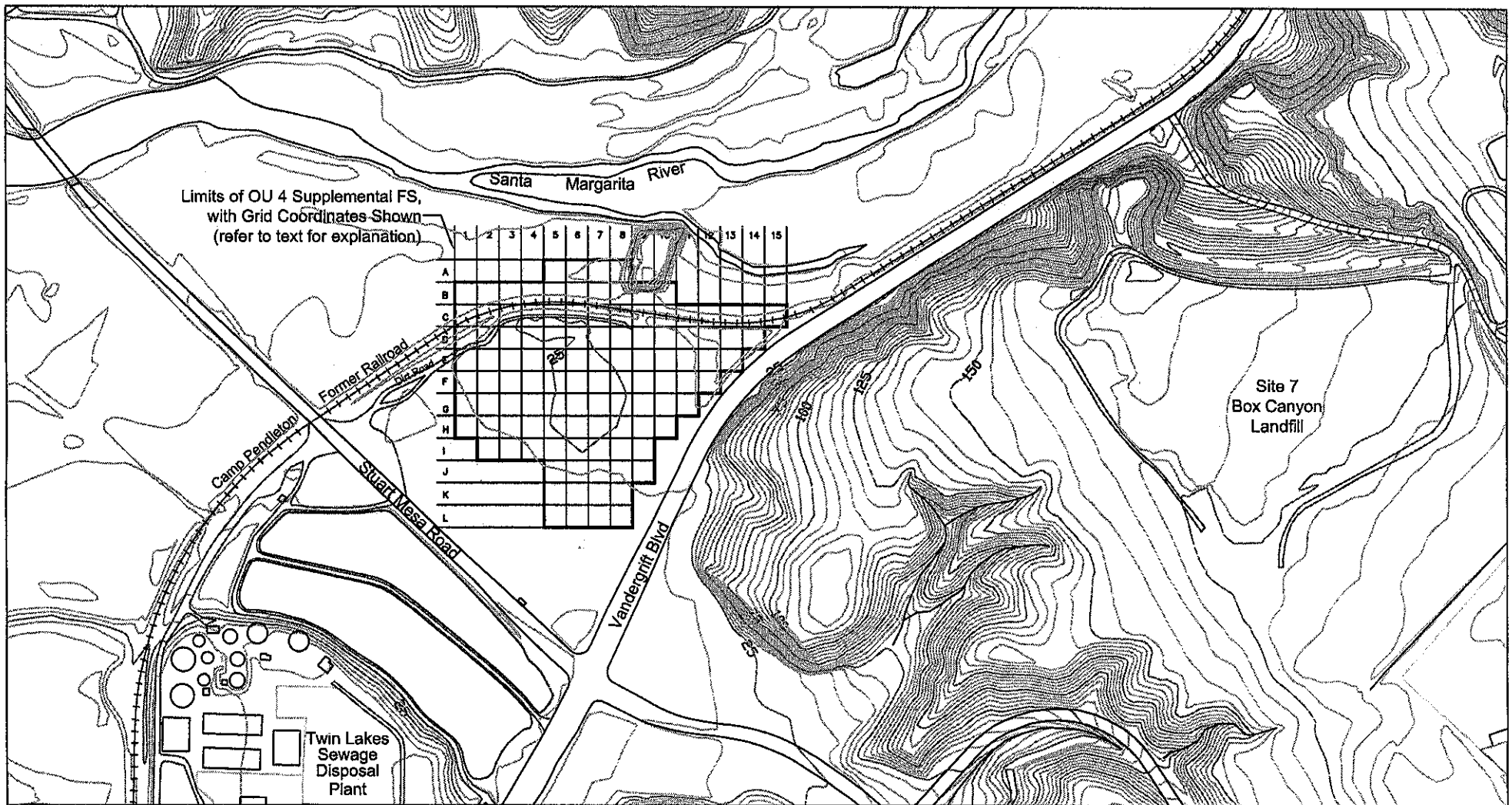
NCP Criterion	Alternative 1D-1 No Action	Alternative 1D-2 Institutional Controls	Alternative 1D-3 Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 1D-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 1D-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Short Term Effectiveness (continued)					
Environmental Impacts	Risk to local habitats and potential ecological receptors from existing conditions will remain.	No adverse environmental impact from institutional actions. Risk to local habitats and potential ecological receptors from existing conditions will remain.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.
Time Until Action Is Completed	Not applicable.	Continued site maintenance.	< 2 years (inclusive of permitting).	26 weeks.	25 weeks
Implementability					
Ability to Construct and Operate	No construction or operation is involved.	Land use restrictions and site maintenance are readily implementable.	Excavation, pretreatment and ex-situ stabilization of contaminated soil use standard and readily available labor skills, equipment, and materials.	Excavation, stabilization, and disposal are readily implementable.	Excavation, stabilization, and disposal are readily implementable.
Ease of Doing More Action if Needed	Because no action is involved, there will be no interference with future actions.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can be easily implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1 No Action	Alternative 1D-2 Institutional Controls	Alternative 1D-3 Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 1D-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 1D-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Implementability (continued)					
Ability to Monitor Effectiveness	Not applicable because no remedial action will be implemented.	Site will be periodically monitored for erosion control. Base Master Plan restrictions for land use will be enforced.	Effectiveness will be monitored through confirmation sampling and analysis during excavation, and through routine leachability testing during treatment.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approval is necessary.	No approval is necessary.	Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors. Would require monitoring for archeological artifacts during excavation activities. May have to be permitted as a TTU under permit-by-rule, which would govern the recycling/asphalt incorporation process. Storage of untreated soil (designated as RCRA-hazardous waste) awaiting stabilization, could require a hazardous waste storage permit.	Manifests will be required for transportation of wastes. Off-base facility has existing permits for treatment and disposal. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors and monitoring for archeological artifacts during excavation activities.	No manifests will be required for on-Base hauling of wastes. On-Base CAMU facility will have required permits for disposal of contaminated soil. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors and monitoring for archeological artifacts during excavation activities.
Availability of Services and Capacities	Not applicable.	Services are available for the proposed institutional actions.	Services are commercially available for the excavation/earthwork and on-Base soil solidification/stabilization process.	Services are commercially available for the excavation/earthwork and off-Base disposal.	Services are commercially available for the excavation/earthwork and on-Base disposal.

Table 2-8
Site 1D Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1D-1	Alternative 1D-2	Alternative 1D-3	Alternative 1D-4	Alternative 1D-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Implementability (continued)					
Availability of Equipment, Specialists, and Materials	Not applicable.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.
Availability of Technologies	Not applicable.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.
Cost					
Overall Cost	$0	$354,600	$9,064,600	$10,308,200	$6,667,400 - $7,943,100



Legend

Site 1D OU 4 Supplemental FS Characterization Unit Grid

N

0 500 1000

Scale in Feet

Figure 2-1

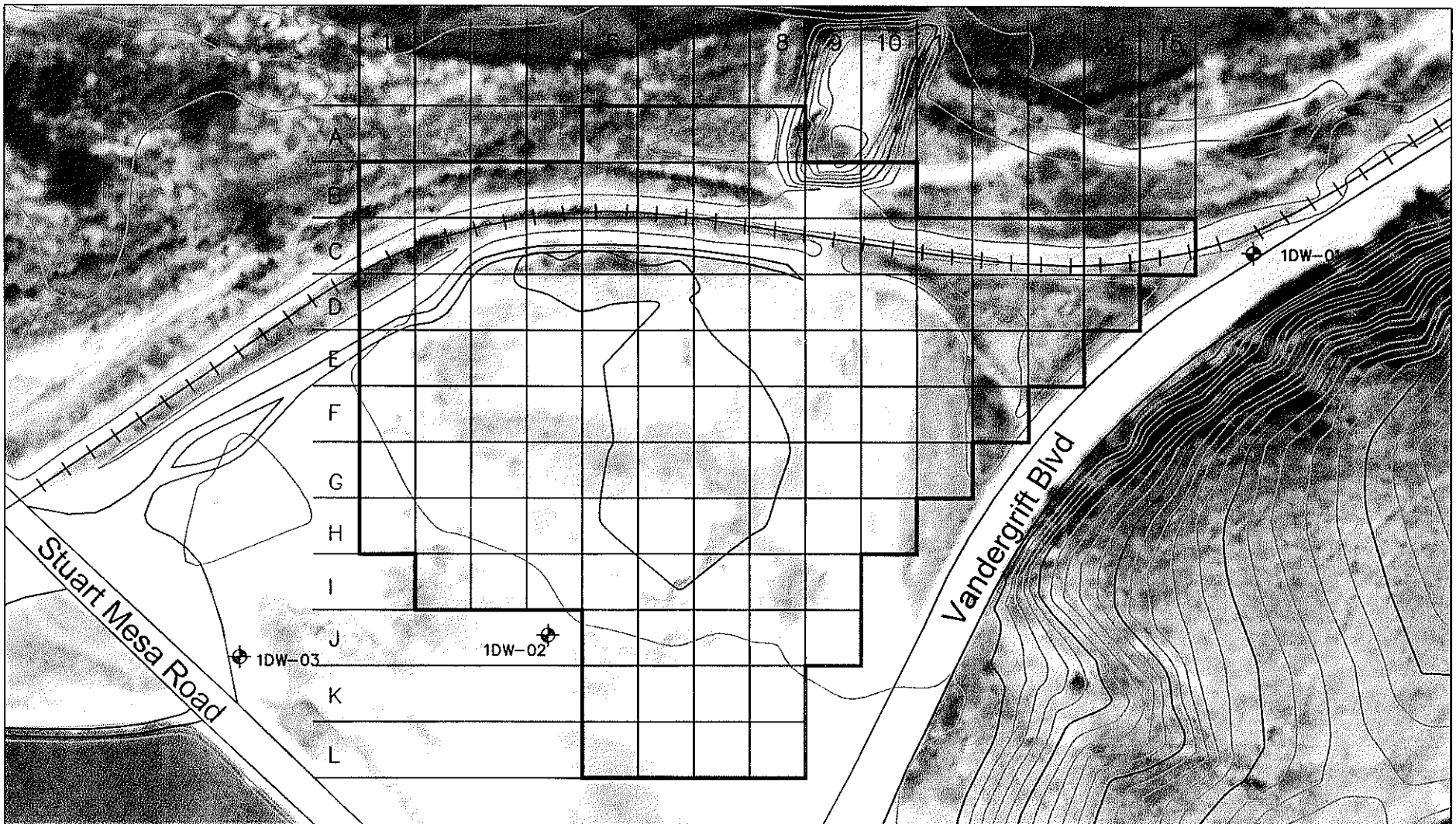
Site 1D Location Map

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\camppendleton\OU4FS\Field\2-i_S1D.dwg



Legend

Site 1D OU 4 Supplemental FS Characterization Unit Grid

Groundwater Monitoring Well

N

0 200 400

Scale in Feet

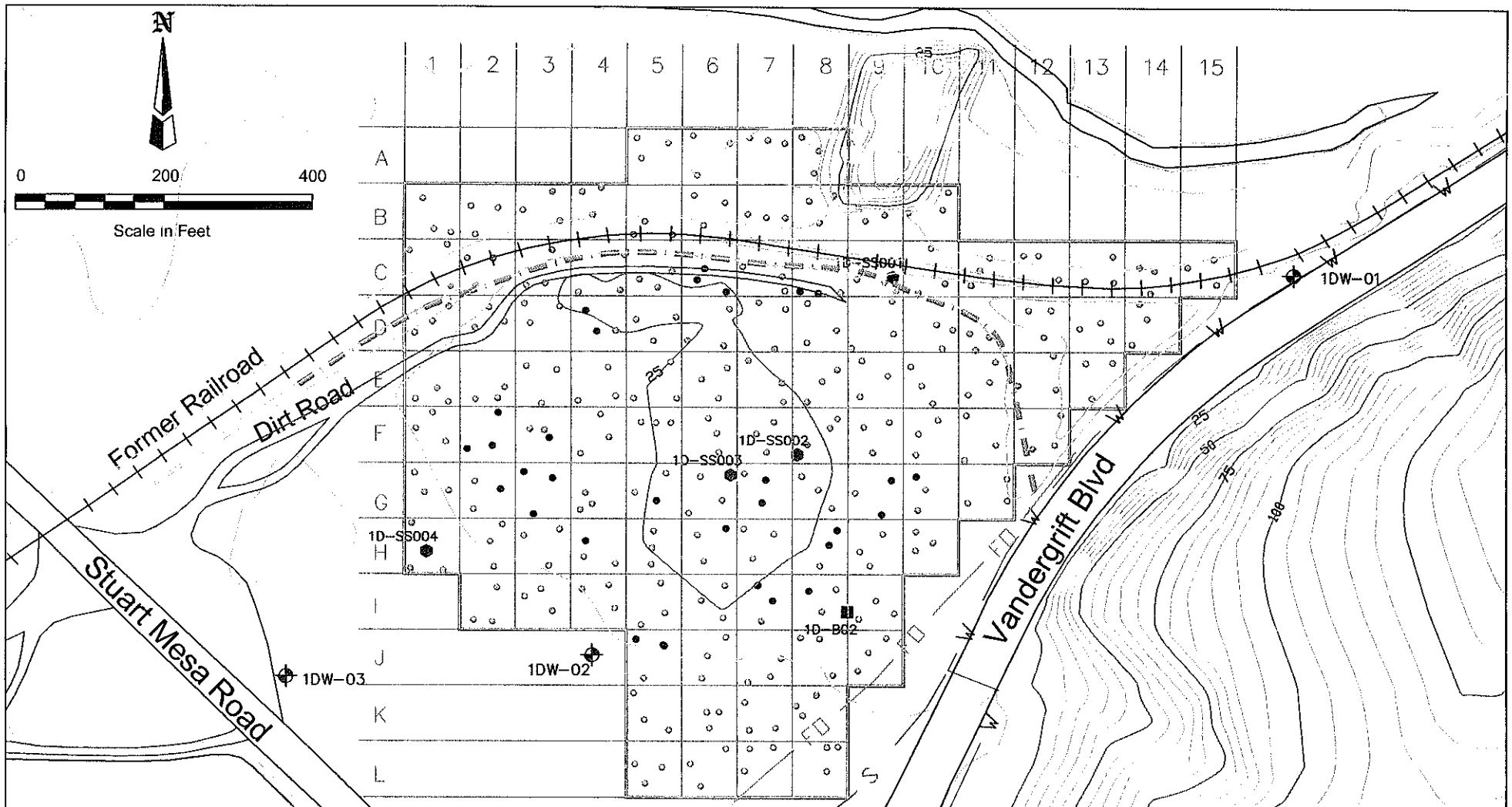
Figure 2-2

Site 1D
1970 Aerial Photograph with OU 4 Supplemental FS Grid

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA



Legend

- Approximate Location of Toad Fence
- Approximate Location of Water Line
- Approximate Location of Sewer
- Approximate Location of Fiber Optics
- Groundwater Monitoring Well (SWDIV, 1996b)
- Surface Sample Location (SWDIV, 1996b)
- Soil Boring Location (SWDIV, 1996b)
- Boring, No Ash Encountered
- Boring, Ash Encountered (2-3 ft bgs)
- Boring, Ash Encountered (4 ft bgs or deeper)

Figure 2-3

Site 1D
Sampling Locations

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

Figure 2-4
Site 1D Lead Detected in Soil, from 0 to 1 ft bgs
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A					4 1	5.2	29.6 J	13 5 J							
B	15.4 J	8.4 J	9 3 J	14 6 J	19 1	12.7 J	12 1 J	7 4 J	12 8 J	23 8					
C	6 8	12.6 J	606 J	1550 J	644	936 J	4200 J	408 J	24 J	5 7	9.5	10 1	10 8	21.4	14 4
D	16.9	71.1	541	485	284	159	474	101	8 9	7.8	21.4 J	18 7	11 1	29	
E	20 4 J	10 9 J	31.6 J	15.8 J	19 5 J	19.2	19 7	33.4	7.3	1.8 J	21 9	25 5	18.4		
F	8 8 J	45.7	96.8	9 9	29	60.6 J	18.5 J	11 3 J	63.6 J	2 9 J	688 J	56.9			
G	< 2.4	669	68.3	153	258	345 J	244	55.4	38.4	12 4	815				
H	1 2	7 5	212	259 J	1 8	166	3 4	1 1	4 4	1.9					
I		3 7	3	12 9	13 8	103	247 J	60.5	13 2						
J					193	56.1 J	12	< 1 9	< 2 1						
K					17 8	5.7	< 1.1	< 1 2							
L					4 5 J	4.7 J	2 7 J	3 4							

results shown in milligrams per kilogram (mg/kg)
<2.1 = not detected at indicated value
J = Estimated value
60.6 J Lead detected in soil above RG (29 mg/kg) from 0 to 1 ft bgs

Figure 2-5
Site 1D Lead Detected in Soil, from 1 to 3 ft bgs
OU 4 Supplemental FS, MCB Camp Pendleton, California

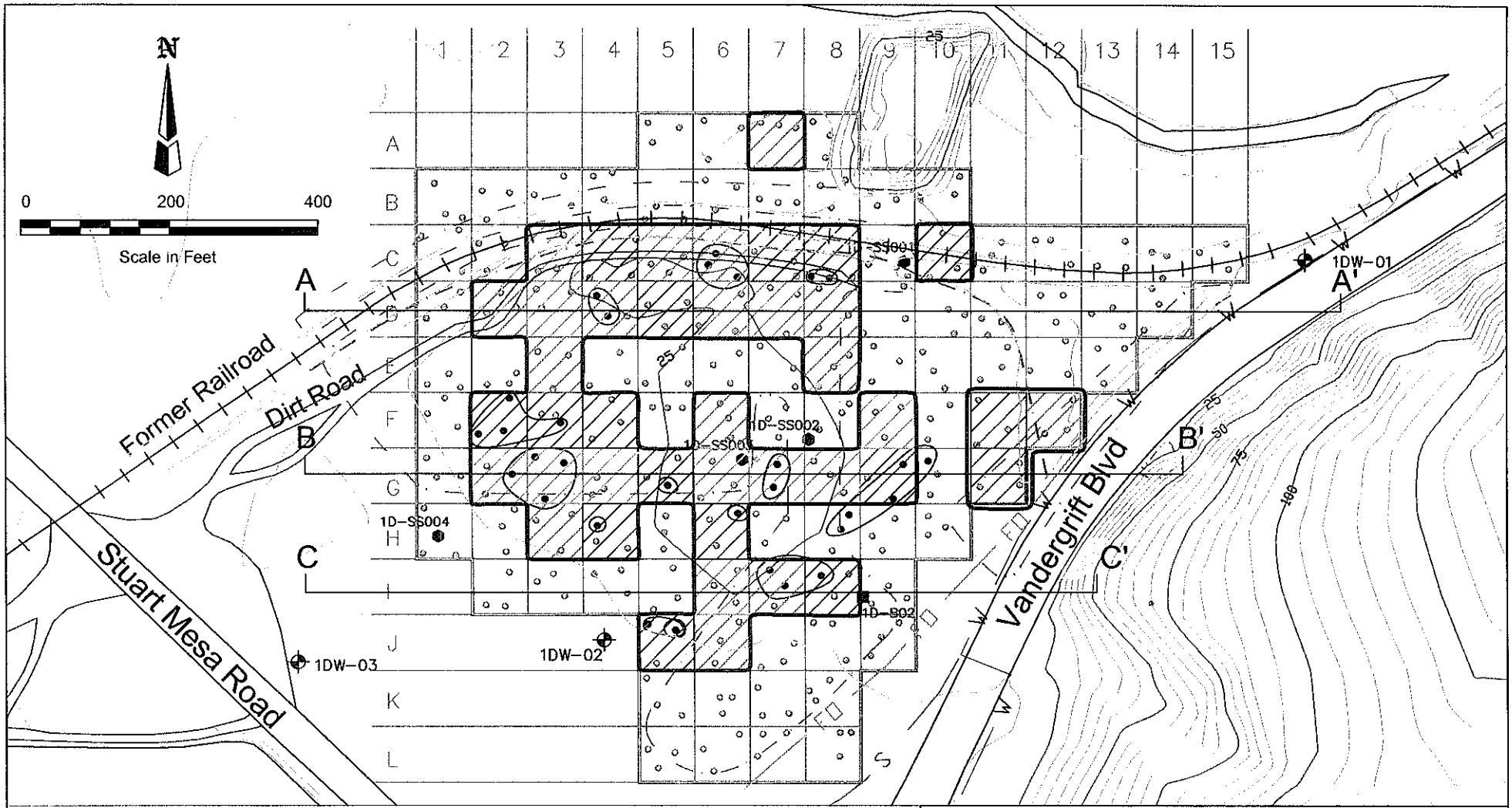
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A					1 7	1 8	2 2	5.5 J							
B	2 J	2 1 J	1 4 J	2.3 J	3 6	2 5 J	4 J	3 1 J	4 7 J	7 4					
C	3.3	1.3 J	375 J	831	983	331 J	1310 J	310 J	7 5 J	1.4	3 9	2 9	5.7	17.4	5.3
D	3.3	7.1	221	942	856	621	155	2 6	9.9	< 0 83	11 3 J	4 4	4.2	3.7	
E	1 9 J	2.4 J	2.8 J	1 9 J	6 J	9	18.6	< 0 75	2.5	<0 47J	4	3 6	4		
F	1 4 J	1070	440	35.2	2 2	< 0.9 J	1.4 J	3 1 J	228 J	1.8 J	155 J	4 2			
G	< 1 5	175	★ 136	47.9	98.6	170 J	★ 294	112	1.6	1.5	418				
H	1 1	0.64	1 4	232 J	1 3	0.87	2 2	2	0.76	14 8					
I		< 1 6	< 0.59	13.5	17 4	50.1	79 1 J	611	< 1 7						
J					382	2 3 J	< 0 67	< 1 7	< 0 84						
K					< 1.1	< 0 86	< 0 89	< 1.2							
L					5 7 J	7 5 J	1 2 J	< 1 5							

results shown in milligrams per kilogram (mg/kg)
<1 7 = not detected at indicated value
J = Estimated value
170 J Lead detected in soil above RG (29 mg/kg) from 1 to 3 ft bgs
★ Indicates cells where sample was analyzed for dioxins/furans; results provided in Table 2-5

Figure 2-6
Site 1D Lead Detected in Soil, from 3 to 5 ft bgs or deeper
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A					1 6	2 3	2.4 J	2 7 J							
B	1.3 J	1.4 J	1.7 J	1 2 J	4 1	2 3 J	4.3 J	1 7 J	5 J	5					
C	2 2	1.3 J	14 1 J	510	2 6	★ 319 J (6-6 5ft)	692 J	★ 316 J	2 J	43.5	2 7	1 8	3 3	3 8	2.2
D	4 3	15.8	7.8	263 (4-6 5ft)	51.7	19 1	1 7	1 3	< 1	3	3.7 J	4 5	4.8	3.2	
E	2.1 J	13.4 J	3.6 J	1 7 J	<0 58J	25 1	8 4	< 0 99 (6-6 5ft)	10	<0.45J	6 J	3 8	3 5		
F	< 1.1 J	116	145	55.3	2	< 1 J	2.7 J	7.8 J (6-6 5ft)	7 1 J	3 4 J	405 J	20			
G	< 1	1 8	14 5	4	190	<0 82J	1 5	16 5	★ 35.4	0 97	742				
H	1.7	0 93	2	175 J	1 9	57.1	1 8	18.4 (5-6ft)	< 0.17	1 9					
I		< 2	< 1 6	7.7	18	3 4	★ 97.9 (4.5-9.2ft)	133	< 2.7						
J					1100	2.1 J	< 0.93	< 1	< 1.1						
K					< 1.1	< 1.1	< 0.93	< 1.5							
L					<0.82J	4.9 J	< 1.1 J	< 1.3							

results shown in milligrams per kilogram (mg/kg)
<2.7 = not detected at indicated value
J = Estimated value
57.1 Lead detected in soil above RG (29 mg/kg) from 3 to 5 ft bgs
97 9 Lead detected in soil above RG (29 mg/kg) deeper than 5 ft bgs, as indicated
★ Indicates cells where sample was analyzed for dioxins/furans; results provided in Table 2-5



Legend

- Boring, No Ash Encountered
- Boring, Ash Encountered (2-3 ft bgs)
- Boring, Ash Encountered (4 ft bgs or deeper)
- Boring where Debris Noted (XRF Borings, May 1999)
- Area, Ash Encountered (2-3 ft bgs)
- Area, Ash Encountered (4 ft bgs or deeper)
- A—A' Cross Section Line
- Characterization Unit, 0-1 ft bgs > RG
- Characterization Unit, 0-3 ft bgs > RG
- Characterization Unit, 0-5 ft bgs > RG
- Characterization Unit, Deeper than 5 ft bgs > RG
- OU 3 FS Boundary (May 1998)
- Approximate Location of Toad Fence
- OU 4 SFS Approximate Extent

Figure 2-7

Site 1D
Distribution of Metals Above RGs and Visible Ash Encountered

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

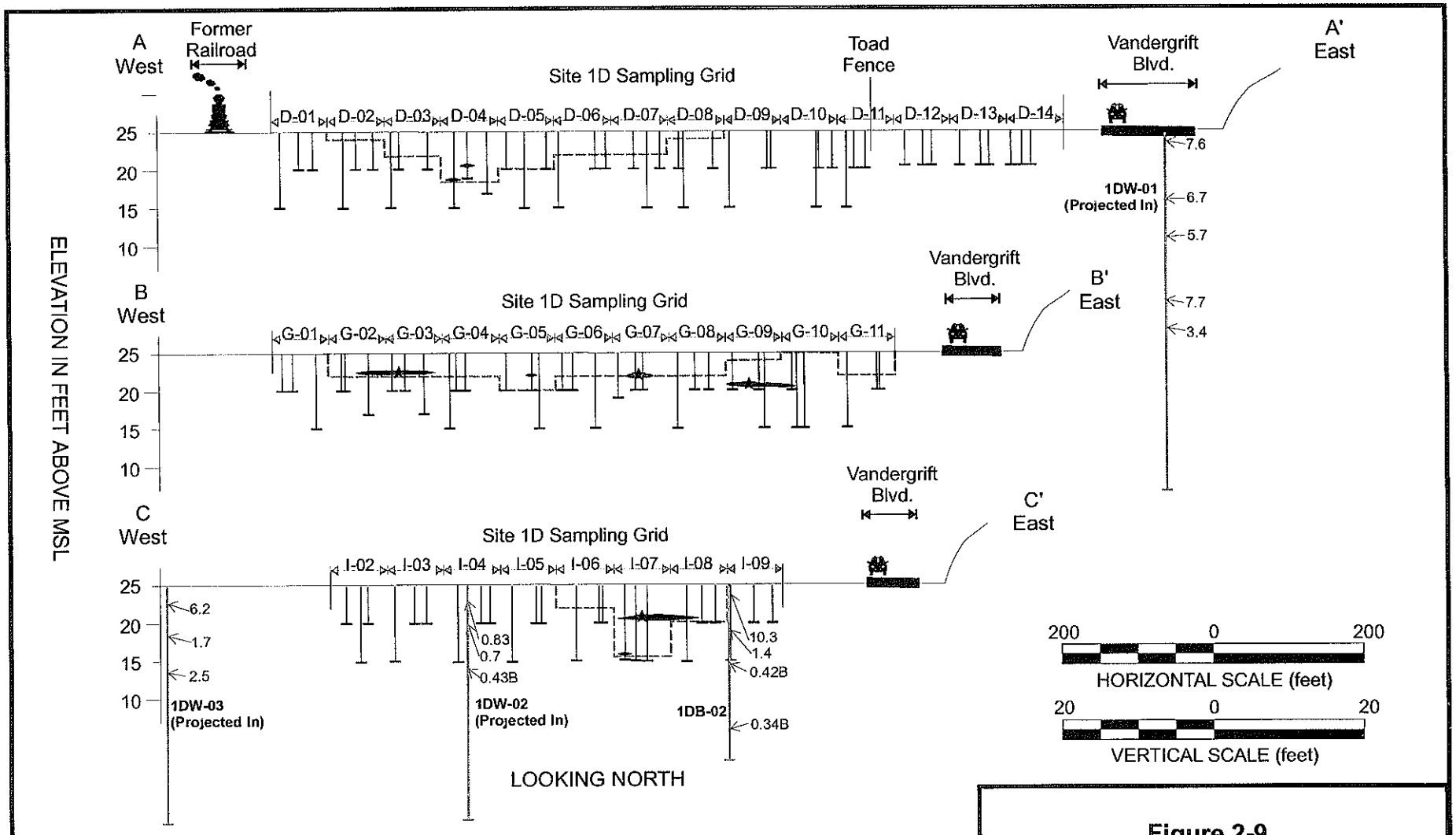
Pasadena, CA

Figure 2-8
Site 1D Distribution of Metals Detected Above RGs By Deepest Depth
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
A							29.6 J								
B															
C			375 J	510	983	319 J (6-6 5ft)	692 J	316 J		43.5					
D		71.1	221	263 (4-6 5ft)	51.7	621	155	101							
E			31.6 J					33.4							
F		116	145	55.3		60.6 J			228 J		405 J	56.9			
G		175	136	47.9	190	170 J	294	112	35.4		742				
H			212	175 J		57.1									
I						50.1	97.9 (4.5-9 2ft)	133							
J					1100	56.1 J									
K															
L															

results shown in milligrams per kilogram (mg/kg)
J = Estimated value
Lead Concentractions Above RG Shown for Deepest Depth
60.6 J Lead detected in soil above RG from 0 to 1 ft bgs
170 J Lead detected in soil above RG from 1 to 3 ft bgs
57.1 Lead detected in soil above RG from 3 to 5 ft bgs
97 9 Lead detected in soil above RG deeper than 5 ft bgs as indicated
Approximate Volume of Soil > Lead RG of 29 mg/kg
CU = 75 x 75 ft Area Extent = 230 625 sq ft = 5 3 acres

Excavation Depth	# of CUs	Volume
0 to 1 ft bgs	9	1,875
1 to 3 ft bgs	13	8,125
3 to 5 ft bgs	16	16 667
Other	3	4,625
	Total:	**31,292 cu yd**



LEGEND

Approximate Bottom of Impacted Soil (Based on Analytical Data)

Ash/Waste Material Encountered in Boring

Dioxins/Furans Detected in Soil Sample

RI Boring Location (SWDIV, 1996b) with Lead Concentrations Shown in mg/kg at Indicated Depth

Figure 2-9

Site 1D
Generalized Cross Sections

OU 4 Supplemental FS
MCB Camp Pendleton, CA

PARSONS
Pasadena, CA

K:\DEPTS\DEPT48\CAMPPENDLETONRIFS\740012\FIELD\OU4FS Report\DraftFinal\Figures\Fig2-9.cdr

Figure 2-10
Site 1D Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 1 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
No Action	None	None	No action is taken.	Required for consideration by NCP.
Institutional Action	Access Restrictions	Use Restrictions / Fencing	Administrative / physical measures are taken to limit site access and use and secure the site.	Potentially applicable. Only partially effective for ecological receptors.
Containment	Capping	Asphalt Cap	Single-layer bituminous asphalt surface cover is placed over site.	Not applicable due to site conditions (i.e., floodplain).
		Concrete Cap	Single-layered concrete cover composed of aggregate and cementitious mixtures is placed over site.	Not applicable due to site conditions (i.e., floodplain).
		Engineered Soil Cover	Single- or multi-layered soil cover designed to required performance standards.	Not applicable due to site conditions (i.e., floodplain).
Removal	Excavation	Mechanical Excavation	Contaminated soil is excavated using heavy equipment.	Potentially applicable.
Disposal	Land Disposal	Backfilling	Treated soil is used as a backfill for the excavated site area.	Potentially applicable.
		On-Base Landfilling	Treated soil is transported to an on-Base landfill.	Potentially applicable.
		Off-Base Landfilling	Contaminated soil is transported to a permitted off-Base disposal facility.	Potentially applicable.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 2-10
Site 1D Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 2 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
In Situ Treatment	Physical / Chemical	Soil Flushing	Flushes contaminants out of soil via injection or infiltration of water or aqueous solution. Groundwater collection and treatment required.	Not readily implementable. Degrades groundwater where it is not currently a concern.
		Solidification / Stabilization	Chemical reagents are mechanically mixed with soil matrix to reduce the toxicity and mobility of metals.	Not effective for site conditions.
		In-Situ Vitrification	Soil waste is heated to the melting point through electrically-charged probes; glassy monolith results.	Difficult to implement and impractical for site contamination.
	Biological	Phytoremediation	Plants are used to extract contaminants from shallow soils.	Not effective for metals and depth of contamination.
Ex-Situ Treatment	Physical / Chemical	Soil Washing	Water-based waste removal process. Water can be augmented with surfactant, leaching agent, or chelating agent.	Not effective for site conditions.
		Acid Extraction	Metals are solubilized and removed from the soil using acidic (i.e., hydrochloric acid) reagents.	Not very effective for metals and difficult to implement.
		Solidification / Stabilization	Chemical reagents are mixed with excavated soils to reduce the toxicity and mobility of metals.	Effective in reducing contaminant mobility. Potentially applicable.
		Vitrification	Excavated soil is heated to the melting point through electrical power to form stable glass and crystalline structure.	Difficult to implement and impractical for site contamination.
	Thermal	Thermal Desorption	Uses heat in a controlled environment to desorb and remove contaminants from the soil.	Not effective for metals.
		Incineration	Contaminated soil is burned in a controlled environment to remove organic contaminants.	Not effective for metals.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 2-11
Site 1D Evaluation of Process Options for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Soil General Response Actions	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
No Action	None	None	Low; contaminants would remain in the soil. Both human and ecological receptors could be exposed. RAOs are not achieved.	High; no action is needed	High; there are no costs.
Institutional Action	Access Restrictions	Use Restrictions / Fencing	Low to moderate; contaminants would remain in the soil. Effective to reduce human exposure but not protective of ecological receptors.	Moderate; readily implementable. DON position is to limit the use of institutional controls to maximize the utilization of military training lands.	High; low capital and O&M costs.
Removal	Excavation	Mechanical Excavation / Backfilling	High; removes contaminated soil and backfills excavation with clean soil. Demonstrated ability to meet RAOs but without treatment; does not reduce contaminant mobility or toxicity.	Moderate to high; readily implementable. Requires agency approval, Base coordination, and H&S planning	Moderate; high capital costs, low O&M costs.
Disposal	Land Disposal	Off-Base Landfilling	High; demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment requirements by off-Base disposal facility.	High; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option.	Moderate; high capital costs, low O&M costs.
		On-Base Landfilling	High; demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment requirements by on-Base disposal facility.	Moderate; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option; dependent on siting, design, and construction of on-Base disposal facility.	Moderate; moderate capital costs, moderate O&M costs.
Ex-Situ Treatment	Physical / Chemical	Solidification / Stabilization	High; permanent treatment effectively reduces contaminant mobility and toxicity. Generally requires treatability studies to optimize effectiveness and meet RAOs.	Moderate; implementability has been demonstrated at similar military installations; will require pilot testing and additional regulatory coordination.	Moderate; moderate capital costs, low O&M costs.

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Evaluation.vsd

3.0 SITE 1E-1

Site 1E-1 is a former refuse burning area located in 32 Area along MACS Road, approximately 3,000 feet from the Santa Margarita River (Figure 3-1). The site is a previously undiscovered series of burn pits adjacent to Site 1E, which was addressed through soil excavation and removal, as described in the OU 3 ROD (IT, 1999a). Following the Site 1E cleanup, five burn pits were identified southeast of the Site 1E excavation area based on information from an aerial photograph taken in 1970. No previous sampling had been conducted in the former waste pits. This information was presented to the FFA Team members at several FFA meetings during 2000, and it was agreed to treat this newly discovered area as a separate site. The new site was designated Site 1E-1 and was formally agreed to be incorporated into OU 4 at the 10 October 2000 FFA meeting.

The selected remedy for Site 1E in the OU 3 ROD was excavation, on-Base disposal, and remedial backfill. The site was excavated in 1999 (August through November) to the planned excavation depth (estimated at 4,000 cubic yards) and confirmation samples were collected. Based on the results of the initial confirmation samples, the decision was made to expand the excavation to achieve clean closure; approximately 59,085 cubic yards were removed. Background information and site conditions are detailed in the following sections.

3.1 Background Information

Because Site 1E-1 is related to Site 1E, previously collected background information and data for Site 1E are pertinent to the evaluation of Site 1E-1. Although this FS provides a summary of information on Site 1E conditions, it does not repeat all the information provided in previous documents on Site 1E regarding detailed site descriptions, histories, regional and site-specific environmental information, or results of previous investigations and risk assessments. This information is documented in the following reports:

- Draft Final Remedial Investigation and Feasibility Study for Operable Unit 3 (IT, 1998).
- Draft Engineering Evaluation/Cost Analysis (EE/CA) For Sites 1D/1003, 1E/1004, 30, and 35 (Kleinfelder, 1997).
- Energy Dispersive X-Ray Fluorescence Field Investigation Report, Sites 1A, 1D, 1E, 1F, and 2A (SWDIV, 1998a).
- Record of Decision, Operable Unit 3 (IT, 1999a).
- Draft Final Remedial Design and Remedial Action Work Plan for Operable Unit 3, Sites 1A, 2A, 1D, 1E, and 1F (OHM, 1999).
- Biological Assessments for Sites 1A, 1D, 1E, 1F, 2A, and 30 (IT, 1999b).
- [Archeological] Monitoring and Discovery Plan for Six Waste Remediation Areas (LSA, 2000).
- Phase I Interim Confirmation Report, Site 1E Remedial Action (IT, 2000).

3.1.1 Site Description and History

Site 1E was investigated as one of the nine refuse burning grounds used throughout the Base from 1942 through the early 1970s. In accordance with common Base practice at the time, burning grounds served as the principal trash disposal areas on the Base prior to the 1970s. Until 1970, all refuse at the Base was subject to burning; however, no information is available on

the specific years of operation or the amount of refuse disposed of at each burning ground. Although there are no confirmed reports of hazardous waste being disposed of at this site, the burning grounds were the primary on-Base disposal areas and may have received some hazardous wastes (SWDIV, 1996b).

In the 1970 aerial photograph, it appears that Site 1E-1 consisted of the actual burn pits (Figure 3-2). Waste material from the burn pits was then disposed of in Site 1E by physically removing the material from the pits. The refuse burning areas were closed between the late 1960s and 1971. The burn pits at Site 1E-1 were closed, covered with native soil, and allowed to revert to natural vegetation. At some point after the burn pits were closed, the area was graded for the realignment of MACS Road, which now crosses over a portion of the former burn pits. Based on superimposing the current topography and roads on the 1970 aerial photograph, the remains of one burn pit, and possibly the edge of a second burn pit, appear to be located underneath the existing road (Figure 3-2). Based on the field data collected for this FS, most of the burn material appears to have been dug out and disposed of at Site 1E, as discussed in the following sections. The boundary of Site 1E-1 is approximately 300 by 120 feet (Figure 3-1). The overall site area is approximately 0.8 acre.

3.1.2 Site Conditions

Site 1E-1 is located on a plateau approximately 2,600 feet north of the Santa Margarita River (Figure 3-1), within the Santa Margarita Basin. The geology of the basin consists of stream-deposited younger and older Quaternary alluvium overlying bedrock of the San Mateo Formation. Site 1E-1 is underlain by older alluvium, which consists of interbedded, fine to coarse-grained, unconsolidated to poorly consolidated sand, silt, and gravel interspersed with clay lenses.

Groundwater was not encountered to a depth of 24 feet bgs during previous investigations (IT, 1998). Based on the elevation of the site and known groundwater in the area, groundwater beneath the site is estimated at 100 feet bgs according to the Group C RI (SWDIV, 1996b).

Habitat at Site 1E-1 consists primarily of annual grasses (wild oat and brome), filaree, fennel, and peppergrass. White sage and coyote brush habitats surround the site. The northeast portion of the site contains an unpaved access road and is sparsely vegetated.

Coastal California gnatcatchers were observed at Site 1E in 1997, and least Bell's vireos were identified in riparian vegetation near the site in 1996. No Pacific pocket mice were observed at the site (IT, 1998), although the site has been identified as being between two known areas of Pacific pocket mouse habitat. Therefore, to conduct the fieldwork, access to the site was limited to the north and east. A biological monitor was present during drilling to indicate areas to be avoided and to eliminate any disturbance of the Pacific pocket mouse.

During the biological monitoring performed before initiating the OU 4 FS field investigations (Appendix B), burrows that might have been made by Pacific pocket mice were observed on site, as was evidence of the coastal California gnatcatcher.

3.1.3 Nature and Extent of Contamination

Several metals were identified during the OU 3 RI/FS and ROD process as COCs at Site 1E, including aluminum, antimony, arsenic, cadmium, chromium, cobalt, copper, iron, lead, and zinc. Historical data for Site 1E are included in Appendix C2. The majority of the metals with concentrations exceeding residential and industrial soil PRGs were reported in shallow (0 to 5 feet) soil (IT, 1998).

The following decision questions were used to define the required sampling at Site 1E-1 for the FS from the DQO process:

- Are adequate site characterization data available to support remedy evaluation?
- What is the lateral and vertical extent of COCs in soil at Site 1E-1?
- Is the nature of the waste consistent with that of Site 1E?

Based on these questions, the sampling was to be considered complete if the soil sampling results bounded the vertical and lateral extent of COCs in soil.

3.1.3.1 FS Sampling

Soil sampling at Site 1E-1 was conducted from 26 to 27 September 2001. The following sections describe the field data collection, which was conducted in accordance with the Draft Final OU 4 Supplemental FS FSP and QAPP (Parsons, 2001a and 2001b).

3.1.3.1.1 Soil Sampling

The objective of the soil sampling was to confirm the nature of waste, the extent of the burn pits, and the presence of bedrock beneath the site. Eight borings were advanced using an all-terrain hollow stem auger drill rig, and three soil samples were collected from each boring (Figure 3-3). The borings were located based on a careful evaluation of the 1970 aerial photograph and a comparison to current surveyed site features to ensure that the borings were within the footprint of the former burn pits (Figure 3-2). The use of judgmental (i.e., biased) borings was intended to focus the investigation on the locations with the greatest likelihood of encountering residual contamination.

The field sampling plan (Parsons, 2001a) anticipated advancing one boring within the footprint of each former pit. However, after detailed site surveying, it was determined that the boring into the fourth pit (from west to east) could not be drilled because of the steep slope. Therefore, boring 1E1-1B-04 was relocated to the first pit where boring 1E1-1B-01 was also advanced.

Each boring was continuously logged in the field to identify any evidence of burn-ash or debris. Samples were collected from ground surface (0 to 1 foot bgs) in each boring to support the HHRA and ERA. In addition, judgmental soil samples were collected from soil intervals where visually identified waste or burn-ash residue was present. The use of visual observations to identify soil-sampling intervals is appropriate at this site given that the release mechanism (i.e., refuse burning) would leave visually identifiable evidence of impacted soils and the most likely location to encounter contamination. Another sample was collected at a depth below the waste to confirm the presence of bedrock, if possible. Samples were collected in accordance with the procedures outlined in the Draft Final FSP and QAPP (Parsons, 2001a and 2001b). Boring logs are included in Appendix D2.

During drilling, the floor of the former burn pits was encountered approximately 17 to 20 feet bgs (Figure 3-4). While a continuous layer of burn ash residue was not encountered, a change in lithology to soil (identified as "native" or finer grained, more dense material) was consistent across the site. Thin (less than 3 inches thick) pockets of ash and burn material were encountered at various depths in several borings and no continuous layer of ash or waste was encountered. Although pockets of ash-darkened soil are present, most of the burn material appears to have been dug out and likely disposed of at Site 1E.

3.1.3.1.2 Soil Analytical Program

Soil samples were analyzed for volatile organic compound (VOCs) (SW8260B), SVOCs (SW8270C), dioxins and furans (SW8280A/SW8290), total petroleum hydrocarbons (TPH) as gasoline (TPH-G) and TPH-diesel (TPH-D) (8015 modified for gas and diesel), pesticides (SW8081A), metals (SW6010/SW7000 series), polychlorinated biphenyls (PCBs) (SW8082), and chlorinated herbicides (SW8151A). This approach is consistent with previous investigations

at former burn areas, including Site 1E. The purpose of maintaining the same list was to determine if the material in the burn pits was similar to that encountered during the Site 1E excavation. In addition, selected soil samples were also analyzed using SW8280A for polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), also referred to as dioxins/furans, in September 2001. Based on preliminary risk calculations, seven of these samples were reanalyzed using method SW8290 to achieve lower detection limits.

To determine leachability potential and any associated threat to underlying groundwater, SPLP (SW1312) analysis was performed on two samples visually identified as having potential waste material. To estimate the amount of soil designated as RCRA-hazardous waste if off-site disposal were to occur, TCLP (SW1311) analysis was also performed on these samples.

3.1.3.2 FS Results

3.1.3.2.1 Soil Evaluation

The analytical results collected during this soil investigation at Site 1E-1 are presented in this section along with a discussion of the nature and extent of contamination. The discussions presented in this section are based on validated analytical data. The data quality assessment is presented in Appendix F. Chain-of-custody and cooler receipt forms for samples collected at Site 1E-1 are provided in Appendix G2. Validated analytical data for Site 1E-1 are provided in Appendix H2. Sampling locations are shown on Figure 3-3.

VOCs

A total of 17 soil samples (15 samples plus two duplicates) were collected for VOC analysis in September 2001. Sampling depths and detected VOCs are presented in Table 3-1. The concentrations of the VOCs detected were all estimated values, and none were detected above their respective residential soil PRGs. The VOCs detected were 2-butanone (methyl ethyl ketone [MEK]) (seven samples), 4-methyl-2-pentanone (methyl isobutyl ketone [MIBK]) (17 samples), and methyl tert-butyl ether (MTBE) (three samples). These detections were located throughout the soil column at low, estimated concentrations and were not concentrated in any specific areas.

MEK and MIBK were sporadically detected in the soil samples with no apparent spatial or depth correlation (Table 3-1). All detections were at levels below analytical reporting limits; thus these concentrations were "J" flagged as estimated values. The origin of these compounds is unknown; given that they were detected at levels generally well below reporting limits (especially MIBK) suggests some uncertainty in analytical identification. The ketones are not easily distinguishable from the aliphatic hydrocarbons in the gas chromatography/mass spectrometer (GC/MS) analysis. Therefore, low-level ketones (where the parent ion is too small to be recognized) may in reality be hydrocarbons.

Although these compounds have multiple industrial/commercial uses, their presence as site-related contaminants at a burn site seems unlikely. Although certain volatile compounds were used as fuels or accelerants in burn pits, it is doubtful that ketone-containing compounds would have been used for that purpose. These chemicals could have been released as part of waste disposal activities. However, it is likely that any VOCs present in the burn pits would have volatilized during burn events. The presence of ketones at Site 1E-1 could also be natural in origin. MEK can be found as a metabolic byproduct of plants and animals (Graedel, 1986, as cited in HSDB, 2002). Although a definitive source of MEK and MIBK could not be identified, it is unlikely that these compounds are present as a result of site-related activities. Because the MEK and MIBK were detected at concentrations well below USEPA Region 9 residential soil PRG values (7,300 and 790 mg/kg), they are of minor concern from a human health

perspective. However, both compounds are conservatively assumed to be site-related for the HHRA and ERA.

In two of the 17 soil samples, MTBE was detected at levels less than 10 percent of its analytical reporting limit. The extremely low level of these detections suggests uncertainty in analytical identification. Given this uncertainty and the lack of any plausible release mechanism to explain the presence of MTBE at depths greater than 10 feet bgs, it is unlikely that MTBE is present as a result of site-related activities. However, a definitive source could not be identified. Given that it was detected at concentrations (up to 0.0009 mg/kg) that are well below the USEPA Region 9 "Cal-Modified" residential soil PRG value of 17 mg/kg (USEPA, 2002), MTBE is of minor concern from a human health perspective. However, it is conservatively assumed to be site-related for the HHRA and ERA.

SVOCs

A total of 26 soil samples (23 samples plus three duplicates) were collected for SVOC analysis in September 2001. Sampling depths and detected SVOCs are presented in Table 3-2. The only SVOC detected was diethyl phthalate at an estimated concentration of 96 micrograms per kilogram (µg/kg) in two samples: 1E1B-06C (21 to 22 feet bgs) and 1E1B-08C (26 to 27 feet bgs). This value is well below the residential soil PRG.

The phthalates are common plasticizers of many resins, particularly polyvinyl chloride (PVC). Because of the common usage of materials made from PVC, low-level phthalate contamination is commonly encountered due to the sampling effort or the sample handling in the laboratory, but extraneous to the sample itself. The level of diethyl phthalate that was found may be attributable to such extraneous contamination. However, its presence is conservatively assumed to be site-related for purposes of the human health evaluation to demonstrate that it is of minor concern.

Based on the lack of SVOCs in surface/near-surface soil samples and incomplete pathway, SVOCs were eliminated as chemicals of potential ecological concern.

Dioxins/Furans

A total of 26 soil samples (23 samples plus three duplicates) were collected for dioxins/furans analysis (SW8280A) in September 2001. The duplicate samples are used to describe an adjacent co-located sample; these samples were not homogenized and split and consequently, should be viewed as independent samples with no expectation of precision with the primary sample. Based on preliminary risk calculations, eight of the original samples were reanalyzed using method SW8290 to achieve lower detection limits. The samples selected for analysis using method SW8290 were intended to characterize the range of dioxin concentrations originally detected using method SW8280A. There is no evidence that the original analyses using method SW8280A were incorrect, only that the reporting limits were somewhat elevated relative to risk-based values. Five of the eight samples selected for analysis using method SW8290 were surface samples (0 to 1 foot bgs) given that these soils would be most available for contact by human and ecological receptors. In addition, the sample with the highest equivalency concentration (1E1B-07C) was selected. All of the analyses using method SW8290 had to rely on a fresh aliquot of soil from the original sample sleeve. The fresh aliquot was taken adjacent to the sample used for the original analyses. This is not viewed as a significant uncertainty given the apparently well-mixed nature of the soils at Site 1E-1. Sampling depths and detected dioxins/furans are presented in Table 3-3.

There are numerous dioxin/furan congeners, although the most widely studied is 2,3,7,8-TCDD. This compound, often called dioxin, represents the reference structure for this class of compounds. The USEPA has adopted the use of toxicity equivalency factors (TEFs) for

compounds that produce dioxin-like toxicity. TEFs are estimates of the toxicity of dioxin-like compounds relative to the toxicity of 2,3,7,8-TCDD, which is assigned a TEF of 1.0. All chlorinated dibenzodioxins (CDDs) and chlorinated dibenzofurans (CDFs) with chlorines substituted in the 2, 3, 7, and 8 positions are assigned TEF values. This approach has also been adopted by Cal/EPA DTSC (1992). For this evaluation, the 2,3,7,8-TCDD TEF was calculated by multiplying the concentration of the various PCDDs and PCDFs by the appropriate TEF. Dioxins and furans with TEFs of zero were not included in the quantitative risk assessment. Resulting equivalency factors for each sample are also shown on Table 3-3.

The dioxins and furans detected included 2,3,7,8-TCDD, 1,2,3,7,8-PeCDD, 1,2,3,6,7,8-HxCDD, 1,2,3,4,7,8-HxCDD, 1,2,3,7,8,9-HxCDD, 1,2,3,4,6,7,8-HpCDD, 1,2,3,4,6,7,8,9-OCDD, 2,3,7,8-TCDF, 1,2,3,7,8-PeCDF, 2,3,4,7,8-PeCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,7,8,9-HxCDF, 1,2,3,4,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, 1,2,3,4,6,7,8-HpCDF, and 1,2,3,4,6,7,8,9-OCDF. The detected dioxins and furans appear to be located throughout the soil column and are not concentrated in any specific areas. They also are not limited to the soil samples with visible evidence of ash or burn material.

In general, dioxins and furans were not detected in the surface soil samples although there were low-level reported detections of 1,2,3,4,6,7,8,9-OCDD in two samples. In Sample 1E1B-03A, this congener was reported at an estimated concentration of 130 picograms per gram (pg/g) using SW8280A. Subsequent analysis using SW8290 of a different (collocated) sample from this interval showed no detectable dioxins (at a reporting level of 1.6 pg/g). The fact that no dioxins were detected in the subsequent analysis (with the lower reporting limits) of this sample is likely attributable to the fact that it represented a physically separate sample taken from an adjacent sampling sleeve collected from this sampling interval. Therefore, direct comparability between the two sets of results cannot be made because these were not "split" samples.

In 1E1B-07A, the same congener (1,2,3,4,6,7,8,9-OCDD) was detected using SW8280A at an estimated concentration of 80 pg/g. Subsequent analysis using SW8290 showed a detection of this congener at a concentration of 100 pg/g, along with the low-level presence of other congeners. The SW8280A detections were flagged as estimated values because the holding times were exceeded and because an internal standard was out of range. Neither of these factors is expected to influence significantly the identification of dioxin/furan congeners, although there is some degree of uncertainty with regard to quantification.

Several dioxin results (2,3,4,6,7,8-HxCDF; 1,2,3,4,7,8,9-HpCDF; and 1,2,3,7,8,9-HxCDF only) below detection limits for select Site 1E-1 soil samples analyzed by method 8280A were rejected due to laboratory control standard recoveries that exceeded acceptance criteria. Laboratory control standard (LCS) samples are a clean matrix spiked with target compounds to determine laboratory performance. Since these recoveries were above the established upper control limit, the reported results may be biased high and these "non-detect" results are unlikely to represent false-negative values.

Additional dioxin results below detection limits were rejected due to exceeding holding times. Sites 1H (analyzed by method 8280A) and 1E-1 (analyzed by method 8290) soil samples were impacted by holding time violations. Since dioxins are very stable compounds and not subject to migration, the reported results are likely very representative of site composition and are usable for making site decisions. The samples analyzed using SW8290 were extracted outside recommended holding times with sample extracts analyzed within three days (meeting method requirements). Section 6.4 of USEPA SW8290, as documented in SW-846, notes that:

> *"sample holding times [extraction within 30 days] are recommendations, but PCDDs and PCDFs are very stable in a variety of matrices and holding times under the conditions listed*

in Section 6.4 [stored at 4 °C in the dark] may be as high as a year for certain matrices. Sample extracts, however, should always be analyzed within 45 days of extraction."

The USEPA has reported background levels for dioxins (USEPA, 2000e) in terms of 2,3,7,8-TCDD TEQs and 1998 World Health Organization (WHO) TEFs. As noted in the USEPA's web site (http://www.epa.gov/wtc/dioxin/dioxin_fact_sheet.html) on the approach for applying TEFs, the only significant difference between the International set and the WHO set is for a penta form of dioxin (i.e., 1,2,3,7,8-PeCDD). A review of the dioxin/furan analytical data (Table 3-3) indicates that this dioxin congener was only detected in one soil sample (1E1B-08A, which was collected at 0.0 to 1.0 foot bgs). The calculated 2,3,7,8-TCDD toxicity equivalents was 0.53 pg/g (Table 3-3 and Appendix I2, Attachment 1). Recalculating using the 1998 WHO TEFs would increase this concentration to 0.65 pg/g. The 2,3,7,8-TCDD equivalents for the other remaining samples would not change or would decrease slightly. Since the USEPA requires laboratories to use the International TEF values in reporting 2,3,7,8-TCDD equivalents in the contract laboratory program (CLP) (USEPA, 2000f) and using the 1998 WHO values would not make a substantive difference, the use of International TEF values were used.

The estimated mean values were approximately 4 pg TEF/g and 12 pg TEF/g for rural and urban areas, respectively. The residential soil PRG value is 3.9 pg/g (3.9×10^{-6} mg/kg). The calculations conservatively assumed that dioxin/furan congeners that were not detected were present at the reporting limit. Current USEPA requirements for analytical laboratories performing dioxin/furan analyses states that congeners that were not detected should not be included in the calculation of 2,3,7,8-TCDD toxicity equivalents (USEPA, 2002f). Therefore, separate 2,3,7,8-TCDD toxicity equivalents have been calculated and are also included in Table 3-3 based on these different treatments for congeners that were not detected.

As shown on Table 3-3, detected levels in surface soils at Site 1E-1 are within this range (based on the SW8290 results, which had lower reporting limits). In addition, the predominant TCDD congener in background is OCDD (USEPA, 2000e), which is the main congener present in these samples. As the data show, there is relatively limited spatial variability in the concentrations of toxicity equivalents; all concentrations based on method SW8290 are within the same order-of-magnitude (i.e., 0.2 to 2 pg/g). These concentrations are all below the cited mean background value for rural surface soils. This low spatial variability in dioxin/furan concentrations is consistent with the conceptual site model source-release mechanism. The data support the hypothesis that the ash/debris at the former burn pits was mostly removed and some type of backfill soil placed there. Only minor residual burn ash contamination appears to be present.

It should be noted that proximity to the ocean, the predominant wind direction, and the lack or presence of upwind sources of dioxin were considered in characterizing "ambient" dioxin/furan concentrations. While the location of the site is relatively isolated from major dioxin sources, it is important to note the proximity of Interstate 5, which runs along the western boundary of Camp Pendleton. This is a heavily traveled highway and rail corridor. The combustion of gasoline containing halogenated scavenger additives, along with diesel emissions, likely represent a significant long-term (i.e., historical) air-deposition source of dioxins/furans at Site 1E-1, which is located relatively close to the coast. Agricultural burning and wildfires also represent potential local sources.

As discussed in Section 3.1.4, reported dioxins/furans in site soils are not considered a significant threat to human health or the environment.

Total Petroleum Hydrocarbons

A total of 26 soil samples (23 samples plus three duplicates) were collected for TPH-G and TPH-D analysis in September 2001. Sampling depths and results are presented in Table 3-4. TPH-G was detected in three samples: 1E1B-03A, 1E1B-04B, and 1E1B-07C. TPH-D was detected in only one sample, 1E1B-03B. TPH-motor oil was detected in four samples: 1E1B-03A, 1E1B-03B, 1E1B-05A, and 1E1B-07B. These detections were located throughout the soil column at low, estimated concentrations and not concentrated in any specific areas.

Pesticides

A total of 26 soil samples (23 samples plus three duplicates) were collected for pesticides analysis in September 2001. Pesticides were only detected in one sample: 1E1B-03A (Table 3-5). The pesticides detected were p,p'-dichlorodiphenyldichloroethene (DDE), and p,p'-dichlorodiphenyltrichloroethane (DDT) at 5 and 6 µg/kg, respectively. Both results are well below their respective residential soil PRGs. These pesticides were at one time in common use, and they are very stable and persistent. Therefore, although they may not have been used for many years, their presence is not unexpected, especially in a surface sample.

Metals

A total of 26 soil samples (23 samples plus three duplicates) were collected for metals analysis in September 2001. Two of these samples were analyzed using the TCLP method. Sampling depths and metals concentrations are presented in Table 3-6. No metals were detected in the surface-soil samples at concentrations above the naturally occurring background range for Santa Margarita Basin 0- to 5-foot soils (SWDIV, 1996b). Three metals (arsenic, chromium, and cobalt) were detected at concentrations slightly greater than the background value for 0- to 10-foot soils. Arsenic was detected at 6.5 mg/kg (above the 5- to 10-foot background value of 4.3 mg/kg) in the duplicate of the sample (i.e., collocated sample) collected from debris in 1E1B-08 from 12 to 16 feet bgs. The concentration in the primary sample was 4.1 mg/kg. Chromium was detected at 34 mg/kg (greater than the 5- to 10-foot background value of 33 mg/kg) in 1E1B-05 from 16 to 17 feet bgs. Cobalt was detected in two deep samples above the 5 to 10 feet background value of 13 mg/kg: at 51J mg/kg in boring 1E1B-01 from 15 to 19 feet bgs and at 21 mg/kg in 1E1B-02 from 21 to 22 feet bgs. None of these metals would be considered likely chemicals of potential concern (COPCs) based on site history. Based on site history, the lack of any spatial correlation, and their presence at levels only slightly greater than the statistically derived background values, it is not likely that Site 1E-1 has been impacted by arsenic, chromium, or cobalt.

Polychlorinated Biphenyls and Chlorinated Herbicides

A total of 26 soil samples (23 samples plus three duplicates) were collected for PCBs and chlorinated herbicides analysis in September 2001. PCBs and chlorinated herbicides were not detected.

3.1.3.2.2 Groundwater and Surface Water Impact Evaluation

Based on the potential threat to groundwater, SPLP analysis was conducted on two soil samples for metals to determine leachability potential and any associated threat to underlying groundwater. These were chosen because they were visually identified as waste material.

SPLP results for aluminum, iron, and vanadium indicate that extractable concentrations are above their respective MCLs or California Action Levels (Table 3-7). However, as previously discussed, (total) concentrations of all of these metals are consistent with background levels (IT, 1998). Given that there do not appear to be any site-related metals and the relatively large depth to groundwater at this site, it is unlikely that these metals pose a threat to groundwater

resources. Other detected compounds at the site (e.g., diethyl phthalate, dioxins/furans, and DDE/DDT) are highly immobile in soil and would not represent a threat to groundwater. Concentrations of DDE/DDT are well below soil screening levels (SSLs) (published as part of the USEPA Region 9 PRG tables [USEPA, 2000a]) that are protective of the groundwater pathway.

A highly conservative screening-level analysis was performed to confirm that detected levels of dioxins/furans in surface soils would not pose a threat to nearby surface water resources (see Appendix J). The Santa Margarita River is located approximately 3,200 feet east and southeast of the site and is the primary surface water receptor. Several other small drainages are closer to Site 1E-1, although these typically are dry except during periods of precipitation run-off. The screening analysis conservatively assumed that the maximum detected concentration of 2,3,7,8-TCDD toxicity equivalents (1.7 pg/g) was in direct contact with surface water under equilibrium conditions. This is a highly conservative assumption given that no attenuation was assumed between the site and the surface water. A surface water concentration of 0.068 picograms per liter (pg/L) was estimated, assuming an organic carbon content of 1 percent and an organic carbon partition coefficient (log K_{oc}) of 6.4 (Marple et al., 1987 and Walters et al., 1989 as cited in USEPA, 2000e). The predicted concentration is well below the MCL of 30 pg/L and the lowest observable effect level of 10 pg/L for freshwater organisms (NOAA, 1999). Thus, it is highly unlikely that surface water resources would be impacted from runoff of residual dioxins present in the surface soils at Site 1E-1.

3.1.4 Human Health Risk Assessment

As discussed in Section 3.1.3.2, metals concentrations in soil samples collected at Site 1E-1 were generally consistent with naturally occurring background levels. Although maximum detected values of chromium and cobalt were slightly above the statistically derived background concentrations, these metals appear to be present at levels generally consistent with background and are not believed to be site related. Arsenic concentrations in the surface samples at Site 1E-1 were less than the statistically derived background value for Santa Margarita Basin soils (4.6 mg/kg for 0 to 5 feet bgs and 4.3 mg/kg for 0 to 10 feet bgs) (SWDIV, 1996a). One subsurface sample, the co-located "duplicate" for 1E1B-08B collected at 12 to 16 feet bgs, had an arsenic concentration of 6.5 mg/kg, which is slightly greater than the background values. Although this single concentration is greater than the background value, it does not appear to represent evidence of site-related arsenic contamination based on the following lines of evidence:

- The maximum site arsenic concentration is less than the maximum detected arsenic concentration in the Santa Margarita Basin soils background data set (11.5 mg/kg).
- There was no evidence of site-related contamination in this sample. All other detected metals were at concentrations below background (Table 3-6). There were no detectable SVOCs (Table 3-2), dioxins/furans (Table 3-3), petroleum hydrocarbons (Table 3-4), or pesticides (Table 3-5). There was a low-level detection of 4-methyl-2-pentanone (also referred to as MIBK) in a sample (see Table 3-1) at a concentration below the reporting limit. In addition, the co-located sample had a similar detection of MEK. The analytical results were flagged as "J" or "estimated" values. As discussed in Section 3.1.3.2 under VOCs, a definitive source of ketones could not be identified; they could be natural in origin or an analytical artifact. They are probably not site-related.
- A co-located "duplicate" sample had an arsenic concentration of 4.1 mg/kg.
- A more refined comparison of site-related arsenic data to background would likely show that the two populations are not statistically different.

- At adjacent Site 1E (where a major soil removal action was recently completed), arsenic was considered a remedial COC in the OU 3 ROD. The maximum detected concentration of arsenic at adjacent Site 1E was 10.7 mg/kg and occurred in a sample with elevated lead (1,610 mg/kg). Given that arsenic was a remedial COC at Site 1E, it is likely that this arsenic detection was site-related given the concentration and its association with lead. Elevated arsenic is often found at sites involved in the use or manufacturing of lead alloys (e.g., lead smelters, battery manufacturing facilities, etc.) given their geochemical association in certain lead ores (ATSDR, 2000a).
- The absence of elevated lead (i.e., 4.9 mg/kg in Table 3-6) in the Site 1E-1 sample (1E1B-08B) further supports that the arsenic is not site-related.

Based on these lines of evidence, the detected arsenic at Site 1E-1 is believed to be naturally occurring.

Samples were collected at Site 1E-1 at depths greater than 1 foot bgs. However, all of these data were collected at depths greater than 10 feet bgs, where soils would not typically be available for contact under a hypothetical residential land use scenario. There were no samples collected from 2 to 10 feet bgs. However, based on a weight–of-evidence approach presented in Section 3.1.6, soils in the 2 to 10 feet bgs interval are not expected to be significantly different from surface soils. Consequently, the lack of sampling data between 2 and 10 feet bgs is not considered a significant uncertainty in the risk assessment.

As described above, sampling at Site 1E-1 targeted surface soils and soils at depths greater than 10 feet bgs. However, only the surface samples were utilized in the risk and hazard calculations.

To characterize potential risks and hazards associated with soil exposure at Site 1E-1, a screening-level risk assessment was performed as part of this FS. The evaluation was performed in accordance with Cal/EPA Preliminary Endangerment Assessment (PEA) guidance for a hypothetical residential receptor. The assessment, documented in Appendix I, indicates a cumulative cancer risk of 8×10^{-6}, with almost all of the risk (95 percent) attributable to arsenic. As discussed previously, arsenic at Site 1E-1 is likely naturally occurring. Excluding the contribution from arsenic, the incremental site-related cancer risk is only 4×10^{-7}, which results primarily from the dioxins/furans (see Table 3-8).

The dioxin/furan cancer risk estimates are based on the 2,3,7,8-TCDD equivalency calculation. Congeners not detected were conservatively assumed to be present at their reporting limit for purposes of the equivalency calculation. In terms of 2,3,7,8-TCDD equivalents, the maximum detected dioxin concentration based on SW8290 was 1.71×10^{-6} mg/kg (1.71 pg/g). The SW8280A results for dioxins/furans were not used because of the presence of numerous "non-detects" with elevated reporting limits. The assumption that individual congeners are present at the reporting limits for purposes of risk calculations results in relatively high incremental risks (e.g., 10^{-6} to 10^{-5}). Subsequent analysis of select samples using SW8290 resulted in significantly lower reporting limits (see Table 3-3) and more accurate estimates of 2,3,7,8-TCDD equivalents.

The cumulative noncancer HI is estimated to be less than the cumulative target HI goal of 1.0. In addition, the maximum detected lead concentration (6.1 mg/kg) is well below the USEPA residential soil PRG value of 400 mg/kg.

3.1.5 Ecological Risk Assessment

Prior to this FS, no soil sampling (or other RI activities including risk assessment work) had been performed at Site 1E-1. All previous work had focused on adjacent Site 1E, where a major

soil removal action was recently completed. The screening-level ERA documented in this FS was based on the results of soil data collected at Site 1E-1, which indicated relatively minor contaminant levels.

The purpose of the ERA was to evaluate the potential risks to ecological receptors posed by site-related preliminary chemicals of potential ecological concern (COPECs) detected in environmental media at Site 1E-1, adjacent to Site 1E; this text summarizes the information presented in Appendix J.

This ERA involves the quantitative evaluation of potential risks to ecological receptors exposed to site-related preliminary COPECs in affected media for which data are available at Site 1E-1. The ERA consists of problem formulation, analysis, and risk characterization. These components of the ERA for Site 1E-1 are summarized below.

3.1.5.1 Problem Formulation

Problem formulation is a planning step for evaluating the ecological setting, defining the conceptual site model (CSM; including exposure pathways and receptors of interest), identifying COPECs, and defining the assessment endpoints.

Habitat at the adjacent Site 1E consists primarily of annual grasses (wild oat and brome), filaree, fennel, and peppergrass. White sage and coyote brush habitats surround the site. The northeast portion of the site contains an unpaved access road and is lightly vegetated. A densely vegetated, stream-cut channel at an elevation 100 feet below the site defines the western border. Many species of wildlife have been observed at and near the site, including the special status species such as the least Bell's vireo, coastal California gnatcatcher, and Pacific pocket mouse.

A CSM was specified for the site that indicates that complete exposure pathways are present. Bird and mammalian wildlife, including special-status birds, are potentially exposed to soil-borne preliminary COPECs, as well as soil-borne preliminary COPECs that are transferred within the food web. The preliminary COPECs include organic pesticides (4,4'-DDT and 4,4'-DDE) and the 2,3,7,8-PCDDs and PCDFs.

For Site 1E-1, the ERA assessment endpoints were protection of terrestrial wildlife receptors from adverse population-level effects due to exposures to site-related preliminary COPECs (gray fox and red-tailed hawk were the receptor species), and protection of individuals of special-status species from adverse effects that could compromise genetic diversity. At this site, the endangered Pacific pocket mouse and least Bell's vireo represent the special-status-species; the other receptors represent the population-level assessment endpoints.

3.1.5.2 Analysis

The analysis phase consists of exposure and ecological-effects assessments.

The receptor-specific exposure doses of each preliminary COPEC were estimated using food-chain uptake algorithms that account for exposure via incidental ingestion of contaminated soil, ingestion of plants grown in contaminated soil, and ingestion of lower-trophic-level animals associated with contamination. Adjustments were made in the exposure assessment to account for accumulation and biomagnification of contaminants through the trophic levels. Bioaccumulation was evaluated by means of contaminant-specific plant, invertebrate, and small mammal bioaccumulation factors (BAFs).

The effects assessment defines and evaluates the potential adverse (i.e., toxic) ecological effects of preliminary COPECs on the receptor species using the measures of effect. This step involved developing reference toxicity values (RTVs) and site-specific preliminary limits of exposure (PLEs) for each soil preliminary COPEC. PLEs are threshold effect levels, which are

defined as the concentrations of preliminary COPECs in environmental media at a site that are presumed to be non-toxic to biota using the site. The PLEs are chemical- and receptor-specific values derived for a given exposure medium and route PLEs are based on the wildlife RTVs. The results of the effects assessment were used to identify chemicals of ecological concern (COECs) and to characterize ecological risk.

3.1.5.3 Risk Characterization

Risk characterization integrates preliminary COPEC exposures to, and effects on, receptors using hazard quotients (HQs), which are ratios of exposure and effect concentrations. The resulting data are used to estimate the magnitude of risk from preliminary COPECs and to assess the risk to ecological receptors. Risk characterization includes two principal steps: risk estimation and risk description.

At the concentrations detected, none of the preliminary COPECs identified in the evaluated soil exposure interval (0 to 1 foot bgs) at Site 1E-1 result in hazard quotient (HQ) values greater than the threshold value of 1. These results indicate there are no preliminary COPECs likely to pose unacceptable hazards to, or induce adverse effects, at the individual organism level for the special-status Pacific pocket mouse or the least Bell's vireo, or population-level effects on any of the representative receptors evaluated. Therefore, based on the risk characterization results generated using data collected during the RI, soil contaminants would pose negligible risk to individuals of the wildlife species evaluated or the terrestrial wildlife guilds that they represent.

Although there is uncertainty associated with the characterization of the extent and magnitude of PCDDs and PCDFs in site soils, the extremely low bioavailability of these compounds in soils with a high organic-carbon content renders them generally unavailable for plant uptake or assimilation by wildlife that may be exposed to soils affected by these chemicals. In addition, the potential for transport of PCDD and PCDFs away from Site 1E-1 to the Santa Margarita River was assessed using highly conservative assumptions (for example, that site soils were in the river not 3,200-feet distant); the results of this analysis indicate that surface-water resources would not be affected by PCDDs and PCDFs in soil at Site 1E-1.

3.1.6 Conclusions of the FS

The data collected for the FS led to the following conclusions:

- Small (less than 3-inch thick) pockets of ash and burn material were encountered at various depths in several borings, although no continuous layer of ash or waste was encountered. Although pockets of ash-darkened soil are present, most of the burn material appears to have been dug out and likely disposed of at Site 1E. The intermittent pockets of ash suggest that the remains of the burn material were mixed into the soils used at the time the burn pits were covered, or when the area was graded for the realignment of MACS Road.

- Only relatively minor soil contamination was found. No metals were detected above naturally occurring background in surface soil samples. Arsenic, chromium, and cobalt were detected at concentrations slightly above background values at depths greater than 10 feet. However, these metals are not believed to be site-related based on a weight-of-evidence approach that considered site history, the uncertainty in quantifying local background levels, and the spatial distribution of detected levels. Low concentrations of dioxins were detected in soil samples from all depths, which support the previous conclusion regarding possible mixing of soils at some time in the past. The dioxins, which are likely site-related as a result of waste burning activities, appear to be present at levels consistent with anthropogenic background for rural areas (USEPA, 2000e).

- A screening-level HHRA, based on maximum detected surface-soil concentrations, indicates a cumulative residential cancer risk of 8 x 10^{-6}, with almost all of the risk (95 percent) attributable to arsenic. As discussed above, detected levels of arsenic at Site 1E-1 are likely naturally occurring and are not believed to be site-related. Excluding the contribution from arsenic, the incremental site-related residential cancer risk is 4 x 10^{-7}, and results primarily from the dioxins/furans. The cumulative noncancer HI is estimated to be less than the cumulative target HI goal of 1.0. In addition, the maximum detected lead concentration (6.1 mg/kg) is well below the USEPA residential soil PRG value of 400 mg/kg.
- There is minor uncertainty in the risk and hazard estimates because the results are based on maximum detected concentrations from soil samples collected at the surface. No soil samples were collected in the 2 to 10 feet bgs interval; thus it is possible that contamination is present but was not sampled. However, it is considered unlikely that significant undiscovered contamination is present. This conclusion is based on a weight-of-evidence approach considering that a judgmental sampling approach was used, which included borings located in the center of the former waste burn pits, soil samples collected where visible burn-ash residue was identified, and the relatively low concentrations of detected analytes, including dioxins, which appear to be present at concentrations consistent with rural background levels. Although one of the former pits could not be sampled due to terrain/accessibility, there is no evidence to suggest that the nature of residual waste in that pit would differ from the other four pits that were sampled.
- The results indicate there are no preliminary COPECs likely to pose unacceptable hazards to, or induce adverse effects at the individual organism level for the special-status Pacific pocket mouse or the least Bell's vireo, or population-level effects on any of the representative receptors evaluated. A screening-level ERA concluded that baseline conditions would pose negligible risk to ecological receptors.
- Based on the SPLP analysis conducted during the FS, extractable concentrations of aluminum, iron, and vanadium are greater than corresponding water-quality goals and could theoretically pose a threat to groundwater. However, these metals were near or below their respective background values in soil. In addition, the site is estimated to be approximately 100 feet above groundwater (SWDIV, 1996a). Therefore, risk to groundwater posed by these relatively low metals concentrations is considered extremely low. Other detected analytes at the site (e.g., dioxins, pesticides, and diethyl-phthalate) were detected at relatively low levels and are relatively immobile and thus pose an insignificant threat to water quality resources.

In summary, there is little evidence of contamination in the upper 10 feet of soil at Site 1E-1. Although it is likely that localized areas of low-level dioxins may be present at the site, the levels do not appear to be significantly higher than anthropogenic background. Under current conditions, the site represents an insignificant threat to human health based on the conservative assumption that a resident would be located on site. Given current and reasonably foreseeable future land uses, it is highly unlikely that this site would be developed for residential purposes. Site 1E-1 also represents an insignificant threat to ecological receptors. Residual soil contamination below 10 feet does not represent an ongoing or future threat to water quality resources. Based on this evidence, further action is not warranted at Site 1E-1. Consequently, remedial alternatives at Site 1E-1 were not identified or evaluated as part of this FS. It is recommended that Site 1E-1 be documented for no further action in the OU 4 ROD.

THIS PAGE INTENTIONALLY BLANK

Table 3-1
Site 1E-1 VOCs Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	2-Butanone (MEK)	4-Methyl-2-pentanone	MTBE
			MDL:	1.7-2.3	0.14-0.19	0.043-0.06
			PQL:	9.2-13	9.2-13	9.2-13
			PRG:	7.3E+06	790	17*
1E1B-01B	15.0-19.0	26-Sep-01	µg/kg	6 J1	1 J1	0.9 J1
1E1B-02B	18.0-19.0	26-Sep-01	µg/kg	5 J1	0.7 J1	< 9.9
1E1B-02C	21.0-22.0	26-Sep-01	µg/kg	5 J1	1 J1	< 9.8
1E1B-03B	10.0-14.0	27-Sep-01	µg/kg	< 11	1 J1	< 11
1E1B-03B (D)	10.0-14.0	27-Sep-01	µg/kg	< 11	1 J1	< 11
1E1B-03C	21.0-22.0	27-Sep-01	µg/kg	< 11	1 J1	< 11
1E1B-04B	14.0-15.0	27-Sep-01	µg/kg	< 12	0.7 J1	< 12
1E1B-04C	20.0-22.0	27-Sep-01	µg/kg	6 J	0.9 J	< 11
1E1B-05B	11.0-12.0	26-Sep-01	µg/kg	5 J1	2 J1	0.6 J1
1E1B-05C	16.0-17.0	26-Sep-01	µg/kg	< 11	0.9 J1	< 11
1E1B-06B	15.5-16.5	26-Sep-01	µg/kg	< 9.2	0.9 J1	< 9.2
1E1B-06C	21.0-22.0	26-Sep-01	µg/kg	4 J1	< 10	< 10
1E1B-07B	11.0-12.0	26-Sep-01	µg/kg	< 10	5 J1	0.6 J1
1E1B-07C	21.0-22.0	26-Sep-01	µg/kg	< 11	4 J1	< 11
1E1B-08B	12.0-16.0	27-Sep-01	µg/kg	6 J	1 J	< 13
1E1B-08B (D)	12.0-16.0	27-Sep-01	µg/kg	< 9.8	0.7 J	< 9.8
1E1B-08C	26.0-27.0	27-Sep-01	µg/kg	< 11	0.8 J1	< 11

µg/kg = micrograms per kilogram
<2 = not detected at indicated value
(D) = duplicate sample
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
PRG = preliminary remediation goal, residential soil
* CAL-modified PRG
J = Estimated value
J1 = Detected concentration is below the practical quantitation limit (PQL) but above the method detection limit (MDL)
4-methyl-2-pentanone = methyl isobutyl keytone (MIBK)

Table 3-2
Site 1E-1 SVOCs Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Diethyl Phthalate
			MDL:	41-87
			PQL:	520-650
			PRG:	4.9E+07
1E1B-01A	0.0-1.0	26-Sep-01	µg/kg	< 540
1E1B-01B	15.0-19.0	26-Sep-01	µg/kg	< 530
1E1B-02A	0.0-1.0	26-Sep-01	µg/kg	< 530
1E1B-02B	18.0-19.0	26-Sep-01	µg/kg	< 560
1E1B-02C	21.0-22.0	26-Sep-01	µg/kg	< 570
1E1B-03A	0.0-1.0	27-Sep-01	µg/kg	< 590
1E1B-03B	10.0-14.0	27-Sep-01	µg/kg	< 580
1E1B-03B (D)	10.0-14.0	27-Sep-01	µg/kg	< 580
1E1B-03C	21.0-22.0	27-Sep-01	µg/kg	< 610
1E1B-04A	0.0-1.0	27-Sep-01	µg/kg	< 570
1E1B-04B	14.0-15.0	27-Sep-01	µg/kg	< 620
1E1B-04C	20.0-22.0	27-Sep-01	µg/kg	< 650
1E1B-05A	0.0-1.0	26-Sep-01	µg/kg	< 520
1E1B-05B	11.0-12.0	26-Sep-01	µg/kg	< 540
1E1B-05C	16.0-17.0	26-Sep-01	µg/kg	< 630
1E1B-06A	0.0-1.0	26-Sep-01	µg/kg	< 540
1E1B-06A (D)	0.0-1.0	26-Sep-01	µg/kg	< 600
1E1B-06B	15.5-16.5	26-Sep-01	µg/kg	< 520
1E1B-06C	21.0-22.0	26-Sep-01	µg/kg	96 J1
1E1B-07A	0.0-1.0	26-Sep-01	µg/kg	< 640
1E1B-07B	11.0-12.0	26-Sep-01	µg/kg	< 530
1E1B-07C	21.0-22.0	26-Sep-01	µg/kg	< 540
1E1B-08A	0.0-1.0	27-Sep-01	µg/kg	< 520
1E1B-08B	12.0-16.0	27-Sep-01	µg/kg	< 610
1E1B-08B (D)	12.0-16.0	27-Sep-01	µg/kg	< 570
1E1B-08C	26.0-27.0	27-Sep-01	µg/kg	96 J1

µg/kg = micrograms per kilogram

<2 = not detected at indicated value

(D) = duplicate sample

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

PRG = preliminary remediation goal, residential soil

J1 = Detected concentration is below the practical quantitation limit (PQL) but above the method detection limit (MDL)

Table 3-3
Site 1E-1 Dioxins and Furans Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	1 2 3,4,6,7,8,9-OCDD	1 2 3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-HxCDF	1 2 3,6,7,8-HxCDD	1 2 3,6,7,8-HxCDF	1 2 3,7,8,9-HxCDD	1 2 3,7,8,9-HxCDF	1,2,3,7,8-PeCDD	1 2 3,7,8-PeCDF	2 3 4,6,7,8-HxCDF	2 3 4,7,8-PeCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	2,3,7,8-TCDD Toxicity Equivalents (Including NDs)(1)	2,3,7,8-TCDD Toxicity Equivalents (ND = 0)(2)
		Method SW8290 MDL:	pg/g	230-3.33	220-2.52	91-1.41	180-2.02	52-2.72	86-1.82	70-1.82	58-1.51	94-1.72	70-2.22	70-4.84	66-1.92	140-1.82	90-3.23	83-1.82	21-0.65	34-0.78	NA	NA
		Method SW8290 PQL:	pg/g	1-1.9	1-1.5	1-0.7	1-0.4	1-0.5	1-0.3	1-0.2	1-0.4	1-0.2	1-0.3	1-0.3	1-0.3	1-0.2	1-0.2	1-0.2	1-0.2	1-0.3	NA	NA
		Method SW8280A MDL:	pg/g	230-260	220-260	91-860	180-210	52-60	86-100	70-81	58-70	94-960	70-81	70-81	66-77	140-160	90-110	83-97	21-24	34-40	NA	NA
		Method SW8280A PQL:	pg/g	1-70	1-60	1-70	1-80	1-80	1-40	1-70	1-50	1-70	1-40	1-70	1-80	1-40	1-80	1-50	1-60	1-40	NA	NA
		PRG:	pg/g	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	3.9	NE	NE	NE
Method SW8290																						
1E1B-02A	0.0 - 1.0	26-Sep-01	pg/g	< 2.9 J	< 0.25 J	0.49 J	0.31 J	0.1 R	0.1 R	0.2 J	0.1 R	0.14 J	0.1 R	0.1 R	0.1 R	0.08 R	0.13 J	0.16 J	0.1 R	0.35 J	0.37	0.17
1E1B-03A	0.0 - 1.0	27-Sep-01	pg/g	1.6 R	1.3 R	0.6 R	0.3 R	0.4 R	0.2 R	0.22 J	0.3 R	0.2 R	0.2 R	0.2 R	0.2 R	0.1 R	0.2 R	0.09 J	0.19 J	0.24 J	0.53	0.28
1E1B-03B	10.0 - 14.0	27-Sep-01	pg/g	< 1.8 J	0.2 R	0.34 J	0.1 R	0.2 R	0.2 R	0.1 R	0.2 R	0.15 J	0.1 R	0.1 R	0.2 R	0.1 R	0.1 R	0.12 J	0.2 R	0.64 J	0.53	0.14
1E1B-04A	0.0 - 1.0	27-Sep-01	pg/g	< 0.86 J	< 0.26 J	0.16 J	0.08 R	0.1 R	0.1 R	0.19 J	0.1 R	0.2 J	0.09 R	< 0.25 J	0.08 R	0.04 R	0.06 R	0.04 R	0.07 R	0.06 R	0.24	0.07
1E1B-07A	0.0 - 1.0	26-Sep-01	pg/g	100 J	10 J	10.7 J	14.8 J	0.5 R	0.3 R	1.7 J	0.69 J	0.87 J	0.77 J	0.3 R	0.3 R	0.46 J	1.1 J	0.73 J	0.2 R	0.3 R	1.7	1.3
1E1B-07B	11.0 - 12.0	26-Sep-01	pg/g	< 4.7 J	< 0.27 J	1.2 J	0.49 J	0.2 R	0.1 R	0.36 J	0.18 J	0.19 J	0.3 J	0.1 R	0.1 R	0.19 J	0.15 J	0.17 J	0.1 R	0.63 J	0.47	0.29
1E1B-07C	21.0 - 22.0	26-Sep-01	pg/g	< 2.9 J	1.5 R	< 0.94 J	0.85 J	0.5 R	0.3 R	0.67 J	0.4 R	0.38 J	0.3 R	0.3 R	0.3 R	0.44 J	0.42 J	0.67 J	0.2 R	1 J	1.1	0.61
1E1B-08A	0.0 - 1.0	27-Sep-01	pg/g	< 3.6 J	< 0.44 J	0.43 J	0.17 J	0.2 R	0.2 J	0.28 J	0.2 J	0.15 J	0.2 J	< 0.25 J	0.23 J	0.24 J	0.14 J	0.09 J	0.2 R	0.1 R	0.54	0.30
Method SW8280A																						
1E1B-01A	0.0 - 1.0	26-Sep-01	pg/g	< 20	< 10	< 10	< 7	< 8	< 8	< 5	< 8	< 5	< 8	< 5	< 10	< 8	< 6	< 8	< 7	< 6	21.8	0
1E1B-01B	15.0 - 19.0	26-Sep-01	pg/g	40 EMPC	< 10	< 10	< 5	< 6	< 6	< 4	< 6	< 4	< 6	< 4	< 9	< 6	< 4	< 6	< 6	< 5	18.0	0
1E1B-02A	0.0 - 1.0	26-Sep-01	pg/g	< 50	< 40	< 40	< 20	< 20	< 20	< 10	< 30	< 20	< 30	< 20	< 40	< 30	< 20	< 30	< 30	< 20	84.4	0
1E1B-02B	18.0 - 19.0	26-Sep-01	pg/g	110	< 40	< 50	< 20	< 30	< 30	< 20	< 30	< 20	< 30	< 20	< 50	< 30	< 20	< 30	< 30	< 30	92.7	0.11
1E1B-02C	21.0 - 22.0	26-Sep-01	pg/g	< 60	< 50	< 50	< 20	< 30	< 30	< 20	< 40	< 20	< 30	< 20	< 50	< 30	< 20	< 30	< 40	< 30	103.6	0
1E1B-03A	0.0 - 1.0	27-Sep-01	pg/g	130	< 40	< 50	< 20	< 30	< 30	< 20	< 30	< 20	< 30	< 20	< 40	< 30	< 20	< 30	< 30	< 20	86.2	0.13
1E1B-03B	10.0 - 14.0	27-Sep-01	pg/g	< 50	< 40	< 40	< 20	< 20	< 30	< 10	< 30	< 20	< 30	< 20	< 40	< 30	< 20	< 30	< 30	< 30	86.4	0
1E1B-03B (D)	10.0 - 14.0	27-Sep-01	pg/g	< 20	< 20	< 10 J	< 30 J	40 R	< 9	< 20	< 10	< 20	< 9	30 R	< 10	< 8	30 R	< 9	< 8	< 6	32.1	0
1E1B-03C	21.0 - 22.0	27-Sep-01	pg/g	40 EMPC	< 40	< 50	< 20	< 20	< 30	< 20	< 30	< 20	< 30	< 20	< 50	< 30	< 20	< 30	< 40	< 30	102.5	0.04
1E1B-04A	0.0 - 1.0	27-Sep-01	pg/g	< 40	< 40	< 30	< 60	70 R	< 20	< 60	< 30	< 60	< 20	60 R	< 50	< 30	60 R	< 30	< 30	< 30	107.2	0
1E1B-04B	14.0 - 15.0	27-Sep-01	pg/g	< 60	< 50	< 50	< 70	80 R	< 30	< 60	< 40	< 70	< 30	70 R	< 50	< 30	70 R	< 30	< 40	< 30	123.6	0
1E1B-04C	20.0 - 22.0	27-Sep-01	pg/g	< 60	< 50	< 50	< 80	80 R	< 30	< 70	< 40	< 70	< 30	70 R	< 50	< 30	80 R	< 40	< 40	< 30	130.7	0
1E1B-05A	0.0 - 1.0	26-Sep-01	pg/g	< 10	< 10	< 10	< 5	< 6	< 6	< 4	< 7	< 4	< 6	< 4	< 10	< 6	< 4	< 7	< 6	< 5	19.0	0
1E1B-05B	11.0 - 12.0	26-Sep-01	pg/g	< 10	< 10	< 10	< 5	< 6	< 7	< 4	< 7	< 4	< 7	< 4	< 10	< 7	< 4	< 7	< 7	< 5	20.3	0
1E1B-05C	16.0 - 17.0	26-Sep-01	pg/g	250	70 EMPC	< 10	< 7	< 9	< 10	< 5	< 10	< 5	< 10	< 6	< 10	< 9	< 6	< 10	< 8	< 7	24.9	0.32
1E1B-06A	0.0 - 1.0	26-Sep-01	pg/g	< 10	< 10	< 9	< 5	< 6	< 6	< 4	< 6	< 4	< 6	< 4	< 10	< 6	< 4	< 6	< 6	< 5	18.4	0
1E1B-06A (D)	0.0 - 1.0	26-Sep-01	pg/g	< 40	< 40	< 40	< 20	< 20	< 20	< 20	< 30	< 20	< 20	< 20	< 40	< 30	< 20	< 30	< 30	< 30	85.4	0
1E1B-06B	15.5 - 16.5	26-Sep-01	pg/g	40	< 20	< 10	< 8	< 10	< 10	< 6	< 10	< 6	< 10	< 6	< 10	< 9	< 7	< 10	< 8	< 7	25.0	0
1E1B-06C	21.0 - 22.0	26-Sep-01	pg/g	70	< 50	< 40	< 20	< 30	< 20	< 20	< 30	< 20	< 30	< 20	< 40	< 30	< 20	< 30	< 30	< 30	85.5	0.07
1E1B-07A	0.0 - 1.0	26-Sep-01	pg/g	80	< 40	< 40	< 20	< 20	< 20	< 10	< 30	< 20	< 30	< 20	< 50	< 30	< 20	< 30	< 40	< 30	100.4	0.08
1E1B-07B	11.0 - 12.0	26-Sep-01	pg/g	90	< 40	< 40	< 20	< 30	< 20	< 20	< 30	< 20	< 30	< 20	< 50	< 30	< 20	< 30	< 40	< 30	101.5	0.09
1E1B-07C	21.0 - 22.0	26-Sep-01	pg/g	< 70	< 60	< 70	< 40	< 40	< 40	< 30	< 50	< 30	< 40	< 40	< 80	< 40	< 30	< 50	< 60	< 40	158.6	0
1E1B-08A	0.0 - 1.0	27-Sep-01	pg/g	< 40	< 40	< 30	< 50	60 R	< 20	< 40	< 30	< 50	< 20	50 R	< 40	< 20	50 R	< 30	< 30	< 20	95.5	0
1E1B-08B	12.0 - 16.0	27-Sep-01	pg/g	< 20	< 20	< 20	< 30	40 R	< 10	< 20	< 10	< 20	< 10	20 R	< 10	< 10	30 R	< 10	< 10	< 8	34.2	0
1E1B-08B (D)	12.0 - 16.0	27-Sep-01	pg/g	< 20	< 20	< 10 J	< 40 J	40 R	< 10	< 30	< 10	< 30	< 10	30 R	< 10	< 10	30 R	< 10	< 8	< 7	35.1	0
1E1B-08C	26.0 - 27.0	27-Sep-01	pg/g	< 30	< 20	< 20	< 30	40 R	< 10	< 20	< 10	< 20	< 10	30 R	< 20	< 10	30 R	< 10	< 10	< 10	40.5	0

pg/g = picogram/gram
<2 = not detected at indicated value
ND = "Not Detected"
Toxicity equivalents were calculated using toxicity equivalency factors from CalEPA, 1996 and USEPA, 1989 (I-TEFs).
Mean rural background value for 2,3,7,8-TCDD toxicity equivalents is 4.1 pg/g (USEPA, 2000b).
(1) "Not-detected" congeners are included in the calculation of toxicity equivalents assuming they are present at the reporting limit.
(2) "Not-detected" congeners are not included in the calculation of toxicity equivalents
EMPC = Estimated Maximum Potential Concentration. EMPC values are calculated for compounds which fall outside the recommended primary/secondary ion ratio. The EMPC value is calculated using the midpoint of the recommended ion ratio range.
R = LCS recovery exceeded acceptance criteria or holding time exceeded (data are considered usable; refer to Section 3.1 3.2 and Appendix F, Data Quality Assessment)

MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
PRG = preliminary remediation goal, residential soil
B = compound detected in the associated laboratory method blank
J = Estimated value reported is below the "reporting limit" and above the estimated detection limit.
(D) = Duplicate Sample
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
NA = not applicable
NE = not established

HxCDD = hexachlorodibenzo-p-dioxin
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran

Table 3-4
Site 1E-1 Total Petroleum Hydrocarbons Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Gasoline	Diesel	Motor Oils
				M8015V	M8015E	M8015E
1E1B-01A	0.0-1.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-01B	15.0-19.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-02A	0.0-1.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-02B	18.0-19.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-02C	21.0-22.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-03A	0.0-1.0	27-Sep-01	mg/kg	0.01 J	< 12	10 J
1E1B-03B	10.0-14.0	27-Sep-01	mg/kg	< 1.2	3 J	6 J
1E1B-03B (D)	10.0-14.0	27-Sep-01	mg/kg	< 1.2	< 12	< 12
1E1B-03C	21.0-22.0	27-Sep-01	mg/kg	< 1.2	< 12	< 12
1E1B-04A	0.0-1.0	27-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-04B	14.0-15.0	27-Sep-01	mg/kg	0.01 J1	< 12	< 12
1E1B-04C	20.0-22.0	27-Sep-01	mg/kg	< 1.3	< 13	< 13
1E1B-05A	0.0-1.0	26-Sep-01	mg/kg	< 1	< 10	8 J1
1E1B-05B	11.0-12.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-05C	16.0-17.0	26-Sep-01	mg/kg	< 1.3	< 13	< 13
1E1B-06A	0.0-1.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-06A (D)	0.0-1.0	26-Sep-01	mg/kg	< 1.2	< 12	< 12
1E1B-06B	15.5-16.5	26-Sep-01	mg/kg	< 1	< 10	< 10
1E1B-06C	21.0-22.0	26-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-07A	0.0-1.0	26-Sep-01	mg/kg	< 1.3	< 13	< 13
1E1B-07B	11.0-12.0	26-Sep-01	mg/kg	< 1.1	< 11	4 J1
1E1B-07C	21.0-22.0	26-Sep-01	mg/kg	0.2 J1	< 11	< 11
1E1B-08A	0.0-1.0	27-Sep-01	mg/kg	< 1	< 10	< 10
1E1B-08B	12.0-16.0	27-Sep-01	mg/kg	< 1.2	< 12	< 12
1E1B-08B (D)	12.0-16.0	27-Sep-01	mg/kg	< 1.1	< 11	< 11
1E1B-08C	26.0-27.0	27-Sep-01	mg/kg	< 1.2	< 12	< 12

mg/kg = milligrams per kilogram

<2 = not detected at indicated value

(D) = duplicate sample

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

J = Estimated value

J1 = Detected concentration is below the practical quantitation limit (PQL) but above the method detection limit (MDL)

Table 3-5
Site 1E-1 Pesticides Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Method	Units	P,P'-DDE	P,P'-DDT
			MDL:	µg/kg	0.28-0.35	0.21-0.26
			PQL:	µg/kg	3.1-3.9	3.1-3.9
			PRG:	µg/kg	1700	1700
1E1B-01A	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-01B	15.0-19.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-02A	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-02B	18.0-19.0	26-Sep-01	SW8081A	µg/kg	< 3.4	< 3.4
1E1B-02C	21.0-22.0	26-Sep-01	SW8081A	µg/kg	< 3.4	< 3.4
1E1B-03A	0.0-1.0	27-Sep-01	SW8081A	µg/kg	5	6
1E1B-03B	10.0-14.0	27-Sep-01	SW8081A	µg/kg	< 3.5	< 3.5
1E1B-03B (D)	10.0-14.0	27-Sep-01	SW8081A	µg/kg	< 3.5	< 3.5
1E1B-03C	21.0-22.0	27-Sep-01	SW8081A	µg/kg	< 3.6	< 3.6
1E1B-04A	0.0-1.0	27-Sep-01	SW8081A	µg/kg	< 3.4	< 3.4
1E1B-04B	14.0-15.0	27-Sep-01	SW8081A	µg/kg	< 3.7	< 3.7
1E1B-04C	20.0-22.0	27-Sep-01	SW8081A	µg/kg	< 3.9	< 3.9
1E1B-05A	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.1	< 3.1
1E1B-05B	11.0-12.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-05C	16.0-17.0	26-Sep-01	SW8081A	µg/kg	< 3.8	< 3.8
1E1B-06A	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-06A (D)	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.6	< 3.6
1E1B-06B	15.5-16.5	26-Sep-01	SW8081A	µg/kg	< 3.1	< 3.1
1E1B-06C	21.0-22.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-07A	0.0-1.0	26-Sep-01	SW8081A	µg/kg	< 3.8	< 3.8
1E1B-07B	11.0-12.0	26-Sep-01	SW8081A	µg/kg	< 3.2	< 3.2
1E1B-07C	21.0-22.0	26-Sep-01	SW8081A	µg/kg	< 3.3	< 3.3
1E1B-08A	0.0-1.0	27-Sep-01	SW8081A	µg/kg	< 3.1	< 3.1
1E1B-08B	12.0-16.0	27-Sep-01	SW8081A	µg/kg	< 3.6	< 3.6
1E1B-08B (D)	12.0-16.0	27-Sep-01	SW8081A	µg/kg	< 3.4	< 3.4
1E1B-08C	26.0-27.0	27-Sep-01	SW8081A	µg/kg	< 3.5	< 3.5

µg/kg = micrograms per kilogram

<2 = not detected at indicated value

PRG = preliminary remediation goal, residential soil

(D) = duplicate sample

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

Table 3-6
Site 1E-1 Metals Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction Method	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			TTLC MDL:	mg/kg	1.7 - 2	0.072 - 0.091	0.077 - 0.097	0.039 - 0.049	0.0077 - 0.0097	0.012 - 0.016	11 - 14	0.0067 - 0.0084	0.022 - 0.027	0.083 - 0.1	0.38 - 0.47	0.04 - 0.051	0.75 - 0.93	0.024 - 0.029	0.0045 - 0.0058	0.032 - 0.04	0.028 - 0.035	1.9 - 8.7	0.088 - 0.11	0.014 - 0.018	15 - 68	0.052 - 0.065	0.014 - 0.018	0.036 - 0.045
			TTLC PQL:	mg/kg	5.2-6.4	5.2-6.5	0.31-0.39	1-1.3	0.21-0.26	0.21-0.26	15-19	0.52-0.65	0.52-0.65	0.52-0.65	3.1-3.8	0.31-0.39	10-13	0.52-0.64	0.21-0.26	0.21-0.26	0.31-0.39	22-100	0.52-0.65	0.52-0.65	110-510	0.52-0.65	0.52-0.65	0.52-0.65
			TCLP MDL:	µg/L	7.8	2.8-5.8	3-3.2	0.92	0.14-0.3	0.46-0.58	NR	0.26-0.52	0.7-0.82	3.2-6	6.8	1.5-1.6	9.6-9.6	0.74-0.74	0.058	1.2-2.2	1.1-1.3	9.8	3.4-4.6	0.22-0.56	280	2-3.2	0.54-0.7	1.4-8
			TCLP PQL:	µg/L	200	20	10	20	4	4	NR	10	10	20	100	10	200	10	0.5	10	10	800	20	20	4000	20	20	20
			Site 1E RG (0-5):	mg/kg	20999 [a]	8.8 [a]	4.3 [b]	NA	NA	9 [b]	NA	33 [b]	13 [a]	26 [a]	26459 [a]	29 [a]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	960 [c]
			Site 1E RG (5-10):	mg/kg	NA	31 [b]	4.3 [b]	NA	NA	9 [b]	NA	33 [b]	NA	NA	NA	130 [b]	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
			RCRA Hazardous Waste TTLC Limit [d]:	mg/kg	NE	500	500	10,000	75	100	NE	500 [f]	8,000	2,500	NE	1,000	NE	NE	20	3,500	2,000	NE	100	500	NE	700	2,400	5,000
			RCRA Hazardous Waste TCLP Limit [e]:	µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	200	NE	NE	NE	1,000	5,000	NE	NE	NE	NE
1E1B-01A	0.0-1.0	26-Sep-01	TTLC	mg/kg	11600	< 0.43	2.9	59.8 J	0.21 J1	0.18 J1	7640	12.9 J	5.3 J	9	12000	14.2 J	2430	142	0.034 J1	< 0.22	6.6 J	1260	< 0.54	< 0.54	345 J	< 0.54	21.9	58.5 J
1E1B-01B	15.0-19.0	26-Sep-01	TTLC	mg/kg	18000	< 5.3	1.3	216 J	< 0.21	0.94	1270	24.5 J	50.5 J	12.8	20800	2.3 J	7990	1180	0.019 J1	< 0.19	15.9 J	5780	< 0.73	< 0.53	<430	< 0.53 J	49.5	78.5 R
1E1B-01B	15.0-19.0	26-Sep-01	TCLP	µg/L	NR	< 20	< 10	216	< 0.44	< 4	NR	< 3.3	< 1.3	< 7.6	NR	< 1.8	NR	NR	0.11 U	< 6.7	< 8.9	NR	< 20	< 20	NR	< 5.2	< 4.6	24.1
1E1B-02A	0.0-1.0	26-Sep-01	TTLC	mg/kg	9710	< 0.19	2.3	72.9 J	0.62	0.033 J1	18400	8.3 J	2.7 J	4.6	7230	4.1 J	3540	150	0.021 J1	< 0.21	5.6 J	2380	< 0.14	< 0.53	445	< 0.53	14.5	24.3 J
1E1B-02B	18.0-19.0	26-Sep-01	TTLC	mg/kg	14700	< 5.6	1.8	124	< 0.22	0.11 J	3330	27.8	8	13.4	18900	3 J	7700	208	< 0.22	< 0.2	10.5	6190	1.5	< 0.56	<450	< 0.56	42.1	65.4
1E1B-02C	21.0-22.0	26-Sep-01	TTLC	mg/kg	15800	< 5.7	5	149	< 0.23	0.82	3540	28.8	20.8	17.3	22200	5 J	8250	506	0.055 J	0.51	21.8	6230	< 0.22	< 0.57	<460	< 0.57	40.1	88.6
1E1B-03A	0.0-1.0	27-Sep-01	TTLC	mg/kg	NR	< 5.9	2	80	< 0.22	0.049 J1	NR	21.7	6.9	< 8.6	18700	6.1	NR	NR	0.028 J1	< 0.23	9.8	5300	< 0.59	< 0.59	790	< 0.59	37.2	34.9
1E1B-03B	10.0-14.0	27-Sep-01	TTLC	mg/kg	NR	< 5.8	3.1	159	< 0.23	0.36	NR	26.5	10.3	16.8	19300	2.9	NR	NR	< 0.23	< 1.7	17	5420	< 0.58	< 0.58	449 J	< 0.58	44.3	89.9
1E1B-03B (D)	10.0-14.0	27-Sep-01	TTLC	mg/kg	NR	< 5.8	6	158	< 0.23	0.38	NR	29.2	10.2	16.7	17900	4.8	NR	NR	0.017 J1	< 0.84	16.8	4180	< 0.58	< 0.58	237 J	< 0.58	45.8	82.5
1E1B-03B	10.0-14.0	27-Sep-01	TCLP	µg/L	769	< 20	< 10	390	< 0.23	1.1 J1	132000	7.3 J1	< 1.6	7.5 J1	7.18	< 10	25300	220	< 0.23	< 0.85	13.4	7250	6.1 J1	< 20	< 4000	< 3.4	2.3 J1	20 J1
1E1B-03C	21.0-22.0	27-Sep-01	TTLC	mg/kg	NR	< 0.43	3.9	94	< 0.24	0.31	NR	26	7.6	16.4	26000	3.1	NR	NR	0.019 J1	< 1.7	13.5	5660	< 0.61	< 0.61	<480	< 0.61	43.4	69.3
1E1B-04A	0.0-1.0	27-Sep-01	TTLC	mg/kg	NR	< 5.7	2.5	69.5	< 0.69	0.057 J1	NR	9.8	< 2.8	< 5.3	7600	4	NR	NR	< 0.23	< 0.23	6.3	2320	< 0.57	< 0.57	460	< 0.57	14.6	26
1E1B-04B	14.0-15.0	27-Sep-01	TTLC	mg/kg	NR	< 6.2	0.67	111	< 0.25	< 0.25	NR	26.7	7.3	11.4	18900	1.8	NR	NR	< 0.25	< 0.25	6.5	6890	< 0.62	< 0.62	<500	< 0.62	33.4	67
1E1B-04C	20.0-22.0	27-Sep-01	TTLC	mg/kg	NR	< 6.5	2	120	< 0.26	0.067 J1	NR	30.9	10.5	17	34700	1.6	NR	NR	0.032 J1	< 0.55	12	7220	< 0.65	< 0.65	305 J	< 0.65	43.7	86.1
1E1B-05A	0.0-1.0	26-Sep-01	TTLC	mg/kg	9530	< 5.2	1.3	72.8 J	< 0.21	0.072 J1	1770	12.8 J	5.6 J	7.2	9760	3.5 J	2520	134	0.032 J1	< 0.21	6.5 J	1340	< 0.52	< 0.52	<410	< 0.52	26	26.1 J
1E1B-05B	11.0-12.0	26-Sep-01	TTLC	mg/kg	8860	< 5.4	0.89	39.3 J	< 0.22	0.045 J1	646	8.7 J	3.8 J	2.9	8470	1 J	2040	91.3	0.025 J1	< 0.22	3.3 J	1250	< 0.2	< 0.54	<430	< 0.54	22.4	20.2 J
1E1B-05C	16.0-17.0	26-Sep-01	TTLC	mg/kg	16800	< 6.3	3.5	134 J	< 0.25	0.089 J1	2110	34.1 J	8.1 J	15.7	24900	2.3 J	8490	215	0.034 J1	< 0.34	11.1 J	7480	< 0.63	< 0.63	<510	< 0.63	50.7	81.2 J
1E1B-06A	0.0-1.0	26-Sep-01	TTLC	mg/kg	9530	< 0.19	1.8	188 J	0.33	0.12 J1	12500	9.5 J	3.5 J	14	8010	13.8 J	2850	142	0.034 J1	< 0.21	6 J	2420	< 0.48	< 0.54	435	< 0.54	17.5	43.8 J
1E1B-06A (D)	0.0-1.0	26-Sep-01	TTLC	mg/kg	7110	< 6	1.7	50.6	< 0.24	0.064 J1	1350	19.5	4.8	6.2	9250	1.3 J	2150	137	< 0.24	0.52	5.1	5990	< 0.19	< 0.6	932	< 0.6	23.9	23
1E1B-06B	15.5-16.5	26-Sep-01	TTLC	mg/kg	5210	< 5.2	0.93	35.1 J	< 0.21	0.11 J1	507	5.9 J	4.2 J	2.6	6920	1 J	1860	138	0.025 J1	< 0.21	2.2 J	1510	< 0.15	< 0.52	<420	< 0.52	19	19.2 J
1E1B-06C	21.0-22.0	26-Sep-01	TTLC	mg/kg	10600	< 5.4	2.7	87.6 J	< 0.22	0.43	842	10.6 J	9.3 J	5.7	13300	1.4 J	3190	229	0.034 J1	< 0.22	6.7 J	1290	< 0.76	< 0.54	135	< 0.54	34.8	34.6 J
1E1B-07A	0.0-1.0	26-Sep-01	TTLC	mg/kg	11100	< 0.1	2.8	82.2	0.67	0.042 J	21900	10.4	3.3	5.5	8110	4.4 J	3980	168	0.046 J	< 0.26	7.1	2430	< 0.64	< 0.64	470 J	< 0.64	15.8	27.9
1E1B-07B	11.0-12.0	26-Sep-01	TTLC	mg/kg	11000	< 5.3	1.9	27.3	0.086 J	0.022 J	621	12.2	4.3	4.1	9600	3.2 J	1490	76.4	0.059 J	< 0.21	6.3	1040	< 0.37	< 0.53	63.9 J	< 0.53	25.1	12.1
1E1B-07C	21.0-22.0	26-Sep-01	TTLC	mg/kg	14800	< 5.4	2.5	117	< 0.22	0.16 J	2820	27.4	7.8	12.8	21700	4.1 J	7360	214	0.044 J	0.65	11.4	6140	< 0.54	< 0.54	<430	< 0.54	36.3	69
1E1B-08A	0.0-1.0	27-Sep-01	TTLC	mg/kg	NR	< 5.2	1.1	35.7	< 0.13	0.021 J1	NR	14.5	4.8	< 4.2	34700	2.7	NR	NR	0.014 J1	< 0.21	7	7220	< 0.52	< 0.52	305 J	< 0.52	25.9	15.2
1E1B-08B	12.0-16.0	27-Sep-01	TTLC	mg/kg	NR	< 6.1	4.1	99.4	< 0.24	0.33	NR	28.2	11.7	19.9	26900	3.7	NR	NR	0.021 J1	< 1.9	17.2	7390	< 0.47	< 0.61	<490	< 0.61	46.4	84
1E1B-08B (D)	12.0-16.0	27-Sep-01	TTLC	mg/kg	NR	< 5.7	6.5	143	< 0.052	0.34	NR	30.3	13.1	21.4	24900	4.9	NR	NR	0.055 J1	< 1	22.1	7080	< 0.57	< 0.57	<460	< 0.57	47	93.1
1E1B-08C	26.0-27.0	27-Sep-01	TTLC	mg/kg	NR	< 0.14	3.3	156	< 0.24	0.28	NR	30.9	8.7	16.7	21900	4.3	NR	NR	0.016 J1	< 0.24	16.3	7190	< 0.59	< 0.59	123 J	< 0.59	41.2	75.8

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
R = rejected result (percent recoveries and relative percent differences were not within the QC limits)

MDL = method detection limit, range shown where applicab RG = Remediation Goal
POL = practical quantification limit, range shown where app NA = not applicable
TCLP analysis
NE = not established
NR = not reported
(D) = duplicate sample

a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)
b) RG based on Background calculated for Human Health Risk Evaluation (SWDIV, 1996b)
b) RG based on PLE (SWDIV, 1996b)
d) Any waste is a hazardous waste if it contains a metal listed above at: 1) a total concentration that exceeds its Total Threshold Limit Concentration (TTLC) value;
2) a concentration, after a Waste Extraction Test (WET), that exceeds its Soluble Threshold Limit Concentration (STLC) value.
e) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), the extract from a representative sample of the waste contains any of the contaminants at concentrations equal to or greater than the respective value given in this table.
f) The TTLC value listed for chromium is the chromium IV value to be conservative; The chromium III (or compounds) TTLC value is 2,500 mg/kg

Table 3-7
Site 1E-1 SPLP Metals Compared to MCLs and Tap Water PRGs
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction Method	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			MDL:	µg/L	0	0-2.9	0-1.6	0.46	0-0.068	0-0.29	NA	0-0.26	0-0.35	0-3	0	0-0.73	0	0	0.058	0-1.1	0-0.67	0	0-2.3	0-0.11	0-0	0-1.6	0-0.35	0-4
			PQL:	µg/L	100	10	5	10	2	2	NA	5	5	10	50	5	100	5	0.500	5	5	400	10	10	2000	10	10	10
			MCL:	µg/L	200 [a]	6	50	1000	4	5	NE	50	NA	1300 [c]	300 [b]	15 [c]	NE	50 [a]	2	NE	100	NA	50	100 [a]	NA	2	15 [b]	5000 [a]
			PRG:	µg/L	36000	15	0.045	2600	73	18	NE	110	2200	1400	11000	NE	NE	880	11	180	730	NE	180	180	NE	2.6	260	11000
1E1B-01B	15.0-19.0	26-Sep-01	SPLP	µg/L	NR	10 R	17	174	2 R	< 0.7	NR	45.6	22.8	38.2	NR	13.7	NR	NR	0.22 J	< 7.9	30.4	NR	3.5 J1	10 R	NR	10 R	158	99.8
1E1B-03B	10.0-14.0	27-Sep-01	SPLP	µg/L	17700	< 10	< 4.4	NR	< 0.12	< 2	5570	26.7	< 5.3	13.8	17900	3.3 J1	7030	103	NA	< 7.8	13.3	3880	< 2.3	< 10	19800	< 10	47.5	47.2

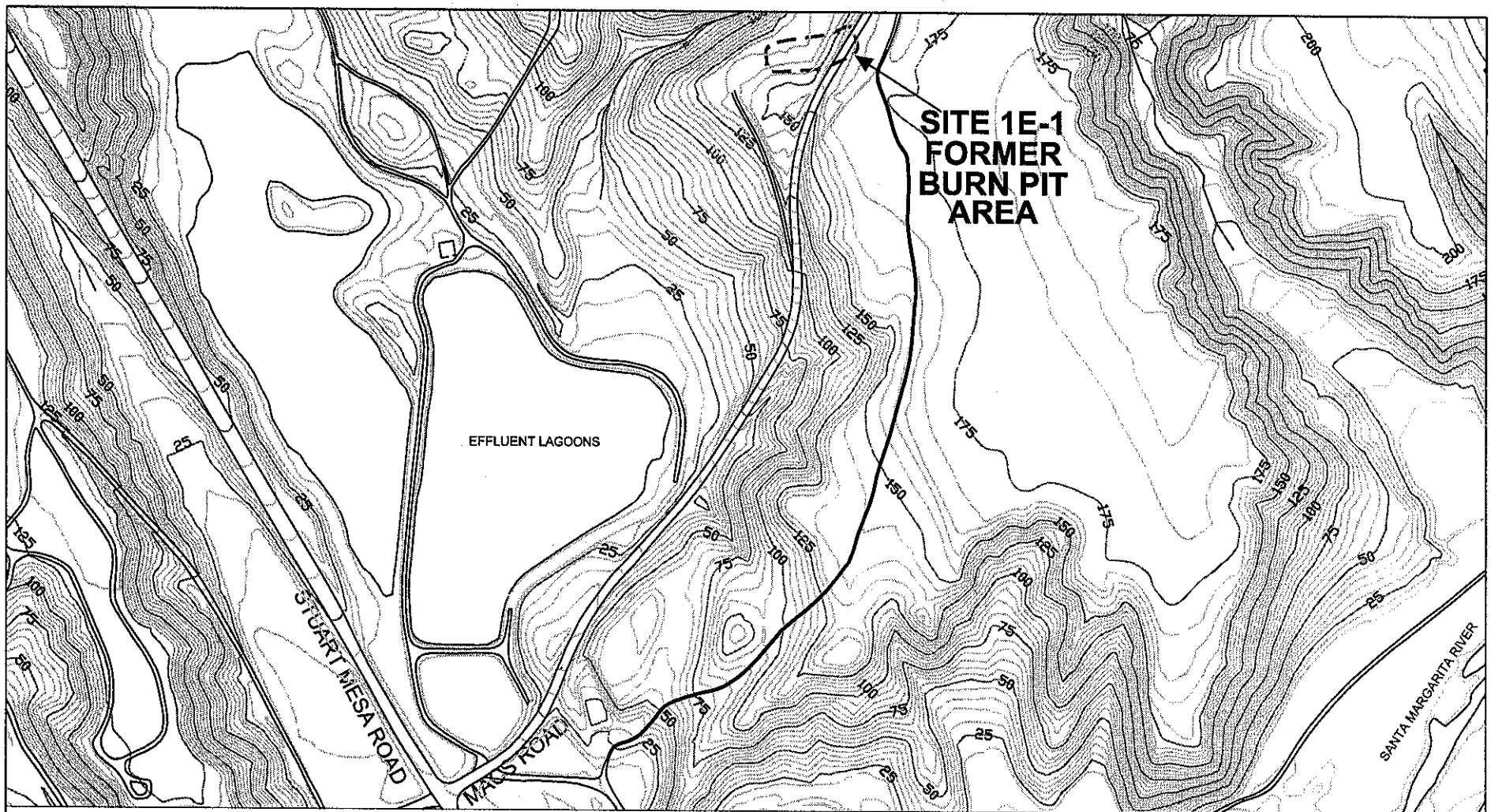
µg/L = micrograms per liter
J = Estimated value
<2 = not detected at indicated value
NA = not applicable
NE = not established
NR = not reported
PRG = preliminary remediation goal
MCL = Maximum Contaminant Level
a Secondary California Maximum Contaminant Level for drinking water (Title 22 CCR)
b Action Level (AL) = health-based advisory levels established by the California Department of Health Services (DHS) for chemicals in drinking water for which primary MCLs have not been adopted.
c Lead and copper are not regulated by MCLs, but in a Treatment Technique for water pipeline systems

MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable

Table 3-8
Site 1E-1 Summary of Human Health Screening-Level Evaluation
OU 4 Supplemental FS, MCB Camp Pendleton, California

Exposure Scenario	Total Cancer Risk[a]	Total Hazard Index[a]
Hypothetical Residential Receptor (0 - 10 ft bgs)[b]		
Arsenic	7×10^{-6}	< 0.1
2,3,7,8-TCDD	4×10^{-7}	-
All other detected analytes	$< 1 \times 10^{-7}$	< 0.1
Total (All COPCs)	**8×10^{-6}**	**< 0.1**

[a] As discussed in the text, soil samples collected at the surface (0 to 1 ft bgs) were assumed to be representative of the 0 to 10 ft bgs soil interval
[b] Source: Appendix I2



Legend

Site 1E-1 Former Burn Pit Area

N

0 500 1000

Scale in Feet

Figure 3-1

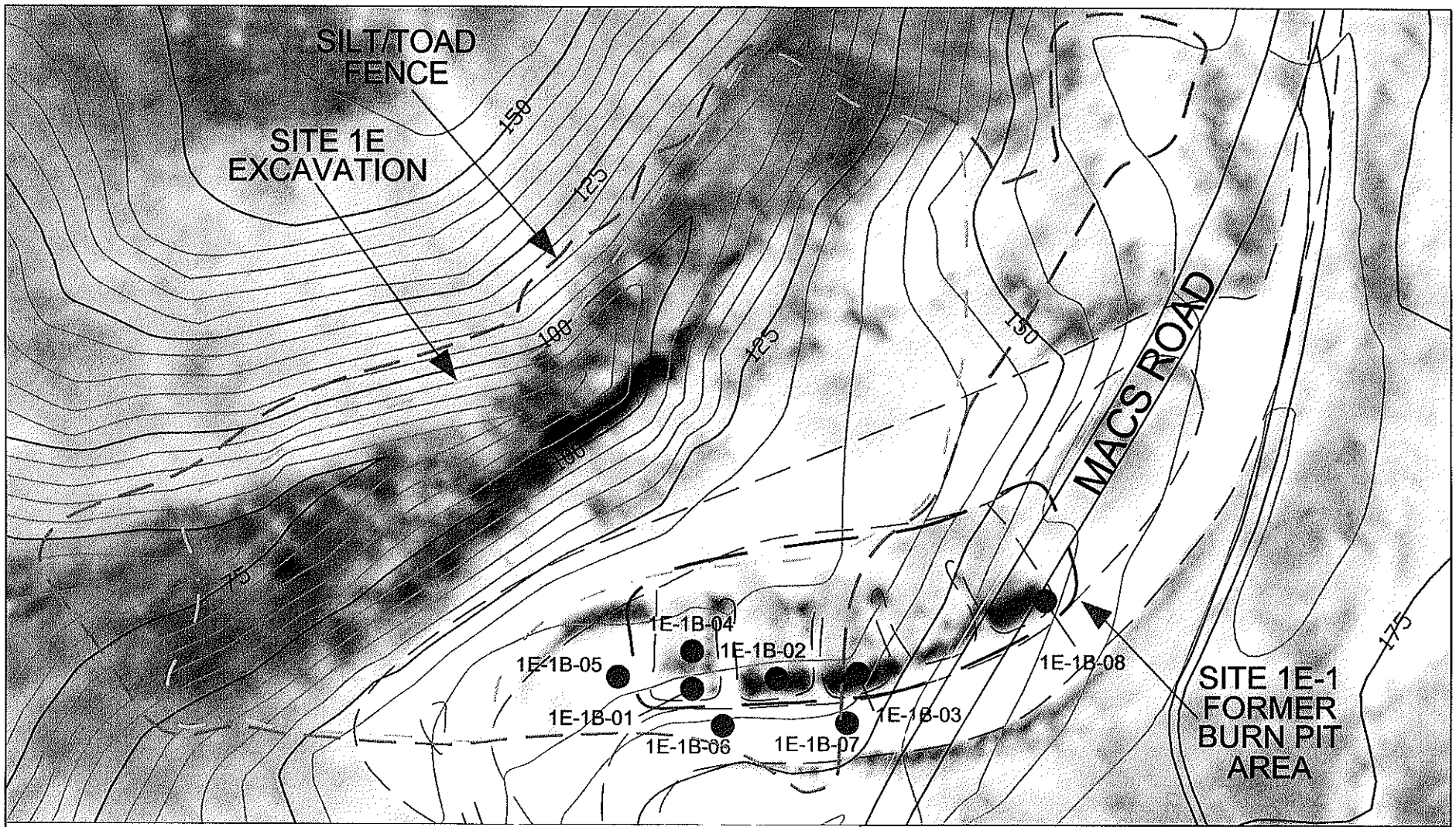
Site 1E-1
Location Map

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmise\ce\camppendleton\OU4FS\FSReport\3-1_S1E-1.dwg



Legend

- Former Burn Pit Area (Site 1E-1)
- Approximate Extent of Site 1E Excavation
- Approximate Location of Silt/Toad Fence
- Soil Boring Location

N

0 100 200

Scale in Feet

Figure 3-2

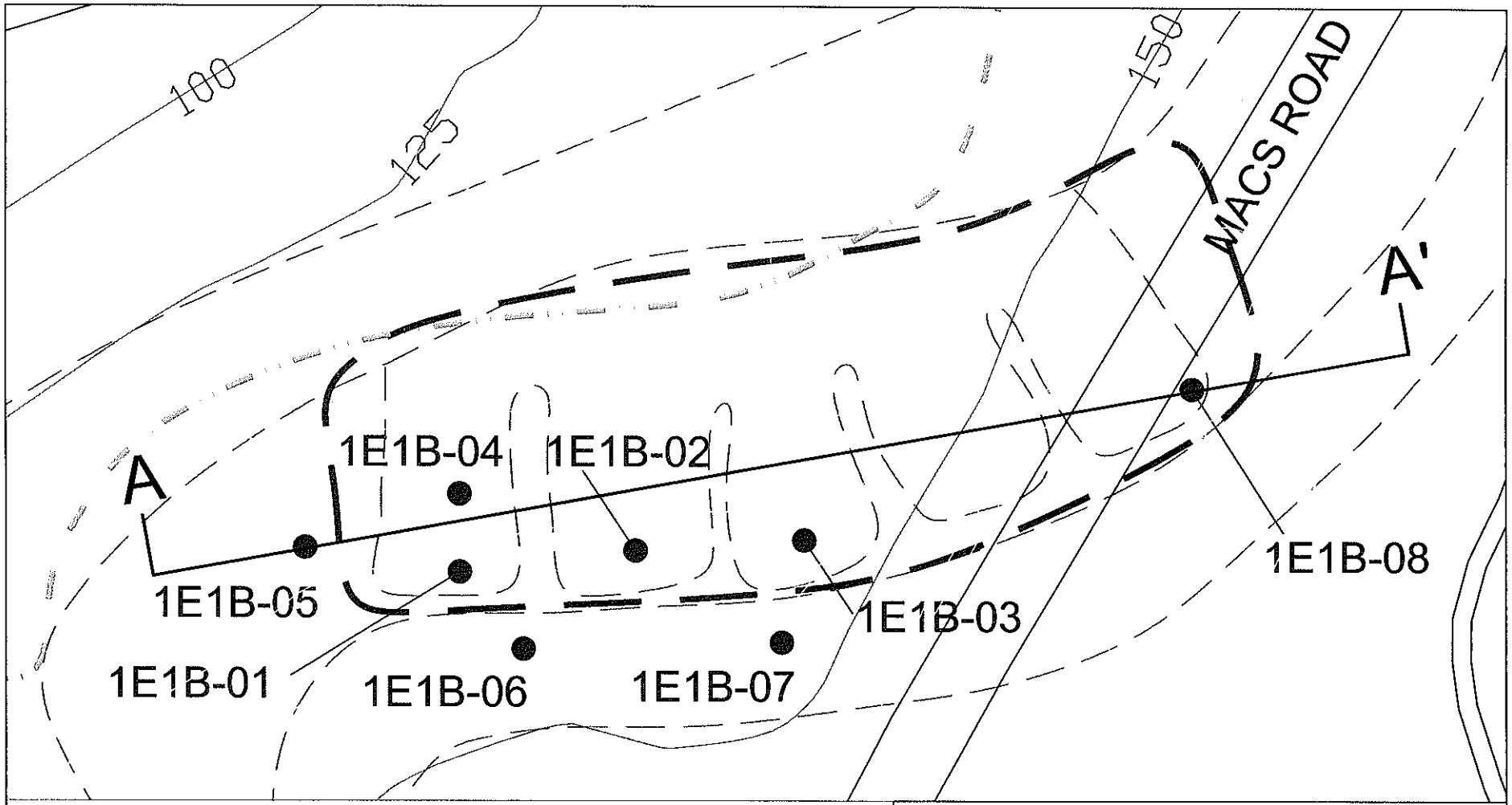
Site 1E-1
1970 Aerial Photograph with Site and Boring Locations

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\camppendleton\OU4FS\FSReport\3-2_S1E-1.dwg



Legend

- Former Burn Pits and Road
- Site 1E Excavation
- Soil Boring Location
- A — A' Cross Section Line

N

0 50 100

Scale in Feet

Figure 3-3

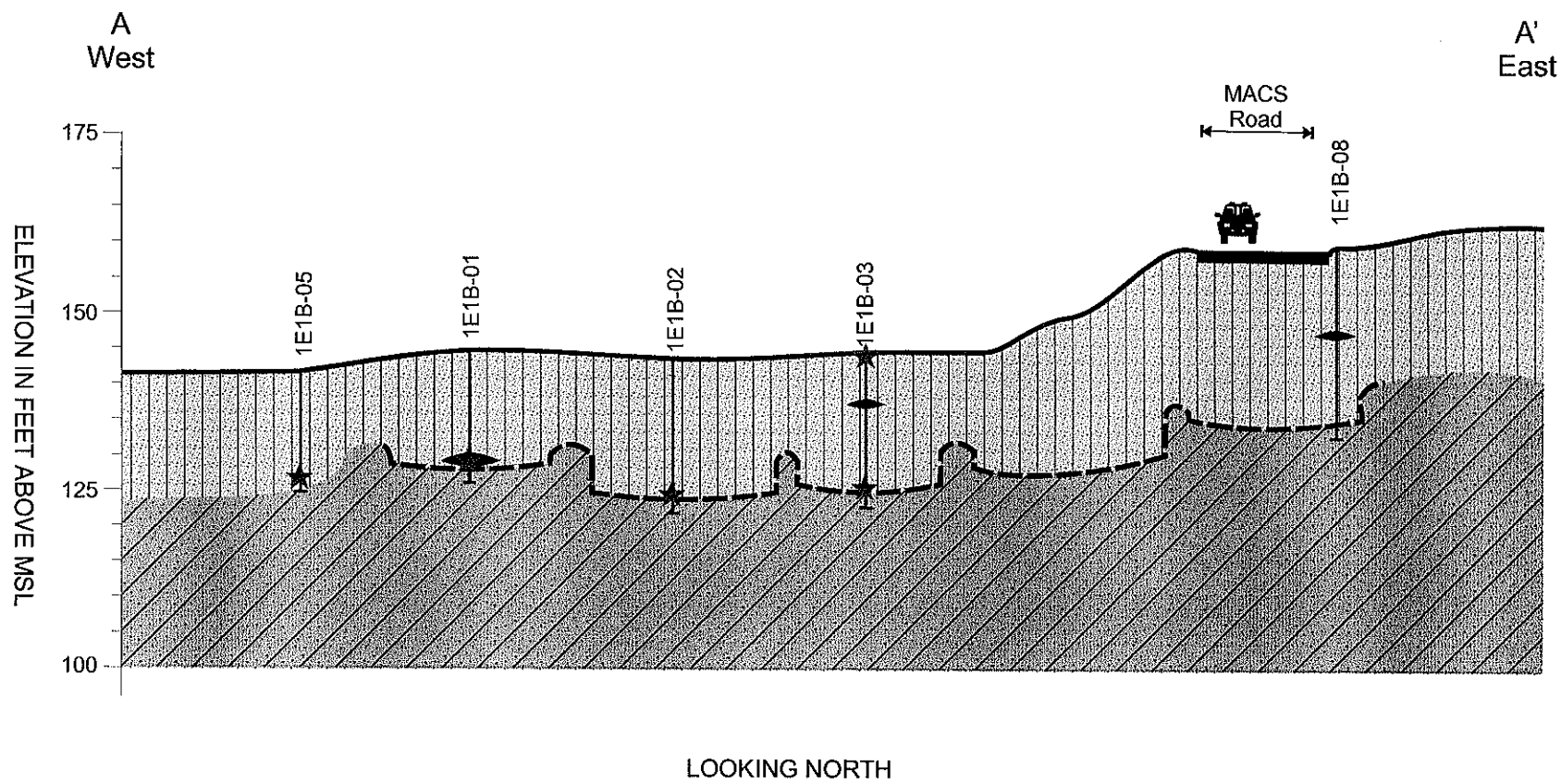
Site 1E-1
Soil Boring
Location Map

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\camppendleton\OU4FS\FSReport\3-3_S1E-1.dwg



LEGEND

- Graded Fill (Silty Sand)
- Native Soil (Silty Sand/Clay)
- Approximate Bottom of Former Burn Pit
- Ash/Waste Material Encountered in Boring
- Dioxins/Furans Detected in Soil Sample

50 0 50
HORIZONTAL SCALE (feet)

25 0 25
VERTICAL SCALE (feet)

Figure 3-4

Site 1E-1
Generalized Cross Section

OU 4 Supplemental FS
Camp Pendleton, CA

PARSONS
Pasadena, CA

K:\DEPTS\DEPT48\CAMPPENDLETONRIFS\740012\FIELD\OU4FS Report\Draft Final\Fig3-4.cdr

4.0 SITE 1H

Site 1H is a former refuse burning area of approximately 1.3 acres located near the western perimeter of the Base in the 62 Area, which is approximately 1,200 feet north of San Mateo Road (Figure 4-1). Previous investigations identified a debris-laden burn layer at approximately 5 feet bgs covered by relatively clean fill soil. The site is currently vacant and covered with vegetation.

This site was previously addressed in the draft RI/FS for Group D Sites (SWDIV, 1997) and was proposed for no further action based on ecological considerations. However, further assessment was recommended based on human health considerations due to a single sample containing elevated lead, antimony, copper, manganese, and zinc concentrations. The site was subsequently addressed in the draft OU 4 RI/FS (Parsons, 1999). The purpose of the FS for Site 1H was to obtain specific additional data needed to refine the known lateral and vertical extent of soil contamination and to develop and evaluate remedial action alternatives for the site. Background information and site conditions are detailed in the following sections.

4.1 Background Information

This FS provides an updated summary of site conditions; however, this document does not repeat all the information provided in previous documents regarding detailed site descriptions, histories, regional and site-specific environmental information, or results of previous investigations and risk assessments. This information is documented in the following reports:

- Draft Remedial Investigation and Feasibility Study for Group D Sites (SWDIV, 1997).
- Draft Remedial Investigation and Feasibility Study for Operable Unit 4 (Parsons, 1999).

4.1.1 Site Description and History

Site 1H was one of nine refuse burning grounds used throughout the Base from 1942 through the early 1970s to burn refuse generated by Base operations. In accordance with common Base practice at the time, burning grounds served as the principal trash disposal areas on the Base prior to the 1970s. Until 1970, all refuse at the Base was disposed of by burning; however, no information is available on the specific years of operation or the amount of refuse disposed of at each burning ground, including Site 1H. Although there are no confirmed reports of hazardous waste being disposed of at this site, the burning grounds were the primary on-Base disposal areas and may have received some hazardous wastes (SWDIV, 1996b). In the Draft RI/FS for Group D Sites, the inspected area at Site 1H was estimated at 0.9 acre measuring 300 by 125 feet (SWDIV, 1997).

4.1.2 Site Conditions

Site 1H is densely vegetated with a grade ranging from 2 to 7 percent and is currently covered by approximately 2 to 3 feet of soil over the buried materials. A steep trail leads up to the site, approximately 1,200 feet north from San Mateo Road (Figure 4-1). A stream-cut canyon is located east of the site and the site drains to the southeast.

The shallow geology is characterized by unconsolidated and semiconsolidated alluvium consisting of fine- to medium-grained silt overlying very fine-grained to fine-grained sand. Silty sand and sand with clay have been observed in borings located in the north-central part of the site. The alluvium overlies bedrock of the La Jolla Group (Parsons, 1999). During this FS investigation, weathered bedrock was encountered at 5 feet bgs in the western portion of the site, but was not encountered at depths up to 15 feet bgs at the rest of the site.

Surface water occurs intermittently in the alluvial valley south of Site 1H along San Mateo Creek at an elevation of approximately 90 feet above mean sea level (amsl) and, therefore, groundwater is conservatively assumed (i.e., environmentally protective) to occur in the valley at the surface water elevation. The elevation at Site 1H is approximately 340 feet amsl, and the elevation difference between the intermittent surface water in the creek and Site 1H is approximately 250 feet. Based on these elevation differences, the water table beneath Site 1H is estimated to occur at an elevation of approximately 115 to 140 feet amsl, which equates to a depth to water of approximately 200 to 225 feet. Groundwater is inferred to flow to the south, following surface topography. Groundwater has not been encountered in borings as deep as 25 feet bgs (SWDIV, 1997).

This estimate is based on the assumption that, moving north from the creek towards Site 1H, the water table mimics the topography, but does not rise as abruptly as the hills rise from the valley floor. This is a very conservative assumption and may grossly underestimate the depth to water (or grossly overestimate the water table elevation) because the ability of the underlying rock formations to store or transmit water is generally poor, and groundwater may occur at much greater depths beneath Site 1H. The bedrock formation (La Jolla Group) is reported to be equivalent to the Silverado and Santiago Formations of adjacent Orange County. These formations are generally described as being poor groundwater aquifers due to induration (i.e., consolidation/solidification as rock) and clay content of some beds in some areas and lateral variation in others (Morton, 1976).

The dominant habitat type at Site 1H is non-native grassland consisting mostly of wild oats. A few patches of sage and coyote brush are scattered throughout the site. No species of special concern species were historically observed at the site. Previous investigations concluded that there were low risks to ecological receptors because of the limited habitat quality, the small, contaminated area, and the presence of clean soil in the upper 5 feet (SWDIV, 1997).

A pair of coastal California gnatcatchers with two fledglings were observed at Site 1H during the Biological Field Survey conducted in August 2001 (Appendix B). Drilling at this site was postponed to the end of the field program to allow for a 10-day period after the fledglings had left the nest.

4.1.3 Nature and Extent of Contamination

The previous investigations noted the presence of mixed debris (such as burned material, glass, and other miscellaneous refuse), as noted on boring log 1HB-02 in the Group D RI (SWDIV, 1997) and boring logs 1HB-3 and 1HB-5 in Appendix F of the Operable Unit 3 RI/FS (IT, 1998). Previous investigations indicated that one dioxin congener (hexachlorodibenzo-p-dioxin) exceeding its residential soil PRG was detected in soil at a depth of 10 feet bgs in boring 1HB-02 (Appendix C3 and SWDIV, 1997). Previous sampling data are included in Appendix C3. Several inorganic compounds were detected above their respective residential soil PRGs, including antimony, arsenic, beryllium, copper, lead, and manganese. The borings with these detections were located in the southeast part of the site, within buried debris. The following decision questions were used to define the required sampling at Site 1H for the FS from the DQO process:

- Are adequate site characterization data available to support the remedy evaluation?
- What is the lateral and vertical extent of COCs in soil at Site 1H?

Based on these questions, the sampling was to be considered complete if the soil sampling results bounded the lateral and vertical extent of COCs in soil.

4.1.3.1 FS Sampling

The FS at Site 1H was conducted from 11 to 15 October 2001. The following sections describe the supplemental field data collection, which was conducted in accordance with the Draft Final OU 4 Supplemental FS FSP and QAPP (Parsons, 2001a and 2001b).

4.1.3.1.1 Soil Sampling

A judgmental soil sampling approach was implemented as described in the OU 4 Supplemental FS Draft Final FSP (Parsons, 2001a) and in accordance with agreements made between FFA team members. Two borings were located inside the boundary of the refuse burning area, and samples were collected from depths of 0, 3, 5, 10, and 15 feet bgs (Figure 4-2). Five additional soil borings were drilled in areas around the perimeter of the refuse burning area, and samples were collected from depths of 0, 5, and 10 feet bgs. Depths varied slightly based on visual observation of waste material during drilling. Borings were advanced using an all-terrain hollow stem auger drill rig or hand auger. Samples were collected in accordance with the procedures outlined in the OU 4 Supplemental FS Draft Final FSP and QAPP (Parsons, 2001a and 2001b). Boring logs are included in Appendix D3.

4.1.3.1.2 Soil Analytical Program

Soil samples were analyzed for metals (SW6010/SW7000 series) (including mercury [SW7471A]), hexavalent chromium (SW7196A), and explosives/explosive residues (SW8330). Three soil samples were analyzed for dioxins/furans (SW8280A) to confirm previous sampling results from those areas.

SPLP (SW1312) analyses for the full suite of metals were performed on soil samples from the two borings located inside the boundary of the refuse burning area: boring 1HSB-01 at 5 to 5.5 feet bgs and boring 1HSB-02 at 10 to 10.5 feet bgs. SPLP analyses were performed to evaluate the leaching potential of the existing contaminants in soil and any associated threat to underlying groundwater. TCLP (SW1311) analyses were also performed on these two samples to estimate the amount of soil designated as RCRA-hazardous waste that may require off-site disposal.

4.1.3.2 FS Results

The analytical results collected during this soil investigation at Site 1H are presented in this section along with a discussion of the nature and extent of contamination. The discussions presented in this section are based on validated analytical data. The data quality assessment is presented in Appendix F. Chain-of-custody and cooler receipt forms for samples collected at Site 1H are provided in Appendix G3. Validated analytical data for Site 1H are provided in Appendix H3. Sampling locations are shown on Figure 4-2, and a vertical distribution of waste material encountered is shown on Figure 4-3.

Dioxins/Furans

Three samples were analyzed for dioxins/furans. Sampling depths and detected dioxins/furans are presented in Table 4-1 and Figure 4-4. Dioxins and furans were detected in two of the three samples (1HSB-01D at 10 to 10.5 feet bgs and 1HSB-02C at 5 to 5.5 feet bgs). The dioxins and furans detected included 1,2,3,4,6,7,8-HpCDD, 1,2,3,4,6,7,8,9-OCDD, 2,3,7,8-TCDF, 2,3,4,7,8-PeCDF, 1,2,3,6,7,8-HxCDF, 1,2,3,4,7,8-HxCDF, 2,3,4,6,7,8-HxCDF, and 1,2,3,4,6,7,8-HpCDF. Sample 1HSB-01D was visually described as containing waste material.

Metals

A total of 29 soil samples (26 samples plus three duplicates) were collected and analyzed for metals (including mercury and hexavalent chromium) in October 2001 (Table 4-2 and

Figure 4-4). Two of these samples were analyzed using the TCLP method (SW1311). Sampling depths and detected metals concentrations are presented in Table 4-2. COCs detected above background included antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, nickel, silver, vanadium, and zinc (IT, 1998). COCs detected above their respective residential soil PRGs included antimony, arsenic, chromium, copper, iron, lead, and manganese. Mercury was not detected above its residential soil PRG, and hexavalent chromium was not detected in any of the samples. These results correlate closely with the results of previous investigations summarized in Table 4-3. Analytical results from three of 29 samples (10 percent) exceeded California hazardous criteria (TTLC), but none exceeded RCRA-hazardous waste criteria. Neither of the two TCLP samples exceeded California-hazardous criteria.

Explosives/Explosive Residues

A total of 29 soil samples (26 samples plus three duplicates) were collected for explosives/explosive residues analysis in October 2001. No explosives/explosive residues were detected.

4.1.3.2.1 Soil Volume Cleanup Estimate

Based on the distribution of waste material and the presence of dioxins in soils, the extent of impacted soil is shown on Figures 4-2 and 4-3. As can be seen in Figure 4-3, the top of the residual waste material varies from 3 to 10 feet bgs and the bottom varies from approximately 5 to 15 feet bgs. The waste material is mixed with soil, and ranges in thickness from 2 to 10 feet.

The volume of all impacted soil is approximately 10,800 cubic yards. Analytical results from five of 29 samples (13 percent) exceeded California hazardous criteria. Therefore, the estimated volume of California-hazardous and non-hazardous soil was 1,403 and 9,394 cubic yards, respectively. Based on the analytical results, none of the soil would be classified as RCRA-hazardous waste.

4.1.3.2.2 Groundwater Impact Evaluation

In order to evaluate the potential threat of metals-impacted soil to groundwater, SPLP analysis was performed on two soil samples (1HSB-01 from 5.0 to 5.5 feet bgs and 1HSB-02 from 10.0 to 10.5 feet bgs). SPLP was conducted for the full suite of metals to determine the leachability potential of metals in the waste material and any associated threat to underlying groundwater. Results are presented in Table 4-4.

The Designated Level Methodology (DLM) for Waste Classification and Cleanup Level Determination (Marshack, 1986, updated June 1989) was applied using these SPLP results. The DLM establishes a framework for determining the degree to which a contaminated site should be remediated. The California WET analysis with a de-ionized water extraction fluid (i.e., DI WET) is the prescribed method for use with the DLM at sites with non-acidic conditions. The use of SPLP with the DLM is a suitable alternative for this site.

The DLM indicates that expected landfill-to-useable groundwater attenuations cited by the USEPA range from one to 1000-fold, based on mathematical models and field data. Further, the DLM suggests using a "generic" environmental factor of 100 to conservatively represent average attenuation of waste constituents as leachate moves to an underground source of drinking water. The DLM indicates that the 100-fold factor should be used in those disposal situations that provide an "average" degree of natural protection for water quality.

The DLM cites an example of average landfill in alluvium of the Central Valley of California with a significant depth (i.e., greater than 30 feet) of soil containing appreciable and continuous clay or silt-clay strata between the base of the landfill and groundwater. At Site 1H, the depth to

groundwater is approximately 200 feet, and the underlying strata are bedrock formations. Site 1H has at least five times the thickness of strata between the base of the waste material and groundwater as cited for the generic example (i.e., greater than 30 feet). Moreover, the underlying strata (i.e., bedrock formations) are at least as impermeable as the alluvial soils cited in the example. Based on geologic maps available for the area, the underlying bedrock is the La Jolla Group consisting of sand, sandstone, and shale, which is equivalent to the Santiago and Silverado formations in adjacent Orange County. Therefore an attenuation factor of 500 was used for Site 1H.

The results of metals analyzed by the SPLP were all below the soluble designated levels presented in Appendix L based on the attenuation factor of 500. Key elements in assigning the attenuation factor include the depth to groundwater of approximately 200 feet, the low mobility of the metals constituents, and isolation of the waste material in Site 1H from significant surface water runoff. In addition, the cumulative effects of combinations of constituents were evaluated using the DLM. These accumulative effects were all below the threshold of 1.0, above which the material would classify as designated waste. The evaluation of Site 1H using the DLM and available SPLP metal results indicates that the waste material at Site 1H does not classify as designated waste. Based on the application of the DLM using available data, Site 1H does not pose a threat to groundwater quality and would not require remediation for this purpose.

The lack of mobility of the metals in 1HSB-01 calculated by the DLM method is consistent with the vertical distribution of contamination in this boring, as demonstrated by comparing results from 10-foot bgs sample (1HSB-01D) with the 15-foot bgs sample (1HSB-01E). The results indicate that metal concentrations at 15 feet bgs are consistent with naturally occurring background (IT, 1998) and show that the contamination detected at 10 feet bgs in this boring has not migrated vertically since the waste was deposited approximately 30 years ago.

4.1.4 Human Health Risk Assessment

In order to characterize potential risks and hazards associated with soil exposure at Site 1H, a screening-level risk assessment was performed as part of this FS. Additional information regarding the methodology and results of the human health risk assessment are provided in Appendix I. Three different hypothetical future exposure scenarios were evaluated: an on-site resident, non-intrusive industrial/commercial worker, and a military training receptor. Average exposure point concentrations (EPCs) were developed using the "bootstrap" method (Efron, 1981) described in Appendix I (see Table I3-2). Risk assessment results are summarized in Table 4-5.

4.1.4.1 Hypothetical Future Residential Receptor

The screening-level residential evaluation was performed in accordance with Cal/EPA PEA guidance, assuming the receptor is exposed to soils between 0 and 10 feet bgs. The assessment (documented in Appendix I) indicated a cumulative cancer risk of 5×10^{-5} with approximately 3×10^{-5} attributable to site-related arsenic and approximately 1×10^{-5} from site-related dioxin. The hazard index was predicted to equal 2. The primary contributors were metals, although no individual metal exceeds a hazard index (HI) of one.

A separate evaluation was performed to characterize impacts from lead. The LEADSPREAD model (DTSC, 2000) was used to estimate PRGs based on DTSC default exposure assumptions and target blood lead distributions for adults and children (1 to 2 years old). The model predicted a 99 percentile PRG of 680 mg/kg for adults and 150 mg/kg for children (Appendix I3, Attachment 2).

The child PRG of 150 mg/kg calculated using LEADSPREAD (DTSC, 2000) (Appendix I, Attachment 2) is significantly less than the standard default child PRG of 400 mg/kg (USEPA,

2002f) calculated using USEPA's (1994b) Integrated Exposure Uptake Biokinetic (IEUBK) Model for Lead in Children. Adult residential PRGs have not been calculated by USEPA because the child resident is the most sensitive receptor.

Using the combined historical (SWDIV, 1997) and the current FS data, the 95 percent upper confidence limit (UCL) on the arithmetic mean was estimated for the 0- to 10-foot exposure interval (Appendix I, Table I3-2). The resultant exposure point concentration estimate of 2,400 mg/kg is well above the USEPA residential soil PRG of 400 mg/kg (USEPA, 2002a) and the LEADSPREAD child PRG of 150 mg/kg (Appendix I3, Attachment 2).

Based on this analysis, it is concluded that baseline conditions represent a potential threat to hypothetical future residential use of Site 1H.

4.1.4.2 Hypothetical Non-Intrusive Commercial Industrial Receptor

For hypothetical future (non-intrusive) commercial/industrial users, the 0- to 1-foot exposure interval was evaluated. The results indicate a cumulative cancer risk of 7×10^{-6} and a hazard index of less than 0.1. Most of the cancer risk was associated with arsenic (approximately 4×10^{-6}) and site-related dioxin (approximately 3×10^{-6}). Because no dioxin data were collected in the 0- to 1-foot soil exposure interval, the detected concentration from 5 to 5.5 feet bgs was conservatively used as the exposure point concentration. Thus, there is some uncertainty in the risk estimates given that actual dioxin concentrations in the surface soil interval are likely less than what is present in deeper soils. Furthermore, arsenic concentrations in the 0 to 1 foot bgs soil interval appear generally consistent with background. The maximum detected value (6.8 mg/kg) is less than the maximum arsenic background value (10.9 mg/kg).

For lead, the results show that the 95 percent UCL mean concentration of 40 mg/kg is below the industrial soil PRG value of 750 mg/kg (USEPA, 2002a). The concentration is also well below the adult occupational PRG of 3,500 mg/kg calculated using LEADSPREAD (Appendix I3, Attachment 2).

Based on this analysis, it is concluded that baseline conditions represent a potential threat to a hypothetical future non-intrusive industrial/commercial receptor at Site 1H. However, as stated above, the risk is likely overestimated as a result of assuming that dioxins are present in subsurface soils at levels comparable to deeper waste-impacted soils.

4.1.4.3 Intrusive Military Training Receptor

For a military training receptor, it is possible that exposure could occur deeper than the 0 to 1 foot bgs interval assumed for non-intrusive commercial/industrial land use. Military personnel engaged in maneuvers at Site 1H were evaluated and assumed to potentially be exposed to lead in the 0 to 3.5 feet bgs soil interval. This soil interval was selected because it includes the samples collected from 3 to 3.5 feet bgs. The results indicate a cumulative cancer risk of 2×10^{-7} and a hazard index of 0.1.

The maximum detected lead concentration in this interval was 817 mg/kg and the EPC was 200 mg/kg, which is less than the adult intrusive worker PRG of 537 mg/kg using LEADSPREAD (Appendix I3, Attachment 2).

Based on this analysis, military training would not result in adverse impacts assuming that deeper soils are not contacted. However, it is possible that military personnel engaged in training could potentially contact deeper contaminated soils (e.g., digging a fighting position). There is considerable uncertainty given the hypothetical nature of the exposure conditions (i.e., type and duration of contact) and the potential for other types of short-term (acute) impacts such as eye, nose, throat, skin, or respiratory system irritation associated with contacting the waste material. These impacts could be significant based on the specific exposure conditions and the

nature of any waste materials contacted (e.g., lead-acid batteries and caustics). Therefore, any on-site military training involving contact with soils deeper than 3 feet may result in adverse health effects depending upon the nature of the exposure.

4.1.5 Ecological Risk Assessment

The purpose of this ERA was to evaluate the potential risks to ecological receptors posed by site-related preliminary COPECs detected in environmental media at Site 1H; this text summarizes the information presented in Appendix J.

This ERA involves the quantitative evaluation of potential risks to ecological receptors exposed to site-related preliminary COPECs in affected media for which data are available at Site 1H. The ERA consists of problem formulation, analysis, and risk characterization. These components of the ERA for Site 1H are summarized below.

4.1.5.1 Problem Formulation

Problem formulation is a planning step for evaluating the ecological setting, defining the conceptual site model (CSM; including exposure pathways and receptors of interest), identifying COPECs, and defining the assessment endpoints.

Habitat at Site 1H includes nonnative grasslands, with small patches of coastal sage scrub habitat. Wildlife species were observed on site, but the habitat is fragmented and provides minimal value habitat for special-status species. Coastal California gnatcatchers, a state special concern species, have been sighted in the general site vicinity, though habitat conditions at Site 1H are considered marginal for this species.

A CSM was specified for the site that indicates that complete exposure pathways are present. Bird and mammalian wildlife, including special-status birds, are potential exposed to soil-borne preliminary COPECs, as well as soil-borne preliminary COPECs that are transferred within the food web. The preliminary COPECs include inorganic elements (arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, mercury, molybdenum, nickel, vanadium, and zinc) and the 2,3,7,8-PCDDs and PCDFs.

For Site 1H, the ERA assessment endpoints were protection of terrestrial wildlife receptors from adverse population-level effects due to exposures to site-related preliminary COPECs (deer mouse, gray fox, and red-tailed hawk were the receptor species), and protection of individuals of special-status species from adverse effects that could compromise genetic diversity. At this site, the coastal California gnatcatchers represent the special-status species; the other receptors represent the population-level assessment endpoints.

4.1.5.2 Analysis

The analysis phase consists of exposure and ecological-effects assessments.

The receptor-specific exposure doses of each preliminary COPEC were estimated using food-chain uptake algorithms that account for exposure via incidental ingestion of contaminated soil, ingestion of plants grown in contaminated soil, and ingestion of lower-trophic-level animals associated with contamination. Adjustments were made in the exposure assessment to account for accumulation and biomagnification of contaminants through the trophic levels. Bioaccumulation was evaluated by means of contaminant-specific plant, invertebrate, and small mammal BAFs.

The effects assessment defines and evaluates the potential adverse (i.e., toxic) ecological effects of preliminary COPECs on the receptor species using the measures of effect. This step involved developing RTVs and site-specific PLEs for each soil preliminary COPEC. PLEs are threshold effect levels, which are defined as the concentrations of preliminary COPECs in

environmental media at a site that are presumed to be non-toxic to biota using the site. The PLEs are chemical- and receptor-specific values derived for a given exposure medium and route. PLEs are based on the wildlife RTVs. The results of the effects assessment were used to identify COECs and to characterize ecological risk.

4.1.5.3 Risk Characterization

Risk characterization integrates preliminary COPEC exposures to, and effects on, receptors using hazard quotients (HQs), which are ratios of exposure and effect concentrations. The resulting data are used to estimate the magnitude of risk from preliminary COPECs and to assess the risk to ecological receptors. Risk characterization includes two principal steps: risk estimation and risk description.

An HQ is the ratio of the EPC of a preliminary COPEC to the PLE for the representative receptor. The greater this ratio, or quotient, the greater the degree that exposure exceeds the toxicity benchmark. An HQ of 1, derived using a no observed adverse effect level (NOAEL) based toxicity benchmark, is considered the threshold below which adverse effects are not expected.

NOAEL-based HQs are less than one for most exposure scenarios. These combinations of preliminary COPEC–exposure route–receptor are eliminated from further consideration, as the NOAEL-based HQs less than one indicate adverse effects are not expected. The exposure scenarios (i.e., preliminary COPEC and receptor combinations) that are not considered further include:

- Arsenic, barium, chromium, mercury, molybdenum, nickel, vanadium, and the PCDDs and PCDFs exposures to any receptor;
- Beryllium and cobalt exposures to mammalian receptors;
- Cadmium, copper, and zinc exposures to gray fox and red-tailed hawk; and
- Lead exposures to gray fox.

NOAEL-based HQs greater than one for a few preliminary COPECs:

- Deer mouse exposed to cadmium, copper, lead, and zinc;
- Coastal California gnatcatcher exposed to cadmium, copper, lead, and zinc; and
- Red-tailed hawk exposed to lead.

A NOAEL-based HQ that is greater than one indicates that the estimated exposure exceeds a no-effect dose and identifies which preliminary COPECs should be further evaluated (now identified as COPECs) to determine the likelihood of adverse effects in ecological receptors. The likelihood of adverse effects is evaluated using effect-based RTVs. HQs based on effect-level RTVs better characterize the likelihood of adverse effects on receptors because of the reliance on effect-based toxicological data; reliance on no-effect-based RTVs does not characterize whether adverse effects could occur because it is not known at what dose above the NOAEL that adverse effects would become expressed.

Effect-based RTVs were obtained from the same literature source as the NOAEL-based RTVs. Effect-based HQs and site-specific PLEs (based of effect-RTVs) were developed for the COPEC-receptor combinations described previously.

None of the estimated exposures to COPECs in soil at Site 1H result in effect-based HQ values greater than one. The effect-based RTVs are doses at which adverse effects have been demonstrated, and HQs greater than one would indicated that adverse effects in receptors would be expected. Based on HQ values less than one, there is not an expectation that adverse ecological effects in receptors would occur.

Based on this conclusion and the distance to the nearest surface water body from the site (3,600 feet away from San Mateo Creek), it is very unlikely that storm water runoff at Site 1H would pose any threat to surface water beneficial uses and water quality objectives.

4.1.6 Conclusions of FS

The data collected for the FS led to the following conclusions:

- The FS better defined the extent and volume of soil contamination that was originally identified in the 1997 and 1999 RI/FS reports (SWDIV, 1997; Parsons 1999).
- COCs detected in site soils above their respective residential soil PRGs include antimony, arsenic, chromium, copper, iron, lead, manganese, and dioxins/furans.
- The estimate for soils impacted above PRGs and where waste was encountered during drilling at Site 1H is approximately 10,800 cubic yards. The lateral extent of impacted soil is approximately 0.7 acre and extends from 5 to 15 feet bgs.
- Three different hypothetical future exposure scenarios were evaluated: an on-site resident, a non-intrusive industrial/commercial worker, and a military training receptor. The results of a screening-level HHRA indicate that Site 1H poses a potential threat to a hypothetical future residential receptor. It is also concluded that baseline conditions represent a potential threat to a hypothetical future non-intrusive industrial/commercial receptor at Site 1H. However, the risk to a hypothetical future non-intrusive industrial/commercial receptor is likely overestimated because of conservative assumptions outlined in Section 4.1.4. Any on-site military training involving contact with soils deeper than 3 feet may result in adverse health effects depending upon the nature of the exposure.
- The results of a screening-level ERA indicate that Site 1H does not represent a significant threat to ecological receptors. None of the estimated exposures to COPECs in soil at Site 1H results in effect-based hazard quotient (HQ) values greater than one. Therefore, there is no expectation that adverse ecological effects in receptors would occur.
- Based on SPLP analyses conducted as part of the FS, extractable concentrations of iron, lead, manganese, and zinc exceed their respective state and federal maximum contaminant levels (MCLs). However, the threat to groundwater is believed to be negligible given the depth to groundwater (approximately 200 to 225 feet bgs) at Site 1H.
- Coastal California gnatcatchers were observed in the vicinity of Site 1H during the Biological Field Survey conducted in August 2001. No nests or nestlings were observed within the site boundary. Biological resource monitoring may be required during any potential site remediation and/or further investigation activities if conducted during the breeding season.

4.2 Development of Remedial Action Objectives

The purpose of this FS is to refine the characterization of the site, and, based on this refined characterization, develop and evaluate remedial action alternatives for each OU 4 site that

comply with ARARs, are protective of human health and the environment, and can be implemented in a cost-effective manner.

As discussed in Section 1.4, in accordance with the framework of CERCLA, NCP, and SARA, the RI/FS and subsequent remedial activities conducted at Site 1H must comply with federal and state ARARs. The ARARs/TBC that might apply to Site 1H are discussed in detail in Appendix A. USEPA guidance (USEPA, 1988b) requires that RAOs be developed during the initial phase of the FS and be used as the framework for developing the remedial alternatives. The remainder of this section addresses the soil contamination at Site 1H that requires remediation based on the site characterization data collected to date.

4.2.1 Chemicals of Concern

As discussed in Section 4.1.3.2, seven metals were detected in soil samples above background levels and their respective residential soil PRGs during the OU 4 FS: antimony, arsenic, chromium, copper, iron, lead, and manganese (Table 4-2). All seven of these metals and dioxins/furans are classified as RCOCs for this FS.

4.2.2 Exposure Routes/Receptors of Concern

Exposure routes and receptors of concern are summarized above in Sections 4.1.4 and 4.1.5.

4.2.3 Proposed Remediation Goals

The proposed RGs considered in the development of alternatives for this site are based on human health risk or background levels. The methodology for developing proposed RGs is described in Section 1.5. Proposed RGs for human health for soil RCOCs were developed based on contaminant concentrations detected in the upper 10 feet bgs of soil.

4.2.4 Remedial Action Objectives

The RAOs for the Site 1H soil contamination are defined below:

- Minimize exposure (inhalation/dermal contact/ingestion) by human receptors to chemicals in soil at concentrations exceeding proposed RGs.

The evaluations of remedial alternatives for the site address different means of achieving these RAOs.

4.3 Identification of General Response Actions

GRAs represent general classes of technologies that have common characteristics in the way they address the risk posed by contaminated soil (i.e., the RAOs). The following GRAs are considered for Site 1H:

- No Action: Represents no further remedial action for the contaminated soil.
- Institutional Action: Represents minimal activity and includes administrative and physical measures to restrict site access but does not involve active remediation of the contaminated soil.
- Containment: Includes primarily physical measures such as capping to restrict soil contaminant migration (e.g., wind erosion, surface runoff) or waste movement.
- Removal: Involves the removal (i.e., mechanical excavation) of contaminated soil.
- Treatment (in situ and ex situ): Includes physical, chemical, and biological measures that would reduce toxicity, mobility, or volume of a contaminant or waste by altering the physical or chemical properties of the contaminants and/or media.

- Disposal: Includes the placement of treated or untreated waste soil in a temporary or permanent, pre-engineered, controlled environment (i.e., landfill) that would restrict contaminant migration and eliminate exposure routes.

4.4 Identification and Screening of Technology Types and Process Options

The objective of this section is to identify remedial technologies and process options for application for soil remediation at Site 1H. This objective is accomplished using a variety of information including previous investigations, remedial actions at other sites, references developed by the USEPA for application at NPL sites, USEPA computerized technology databases (ATTIC, Version 1.0, VISITT, Version 2.0, and CLU-IN), and standard engineering references.

For each GRA discussed above, one or more potentially applicable remedial technologies were identified. The goal of the screening process is to evaluate a large number of technologies to identify those that are potentially implementable for the remediation of soil and under the specific Site 1H conditions. In this step, both process options and entire technology types can be eliminated based on technical effectiveness and/or implementability considerations. Information on site characteristics and contaminant types and concentrations was used to eliminate technology types and process options that are neither applicable nor effectively implementable at the site.

The remedial technologies identified and evaluated in the previous feasibility studies performed for Site 1H served as the starting point for the list of technology options evaluated in this FS report. These evaluations were revised as appropriate to reflect current site conditions and technology updates. In addition, relevant new technologies were included in the evaluation. A summary of the technologies considered in this FS is presented below:

- Institutional Action
  - Access Restrictions
  - Fencing
- Containment
  - Capping
- Removal
  - Excavation
- Disposal
  - Landfill
  - Backfilling
- In Situ Physical/Chemical Treatment
  - Soil Flushing
  - Solidification/Stabilization
  - In Situ Vitrification
- In Situ Biological Treatment
  - Phytoremediation
- Ex Situ Physical/Chemical Treatment
  - Soil Washing
  - Acid Extraction
  - Solidification/stabilization
  - Chemical Oxidation - Reduction
  - Vitrification
- Ex Situ Thermal Treatment
  - Thermal Desorption
  - Incineration

Figure 4-5 lists the GRAs for the Site 1H soil contamination, identifies the remedial technologies and process types for each response action, and summarizes the screening results for each technology and process. A brief description of the technologies and process options under each GRA is provided in the following sections, along with the rationale for retaining or eliminating each technology.

4.4.1 No Action

The no action response was retained for consideration during the development and analysis of alternatives as required by the NCP (40 CFR 300.430[e][6]). The no action response does not provide any additional remediation, containment, or security measures to reduce potential risk to human health or the environment at Site 1H.

4.4.2 Institutional Action

Institutional action refers to administrative and physical actions taken to reduce or eliminate risks to public health and the environment by controlling exposure pathways rather than removing contaminants or controlling and reducing their mobility, toxicity, or volume. For soil, institutional action such as access restrictions and fencing are typically considered during the initial screening of technologies to limit exposure of potential human receptors. The reasonably anticipated future land use at Site 1H is neither residential nor industrial given its remote location in an area used for military training. Thus, land use and access restrictions would effectively limit future development and physical access to the site and were retained for further evaluation. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

4.4.3 Containment

Containment actions for soil contamination are intended to isolate RCOCs from potential contact with humans and to protect unimpacted media by reducing or eliminating the migration of RCOCs from soil to groundwater or surface water systems. The containment option typically is capping.

Capping is the process used to cover contaminated materials to prevent their contact with human and ecological receptors. Substantive performance standards for cap design at CERCLA sites include minimum infiltration, low cover maintenance, efficient site drainage, high resistance to damage by settling and subsidence, and low permeability. Caps can be single-layered or multi-layered and come in a variety of designs and materials including asphalt, concrete, or engineered soil caps. The selection of capping materials and cap design are influenced by site-specific factors such as local availability and cost of cover materials, intended function of cover materials, the nature of the waste being covered, local climate and hydrogeology, and projected future use of the site.

Site 1H is a relatively flat (with grades up to 7 percent), heavily vegetated and remote area. The site is located outside the 100-year floodplain, and groundwater depth is estimated to be greater than 200 feet bgs (Parsons, 1999). Currently, the site is undeveloped and vacant, and the Base has no plans to develop the area. Given the physical and hydrogeological conditions at Site 1H, capping is considered a feasible technology. Both flexible membrane liners and engineered soil cover designs were evaluated based on the desired functionality of the cap, and the site setting and projected future use. Given the site topography, significant grading of the existing foundation would be required to provide a suitable base and adequate sheet drainage for a flexible liner cover, in addition to a top layer of clean soil at least 18 inches thick on top of the liner to allow sufficient room for vegetation to grow. Based on these considerations, a flexible liner design was found to be no more cost effective and would require more long-term maintenance than an evapotranspiration (ET) soil cover design. Therefore, the engineered soil cover design option is retained for further evaluation.

4.4.4 Removal

Removal actions are intended to remove soils containing RCOCs. The removal option considered for soil at Site 1H is excavation.

Under this process option, the contaminated soil is excavated and removed from the site and the excavated area is backfilled with clean imported soil and compacted to required standards. Excavation is generally followed by treatment and/or disposal of the contaminated soil. This option is particularly suited for source removal. A frequent practice is to excavate and remove "hot spots" in combination with other measures such as containment (i.e., capping) of less contaminated soils. Worker health and safety concerns weigh heavily in the decision to remove highly toxic or reactive waste material.

Other factors considered include contaminant mobility, feasibility of on-site containment or in situ treatment, depth of contamination, and the cost of disposing of the waste or rendering it nonhazardous after excavation.

Air monitoring is usually required for this option to demonstrate the effectiveness of dust suppression measures to minimize the contaminant exposure potential to workers and off-site receptors. Mechanical excavation using heavy equipment such as a backhoe is feasible at Site 1H because the vertical extent of contamination only extends to a maximum of 15 feet bgs and covers a relatively small area of approximately 31,000 square feet. However, the potential for worker exposure to contamination from implementing this option exists at Site 1H. Coordination with agencies and implementation of biological monitoring and appropriate mitigation measures could be required. Excavation is a readily implementable and was retained for further consideration in the evaluation of remedial options for this site.

4.4.5 Disposal

This GRA involves disposal of excavated contaminated soil in an appropriate landfill. On-Base treatment is not a component of this process option. Two process options were considered under this GRA: on-Base landfilling and off-Base landfilling. These two options are evaluated below.

4.4.5.1 On-Base Landfilling

This process option involves disposal of excavated soil in an on-Base landfill. MCB Camp Pendleton is currently in the planning stages of developing a new on-base CAMU facility for the purpose of consolidating wastes from the various IR sites. Characterization samples would be collected from excavated stockpiles to determine contaminant concentrations prior to disposal. This process option is potentially applicable and was retained for further evaluation.

4.4.5.2 Off-Base Landfilling

Off-Base landfilling is another process option for disposal of excavated soil. Waste characterization testing would need to be performed during excavation to determine whether the soil exhibits hazardous characteristics that would control the selection of an appropriate disposal facility. Landfilling of hazardous waste has become increasingly difficult and expensive and is regarded as a less desirable option. This process option is potentially applicable and was retained for further evaluation.

4.4.6 In Situ Treatment

This GRA encompasses remedial technologies and process options that are designed to treat contaminated soil in place. The main advantage of in situ treatment is that it allows the soil to be treated without being excavated and transported to an off-site disposal facility, resulting in potentially significant cost savings. However, in situ treatment generally requires longer timeframes and there is less certainty about the uniformity of treatment because of the variability in soil characteristics and the difficulty in verifying the efficacy of the process. In situ treatment technologies evaluated for contaminated soil at Site 1H fall into two broad groups: physical/chemical and biological. Physical/chemical treatment is typically cost-effective and can

be completed in shorter timeframes than biological treatment. Some technologies combine both physical and chemical treatment processes.

4.4.6.1 Physical/Chemical Treatment

This process option uses the physical/chemical properties of the contaminants or contaminated media to destroy (i.e., chemically convert the contaminants to innocuous compounds), separate, or contain the contamination. Three process options were evaluated under this GRA: soil flushing, S/S, and in situ vitrification.

4.4.6.1.1 In Situ Soil Flushing

In situ soil flushing extracts contaminants from soil with water or other suitable aqueous solution. Soil flushing is accomplished by passing the extraction fluid through in-place soils using an injection or infiltration process. Soil flushing uses the contaminant's solubility in liquid to physically separate it from the soil. Surfactants may be added to the flushing solution to chemically increase the contaminant's solubility. Contaminants are leached with the extraction fluid into the underlying groundwater, which is then extracted and treated above ground to appropriate standards prior to recycling or release to local POTWs or receiving streams. Although this technology appears suitable for treatment of metals in high-soil-permeability conditions such as at Site 1H, it has no applicability at this site because it would introduce contaminants into the groundwater. Therefore, this technology was not retained for further consideration in developing remedial alternatives.

4.4.6.1.2 In Situ Solidification/Stabilization

In situ S/S reduces the mobility of contaminants in soil through both physical and chemical means. In situ solidification seeks to trap or immobilize contaminants within their "host" medium (i.e., soil), instead of removing them through chemical or physical means. This process option works by changing the physical properties of the contaminated soil, rendering it solid (with high structural integrity) and making the contaminants less prone to mobilization via leaching (USEPA, 1986). The solubility of soil contaminants is reduced by encapsulating the contaminants in a solidifying reagent, thereby reducing the surface area exposed to leaching, and/or by coating the contaminated soil with low-permeability materials (USEPA, 2000b).

In situ stabilization treatment processes are intended to convert contaminants to less mobile forms through chemical or thermal interactions. The addition and mixing of stabilizing agents can be achieved either by flooding the ground surface with a liquid stabilizing agent or by allowing it to percolate into the subsurface and react with the target contaminant. Stabilizing agents in either liquid or dry form also can be introduced and mixed with subsurface soil via auger mixing (USEPA, 1997a).

In situ solidification/stabilization limits the mobility of the contaminants but does not reduce contaminant concentrations per se. Its effectiveness is highly dependent on homogenous mixing, which can be difficult to ensure in clay-rich soil environments or where the soil contains significant debris (USEPA, 1997a), as at Site 1H. The soil at Site 1H contains locally abundant man-made debris, such as scrap lumber, glass, and other miscellaneous refuse. Grout injection bottom barriers (i.e., impermeable horizontal subsurface barriers) can be used to prevent vertical migration by providing a floor of impermeable material beneath the contaminated soil via directional drilling with forced grout injection. Bottom barriers are likely not necessary at Site 1H because groundwater is very deep (estimated at over 200 feet bgs). In situ technologies also require long-term maintenance, post-cure testing, and implementation of land use restrictions. Because of these limitations, this technology was not retained for further consideration in developing remedial alternatives.

4.4.6.1.3 In Situ Vitrification

This technology treats metal-contaminated soil using heat, usually applied through electrical power, to melt the soil at extremely high temperatures (typically 2,900 to 3,600°F). The molten soil forms a stable glass and crystalline structure with very low leaching characteristics that immobilizes the inorganic contaminants by entrapping them or chemically incorporating them in the melt. Because this technology does not destroy many of the metal contaminants but rather traps them inside the matrix, it is often applied to highly concentrated characteristic hazardous waste to meet applicable disposal requirements. There are several disadvantages with this technology. The high temperatures associated with this process produce to emissions of toxic vapor from relatively volatile metals (i.e., mercury and lead) that must be captured and treated, the resulting solidified matrix may hinder future site use and necessitate the use of site access restrictions, implementation entails long-term maintenance, and the technology is energy intensive and costly. Because of these concerns, this technology is impractical for application at Site 1H and was therefore excluded from further consideration.

4.4.6.2 Biological Treatment (Phytoremediation)

Phytoremediation is an emerging technology that uses plants to remove, transfer, stabilize, or degrade chemical contaminants in soil, sediment, or groundwater. There are various applications of phytoremediation technologies; the most appropriate application to Site 1H is enhanced rhizosphere biodegradation, which takes place in the soil immediately surrounding plant roots. Natural substances released by plant roots supply nutrients to soil microorganisms enhancing their biological activity. Plant roots also loosen the soil and then die, leaving paths for transport of water and aeration. This process facilitates the movement of soil moisture to the surface zone.

Research has shown that plants can be used to treat most classes of compounds including metals. Plant species are selected on the basis of their potential to evapotranspirate groundwater, the degradative enzymes they produce, their growth rate and yield, the depth of their root zone, and their ability to bioaccumulate contaminants. Although certain plants allow uptake from deeper zones, phytoremediation is best suited for use in soils that are within 2 to 3 feet bgs and are contaminated with intermediate concentrations of organic waste. Considering the few demonstrated successful applications of this technology to treat heavy metals, the long timeframe required to achieve cleanup goals, the relatively high concentrations of lead in soil at Site 1H, and the limited effectiveness of this technology in soil deeper than 3 feet, phytoremediation was excluded from further consideration for this site.

4.4.7 Ex Situ Treatment

The main advantage of ex situ treatment is that it generally requires less time, and there is greater certainty about the uniformity of treatment because of the ability to monitor and thoroughly mix the contaminated soil. Ex situ treatment, however, requires excavation of the contaminated soil to the ground surface for treatment and subsequent disposal of the treated soil at an appropriate facility or beneficial reuse as fill or construction material. Compared to in situ treatment, these ex situ options lead to increased costs and engineering support for treatment equipment, permitting, and material handling and disposal. Ex situ treatment technologies that were evaluated for metal-contaminated soil at Site 1H fall into two broad groups: physical/chemical and thermal.

4.4.7.1 Physical/Chemical Treatment

Soil washing, acid extraction, S/S, and vitrification were considered as potentially applicable ex situ physical/chemical treatment options for Site 1H.

4.4.7.1.1 Ex Situ Soil Washing

Soil washing is a water-based volume reduction process for scrubbing soils ex situ to remove contaminants. This process removes heavy metals from soil by suspending them in the wash solution, or by concentrating them into a smaller volume of soil through particle size or gravity separation. Washing processes that separate the fine clay and silt particles from the coarser sand and gravel particle can effectively separate and concentrate the contaminants into a smaller volume of soil that can undergo further treatment/disposal. The wash water can be augmented with pH adjustment, a leaching agent, or a chelating agent. The contaminated water generated from the process also requires further treatment. Soil washing is generally considered a media transfer technology and is ineffective in achieving cleanup goals when used alone. This process option has seen limited use in the United States. Because of these issues, it was eliminated from further consideration.

4.4.7.1.2 Ex Situ Acid Extraction

Acid extraction uses acidic (hydrochloric acid) reagents to extract heavy metal contaminants from soils. In this process, soil is first mechanically screened to remove coarse solids. Because metals are generally found on the finer soil particles such as clays and humic material, the fine soil particles containing the bulk of the metals are separated in this process, thus considerably reducing the mass of contaminated soil requiring further treatment. Hydrochloric acid is then thoroughly mixed with the separated fine soil in the extraction unit. Residence times generally range between 10 and 40 minutes depending on the soil type, contaminants, and contaminant concentrations. The soil-extraction mix is continuously pumped out of the mixing tank and the soil and extractant separated using hydrocyclones. The resulting "cleaned" soil is then filtered, rinsed, dried, and disposed of or reused. Any residual acid in the treated soil also must be neutralized. The extraction solution and rinse water are typically hazardous, and can be regenerated using commercially available precipitants, such as sodium hydroxide or lime, along with a flocculent that removes the metals and reforms the acid. The removed heavy metals are concentrated in a form that is potentially suitable for recovery. These residues often require additional treatment such as S/S or vitrification. Offgases from the process also require collection and treatment. Elevated temperatures associated with the process raise concerns of toxic metallic vapor emissions, which can be difficult to control.

This process option is applicable for organic materials but only partially oxidizes the metals that constitute the soil RCOCs at Site 1H. Meeting stringent heavy metal cleanup criteria (i.e., California WET) may prove uneconomical. Capital costs can be relatively high, and the technology is typically economical only at larger sites. In addition, hazards associated with the handling of acids and residues following extraction suggest that implementation of this process option could be difficult. For these reasons, acid extraction was eliminated from further consideration.

4.4.7.1.3 Ex Situ Solidification/Stabilization

Solidification refers to techniques that encapsulate the waste in a monolithic solid of high structural integrity. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. In ex situ S/S, contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization). There are many innovations of this technology, most of them modifications of proven processes directed at encapsulating or immobilizing the contaminants by processing the contaminated soil. Ex situ S/S is often accomplished by mixing the excavated soil with stabilizing reagents or binders, such as cement, phosphate, lime/pozzolans, soluble silicates, sulfur-based additives, or proprietary stabilizing reagents (USEPA, 2000b).

At Site 1H, the impacted soil contains locally abundant anthropogenic debris, such as scrap lumber, glass, and other miscellaneous refuse. The effectiveness of stabilization is highly dependent on uniform mixing, which may be difficult to achieve with the debris-laden materials at Site 1H. Furthermore, anthropogenic debris, if present in large quantities (which is probable at this site), could require a separate and distinct remedial technology, which would render the cleanup more complicated and costly. For these reasons, this technology is judged impractical for Site 1H and was excluded from further consideration.

4.4.7.1.4 Ex Situ Vitrification

Ex situ vitrification processes are stabilization/solidification methods that employ heat between 1,900° to 3,600°F (USEPA, 1997a) to melt and convert waste materials into a glass matrix. The high temperatures destroy organic constituents with very few by-products. Inorganics such as heavy metals are incorporated into a stable, relatively strong, and durable glass structure that is very resistant to leaching and with mechanical and chemical properties similar to granite. Vitrification is an energy-intensive and costly technology, not readily implementable, and difficult to ensure homogeneous melting and control emissions of toxic vapors of the relatively volatile metals (i.e., lead) of concern at Site 1H. Therefore, this technology is impractical for Site 1H and was excluded from further consideration.

4.4.7.2 Thermal Treatment

Thermal processes use heat to increase the volatility (separate); burn, decompose or detonate (destroy); or melt (immobilize) the contaminants. Thermal desorption and incineration were considered as potentially applicable ex situ thermal treatment process options and are evaluated below.

4.4.7.2.1 Ex Situ Thermal Desorption

Thermal desorption is a separation technology that uses heat in a controlled environment to volatilize and remove contaminants from the soil. The gas used can be air or an inert gas such as nitrogen. Indirect heating is applied to avoid combustion. The temperature range is usually 300° to 1,200°F (lower than that of incineration), although higher temperatures can be used with an inert gas (USEPA, 1997a). Because the operating temperature for this technology is typically far below the boiling point of metals, it is generally ineffective for metals. In addition, volatilization of the relatively volatile metals (i.e., mercury and lead) and generation of toxic fumes could pose operational and worker safety difficulties. Accordingly, thermal desorption was eliminated from further consideration.

4.4.7.2.2 Ex Situ Incineration

Incineration, which can be implemented on or off site, refers to a thermal treatment that destroys organic contaminants by oxidizing them at high temperatures. The two most important parameters for effective destruction of contaminants are temperature and residence time (Freeman, 1989). These two parameters are different for different incineration process designs. The two most commonly used designs are fluidized bed and rotary kiln incinerators. Incineration could be applicable for treatment of organics and diesel contamination, but it is ineffective for treatment of metals because a large percentage of the relatively volatile metals (e.g., lead and mercury) would be emitted as toxic vapors that are difficult to control. Another problem with incineration of metals is that they are not completely destroyed and generally are present in the ash residue, which may require additional treatment and disposal. Finally, because metals have little heat recovery value, system operation is ineffective, costly, and impractical. Therefore, incineration was eliminated from further consideration.

4.5 Evaluation of Technology Process Options

Technologies and process options judged to be potentially viable in the previous section for Site 1H contaminated soil are reviewed according to three criteria: effectiveness, implementability, and cost. These criteria are briefly discussed below.

- **Effectiveness.** The effectiveness evaluation focuses on the following elements:
  - Potential effectiveness of process options for handling the estimated areas or volumes of media and meeting the RGs identified in the RAOs
  - Potential impacts to human health and the environment during the construction and implementation phase
  - Reliability and proven effectiveness of the process with respect to the contaminants and conditions at the site
- **Implementability.** The initial technology screening eliminated technology types or process options that were clearly ineffective or unworkable at the site. This evaluation addresses both the technical and institutional feasibility of implementing each process including the following institutional aspects:
  - Ability to obtain necessary permits and rights-of-way for off-site actions
  - Availability of necessary equipment and skilled workers to implement the technology
  - Availability (including capacity) of treatment, storage, and disposal services
- **Cost.** Cost plays a limited role in the screening of technologies at this phase. Relative capital and O&M costs are considered rather than absolute costs. For this evaluation, the cost analysis is based on engineering judgment. Each technique is evaluated as to whether costs are low, moderate, or high relative to other process options in the same technology type. The greatest cost consequences in site remediation are usually associated with the degree to which different technology types are used. Using different process options within a technology type usually has a less significant effect on cost than the use of different technology types. A technology process option can be eliminated on the basis of costs only if other process options within the same technology type are comparably effective and implementable but have a much lower cost.

Figure 4-6 lists all the technologies and process options that passed the initial screening in the previous section. Based on the above criteria, the process options were evaluated relative to other processes within the same technology type to select a representative process option to be included in a remedial alternative. At this stage of the FS, the emphasis is on the effectiveness of each option; implementability and cost are of lesser importance. Each criterion is rated as low, moderate, or high relative to the technologies within the same process option. The results of the evaluation are discussed in the following sections and are summarized in Figure 4-6.

4.5.1 No Action

The evaluation of the no action option for soil contamination at Site 1H is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. The effectiveness is rated low because both human and ecological receptors could be exposed to the contaminated soil. RAOs are not achieved.	Low
Implementability	No equipment, skilled workers, or permits are required.	High
Cost	No cost is associated with no action.	High

The no action option is retained for incorporation into remedial action alternatives, as required by the NCP, and will be used as a baseline for comparison of other options.

4.5.2 Institutional Action

Access/use restrictions were retained for further evaluation. Access restriction involves limiting site access and future use/development by amending the Base Master Plan.

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. Access restriction would effectively reduce the human health exposure pathway.	Moderate
Implementability	Readily implementable. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.	Moderate to High
Cost	Low capital or O&M costs.	High

Access and use restrictions are further retained for incorporation into the remedial action alternatives.

4.5.3 Containment

Capping was the containment technology retained after the initial screening phase. Based on the desired functionality of the cap to meet RAOs and the site characteristics, an engineered soil cover was determined to be the only suitable capping option for Site 1H. This process option is carried forward for further evaluation.

Criterion	Evaluation	Rating
Effectiveness	Provides adequate overall protection of human health and the environment with a high degree of long-term effectiveness and permanence. Does not include treatment; therefore, does not reduce contaminant toxicity, mobility or volume.	High
Implementability	Necessary equipment, materials, and skilled labor typically available. Relatively easy to construct because only general earthwork is needed.	High
Cost	High capital costs, low O&M costs.	Moderate

Based on its overall high ratings, this option is retained for incorporation into the remedial action alternatives.

4.5.4 Removal

The evaluation of the removal option for soil contamination at Site 1H is summarized as follows:

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs but does not reduce contaminant mobility or toxicity without treatment.	High
Implementability	Necessary equipment and skilled labor typically available. Requires agency approval, Base coordination, and H&S planning.	Moderate to High
Cost	High capital costs, low O&M costs.	Moderate

The removal option is an important strategic option available to support remedial actions at Site 1H and is retained for further consideration in the development of remedial alternatives.

4.5.5 Disposal

Both the on-Base CAMU and off-Base disposal landfilling of excavated soil were retained from the initial screening phase.

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment to stabilize waste prior to disposal .	High
Implementability	Necessary equipment and skilled labor typically available.	Moderate to High
Cost	On-Base disposal: High capital and low O&M costs. On-Base CAMU: Moderate capital and O&M costs.	Low

Land disposal, both on and off Base, is an important strategic option available to support remedial actions at Site 1H and is retained for further consideration in the development of remedial alternatives.

4.5.6 In Situ Treatment

No in situ treatment technologies were retained after the initial screening phase.

4.5.7 Ex Situ Treatment

No ex situ treatment technologies were retained after the initial screening phase.

4.5.8 Summary of Process Option Selection

As illustrated in Figure 4-6, all the process options evaluated for remediation of RCOCs in soil at Site 1H are summarized below:

- The no action response is retained as required by the NCP.
- Access/use restrictions periodic site inspection/monitoring are selected as institutional actions.
- Engineered soil cover is the selected process option for containment.
- Mechanical excavation is the selected process to remove contaminated soil from the site.
- On-Base disposal at a new CAMU facility and off-Base landfilling at a permitted hazardous waste facility were both kept as viable disposal options.

The selected process options provide the basis for the development of alternatives as discussed in the following section.

4.6 Development and Detailed Analysis of Remedial Alternatives

Guidance for the development of remedial alternatives for Site 1H was obtained from the following sources:

- 40 CFR 300 (NCP)
- Section 121 of SARA
- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988b)
- Navy/Marine Corps Installation Restoration Manual (DON, 1992).

As recommended by USEPA guidance (USEPA, 1988b) and the NCP, acceptable engineering practices that relate to site-specific conditions were considered during development of the remedial action alternatives. The alternatives developed satisfy the requirements of 40 CFR 300.430(e), which specify that alternatives be developed to include no action, institutional actions, little to no treatment alternatives, and alternatives that reduce the toxicity, mobility, or volume of contaminants, to the extent practical.

The process options selected for Site 1H in the previous section were assembled into specific alternatives representing possible remedies for the soil contamination at the site. Because of the limited number of process options retained for further consideration, few potential remedial alternatives are appropriate for Site 1H. Therefore, screening of alternatives was not necessary for Site 1H. All the alternatives developed were carried forward into the detailed analysis.

4.6.1 Overview of Detailed Analysis and Nine NCP Evaluation Criteria

An overview of detailed analysis and nine NCP evaluation criteria is presented in Section 2.6.1 (Site 1D) of this report.

4.6.2 Description of Remedial Alternatives

Alternatives were developed to address the RCOCs for Site 1H. The estimated total area of contamination above proposed RGs is approximately 31,000 square feet (0.7 acre). The impacted soils are mainly deeper than 5 feet bgs. The estimated total in-place volume of impacted soil is 10,800 cubic yards.

The following four alternatives were developed for remediation of contaminated soil at Site 1H:

- Alternative 1H-1: No action
- Alternative 1H-2: Institutional controls (site access restrictions with Base Master Plan amendment and periodic site inspection/monitoring)
- Alternative 1H-3: Capping with engineered soil cover and institutional controls
- Alternative 1H-4: Soil excavation, backfill, and off-Base disposal
- Alternative 1H-5: Soil excavation, backfill, and on-Base disposal.

Each alternative is described in detail in the following sections.

4.6.2.1 Alternative 1H-1: No Action

The NCP (40 CFR 300.430[e][6]) requires that a no action alternative be evaluated. Under this alternative, no further action would be taken to control or clean up the soil contamination at Site 1H to reduce potential risks to human health and the environment. The no action alternative involves no remediation of soils and results in no disturbance to the existing environment.

4.6.2.2 Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

This alternative implements institutional controls at Site 1H to reduce the risk to human health by controlling and monitoring exposure pathways rather than removing or controlling the risk source. Institutional actions refer to measures other than engineering control and treatment technologies. The institutional actions in Alternative 1H-2 include implementing restrictions on the site's future development and use, as well as periodic site inspection/monitoring of the site to prevent unauthorized use.

The intent of the land use restrictions is to limit activities that would increase the potential for exposure of receptors to buried materials. Future use of Site 1H for residential or industrial purposes would be controlled by enforcing these land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. To limit erosion and reduce the potential for exposure of human and ecological receptors to the buried materials, the site would be inspected periodically, during the rainy season, for evidence of erosion. If required, measures would be implemented to limit or control site erosion.

Alternative 1H-2 represents minimal administrative actions and physical measures to restrict site access in order to temporarily reduce and control exposure risks, but it does not involve any active remediation of the contaminated soil to permanently eliminate exposure risk. Site monitoring is expected to continue as long as wastes remain at the site.

4.6.2.3 Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

Alternative 1H-3 consists of an engineered soil cover, (i.e., an evapotranspiration [ET] cover), annual monitoring, O&M, and institutional controls. This alternative includes construction of an approximately 1.4-acre ET cover system. Site 1H is densely vegetated with a grade ranging from 2 to 7 percent and is currently covered by approximately 2 to 3 feet of soil over the buried materials. The cap would be designed to provide long-term minimization of infiltration of liquids, function with minimum maintenance, promote drainage and minimize erosion or abrasion of the cover, accommodate settling and subsidence, and have a minimum permeability of 10^{-6} cm/s. The implementation of appropriate mitigation measures and coordination with the USFWS and the CDFG would be required to minimize and avoid habitat disruptions during all site activities.

The ET cover would use the natural process of surface runoff, storage, evaporation, and transpiration to control infiltration of water through the existing cover. The basic profile of the ET cover includes from top of grade to foundation: 6-inch vegetated top soil layer (loosely compacted), 18-inch soil layer at 95 percent compaction, 12-ounce geotextile cushion layer, 12-inch rounded cobble layer, and 2-inch sand layer reinforced with geogrid. See Figure 4-7 for an example of an ET cover.

The topsoil layer promotes vigorous, shallow-rooted plant growth. The underlying compacted soil layer would provide impermeable characteristics with limited water storage for removal by the natural process of evapotranspiration. The geotextile cushion serves as a barrier to keep the compacted soil and cobble layer unconsolidated. The cobble layer minimizes the potential

for penetration from burrowing animals and plant roots, thereby protecting local wildlife from exposure to the buried materials below to cap cover system. Soils most suitable for ET covers are those with a high available water retention capacity and an adequate supply of nutrients to support vigorous plant growth. The vegetation most suitable for the ET cover is generally a wide mixture of native grass species with no shrubs or trees so that high transpiration is maintained even under adverse growing conditions and during long-term climactic changes.

In general, ET covers require less maintenance than traditional covers because this type of cover system is inherently self-renewing.

Installing the cap cover system would entail the following steps:

- Clear and grub existing vegetative growth and large boulders/rocks down to the exposed surface soil.
- Grade the existing foundation to the design to provide consistent sheet drainage and earthen swales – the subsequent cap layers would mirror the foundation grade.
- Depending on the settling characteristics of the cover soils over the buried materials, install a 12-inch thick cohesionless sand layer over the foundation grade and reinforce with geogrid to provide a stabilized grade for the cap system.
- Place a 1-foot layer of rounded cobbles (3 to 6 inches in diameter) over the existing sand layer. The sand and cobble layers would "day-light" at down-slope areas to allow for any subsurface drainage of rainwater, which may infiltrate into the cobble layer.
- Install a 12-ounce geotextile cushion on top of the cobble layer to keep the overlying compacted soil layer from consolidating into the cobble layer.
- Place 18 inches of clean soil in 6-inch lifts over the geotextile cushion at 95 percent compaction. To minimize damage to the geotextile cushion, the placement of soil would likely have to be completed at the site perimeter while pushing the soil inward to the center of the site.
- Loosely place the last 6-inch layer of vegetative soils to promote vegetative growth.
- Install temporary irrigation piping and sprinkler systems.
- Fertilize and till the top vegetative soil layer.
- Plant/hydroseed native grasses.

To ensure that human health and the environment are protected in the future, the soil cap must not be breached through trenching, excavation, or any other similar activity unless prior approval is obtained from the Base and the lead regulatory agency(s). Details of the alternative specifics would be incorporated into the Base Master Plan. This restriction does not apply to maintenance activities to preserve or restore the physical integrity of the cap. Maintenance activities may include cleaning earthen drainage channels, removing weeds (including bushes and trees), replacing erosion control materials, and regrading. Also, if significant erosion results from heavy rains, partial excavation of the cover soil may be partially excavated and additional cover soil may be imported, placed, and reseeded. Access roads would be maintained and improved as necessary.

The total duration of the construction portion of the remedial action is expected to be 13 calendar weeks.

4.6.2.4 Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

Alternative 1H-4 for Site 1H addresses remediation of contaminated soils exceeding the proposed RGs through excavation and off-Base disposal. The following elements are associated with Alternative 1H-4:

- Excavation of impacted soil
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles for waste characterization
- Transportation of the excavated soil to an off-Base disposal facility
- Site restoration.

Based on the volume of material (10,800 cubic yards) that exceeds the proposed RGs provided in Section 4.1.3.2, it is estimated that approximately 15,000 tons would require excavation and off-Base disposal at Site 1H. The excavation area is an irregularly shaped area measuring roughly 140 by 300 feet. Within this area, approximately 36,710 square feet (0.8 acre) is impacted. Based on the data and waste classification discussed in Appendix K2, approximately 1,400 cubic yards (2,100 tons) of the excavated soil would classify as California-hazardous waste, and approximately 9,400 cubic yards (14,100 tons) would classify as nonhazardous waste. None of the excavated soil would qualify as RCRA hazardous waste and would not be subject to the universal treatment options of the land disposal restrictions; therefore, no pretreatment will be performed prior to disposal.

Heavy earthmoving equipment, such as a track-mounted excavator and track- or wheeled-loaders, would be used to excavate the impacted soil within the lateral limits shown in Figure 4-2. Excavated soils would be placed in discrete 500-ton stockpiles. During soil removal, the excavation would progress vertically and laterally to remove the areas of identified soil contamination exceeding the RGs. The excavation sidewalls would be sloped at 1.5:1 (horizontal:vertical) to maintain slope stability and avoid the use of shoring.

Following excavation to the assumed lateral limits and target depth, confirmation samples would be collected for laboratory analysis. Confirmation sampling would be performed shortly after excavation has been completed, so that, to the extent possible, sampling would be performed concurrent with excavation. An average of five confirmation samples would be collected from each 50- by 50-foot (2,500-square-foot) area of the excavation. Along the perimeters of the excavation area, some of these samples would be collected from the excavation sidewalls or slopes and from the excavation floor. Based on the analytical results from the confirmation samples and comparison to RGs, the excavation would be backfilled or extended laterally and/or vertically until the cleanup goals are achieved. If additional excavation were required, additional confirmation sampling and analysis would be performed until the cleanup goals are met.

A licensed land surveyor would survey the final spatial limits of the excavation after confirmation sampling and analysis and prior to placement and compaction of backfill. After excavation and confirmation sampling had been in a portion of the excavation, placement of backfill and compaction would be initiated. To the maximum extent possible, backfill and compaction would be performed concurrently with excavation and confirmation sampling. The backfill and compaction would extend approximately 2 weeks beyond the completion of all confirmation sampling and analysis. Prior to placement of backfill, the exposed bottom of the excavation

would be moisture conditioned and the excavation backfilled with imported clean soil. All backfill material would be placed in lifts, moisture conditioned, and compacted. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours, surveyed, and revegetated to restore habitat and to minimize erosion.

During remedial action, the excavation and stockpile areas would be delineated with barricades, caution tape, and warning signs to minimize unauthorized access to these areas. Potential exposure and protection procedures for site workers would be addressed in a site-specific health and safety plan. The risk of exposure for site personnel to soil contaminants would be minimized by the following procedures: proper selection of PPE; establishing support, contaminant reduction, and exclusion zones; applying dust suppressants and/or water to reduce dust emissions in the excavation and at the stockpile areas; and monitoring dust using direct-reading instruments.

A medium-sized tracked excavator (caterpillar 235 or equivalent) would be used to excavate the soil and place it in small stockpiles adjacent to the excavation. Large-capacity front-end loaders would then transfer the soil from the excavation to the stockpile staging area. Plastic sheeting would be required to protect the ground surface beneath the 500-ton stockpiles. Each stockpile would remain on the plastic until it was transported off Base. The stockpiles would be periodically wetted and regularly monitored to ensure control of fugitive dust emissions. The water applied during dust control activities would be applied in a fashion so as to eliminate the potential for erosion and/or impact to existing storm water utilities. Soil stockpiles would be covered with plastic and the plastic would be secured with sand bags at the end of each working day.

Prior to transport, composite stockpiles samples would be collected and the analytical results would then be used to characterize and classify the waste. Based on topographic maps of the area immediately surrounding the site, sufficient open space is available near the excavations as a staging area for the stockpiles.

Approximately 400 cubic yards (600 tons) of material would be removed from this site daily, requiring 25 working days to complete the excavation and loading of soil.

For estimating purposes, it is assumed that all nonhazardous soil would be transported by truck to the Waste Management Bradley Facility in Tujunga, California, and all California-hazardous soil would be transported to Waste Management's Kettleman Hills Facility in Kettleman City, California for disposal. All soils would be transported under Uniform Hazardous Waste Manifest to the appropriate disposal facility. All required placards would be placed on vehicles prior to leaving the site. All federal and California DOT guidelines and regulations would be followed. Each transport truck is expected to safely haul 18 cubic yards (24 tons) of soil to the disposal facility. To ensure that trucks do not exceed the public highway weight limits, calibrated portable scales would be placed on site and operated by a certified weigh master. An average rate of 15 minutes per transport truck is estimated for loading, weighing, and tarping; therefore, a total of 32 trucks could be loaded in each 8-hour shift. Transportation and waste profiling of the excavated soil would occur concurrently with excavation and require approximately 27 working days. The cost estimate in Appendix K2 is based on 5-day work weeks (8 hours per day), which results in 38 calendar days (or approximately 6 weeks).

The total duration of the remedial action is expected to be 11 calendar weeks, based on an excavation, transportation and disposal rate of approximately 400 cubic yards (600 tons) per day. Mobilization to the field would require approximately 1 day. Excavation and stockpiling (including sampling), transportation and disposal would require approximately 6 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the

excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately 1 week after sampling is complete. Site cleanup and restoration (final grade check, surveying, and revegetation) would require another 1 week.

4.6.2.5 Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-5 is the same as Alternative 1H-4, except that contaminated soils exceeding RGs would be disposed of at a new on-Base CAMU disposal facility instead of shipped off the Base. The following elements are associated with Alternative 1H-5:

- Excavation of impacted soil
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles and excavation areas for waste characterization
- Hauling of the excavated soil to an on-Base CAMU disposal facility
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material
- Site restoration.

Soil excavation, temporary stockpile storage, waste characterization, confirmation sampling, backfilling, and site restoration activities would be conducted exactly as detailed in Alternative 1H-4. Upon excavation, all contaminated soil would be hauled to an on-Base CAMU facility for disposal.

For cost estimating purposes, it is assumed that each transport truck would safely haul 18 cubic yards (24 tons) of soil per trip to a CAMU facility. An average rate of 15 minutes per truck is estimated for loading, weighing, and tarping. Based on the excavation, hauling, and disposal rate of 400 cubic yards (600-ton per day), a total of 25 truck-trips per day to a CAMU facility would be needed.

The mobilization would require 1 day. Excavation, stockpiling (including sampling), and hauling to an on-Base CAMU facility would require approximately 5 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately another 2 weeks. Site cleanup and restoration (final grade check, surveying, and revegetation) would require 1 week. The total duration of the remedial action is expected to be 10 calendar weeks.

Currently an operational CAMU does not exist at MCB Camp Pendleton. The implementation of this alternative would be contingent upon the siting, design, and construction of a 10 to 15 acre CAMU. A new CAMU facility would be available to accept waste from Site 1H in 3 to 4 years.

For this proposed alternative, identification of a specific disposal site is not necessary to meet the feasibility study requirements of evaluating the alternative. If DON chooses this as the preferred alternative, a specific on-Base disposal site would need to be located that meets statutory requirements. Therefore, an appropriate addendum document would be prepared to address disposal site compliance with ARARs, and specific pre-treatment requirements, prior to preparation of the OU 4 Proposed Plan and implementation of this alternative.

4.6.3 Detailed Analysis of Site 1H Remedial Alternatives

This section presents a detailed analysis of the five remedial alternatives that were developed for Site 1H. The detailed analysis of remedial alternatives consists of evaluating each selected

alternative against the nine NCP evaluation criteria. The objective of the detailed analysis is to present and interpret the relevant information necessary to select the most appropriate and cost-effective remedy for a site to meet the RAOs. The detailed analysis is designed to provide decision makers with sufficient information to compare the alternatives adequately, select an appropriate remedy for the site, and demonstrate satisfaction of the CERCLA remedy selection requirements in the ROD (Table 4-6). All five alternatives were selected for the detailed analysis.

4.6.3.1 Overall Protection of Human Health and the Environment

An analysis of how well each alternative meets overall protection of human health and the environment is provided below.

Alternative 1H-1: No Action

The no action alternative includes no treatment and no control of exposure pathways. Under this alternative, the potential impacts to human health would be the same as those calculated in the baseline human health risk assessment. Although the no action alternative would be protective under current land use conditions, Site 1H would pose a threat to any future residential use. Hypothetical industrial development would result in an acceptable risk as long as soils deeper than about 3 feet bgs are not contacted. A hypothetical military receptor could be exposed to soil contaminants at levels that result in adverse health effects, depending on the nature and duration of the exposure. Because it does not provide any protection if land use changes, the no action alternative would not be protective of human health.

The ERA concluded that none of the COPECs identified in the evaluated soil exposure interval (0 to 3 feet bgs) is likely to pose unacceptable hazards or induce adverse effects to the potential ecological receptors evaluated from direct exposure to the soil. Based on this conclusion, the extremely low bioavailability and solubility of dioxins/furans, and the distance to the nearest surface water body from the site (3,600 feet away), it is very unlikely that subsurface soils at Site 1H would pose any threat to surface water beneficial uses and water quality objectives.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

Alternative 1H-2 provides control of exposure pathways and would be protective of human health. The potential for human contact with materials buried at the site would be limited by the components of this alternative. Although current conditions are protective of current uses, this alternative would provide protection for future potential receptors by limiting changes in land use through land use restrictions placed in the Base Master Plan.

The results of a screening-level human health evaluation indicated that lead concentrations in the upper 3 feet bgs would not represent a threat to human health under a hypothetical on-site industrial land use scenario. This included a quantitative assessment of exposure using the LEADSPREAD model of on-site inhalation of particulate-bound contaminants in fugitive dust, as well as the exposure resulting from incidental soil ingestion and dermal contact with soil. Given that the on-site risk, hazard, and blood-lead levels were found to be acceptable for an on-site receptor, impacts to an adjacent off-site receptor would be even lower given the lack of direct soil contact and the greater distance for any fugitive dust to travel.

The ERA concluded that none of the COPECs identified in the evaluated soil exposure interval (0 to 3 feet bgs) is likely to pose unacceptable hazards or induce adverse effects to the potential ecological receptors evaluated from direct exposure to the soil. Based on this conclusion, the extremely low bioavailability and solubility of dioxins/furans, and the distance to the nearest surface water body from the site (3,600 feet away), it is very unlikely that subsurface soils at

Site 1H would pose any threat to surface water beneficial uses and water quality objectives. The site is located in a hilly well-drained area with no evidence of significant erosion.

The results of a fate-and-transport analysis indicate that soil contaminants at Site 1H likely do not represent a threat to groundwater resources (see Appendix L).

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

This alternative is expected to provide overall protection of human health and the environment by effectively reducing the availability of contaminated soil to receptors and eliminating exposure pathways to the contaminated soil. In addition, institutional controls would limit future site receptors and monitoring requirements would ensure the integrity of the cover to limit any receptor contact with subsurface contamination.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

Alternative 1H-4 would be protective of human health and the environment because all contaminated soil exceeding chemical-specific RGs would be physically removed off Base and the area would be backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment and protective of groundwater quality.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-5 would protect human health and the environment because all contaminated soil exceeding chemical-specific RGs would be physically removed and hauled away to a CAMU facility, and the excavation backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment, and protective of groundwater quality.

4.6.3.2 Compliance with ARARs

An analysis of how well each alternative complies with ARARs is provided below.

Alternative 1H-1: No Action

No action-specific ARARs are identified for the no action alternative because no action is taken.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

Alternative 1H-2 complies with ARARs. Although soil contamination would be left in place, it does not pose a threat to groundwater resources or ecological receptors.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

Alternative 1H-3 complies with ARARs, including air permitting, waste pile, and capping requirements for hazardous waste. Alternative 1H would meet requirements for discharge visible emissions during excavation/construction, requirements for stockpiling and covering of disturbed soils during foundation grading, and requirements associated with cap design and maintenance. It is likely that Alternative 1H-3 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

Alternative 1H-4 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the

proposed remediation cleanup goals. San Diego APCD Rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. Soils would be wetted, covered with a synthetic material or soil polymer to meet the air requirements. It is likely that Alternative 1H-4 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-5 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. San Diego APCD Rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. To meet this requirement, soils would be wetted and covered with a synthetic material or soil polymer. It is likely that Alternative 1H-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. In order for this alternative to be selected, the proposed site and design of a CAMU would need to comply with ARARs identified in Appendix A, including CAMU requirements set forth in 40 CFR 264.552 and CCR Title 22, Section 66264.552.

4.6.3.3 Long-Term Effectiveness and Permanence

An analysis of the long-term effectiveness and permanence for each alternative is provided below.

Alternative 1H-1: No Action

The risks associated with the no action alternative were evaluated in the baseline HHRA and ERA. This alternative would not provide actions or controls to reduce existing contaminant concentrations or risks to human health or the environment. As a result, the reliability and adequacy of actions or controls is not evaluated for no action. No action is not considered to provide long-term effectiveness and permanence because contaminated material would remain at the site. Although the threat to human health is minimal under current land use conditions, future changes in land use could result in an adverse threat to human health.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

This alternative would be effective in controlling potential exposure to buried material as long as land use restrictions are enforced. Under current use (unoccupied), this site does not pose a threat to human health. The institutional measures would reduce the potential for human contact with buried materials and limit future site development, thereby improving long-term effectiveness. Long-term effectiveness could be compromised if institutional controls are ineffective in limiting military training in this area.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

Alternative 1H-3 provides long-term effectiveness and permanence by limiting potential receptor contact with contamination through both an engineered cover and land-use restrictions. The long-term effectiveness would depend on proper monitoring and maintenance of the cap. Annual O&M of the cap consists of periodic watering and weed removal (including any bushes or trees), repair as necessary and appropriate to ensure integrity, laying down additional topsoil cover as necessary, and annual detailed inspections. Vegetation on the cap must be maintained to reduce the potential for cap erosion and penetration below the cobble/sand

layers. A monitoring, maintenance, and inspection program would be developed and specified in the remedial action plan (RAP). Adherence to the program would help ensure long-term integrity and effectiveness of the cap. Land use restrictions would be needed to effectively preclude any excavation and trenching, as well as residential, agricultural, or any development in the cap area. A 50-year life expectancy has been assumed for the cap.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

This alternative adequately addresses the criterion of long-term effectiveness because contaminants would be removed from the site and the contaminated soil replaced with clean fill. The excavation of contaminated soil provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. This alternative would provide a high degree of long-term effectiveness and permanence.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

This alternative would provide a high degree of long-term effectiveness and permanence because contaminants are removed and the contaminated soil is replaced with clean import soil. The excavation of contaminated soil provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. Removal and on-Base disposal of the contaminated soil at a new CAMU facility would result in acceptable levels of residual soil contamination at this site from both a human and ecological perspective.

4.6.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

An analysis of the reduction of toxicity, mobility, or volume through treatment for each alternative is presented below.

Alternative 1H-1: No Action

Because active treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

Because treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

The mobility of the contaminated soil would be reduced by installation of a cap to inhibit contaminated surface water runoff, infiltration, and potential downward leaching of contaminants to groundwater, but because treatment is not a component of this alternative, there is no reduction in toxicity or volume of soil through treatment.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

Since Alternative 1H-4 does not involve treatment of contaminated soil prior to off-Base transport and disposal, there is no reduction in toxicity, mobility, or volume of soil through treatment. Alternative 1H-4 is ranked low.

Alternative 1H-5: Soil Excavation, Backfill, and Off-Base Disposal

Alternative 1H-5 does not involve treatment of contaminated soil prior to on-Base transport and disposal. There is no reduction in toxicity, mobility, or volume of soil through treatment. Alternative 1H-4 is ranked low.

4.6.3.5 Short-Term Effectiveness

An analysis of the short-term effectiveness for each alternative is provided below.

Alternative 1H-1: No Action

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

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

Implementation of use restrictions is administrative and presents no short-term effectiveness issues. Implementation of Alternative 1H-2 is not expected to result in any significant adverse environmental impacts.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

The short-term effectiveness for Alternative 1H-3 is rated moderate. Movement of construction equipment over the contaminated soil could create a potential for short-term risk to site workers due to exposure to contaminated soil, including inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during cap construction. Dispersion of fugitive dust and particulate matter would be controlled by appropriate dust suppression measures during clearing/grubbing and foundation grading operations. A site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. Traffic accidents associated with driving public highways could occur in the course of soil transportation. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during would be minimized by using dust suppressants and/or appropriate personal protective equipment, where applicable.

Implementation of Alternative 1H-3 would not result in any significant, adverse impacts to ecological resources. The area in Site 1H subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG) including implementation of appropriate monitoring and mitigation requirements. The areas affected during remediation would be revegetated following completion of the remedial alternative.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

The short-term effectiveness for Alternative 1H-4 is rated moderate. A site-specific sampling plan and a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation and transportation.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported to the selected off-Base disposal facility in covered trucks traveling on pubic highways. All soils would be transported under Uniform Hazardous Waste Manifest to the appropriate disposal facility. All required placards would be placed on vehicles prior to leaving the site. All federal and California Department of Transportation guidelines and regulations would be followed. Prior to leaving the site, trucks would be thoroughly inspected to ensure no loose contaminated soil is present on the outside of the trucks that could present a hazard to the public. Traffic accidents associated with driving public highways could occur in the course of soil transportation. In the case of a traffic accident, the risk to the public would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate personal protective equipment, where applicable.

Implementation of Alternative 1H-4 would not result in any significant, adverse impacts to ecological resources. The area in Site 1H subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG) including implementation of appropriate monitoring and mitigation requirements. The areas affected during remediation would be revegetated following completion of the remedial alternative.

Field personnel participating in the excavation and sampling activities would wear personal protective equipment, as specified in the health and safety plan. The remedial activities in this alternative are expected to be completed in less than one year.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

The short-term effectiveness for Alternative 1H-5 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation and treatment.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The stabilized contaminated soil would be transported to a new CAMU disposal facility in covered trucks traveling on Base roads. Prior to leaving the site, trucks would be thoroughly inspected to ensure that no loose contaminated soil, which could present a health hazard, is present on the outside of the trucks. In the case of a traffic accident, human health risk would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate PPE, where applicable.

Implementation of Alternative 1H-5 is not expected to result in any significant adverse environmental impacts. The area in Site 1H subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

4.6.3.6 Implementability

An analysis of the implementability of each alternative is provided below.

Alternative 1H-1: No Action

No implementability concerns are posed by this alternative because no action would be taken.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

Institutional actions comprising this alternative are implementable. Modifications to the Base Master Plan are administrative in nature. Close coordination with on-Base tenants would be required to ensure that no military training occurs in this area. The Base would have primary responsibility for implementing this alternative and possesses the authority and capability to establish appropriate safeguards and to monitor compliance. Existing staff with the Base Environmental Security Office coordinate all on-Base construction activities to ensure appropriate environmental review. Institutional controls for IR sites are maintained on a central GIS that is readily accessible. Furthermore, the 5-year review process provides an additional level of review to ensure that the site is not used inappropriately. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

Implementability is ranked high for Alternative 1H-3. The construction techniques required for capping are well established. This alternative uses standard and readily available labor skills and cap construction equipment and supplies. Soil, sand, cobbles, and geosynthetic materials required for the cap are locally and regionally available. A Nationwide Permit 38 from the Army Corps of Engineers would likely apply to the project and would preclude a requirement for individual Section 404 permit regulating the discharge of "dredge and fill" material.

Implementation of Alternative 1H-3 would require coordination with the USFWS and the CDFG to ensure that this alternative is protective of ecological receptors and complies with requirements of the Endangered Species Act. This review process would take 6 to 12 months and would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

As stated above for Alternative 1H-2: Institutional Controls, close coordination with on-Base tenants would be required to ensure that no military training occurs in this area. In addition, the 5-year review process would be required.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

Excavation and disposal of contaminated soil at an off-Base disposal facility are readily implementable and this alternative is ranked high. Several firms are available that can provide the necessary equipment, materials, and labor to excavate and dispose of the contaminated soil. Licensed disposal facilities capable of accepting the contaminated soil currently exist within California.

Because the majority of the impacted soil would be permanently removed from the site, future soil remedial activities are not expected to be necessary. The effectiveness of soil excavation would be evaluated by collecting and screening confirmation samples during excavation.

Implementation of Alternative 1H-4 would require coordination with the USFWS and the CDFG to ensure that this alternative is protective of ecological receptors and complies with requirements of the Endangered Species Act. This review process would take 6 to 12 months and would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-5 is dependent on the siting, design, and construction of a new on-Base CAMU. Factors affecting the implementability of an on-Base CAMU include the time required to conduct siting studies and to design and construct the facility (estimated to take 3 to 4 years to complete), compliance with the CAMU disposal unit regulations under RCRA, availability of 10 to 15 acres of land to locate a CAMU, and placement of institutional controls on a CAMU location in the Base Master Plan. Given that the Base mission is to support training, any area with a land use restriction would limit that function.

Excavation and disposal of contaminated soil at a new on-Base CAMU disposal facility are readily implementable, and the necessary equipment, materials, and labor are readily available. Because the majority of the impacted soil would be permanently removed from the site, future soil remedial activities are not expected to be necessary. Collecting and screening confirmation samples during excavation would be used to evaluate the effectiveness of soil excavation.

The DON will be required to meet the substantive requirements of all necessary permits. Implementation of Alternative 1H-5 would require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with requirements of the Endangered Species Act. This review process would take 6 to 12 months and would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

Based on the above factors, Alternative 1H-5 is rated moderate.

4.6.3.7 Cost

A summary of the costs is provided below.

Alternative 1H-1: No Action

No costs are associated with Alternative 1H-1.

Alternative 1H-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment)

The total cost of Alternative 1H-2 is estimated to be approximately $247,000. This cost covers the administrative costs for implementation of use restrictions and future maintenance costs of the site surface. If institutional controls were implemented, there would be indirect costs associated with the Base not being able to use the property for training and other purposes. Given that the Base mission is to support training, any area with a land use restriction would limit that function. This potential loss of land use is not quantified in this document, but is considered as a factor in evaluating implementability of institutional controls as a remedial alternative. A cost estimate and present worth analysis, including maintenance costs, is provided in Appendix K2.

Alternative 1H-3: Capping (Engineered Soil Cover), Cap Monitoring/Maintenance, and Institutional Controls

The capital cost for design and construction of the cap system is estimated at $780,000; the operation and maintenance cost (2002 dollars) is estimated at $460,000, for a total of $1,240,000. The detailed cost analysis was prepared using an underlying set of assumptions as presented in Appendix K2.

Alternative 1H-4: Soil Excavation, Backfill, and Off-Base Land Disposal

The cost for Alternative 1H-4 is estimated to be approximately $2,629,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; confirmation sampling and laboratory analysis; waste characterization; transportation and disposal of contaminated soil at a California hazardous waste disposal facility; excavation backfill with clean soil; surveying; and site restoration. A breakdown of the cost estimate is provided in Appendix K2.

Alternative 1H-5: Soil Excavation, Backfill, and On-Base Disposal

The cost for Alternative 1H-5 is estimated at $2,466,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; confirmation sampling and laboratory analysis; waste characterization; hauling and disposal of contaminated soil at a new on-Base CAMU site; excavation backfill with clean soil; surveying; and site restoration.

The cost also includes an allocated portion of the total construction and O&M costs associated with a new CAMU. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate. Thus, the cost of Alternative 1H-5 includes $625,000 in capital costs toward conducting the siting study, designing, constructing and closing of a new CAMU, and $98,000 in O&M costs earmarked for maintaining and monitoring a CAMU over 30 years. A breakdown of the cost estimate is provided in Appendix K2.

4.7 Comparative Analysis

This section provides a comparative evaluation of Alternatives 1H-1 through 1H-4 relative to the NCP criteria and discusses the advantages and disadvantages of the alternatives relative to each other. A summary of the comparative analysis is presented below.

4.7.1 Overall Protection of Human Health and the Environment

Alternative 1H-1 would leave contaminant concentrations in place that pose a potential threat for future human health exposure. Alternative 1H-2 would control exposure pathways and would be protective of human health. Alternative 1H-3 would protect human health by capping the impacted soils and using institutional controls, effectively eliminating potential exposure pathways. Alternatives 1H-4 and 1H-5 would protect human health through removal and disposal of impacted soils in an appropriate off-Base disposal facility.

4.7.2 Compliance With ARARs

Based on the screening-level ERA, Alternative 1H-1 would not comply with location-specific requirements of the Endangered Species Act though Alternative 1H-2 would comply. Alternatives 1H-4 and 1H-5 would comply with ARARs for excavation and transportation. It is likely that Alternatives 1H-3, 1H-4, and 1H-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required.

4.7.3 Long-Term Effectiveness and Permanence

Alternative 1H-1 is rated low for long-term effectiveness and permanence because no measures or controls are associated with this alternative. Alternative 1H-2 would require long-term maintenance. Alternative 1H-2 would provide a degree of long-term effectiveness through limiting exposure and site uses. Alternative 1H-3 would provide a higher degree of long-term effectiveness through elimination of exposure pathways via capping in addition to restricting site uses. Alternatives 1H-4 and 1H-5 would provide the greatest degree of long-term effectiveness and permanence because they involve removal of the contaminated soils from the area and backfilling of the excavation with clean import soil. For Alternatives 1H-4 and 1H-5, the measures and controls implemented would effectively reduce the potential for future human exposure, and no further actions (e.g. institutional controls) would be necessary.

4.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment

Alternatives 1H-1 and 1H-2 are rated low for this evaluation criterion because they do not involve treatment. Alternatives 1H-3 and 4 would reduce contaminant mobility but do not involve treatment and are therefore ranked low. Alternative 1H-5 would not involve treatment and would not reduce contaminant mobility, toxicity, or volume and is therefore ranked low.

4.7.5 Short-Term Effectiveness

This criterion is not rated for Alternative 1H-1 because it does not involve any actions that would disturb the site. The short-term effectiveness of Alternative 1H-2 is ranked high and is expected to be the greatest of the four alternatives. Minimal site activities are planned. The potential for short-term dust exposure exists during cap construction for Alternative 1H-3 and during excavation, and transportation to an off-Base disposal facility for Alternative 1H-4 or an on-Base CAMU facility for Alternative 1H-5. Alternatives 1H-3, 1H-4, and 1H-5, which are ranked moderate, could result in short-term impacts to ecological receptors although impacts would be minimal if appropriate regulatory coordination occurs, including implementation of any required mitigation and monitoring measures during construction.

4.7.6 Implementability

This criterion is not rated for Alternative 1H-1 because no activities would be conducted under this alternative. Alternatives 1H-2, 1H-3, and 1H-4 are readily implementable and involve commonly performed remedial operations. Alternative 1H-2 is considered easier to implement because activities are largely administrative. However, given that the Base mission is to support training, any area with a land use restriction would limit that function and this potential loss of land use causes Alternative 1H-2 to be rated moderate.

Equipment, materials, and labor for Alternatives 1H-3, 1H-4, and 1H-5 are easily available, and all three alternatives involve commonly performed remedial operations. Excavation and treatment for Alternative 1H-4 use standard equipment and labor skills and are readily implementable. Stabilizing reagents range from widely available off the shelf reagents, such as fly ash, cement, etc., to less common, more specialized proprietary reagents. Alternative 1H-4 is ranked high because all components of this alternative are readily implementable.

Alternative 1H-3 is ranked high although it would require significant coordination with the regulatory agencies. Alternative 1H-5 would involve compliance with the disposal requirements of an on-Base CAMU. Alternative 1H-5 is ranked moderate to implement because it would require 10 to 15 acres of available land to locate a new CAMU facility; 3 to 4 years to site, design, and construct the CAMU; compliance with the disposal requirements of an on-Base CAMU; significant regulatory coordination; and O&M funding uncertainty.

4.7.7 Cost

No cost is associated with Alternative 1H-1. Alternative 1H-2 is less expensive than Alternatives 1H-3, 1H-4, and 1H-5, with an estimated cost of approximately $247,000. Alternative 1H-3 provide a medium cost alternative with a present net worth of $1,240,000. Alternative 1H-5 would cost approximately $2,466,000. Alternative 1H-4 is the most expensive remedial alternative for Site 1H, with an estimated cost of approximately $2,629,000.

4.7.8 Summary of Comparative Analysis

The results of the comparative analysis for Site 1H are summarized below.

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	Yes	Yes	Yes	Yes
Compliance with ARARs	No	Yes	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Moderate	Moderate to High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	Low	Low	Low
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	High	High	Moderate
Cost ($ million)	0	0.25	1.24	2.63	2.47

[a]No Action
[b]Institutional Controls
[c]Capping with Engineered Soil Cover and Institutional Controls
[d]Soil Excavation, Backfill, and Off-Base Disposal
[e]Soil Excavation, Backfill, and On-Base Disposal

Alternative 1H-1 does not meet ARARs, would not protect human health, and does not provide long-term effectiveness and permanence. No costs are associated with Alternative 1H-1.

Alternatives 1H-2, 1H-3, 1H-4, and 1H-5 are protective of human health and the environment, meet ARARs, and provide a high degree of long-term effectiveness and permanence. Alternatives 1H-4 and 1H-5 may provide additional long-term permanence and effectiveness because they do not rely on site use restrictions to reduce the potential for adverse health effects.

No reduction of toxicity, mobility, or volume through treatment is associated with any of the alternatives, so all alternatives are ranked low for this criterion. Alternative 1H-2 is viewed as providing greater short-term effectiveness than Alternatives 1H-3, 1H-4, or 1H-5. Alternatives 1H-3 and 1H-4 are readily implementable. Alternative 1H-5 would be more difficult to implement because it would require 3 to 4 years to site, design, and construct an on-Base CAMU, require more regulatory involvement, long-term O&M, and the loss 10 to 15 acres of current land use with institutional controls placed on a new CAMU location.

The cost to reduce the human health and ecological risks and exposure pathways associated with site metals is estimated to be $247,000 for Alternative 1H-2 and $1,240,000 for Alternative 1H-3. To achieve a higher level of protectiveness and unrestricted future land use, Alternative 1H-4 would cost $2,629,000. To achieve the same higher level of protectiveness and unrestricted future land use for the site as Alternative 1H-4, but with restricted future land use for a CAMU location, Alternative 1H-5 would cost $2,466,000.

THIS PAGE INTENTIONALLY BLANK

Table 4-1
Site 1H Dioxins and Furans Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Method	Units	1,2,3,4,6,7,8,9-OCDD	1,2,3,4,6,7,8,9-OCDF	1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDD	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-HxCDF	1,2,3,7,8-PeCDD	1,2,3,7,8-PeCDF	2,3,4,6,7,8-HxCDF	2,3,4,7,8-PeCDF	2,3,7,8-TCDD	2,3,7,8-TCDF	2,3,7,8-TCDD Toxicity Equivalents (Including NDs)(1)	2,3,7,8-TCDD Toxicity Equivalents (ND = 0)(2)
				MDL:	pg/g	220-250	220-250	90-100	180-200	50-60	90-100	70-80	60	90-100	70-80	70-80	70	140-150	90-100	80-90	20	30-40	NA	NA
				PQL:	pg/g	40	30	20	20-30	20-30	20	20	20	20	20	20	20	20	20	20	10	10	NA	NA
				PRG:	pg/g	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	3.9	NE	NE	NE
1HSB-01D	10.0 - 10.5	15-Oct-01	8280A	pg/g	<160 J	<80 J	50 J	<110 J	20 R	20 R	70 J	20 R	<30 J	20 R	20 R	20 R	20 R	50 J	40 J	10 R	40 J	70.0	36.7
1HSB-02C	5.0 - 5.5	15-Oct-01	8280A	pg/g	<110 J	<50 J	20 R	<80 J	30 R	20 R	50 J	20 R	<40 J	20 R	20 R	20 R	20 R	30 J	20 R	10 R	40 J	56.5	12.0
1HSB-02D	10.0 - 10.5	15-Oct-01	8280A	pg/g	40 R	30 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	20 R	10 R	10 R	46.7	0.0

pg/g = picogram/gram
<2 = not detected at indicated value
(D) = Duplicate Sample
PRG = preliminary remediation goal, residential soil
J = Estimated value reported is below the "reporting limit" and above the estimated detection limit.
R = holding time exceeded
Toxicity equivalents were calculated using toxicity equivalency factors from CalEPA, 1996 and USEPA, 1989 (I-TEFs).
Mean rural background value for 2,3,7,8-TCDD toxicity equivalents is 4.1 pg/g (USEPA, 2000b).
(1) "Not-detected" congeners are included in the calculation of toxicity equivalents assuming they are present at the reporting limit.
(2) "Not-detected" congeners are not included in the calculation of toxicity equivalents.

MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
NA = not applicable
NE = not established

HxCDD = hexachlorodibenzo-p-dioxin
HpCDD = heptachlorodibenzo-p-dioxin
HpCDF = heptachlorodibenzofuran
HxCDF = hexachlorodibenzofuran
OCDD = octachlorodibenzo-p-dioxin
OCDF = octachlorodibenzofuran
PeCDD = pentachlorodibenzo-p-dioxin
PeCDF = pentachlorodibenzofuran
TCDD = tetrachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran

Table 4-2
Site 1H Metals Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction Method	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Hexavalent Chromium
			TTLC MDL:	mg/kg	0.82 - 0.94	0.29 - 0.33	0.31 - 0.35	0.16 - 0.18	0.031 - 0.035	0.049 - 0.056	9.8 - 11	0.027 - 0.03	0.086 - 0.098	0.33 - 0.37	0.7 - 7.3	0.16 - 0.18	0.98 - 1.1	0.078 - 0.089	0.0046 - 0.0053	0.13 - 0.3	0.11 - 0.13	1 - 12	0.35 - 0.4	0.057 - 0.065	29 - 33	0.2 - 0.23	0.057 - 0.085	0.14 - 0.16	0.049 - 0.056
			TTLC PQL:	mg/kg	20 - 23	5 - 23	1.2 - 1.4	4.1 - 4.7	0.82 - 0.94	0.82 - 0.94	82 - 94	2 - 2.3	2 - 2.3	2 - 2.3	12 - 130	1.2 - 1.4	41 - 47	2 - 2.3	0.2 - 0.23	0.82 - 0.94	1.2 - 1.4	82 - 920	2 - 2.3	2 - 2.3	410 - 470	2 - 2.3	2 - 2.3	2 - 2.3	0.051 - 0.058
			TCLP MDL:	µg/L	12	6	2.8	0.92	0.08	0.06	NR	0.38	0.48	3.2	3.2	2.8	NR	0.8	NA	2.2	1.3	NR	4.6	0.22	NR	3.2	0.7	6	NA
			TCLP PQL:	µg/L	200	20	10	20	4	4	NR	10	10	20	100	10	NR	10	NA	10	10	NR	20	20	NR	20	20	20	NA
			Background [a]:	mg/kg	21733	8.38	10.9 [b]	261.2	1.42	1.52	NE	32.6	12.8	26	28,553	21.7	10672	655	0.10	5.98	20.2	NE	0.80	1.36	NE	1.33	73.8	104	NE
			Residential Soil PRG:	mg/kg	76,000	31	0.39	5,400	150	9	NE	30	4,700	2,900	23,000	400	NE	1,800	2.3	390	150	NE	390	390	NE	5.5	550	23,000	0.2
			RCRA Hazardous Waste TTLC Limit [c]:	mg/kg	NE	500	500	10,000	75	100	NE	500 [e]	8,000	2,500	NE	1,000	NE	NE	20	3,500	2,000	NE	100	500	NE	700	2,400	5,000	500
			RCRA Hazardous Waste TCLP Limit [d]:	µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	200	NE	NE	NE	1,000	5,000	NE	NE	NE	NE	5,000
1HSB-01A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	4460	< 0.48	4.5	92.1	0.38 J1	0.91	3860	7	3.4	150	7460	143	2050	512	0.49	< 0.59	6.1	1650 J	< 0.64	< 0.075	< 79.1	< 2.1	9.9	473	< 0.052
1HSB-01B	3.0 - 3.5	15-Oct-01	TTLC	mg/kg	14500	23.6	13	442	0.54 J1	8.2	15400	46.1	11.8	2150	47000	817	4590	2630	0.31	< 1.9	96.6	3580 J	2.6	2.1 J1	< 140	< 1.5	89.8	4030	< 0.055
1HSB-01B (D)	3.5 - 4.0	15-Oct-01	TTLC	mg/kg	8480	< 2.2	8	415	0.42 J1	1	6390	16.6	4.7	133	12000	85.4	3000	507	0.098 J1	< 0.82	9.2	1520 J	< 2.1	< 2.1	< 95	< 2.1	18	402	< 0.053
1HSB-01C	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	13300	231	17.1	320	0.51 J1	7.2	17000	60.6	14.4	1360	67000	14200	4840	2100	0.27	3.9	53.7	3690 J	5	2.6	< 477	< 2.3	25.9	3310	< 0.054
1HSB-01C	5.0 - 5.5	15-Oct-01	TCLP	µg/L	2430	< 33.2	< 7.3	576	< 4	68.3	NR	12.6	< 8	702	2580	211	NR	3350	0.27	6.0 J1	54.3	NR	11.0 J1	3.1 J1	NR	< 20	6.9 J1	15900	NA
1HSB-01D	10.0 - 10.5	15-Oct-01	TTLC	mg/kg	20300	< 23	6.6	181	0.96	< 0.91	4920	8.8	8.7	18.5	24700	15.1	7090	356	0.064 J1	< 0.43	7.1	5150 J	< 2.3	< 2.3	1310	< 2.3	28.3	87.9	< 0.057
1HSB-01E	15.0 - 15.5	15-Oct-01	TTLC	mg/kg	9520	< 0.49	4.1	64.2	0.71 J1	< 0.91	2670	7.7	6.2	9.3	13100	11.2	4240	253	0.05 J1	< 0.45	6.2	2060 J	< 2.3	< 2.3	873	< 0.35	13.4	50	< 0.057
1HSB-02A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	9670	< 0.62	6.8	239 J	< 0.24	0.56 J1	1740	14.1	7	23.8	15900	16.8	4350	908 J	0.042 J1	< 1.6 J	13.4 J	3090 J	< 0.96	< 2.1	< 410	< 2.1	33.6	69.9 J	< 0.052
1HSB-02B	3.0 - 3.5	15-Oct-01	TTLC	mg/kg	9440	4.1 J1	8.6	169	< 0.28	2	9660	33	9.2	278	34900	409	3200	943	0.17 J1	< 2.3	38.8	1630 J	< 1.3	< 0.1	< 370	< 2.1	30.3	1250	< 0.052
1HSB-02C	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	13900	< 0.49	11	208	0.46 J1	< 0.88	2800	18	8.1	14.2	19900	17.6	5540	181	0.046 J1	< 0.48	9.6	2700 J	< 2.2	< 2.2	1560	< 2.2	35.8	67.6	< 0.055
1HSB-02D	10.0 - 10.5	15-Oct-01	TTLC	mg/kg	11500	< 0.79	6	112	0.38 J1	< 0.85	2230	18.5	8.4	13.6	16700	9.7	3510	305	0.055 J1	< 0.71	7.2	1330 J	< 2.1	< 2.1	< 83.3	< 2.1	44	42.2	< 0.053
1HSB-02D (D)	10.5 - 11.0	15-Oct-01	TTLC	mg/kg	15700	< 21	6.8	111	0.32 J1	< 0.85	2750	20.9	10	15.6	20600	9.8	4220	334	0.047 J1	< 0.85	8.6	1530 J	< 0.62	< 2.1	< 430	< 2.1	51.2	47.3	< 0.053
1HSB-02D	10.0 - 10.5	15-Oct-01	TCLP	µg/L	2210	< 20	< 10	464	< 4	< 3.8	NR	5.1 J1	< 0.87	107	2280	41.8	NR	386	0.055	2.6 J1	9.6 J1	NR	10.2 J1	1.3 J1	NR	< 20	7.5 J1	1530	NA
1HSB-02E	15.0 - 15.5	15-Oct-01	TTLC	mg/kg	13800	< 0.48	7.3	1140	0.69 J1	< 0.88	4230	12.1	6.1	17.1	17600	10	4780	233	0.11 J1	< 0.97	5.9	1940 J	< 0.55	< 2.2	1020	< 2.2	29.7	45.2	< 0.055
1HSB-03A	0.0 - 0.5	11-Oct-01	TTLC	mg/kg	6860	< 0.36	4	92	0.4 J1	0.063 J1	2210	3.8	4.2	4.6 J	10200	9.7	3210	189	< 0.21	0.94	2.5	2380	< 2.1	< 2.1	< 410	< 2.1	9.8	48.2	< 0.052
1HSB-03B	5.0 - 5.5	11-Oct-01	TTLC	mg/kg	12300	24.4	12.9	163	0.14 J1	4.1	9540	62.7	20	5310 J	142000	1280	2650	1980	0.065 J1	12.8	59.9	2230	0.56 J1	1.7 J1	3450	< 2.1	14.1	2560	< 0.052
1HSB-04A	0.0 - 0.5	11-Oct-01	TTLC	mg/kg	6840	0.79 J	4	72.8	0.46 J1	< 0.83	2370	3.2	3.8	7.9 J	9660	5.6	3000	199	< 0.21	0.71 J1	2.3	1810	< 2.1	< 2.1	< 70.2	< 2.1	9.4	37.4	< 0.052
1HSB-04A (D)	0.0 - 0.5	11-Oct-01	TTLC	mg/kg	6530	0.47 J	4.6	72.9	0.47 J1	0.077 J1	2460	3.5	3.7	8.8 J	9480	6.6	2920	192	0.03 J1	0.62 J1	2.4	1950	< 2.1	< 2.1	< 84.8	< 2.1	9.4	38.7	< 0.052
1HSB-04B	5.0 - 5.5	11-Oct-01	TTLC	mg/kg	10500	0.71 J	4.7	95.4	0.69 J1	0.28 J1	6180	8.4	5.8	35.9 J	14800	37.7	5040	390	< 0.21	< 0.49	4.8	3240	< 2.1	< 2.1	1010	< 2.1	15.6	217	< 0.053
1HSB-05A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	10000	< 1.2	5.9	89.7	0.32 J1	0.25 J1	2310	12.5	7.3	20.4	15300	23.1	3350	327	0.086 J1	< 0.77	7	2440 J	< 0.5	< 2.1	< 420	< 2.1	31.6	104	< 0.052
1HSB-05B	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	14300	< 0.65	6.9	94.7	1.1	< 0.86	4650	14.6	7.1	15.4	19700	8.8	5410	270	0.051 J1	< 0.25	7.5	2650 J	< 0.65	< 2.1	< 430	< 2.1	37	62.3	< 0.054
1HSB-05C	10.0 - 10.5	15-Oct-01	TTLC	mg/kg	8230	< 0.78	5.4	105	0.35 J1	0.22 J1	2950	58.6	30.7	91.4	16900	48.6	3620	349	0.057 J1	3.6	13.8	1670 J	< 0.83	< 2.1	< 430	< 2.1	30.7	218	< 0.054
1HSB-06A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	12900	< 21	6.6	148	0.32 J1	< 0.82	1610	22.4	7.5	15.6	20500	8.4	5680	302	0.076 J1	< 0.82	8.8	1990 J	< 2.1	< 2.1	< 305	< 2.1	48.2	67.3	< 0.051
1HSB-06B	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	13100	< 0.45	6.8	164	< 0.27	< 0.88	1690	18.3	8.4	11.8	19300	8.6	4580	183	0.049 J1	< 0.88	7.7	1970 J	< 2.2	< 2.2	932	< 2.2	42.9	46.3	< 0.055
1HSB-06C	10.0 - 10.5	15-Oct-01	TTLC	mg/kg	14600	< 22	7.1	122	< 0.28	0.057 J1	1750	23.6	8.8	26.3	20300	13.6	4720	208	0.15 J1	< 0.27	9.1	1820 J	< 0.56	< 2.2	537	< 2.2	50.5	69.9	< 0.054
1HSB-07A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	4150	< 20	3.9	84.6	< 0.13	< 0.82	1560	1.8 J1	3	6.8	7710	5	2360	185	0.048 J1	< 1.4	3.3	1560 J	< 0.49	< 2	< 410	< 2	8.8	30.1	< 0.051
1HSB-07B	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	20100	< 23	9.5	148	1.6	0.4 J1	5890	6.6	30.5	9.6	35700	10.6	9340	1170	0.058 J1	3.3	7.1	7060 J	< 1.1	< 2.3	619	< 0.55	28	111	< 0.058
1HSB-07C	10.0 - 10.5	15-Oct-01	TTLC	mg/kg	27200	< 23	4.7	64.6	1.4	< 0.92	6150	8.9	7.6	14.6	37100	16.1	9600	308	0.055 J1	< 0.92	7.6	7450	< 2.3	< 2.3	708	< 0.72	26.2	102	< 0.058
1HSB-08A	0.0 - 0.5	15-Oct-01	TTLC	mg/kg	9210	< 0.48	5	99.4	0.52 J1	0.1 J1	3270	5.2	5.3	7.2	13000	10.7	4320	236	0.1 J1	< 0.71	3.6	2930	< 0.55	< 2.1	< 420	< 2.1	16.8	71.2	< 0.053
1HSB-08B	5.0 - 5.5	15-Oct-01	TTLC	mg/kg	10200	< 1.9	6.8	281	0.52 J1	0.49 J1	4050	13.1	6.6	127	17100	73	4600	334	0.1 J1	< 1	7.5	2650	< 0.5	< 2.1	< 430	< 2.1	22.4	322	< 0.053
1HSB-08C	12.0 - 12.5	15-Oct-01	TTLC	mg/kg	14700	14.5 J1	9.6	233	0.42 J1	6.8	13500	42.9	9.3	885	34000	1380	3870	2920	0.29	3.3	37.2	2770	2.6	6.2	< 383	< 1.8	27.8	3170	< 0.054

a) Background values used in the Operable Unit 3 RI/FS (IT, 1998) for 0-10 ft bgs; primarily from the Santa Margarita Background Values (SWDIV, 1997).
b) Background for Arsenic was compared to upgradient boring 2FBG-08 (IT, 1998).
c) Any waste is a hazardous waste if it contains a metal listed above at: 1) a total concentration that exceeds its Total Threshold Limit Concentration (TTLC) value;
2) a concentration, after a Waste Extraction Test (WET), that exceeds its Soluble Threshold Limit Concentration (STLC) value.
d) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), the extract from a representative sample of the waste contains any of the contaminants at concentrations equal to or greater than the respective value given in this table.
e) The TTLC value listed for chromium is the chromium IV value to be conservative; The chromium III (or compounds) TTLC value is 2,500 mg/kg

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
(D) = Duplicate Sample
<2 = not detected at indicated value
J = Estimated value
J1 = Detected concentration is below the practical quantitation limit (PQL) but above the method detection limit (MDL)

NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
PRG = preliminary remediation goal, residential soil (USEPA, 2000e)

TCLP analysis
73 Detected above background

Table 4-3
Site 1H Metals Detected in Soil in Previous Investigations (SWDIV, 1997 and IT, 1998)
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Mercury	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Hexavalent Chromium
Background [a]:			mg/kg	21733	8.38	10.9 [b]	261.2	1.42	1.52	NE	32.6	12.8	26	28,553	21.7	10,672	655	0.10	5.88	20.2	NE	0.80	1.36	NE	1.33	73.8	104	NE
Residential Soil PRG:			mg/kg	76,000	31	0.39	5,400	150	9	NE	30	4,700	2,900	23,000	400	NE	1,800	2.3	390	150	NE	390	390	NE	5.5	550	23,000	0.2
1HB01	1	24-Jun-96	mg/kg	20000	<2.4 N	7.4	128	1 B	<0.88	3430	14.2	5.6 B	7.4	20800	7.7	6160	176	<0.16	1.4 B	5.8 B	4160	<1	<0.66 N	849 B	<0.88	37.6	55	NA
1HB01	5	24-Jun-96	mg/kg	21100	<2.5 N	6.3	92	1.1 B	<0.91	4850	11.4	6.4 B	7.3	19700	9.4	6510	218	<0.17	1.7 B	5.2 B	4150	<1	<0.68 N	2080	1.1 B	35.3	56.1	NA
1HB01	10	24-Jun-96	mg/kg	18000	<2.5 N	3.4	32 B	1.1 B	<0.91	5760	11.7	6.2 B	26.1	17500	10.1	7120	255	<0.17	<1.1	7.9 B	4610	<1.1	<0.69 N	1340	<0.91	29	66.9	NA
1HB02	1	24-Jun-96	mg/kg	11900	<2.3 N	5.5	91.9	0.68 B	<0.85	2780	6.7	4.1 B	3.3 B	13500	6.9	4000	225	<0.16	1.2 B	2.8 B	2590	<0.97	<0.64	189 B	<0.85	21.4	46.1 E	0.064J
1HB02	5	24-Jun-96	mg/kg	16400	<2.5 N	4.6	75.8	1 B	<0.91	10100	6.4	5.9 B	5.6 B	16400	7.3	5720	201	<0.17	1.4 B	3.6 B	4670	<1.1	<0.68	237 B	<0.91	20.3	52.1 E	0.057J
1HB02	10	24-Jun-96	mg/kg	21600	273 N	64.3	598	<0.44	6.9	13900	92.4	18 B	1110	107000	21200	1,970 B	3760	1.9	17.8 B	92.6	1540 B	<10.2	4.6	1,440 B	<8.9	12.4 B	7,230 E	0.089J
1HB02 (D)	10	24-Jun-96	mg/kg	9560	24.6 N	8.7	295	0.34 B	5.1	12900	43.3	7.1 B	544	27800	730	3110	2700	2.9	3.9 B	18.8	2580	<1.1	2 B	936 B	<0.92	19	2,810 E	NA
1HB02	12	24-Jun-96	mg/kg	11900	7.7 B	10.7	137	<0.02	0.89 B	7210	23.3	10.5	154	46500	215	4550	1850	0.45	3.8	22.7	4180	1.2	1.2 B	1360	<1.2	23.1	2000	NA
1HB03	1	02-Oct-97	mg/kg	12700	<0.55	5.2	366	0.13 B	<0.076	2660	9.3	6.9 B	9.9	13700	8.9	3920	1380	<0.085	1.3 B	5.3 B	3040	<0.76	<0.21	<82.2	<1.1	29.4	60.9	NA
1HB03	5	02-Oct-97	mg/kg	28400	<0.62	3.6	717	1.6	<0.086	4790	9.6	11.6	12.8	24600	11.3	9340	358	<0.097	0.46 B	7.1 B	7840	<0.86	<0.24	1290	<1.3	31.7	91.1	NA
1HB03	10	02-Oct-97	mg/kg	25300	<0.58	5.8	43.9	1.2	<0.08	5470	12	36.4	56	27400	17.2	7590	323	<0.11	<0.24	14.5	7230	<0.8	<0.22	1180	<1.2	27	69.1	NA
1HB04	1	02-Oct-97	mg/kg	13800	<0.54	6.4	104	0.77 B	<0.075	4000	7.8	5.7 B	8.7	15700	10.9	5180	206	<0.093	0.88 B	4.6 B	4830	0.77 B	<0.21	<80.6	<1.1	21.8	57.8	NA
1HB04 (D)	1	02-Oct-97	mg/kg	13100	<0.63	4.5	98.5	0.76 B	<0.087	4030	6.4	7.2 B	8.1	15800	9.1	5170	234	<1.1	0.51 B	3.7 B	5050	<0.87	<0.24	<93.6	<1.3	21.5	64	NA
1HB04	5	02-Oct-97	mg/kg	15300	3.5 B	7.8	155	0.4 B	0.4 B	4430	16.9	7.1 B	173	20100	448	4810	869	<1.1	1.4 B	9.4	3620	<0.73	0.5 B	1160	<1.1	31.1	780	NA
1HB05	1	02-Oct-97	mg/kg	6320	<0.56	6.7	50.5	0.39 B	<0.077	1950	2.6	3.1 B	3.5 B	9060	6.5	2310	136	<0.1	1.1 B	1.7 B	1950	<0.77	<0.21	<82.5	<1.2	13.5	29.8	NA
1HB05	5	02-Oct-97	mg/kg	12200	18.2	26.6	676	<0.018	6.2	42400	169	16.2	2260	53200	1290	4410	3720	0.32	7.9	62.7	3310	2.6	5.8	1690	<1.1	70.8	6540	NA
1HB05 (D)	5	02-Oct-97	mg/kg	11900	19.9	24.1	671	<0.019	7.5	56200	49.2	13.1	2440	49500	988	4520	4930	0.3	4.5	58.1	3130	2.4	5.7	1740	<1.1	44.3	7380	NA
1HB05	10	02-Oct-97	mg/kg	13800	43	22.3	410	<0.018	8.3	20600	90.6	16.3	5930	87500	1300	3780	6780	0.79	14.8	83.6	3810	3.3	5	3360	<1.1	41.5	11100	NA

mg/kg = Milligrams per kilogram
(D) = Duplicate Sample
PRG = preliminary remediation goal, residential soil
NE = Not established
NA = Not analyzed

E = The reported value is estimated because of interference.
N = Spiked sample recovery is not within control limits.
RE = Denotes repeat sampling and analysis for this sample location.
< = Not detected at the detection limit presented.
B = The reported value obtained is less than the contract-required detection limit (CRDL) but greater than or equal to instrument detection limit (IDL).

73 Detected above background

a) Background values used in the Operable Unit 3 RI/FS (IT, 1998) for 0-10 ft bgs; primarily from the Santa Margarita Background Values (SWDIV, 1997).
b) Background for Arsenic was compared to upgradient boring 2FBG-08 (IT, 1998).

Table 4-4
Site 1H SPLP Metals Compared to MCLs and Tap Water PRGs
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
		MDL:	µg/L	NA	3	1.4	0.46	0.04	0.3	NA	0.2	0.23	1.6	1.6	1.4	8.7	0.4	1.1	0.67	NA	2.3	0.11	NA	1.6	0.35	3
		PQL:	µg/L	NA	10	5	10	2	2	NA	5	5	10	50	5	100	5	5	5	NA	10	10	NA	10	10	10
		MCL:	µg/L	200 [a]	6	50	1000	4	5	NE	50	NA	1300 [c]	300 [b]	15 [c]	NE	50 [a]	NE	100	NA	50	100 [a]	NA	2	15 [b]	5000 [a]
		PRG:	µg/L	36000	15	0.045	2600	73	18	NE	110	2200	1400	11000	NE	NE	880	180	730	NE	180	180	NE	2.6	260	11000
1HSB-01C	5.0 - 5.5	15-Oct-01	µg/L	1220	19.2	< 1.9	128	< 2	1.1 J1	NR	46.2	< 1.7	142	1210	112	6460	91.3	9	26.3	NR	3.6 J1	< 10	NR	< 10	3.8 J1	818
1HSB-02D	10.0 - 10.5	15-Oct-01	µg/L	2820	3 J1	< 1.8	724	1.5 J1	0.5 J1	NR	5.9	< 1.2	< 19.8	2040	< 12.4	10900	92.8	< 5	11.6	NR	2.5 J1	< 10	NR	< 10	22.5	96.8

µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
J1 = Detected concentration is below the practical quantitation limit (PQL), but above the method detection limit (MDL)
(D) = Duplicate Sample
PRG = preliminary remediation goal, drinking water
MCL = Maximum Contaminant Level
a Secondary California Maximum Contaminant Level for drinking water (Title 22 CCR)
b Action Level (AL) = health-based advisory levels established by the California Department of Health Services (DHS) for chemicals in drinking water for which primary MCLs have not been adopted.
c Lead and copper are not regulated by MCLs, but in a Treatment Technique for water pipeline systems

113 Concentration above MCL
NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit
PQL = practical quantification limit

Table 4-5
Site 1H Summary of Human Health Screening-Level Evaluation
OU 4 Supplemental FS, MCB Camp Pendleton, California

Exposure Scenario	Total Cancer Risk	Total Hazard Index
Hypothetical Residential Receptor (0 - 10 ft bgs)		
2,3,7,8-TCDD	1×10^{-5}	-
Arsenic	3×10^{-5}	0.6
Other Detected Chemicals	2×10^{-7}	0.9
Total (All COPCs)	**5×10^{-5}**	**2**
Hypothetical Non-Intrusive Worker Receptor (0 - 1 ft bgs)		
2,3,7,8-TCDD	3×10^{-6}	-
Arsenic	4×10^{-6}	< 0.1
Other Detected Chemicals	2×10^{-7}	< 0.1
Total (All COPCs)	**7×10^{-6}**	**< 0.1**
Intrusive Military Training Receptor (0 - 3.5 ft bgs)		
2,3,7,8-TCDD	1×10^{-7}	-
Arsenic	1×10^{-7}	< 0.1
Other Detected Chemicals	$< 1 \times 10^{-7}$	< 0.1
Total (All COPCs)	**2×10^{-7}**	**0.1**

Source: Appendix I3.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1 No Action	Alternative 1H-2 Institutional Controls	Alternative 1H-3 Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Alternative 1H-4 Soil Excavation, Backfill, and Off-Base Land Disposal	Alternative 1H-5 Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Overall Protection of Human Health and the Environment					
Human Health Protection	Provides no reduction in baseline risks. Existing soil contamination will remain. Not protective of human health.	Existing soil contamination will remain. Eliminates potential exposure by controlling site use. Protective of human health.	Existing soil contamination will remain. Effectively reduces availability of contaminated soil to receptors and eliminates exposure pathways. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it in an off-base licensed disposal facility. Site would be backfilled with clean imported soil. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it at the on-Base CAMU facility. Site would be backfilled with clean imported soil. Protective of human health.
Environmental Protection	Soil contamination does not pose a risk to local habitats and potential ecological receptors. Protective of the environment.	Soil contamination does not pose a risk to local habitats and potential ecological receptors. Protective of the environment.	Soil contamination does not pose a risk to local habitats and potential ecological receptors. Protective of the environment.	Soil contamination does not pose a risk to local habitats and potential ecological receptors. Protective of the environment.	Soil contamination does not pose a risk to local habitats and potential ecological receptors. Protective of the environment.
Compliance with ARARs					
Chemical-Specific ARARs	Does not comply with risk-based residential PRG ARARs.	Complies with risk-based residential PRG ARARs.	Complies with risk-based residential PRG ARARs.	Complies with risk-based residential PRG ARARs.	Complies with risk-based residential PRG ARARs.
Location-Specific ARARs	No location-specific ARARs were identified.	No location-specific ARARs were identified.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act and the Migratory Birds Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act and the Migratory Birds Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act and the Migratory Birds Act. Coordination with the USFWS and CDFG would be required.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1 No Action	Alternative 1H-2 Institutional Controls	Alternative 1H-3 Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Alternative 1H-4 Soil Excavation, Backfill, and Off-Base Land Disposal	Alternative 1H-5 Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Compliance with ARARs (continued)					
Action-Specific ARARs	Does not comply with RCRA closure with no post-closure requirements (i.e., clean closure).	Complies with RCRA closure and post-closure requirements.	On-site construction would meet APCD emission ARARs. Complies with RCRA closure and post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.
Long-Term Effectiveness and Permanence					
Effectiveness to reduce risk	Existing risk will remain because the contamination will not be removed. Would not provide long-term effectiveness and permanence.	Would reduce risk by eliminating potential exposure to soil contaminants. Provides long-term effectiveness as long as institutional controls are enforced.	Would reduce risk by eliminating potential exposure to soil contaminants. Provides long-term effectiveness and permanence through engineered cover. Long-term effectiveness depends on proper monitoring and maintenance of soil cover and enforcement of institutional controls.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.
Adequacy and Reliability of Controls	Provides no reliable or adequate controls for remaining contamination.	Institutional actions would adequately and reliably reduce human health exposure pathways and risks.	Soil cover and institutional actions would adequately and reliably reduce human health exposure pathways and risks.	Excavation and off-base disposal will adequately, reliably, and permanently reduce human health exposure pathways and risks.	Excavation and on-base disposal at CAMU facility will adequately, reliably, and permanently reduce human health exposure pathways and risks.
Need for 5-Year Review	No review will be done.	A 5-year review will be conducted. .	A 5-year review will be conducted.	No review will be conducted.	No review will be conducted.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1	Alternative 1H-2	Alternative 1H-3	Alternative 1H-4	Alternative 1H-5
	No Action	Institutional Controls	Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Soil Excavation, Backfill, and Off-Base Land Disposal	Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Treatment Process Used	None.	None.	None.	Off-base chemical fixation/ solidification (TTU).	On-Base chemical fixation/ solidification (TTU).
Amount Destroyed or Treated	None.	None.	None.	Approximately 9,700 cubic yards of (in-place) contaminated soil.	Approximately 29,000 cubic yards of (in-place) contaminated soil.
Reduction of Toxicity, Mobility, or Volume	None.	None.	None.	Reduction of mobility but increase in volume through stabilization.	Reduction of mobility but increase in volume through stabilization.
Irreversible Treatment	None.	None.	None.	Long-term irreversibility of stabilization is not well documented.	Long-term irreversibility of stabilization is not well documented.
Type and Quantity of Residuals Remaining After Treatment	No treatment.	No treatment.	No treatment.	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).
Statutory Preference for Treatment	Does not satisfy the statutory preference for treatment.	Does not satisfy the statutory preference for treatment.	Does not satisfy the statutory preference for treatment.	Partially satisfied because the soil will be treated off base before disposal.	Partially satisfied because the soil will be treated on base before disposal.
Short-Term Effectiveness					
Community Protection	Risk to community will remain the same as the baseline risk. Baseline human health risk (5×10^{-5}) is within EPA's acceptable range; however, lead levels exceed PRGs.	No risk to community from planned institutional actions.	Temporary increase in potential risks due to dust emissions from soil handling, moving, and stockpiling during soil cover construction.	Temporary increase in potential risks due to dust emissions from soil handling, transportation, and treatment at off-base facility.	Temporary increase in potential risks due to dust emissions from soil, excavation, treatment, handling, hauling, and disposal at on-Base CAMU facility.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1	Alternative 1H-2	Alternative 1H-3	Alternative 1H-4	Alternative 1H-5
	No Action	Institutional Controls	Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Soil Excavation, Backfill, and Off-Base Land Disposal	Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Short-Term Effectiveness (continued)					
Worker Protection	Not applicable because no remedial action will be implemented.	Limited protection would be required during site erosion control maintenance activities.	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil during site construction (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation and off-site disposal (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation and off-site disposal (use of PPE and dust suppressants).
Environmental Impacts	No impact from existing conditions.	No adverse environmental impact from institutional actions.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.
Time Until Action Is Completed	Not applicable.	Continued site maintenance	< 2 years (including permitting).	11 weeks.	10 weeks.
Implementability					
Ability to Construct and Operate	No construction or operation is involved.	Land use restrictions and site maintenance are readily implementable.	Construction and maintenance of engineered soil cover are readily implementable. Uses standard and readily available labor skills, equipment, and materials.	Excavation, stabilization, and disposal are readily implementable.	Excavation, stabilization, and disposal are readily implementable.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1	Alternative 1H-2	Alternative 1H-3	Alternative 1H-4	Alternative 1H-5
	No Action	Institutional Controls	Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Soil Excavation, Backfill, and Off-Base Land Disposal	Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Implementability (continued)					
Ease of Doing More Action if Needed	Because no action is involved, there will be no interference with future actions.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can be easily implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.
Ability to Monitor Effectiveness	Not applicable because no remedial action will be implemented.	Site will be periodically monitored for erosion control. Base Master Plan restrictions for land use will be enforced.	Effectiveness will be monitored through periodic O&M to preserve or restore the physical integrity and functionality of the cover. Base Master Plan restrictions for land use will be enforced.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approval is necessary.	No approval is necessary.	Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors during soil cover construction activities.	Manifests will be required for transportation of wastes. Off-base facility has existing permits for treatment and disposal. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors during excavation activities.	No manifests will be required for on-Base hauling of wastes. On-Base CAMU facility will have required permits for disposal of contaminated soil. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors during excavation activities.
Availability of Services and Capacities	Not applicable.	Services are available for the proposed institutional actions.	Services are commercially available for the construction and maintenance of the soil cover.	Services are commercially available for the excavation/earthwork and off-base disposal.	Services are commercially available for the excavation/earthwork and on-Base disposal.
Availability of Equipment, Specialists, and Materials	Not applicable.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.

Table 4-6

Site 1H Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 1H-1	Alternative 1H-2	Alternative 1H-3	Alternative 1H-4	Alternative 1H-5
	No Action	Institutional Controls	Capping (Engineered Soil Cover), Cap Monitoring/ Maintenance, and Institutional Controls	Soil Excavation, Backfill, and Off-Base Land Disposal	Soil Excavation, Backfill, and On-Base Disposal at CAMU Facility
Implementability (continued)					
Availability of Technologies	Not applicable.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.
Cost					
Overall Cost	$0	$246,600	$1,240,000	$2,628,600	$2,465,800

Legend

Site 1H

N

0 600 1200

Scale in Feet

Figure 4-1

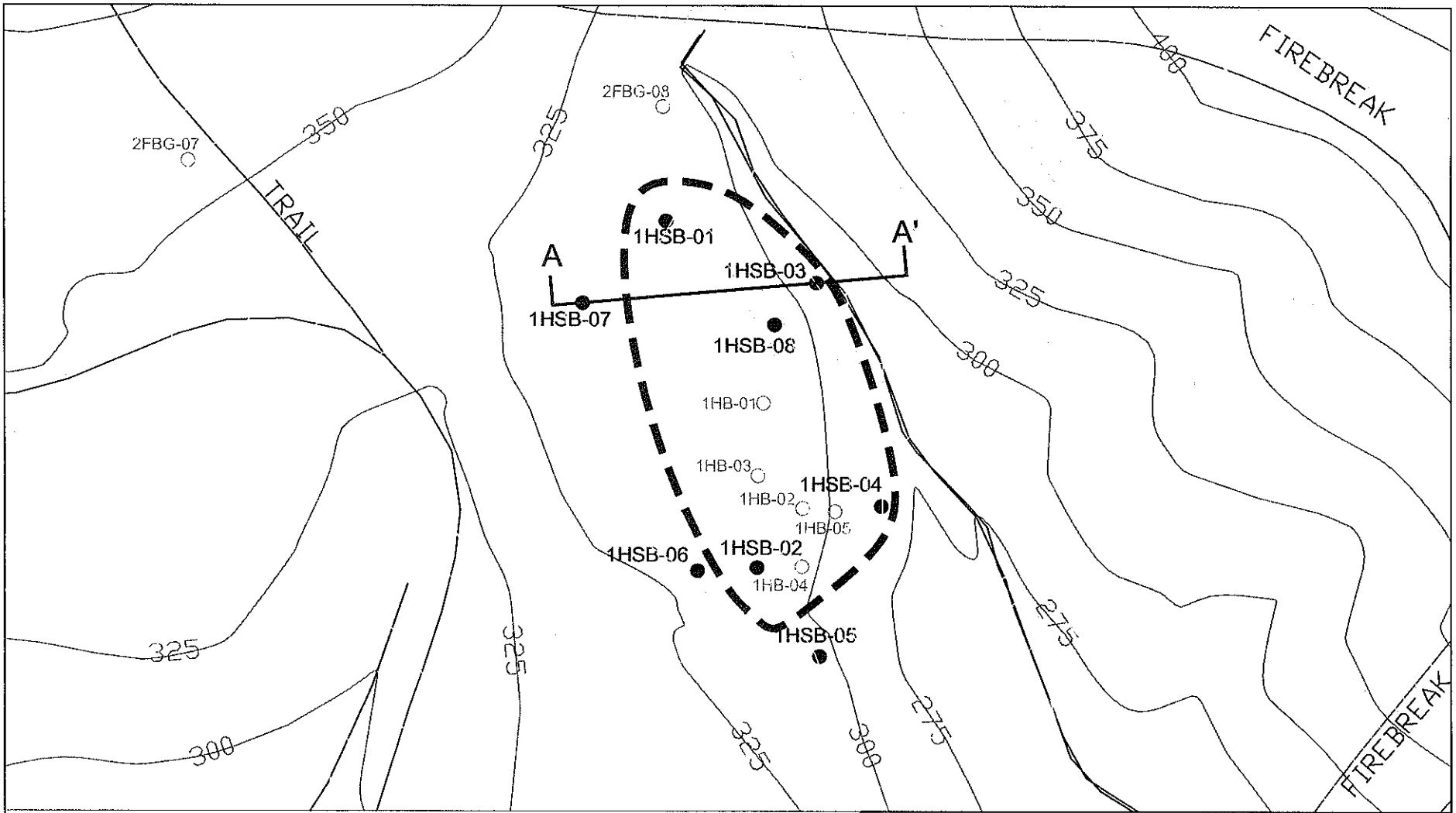
Site 1H Location Map

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmias\ce\camppendleton\OU4FS\OU4FSReport\4-i_S1H.dwg



Legend

- Soil Boring Location (Parsons 2001)
- Former Soil Boring Location
- A — A' Cross Section Line

N

0 100 200

Scale in Feet

Figure 4-2

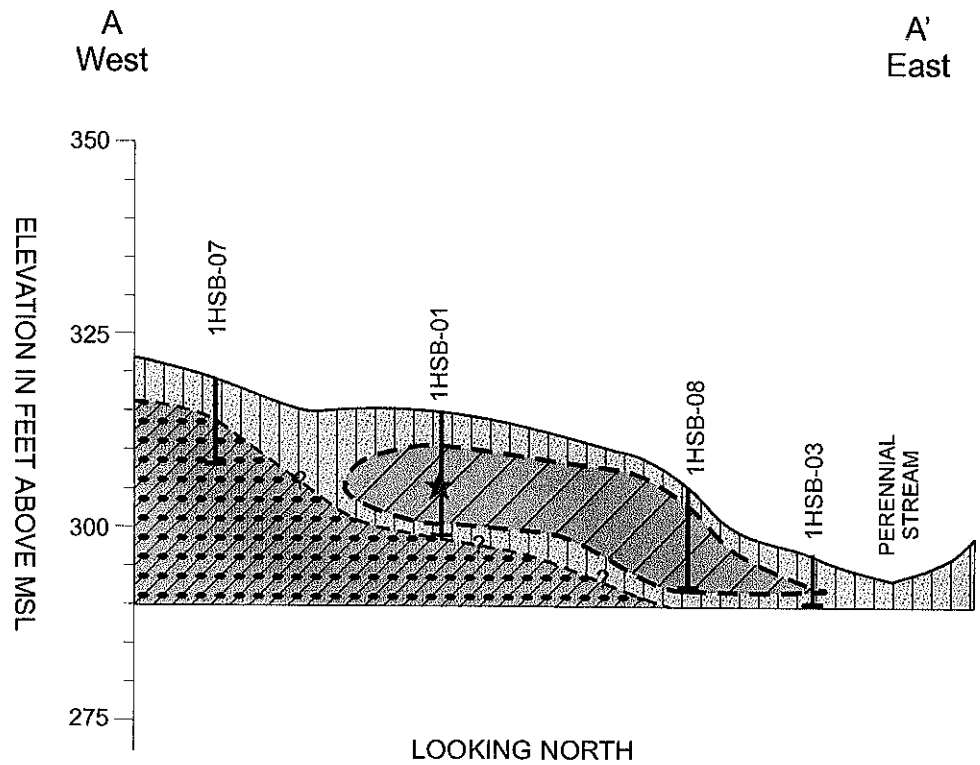
Site 1H Soil Boring Location Map

OU4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\camppendleton\OU4FS\OU4FSReport\4-2_S1H.dwg



LEGEND

- Silty Sand
- Weathered Bedrock
- Approximate Extent of Waste Material (Based on Boring Logs and Analytical Results)
- ★ Dioxins/Furans Detected in Soil Sample

50 0 50
HORIZONTAL SCALE (feet)

25 0 25
VERTICAL SCALE (feet)

Figure 4-3

Site 1H
Generalized Cross Section

OU 4 Supplemental FS
Camp Pendleton, CA

PARSONS
Pasadena, CA

K:\DEPTS\DEPT48\CAMPPENDLETONRIFS\740012\FIELD\OU4FS Report\Draft Final\Fig4-3.cdr

1HSB-01

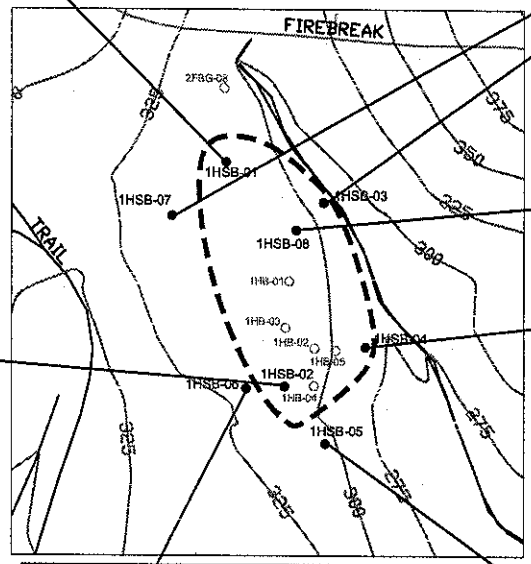
		0.0-0.5	3.0-3.5	3.5-4.0	5.0-5.5	10.0-10.5	15.0-15.5
Antimony	mg/kg	<0.48	**23.6**	<2.2	**231**	<23	<0.49
Arsenic	mg/kg	4.5	**13**	8	**17.1**	6.6	4.1
Chromium	mg/kg	7	**46.1**	16.6	**60.6**	8.8	7.7
Copper	mg/kg	**150**	**2,150**	**133**	**1,360**	18.5	9.3
Iron	mg/kg	7,460	**47,000**	12,000	**67,000**	24,700	13,100
Lead	mg/kg	**143**	**817**	**85.4**	**14,200**	15.1	11.2
Manganese	mg/kg	512	**2630**	507	**2,100**	356	253
1,2,3,4,6,7,8,9-OCDD	pg/g	NA	NA	NA	NA	<160J	NA
1,2,3,4,6,7,8-HpCDD	pg/g	NA	NA	NA	NA	50J	NA
1,2,3,4,6,7,8-HpCDF	pg/g	NA	NA	NA	NA	<110J	NA
1,2,3,4,7,8-HxCDF	pg/g	NA	NA	NA	NA	70J	NA
1,2,3,6,7,8-HxCDF	pg/g	NA	NA	NA	NA	<30J	NA
2,3,4,6,7,8-HxCDF	pg/g	NA	NA	NA	NA	50J	NA
2,3,4,7,8-PeCDF	pg/g	NA	NA	NA	NA	40J	NA
2,3,7,8-TCDF	pg/g	NA	NA	NA	NA	40J	NA

1HSB-07

		0.0-0.5	5.0-5.5	10.0-10.5
Arsenic	mg/kg	3.9	9.5	4.7
Chromium	mg/kg	1.8	6.6	8.9
Copper	mg/kg	6.8	9.6	14.6
Iron	mg/kg	7,710	**35,700**	37,100
Lead	mg/kg	5	10.6	16.1
Manganese	mg/kg	185	**1,170**	308

1HSB-03

		0.0-0.5	5.0-5.5
Antimony	mg/kg	<0.36	**24.4**
Arsenic	mg/kg	4	**12.9**
Chromium	mg/kg	3.8	**62.7**
Copper	mg/kg	4.6J	**5,310J**
Iron	mg/kg	10,200	**142,000**
Lead	mg/kg	9.7	**1,280**
Manganese	mg/kg	189	**1,980**



1HSB-08

		0.0-0.5	5.0-5.5	12.0-12.5
Antimony	mg/kg	<0.48	<1.9	14.5
Arsenic	mg/kg	5	6.8	9.6
Chromium	mg/kg	5.2	13.1	42.9
Copper	mg/kg	7.2	**127**	885
Lead	mg/kg	10.7	73	1380
Manganese	mg/kg	236	334	2920

1HSB-02

		0.0-0.5	3.0-3.5	5.0-5.5	10.0-10.5	10.5-11.0	15.0-15.5
Antimony	mg/kg	<0.62	4.1	<0.49	<0.79	<21	<0.48
Arsenic	mg/kg	6.8	8.6	11	6	6.8	7.3
Chromium	mg/kg	14.1	33	18	18.5	20.9	12.1
Copper	mg/kg	23.8	**278**	14.2	13.6	15.6	17.1
Iron	mg/kg	15,900	**34,900**	19,900	16,700	20,600	17,600
Lead	mg/kg	16.8	**409**	17.6	9.7	9.8	10
Manganese	mg/kg	**906J**	**943**	181	305	334	233
1,2,3,4,6,7,8,9-OCDD	pg/g	NA	NA	<110J	40R	NA	NA
1,2,3,4,6,7,8-HpCDF	pg/g	NA	NA	<80J	20R	NA	NA
1,2,3,4,7,8-HxCDF	pg/g	NA	NA	50J	20R	NA	NA
2,3,4,6,7,8-HxCDF	pg/g	NA	NA	30J	20R	NA	NA
2,3,7,8-TCDF	pg/g	NA	NA	40J	10R	NA	NA

1HSB-04

		0.0-0.5	0.0-0.5	5.0-5.5
Arsenic	mg/kg	4	4.6	4.7
Chromium	mg/kg	3.2	3.5	8.4
Copper	mg/kg	7.9J	8.8J	**36.9J**
Lead	mg/kg	5.6	6.6	**37.7**
Manganese	mg/kg	199	192	390

1HSB-06

		0.0-0.5	5.0-5.5	10.0-10.5
Arsenic	mg/kg	6.6	6.8	7.1
Chromium	mg/kg	22.4	18.3	23.6
Copper	mg/kg	15.6	11.8	26.3
Lead	mg/kg	8.4	8.6	13.6
Manganese	mg/kg	302	183	208

1HSB-05

		0.0-0.5	5.0-5.5	10.0-10.5
Arsenic	mg/kg	5.9	6.9	5.4
Chromium	mg/kg	12.5	14.6	58.6
Copper	mg/kg	20.4	15.4	91.4
Lead	mg/kg	23.1	8.8	48.6
Manganese	mg/kg	327	270	349

Legend

● Soil Boring Location (Parsons 2001)

○ Former Soil Boring Location

817 Result above Background Concentration shown in Bold Text

N

0 200 400

Scale in Feet

Figure 4-4

Site 1H
Soil Sampling Results

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS

Pasadena, CA

k:\cad\esmiss\ce\comppendleton\OU4FS\OU4FSReport\4-4_S1H.dwg

Figure 4-5
Site 1H Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 1 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
No Action	None	None	No action is taken.	Required for consideration by NCP.
Institutional Action	Access Restrictions	Use Restrictions	Administrative / physical measures are taken to limit site access and use and secure the site.	Potentially applicable. Only partially effective for ecological receptors.
Containment	Capping	Asphalt Cap	Single-layer bituminous asphalt surface cover is placed over site.	Not applicable due to site conditions.
		Concrete Cap	Single-layered concrete cover composed of aggregate and cementitious mixtures is placed over site.	Not applicable due to site conditions.
		Engineered Soil Cover	Single- or multi-layered soil cover designed to required performance standards.	Potentially applicable.
Removal	Excavation	Mechanical Excavation	Contaminated soil is excavated using heavy equipment.	Potentially applicable.
Disposal	Land Disposal	Backfilling	Treated soil is used as a backfill for the excavated site area.	Potentially applicable.
		On-Base Landfilling	Contaminated soil is transported to an on-Base landfill.	Potentially applicable.
		Off-Base Landfilling	Contaminated soil is transported to a permitted off-Base disposal facility.	Potentially applicable.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 4-5
Site 1H Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 2 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
In Situ Treatment	Physical / Chemical	Soil Flushing	Flushes contaminants out of soil via injection or infiltration of water or aqueous solution. Groundwater collection and treatment required.	Not readily implementable. Degrades groundwater where it is not currently a concern.
		Solidification / Stabilization	Chemical reagents are mechanically mixed with soil matrix to reduce the toxicity and mobility of metals.	Not effective for site conditions.
		In-Situ Vitrification	Soil waste is heated to the melting point through electrically-charged probes; glassy monolith results.	Difficult to implement and impractical for site contamination.
	Biological	Phytoremediation	Plants are used to extract contaminants from shallow soils.	Not effective for metals and depth of contamination.
Ex-Situ Treatment	Physical / Chemical	Soil Washing	Water-based waste removal process. Water can be augmented with surfactant, leaching agent, or chelating agent.	Not effective for site conditions.
		Acid Extraction	Metals are solubilized and removed from the soil using acidic (i.e., hydrochloric acid) reagents.	Not very effective for metals and difficult to implement.
		Solidification/Stabilization	Chemical reagents are mixed with excavated soils to reduce the toxicity and mobility of metals.	Not effective for site conditions(i.e. abundant anthropogenic debris in impacted soils).
		Vitrification	Excavated soil is heated to the melting point through electrical power to form stable glass and crystalline structure.	Difficult to implement and impractical for site contamination.
	Thermal	Thermal Desorption	Uses heat in a controlled environment to desorb and remove contaminants from the soil.	Not effective for metals.
		Incineration	Contaminated soil is burned in a controlled environment to remove organic contaminants.	Not effective for metals.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 4-6
Site 1H Evaluation of Process Options for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Soil General Response Actions	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
No Action	None	None	Low; contaminants would remain in the soil. Both human and ecological receptors could be exposed. RAOs are not achieved.	High; no action is needed.	High; there are no costs.
Institutional Action	Access Restrictions	Use Restrictions	Moderate; contaminants would remain in the soil. Effective to reduce human exposure but not protective of ecological receptors.	Moderate; readily implementable. DON position is to limit the use of institutional controls to maximize the utilization of military training lands.	High; low capital and O&M costs.
Containment	Capping	Engineered Soil Cover	Moderate to high; covers contaminated soil. Effective to eliminate human and ecological exposure. Does not involve treatment, therefore, does not reduce contaminant toxicity, mobility, or volume.	High; readily implementability, easy to construct. DON position is to limit the use of institutional controls to maximize the utilization of military training lands.	Moderate; high capital costs, low O&M costs.
Removal	Excavation	Mechanical Excavation / Backfilling	High; removes contaminated soil and backfills excavation with clean soil. Demonstrated ability to meet RAOs but without treatment; does not reduce contaminant mobility or toxicity.	Moderate to high; readily implementable. Requires agency approval, Base coordination, and H&S planning.	Moderate; high capital costs, low O&M costs.
Disposal	Land Disposal	Off-Base Landfilling	High; demonstrated ability to meet RAOs but without treatment; does not reduce contaminant mobility or toxicity.	High; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option.	Moderate; high capital costs, low O&M costs.
		On-Base Landfilling	High; demonstrated ability to meet RAOs but without treatment; does not reduce contaminant mobility or toxicity.	Moderate; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option; dependent on siting, design, and construction of on-Base disposal facility.	Moderate; moderate capital costs, moderate O&M costs.

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Evaluation.vsd

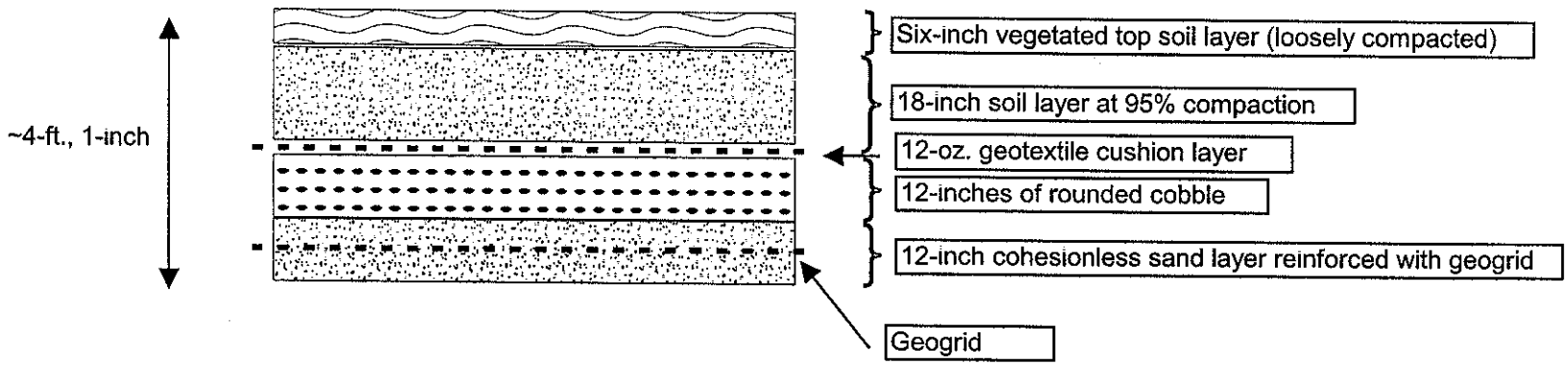


Figure 4-7

Site 1H
Proposed CAP

OU 4 Supplemental FS
MCB Camp Pendleton, CA

PARSONS

Pasadena, CA

K:\DEPTS\DEPT48\CAMPPENDLETONRIFS\740012\FIELD\OU4FS Report\Draft Final\Fig4-7.cdr

5.0 SITE 30

Site 30, approximately 11 acres, is located in the 31 Area, approximately 1,300 feet west of the intersection of Stuart Mesa Road and MACS Road (Figure 5-1). The site consists of fill soil that was transported in the mid- to late-1960s or early 1970s that contains bullets and bullet fragments from a 31 Area small arms firing range (Kleinfelder, 1997). Several metals have been identified as COCs, but lead is the primary COC. The recommended action for Site 30 in the OU 3 EE/CA (Kleinfelder, 1997) was "hot spot" excavation/removal to remove significantly contaminated soil. The volume of soil requiring removal was estimated to be 25,000 cubic yards (IT, 1998). The excavated soil would have been disposed of in the on-Base CAMU. After the closure of the on-Base CAMU in April 2000, a decision was made to refine the characterization of the site to allow for more accurate cost estimates for various remedial alternatives. As mentioned in Section 1.0, the site was moved from OU 3 to OU 4 for this FS. Background information and site conditions are detailed in the following sections.

5.1 Background Information

This FS provides a summary of site conditions; however, this document does not repeat all the information provided in previous documents regarding detailed site descriptions, histories, regional and site-specific environmental information, or full documentation of previous investigations and risk assessments. This information is documented in the following reports:

- Draft Final Remedial Investigation and Feasibility Study for Operable Unit 3 (IT, 1998).
- Draft Engineering Evaluation/Cost Analysis (EE/CA) for Sites 1D/1003, 1E/1004, 30, and 35 (Kleinfelder, 1997).
- Biological Assessments for Sites 1A, 1D, 1E, 1F, 2A, and 30 (IT, 1999b).
- Draft Engineering Evaluation and Cost Analysis, Site 30 (IT, 1999c).
- [Archeological] Monitoring and Discovery Plan for Six Waste Remediation Areas (LSA, 2000).

5.1.1 Site Description and History

Site 30 consists of soil fill material in the vicinity of an unpaved road west of Stuart Mesa Road. The soil contains bullets and bullet fragments from a 31 Area small arms firing range (Kleinfelder, 1997). The site history section of the Draft EE/CA (Kleinfelder, 1997) states *"soil from firing ranges likely was transported to this area and used for construction of a dirt road during the mid- to late-60s and possibly into the 70s."* However, later in the same document, when describing actual results of field investigation, the document states, *"Exploratory drilling in the unpaved utility roadway (MACS Road) using a truck-mounted CME 75 HT hollow-stem auger drill rig showed that subsurface materials beneath the road (observed to a depth of 5 feet bgs) did not exhibit the same characteristics (reddish color) of the imported firing range materials observed elsewhere at the site. Borings K30-B-18 through K30B-20 were drilled as part of this exploration work. This suggests that the fill material was imported and placed after the construction of the roadway and that realignment of the roadway may not be necessary during a removal action."* Also in the 1997 EE/CA, three separate areas of fill were identified, each about 200 feet long and 80 feet wide (Kleinfelder, 1997). This FS presents a more refined characterization of soil contamination.

Site 30 groundwater sampling results were documented in the Draft Final RI for Group C Sites (SWDIV, 1996b). Three hydropunch samples were collected and analyzed for metals.

Manganese concentrations detected in all the samples exceeded tap water PRGs and the 95th percentile background concentration. As stated in the Draft Final RI for Group C Sites (SWDIV, 1996b), *"A risk management decision was made for no further action for groundwater because the ILCR is below $1x10^{-6}$ and the HI is very close to 1 based on a naturally occurring metal, manganese."* The Site 30 EE/CA dated May 6, 1999 states that groundwater was sampled and evaluated, but not found to be of concern. Therefore, because groundwater was determined not to require further action, the OU 4 FS focused on better defining the volume of soil waste requiring remediation at Site 30.

5.1.2 Site Conditions

Site 30 is located in the Santa Margarita Basin. Soil at this site consists of interbedded, fine to coarse-grained alluvial sand, silt, and clay deposited as discontinuous lenses. The upper alluvium consists of poorly graded to well-graded sand, silt, and minor clay. The sand contains lenses with varying amounts of silt. The lower alluvium consists of finer grained materials such as silt with minor clay, exhibits localized gastropod or clam bioturbation, and contains crushed shells (SWDIV, 1996b).

Groundwater was encountered at 20 to 50 feet bgs during the Group C RI (SWDIV, 1996b). Groundwater is inferred to flow parallel to surface topography, towards the west or southwest (SWDIV, 1996b).

Site 30 contains three types of vegetation: California sagebrush, coastal freshwater marsh, and coastal brackish marsh. The California sagebrush series includes white sage, coyote brush, and prickly cactus and is located on the elevated portions of the site. The freshwater marsh, which contains cattails and bulrush, is primarily confined to a ponded area in the western portion of the site. Coastal brackish marsh is located along the Santa Margarita River, which is approximately 150 feet south of the site. The brackish marsh is dominated by willow, mulefat, tree tobacco, and pickleweed (IT, 1998).

In 1997, coastal California gnatcatchers were observed at Site 30. Least Bell's vireos were observed in adjacent riparian habitats, but not within the site's boundary. A Belding's savannah sparrow (a special-status species) was observed in the brackish marsh habitat at Site 30. Surveys at Site 30 for the arroyo toad and Pacific pocket mouse were conducted in 1997, but neither of these species was observed (IT, 1998).

In 1997, biological samples of plants and invertebrates were taken at Site 30. Lead levels in plants were much higher than reference concentrations, indicating that there may be increased risk, both directly to plants and to those receptors feeding on plants. Copper and lead concentrations in invertebrates were slightly higher than reference concentrations, indicating that there may be increased risk to invertebrates and receptors feeding on invertebrates at the site (IT, 1998).

California gnatcatchers and least Bell's vireos were observed in the vicinity of Site 30 during the biological field survey conducted in August 2001 (Appendix B). No nests or nestlings were observed. A biological monitor was present during drilling in the marsh areas and fieldwork was conducted as scheduled.

Site 30 is on and near prehistoric sites and historic archeological sites. The Monitoring and Discovery Plan (LSA, 2000) reports that Site 30 is situated directly atop the first prehistoric site, which is recorded as a low-density shell midden with over 100 pieces of shell. This site also contains flakes (from stone tools) (LSA, 2000). The southern portion of a second archeological site is located near the eastern edge of the site (LSA, 2000). This site contains both historic (ceramic fragments and ration tins) and prehistoric (one core fragment, one mano, one unidentified ground stone fragment, fifteen pieces of lithic debitage, several fragments of bone,

and over 300 pieces of marine shell) artifacts (LSA, 2000). A third site is located approximately 360 feet north and upslope of Site 30 (outside of the remediation area) and is composed of one core fragment, four flakes, and more than 50 pieces of marine shell (LSA, 2000). Because of these sites, archeological and Native American monitoring is required during site investigation and remediation activity conducted at Site 30 (LSA, 2000).

5.1.3 Nature and Extent of Contamination

The previously established COCs at Site 30 are antimony, arsenic, chromium, cobalt, copper, lead, and manganese (IT, 1998). Based on the RI/FS for OU 3, the extent of significant metals-impacted soil appeared to be confined to the central part of the site (Kleinfelder, 1997). Historical soil sampling data are included in Appendix C4.

Manganese was considered a remedial COC because of a single detection ("hot spot") of 5,140 mg/kg (IT 1993-1994 sample location 30BG001 at 5 feet bgs), which was greater than the previously established RG of 3,200 mg/kg. However, based on a weight-of-evidence approach, this manganese detection is believed to be naturally occurring. Lines of evidence for this conclusion are summarized below:

- Use of the 95th percentile background concentration is a convenient screening mechanism for identifying potentially site-related metals. However, limitations in the number of samples that comprise a background population and the inherent difficulty in characterizing the wide range of trace metals in a geologically diverse area such as Camp Pendleton require that other lines of evidence be examined.
- Extensive characterization of the fill soils at Site 30 has indicated that manganese is present across the remainder of the site at levels consistent with the statistically derived background value and well below the (current) residential soil PRG value of 1,800 mg/kg (USEPA, 2002a). As shown on Table 5-2, manganese concentrations across Site 30 range from 127 to 873 mg/kg. (The 95th percentile background concentration for manganese in the Santa Margarita Basin is 688 mg/kg, with the maximum detected background value of 1,060 mg/kg.) Manganese concentrations are well below the 95th percentile background value of 688 mg/kg in all samples with elevated lead.
- The location with the elevated manganese was selected and sampled to characterize background levels of metals at Site 30. Given that the disposed range soils were used as a fill material at the site, the background sampling location was visually sited in an area that was likely not fill. The appropriateness of this location for collecting background samples is evidenced by the extremely low lead detected (1.8 mg/kg). Manganese concentrations from other soil samples in that boring (collected at 1, 15, and 34 feet bgs were consistent with background. Similarly, concentrations of manganese in other nearby soil borings were consistent with background (see Figure 2-7 from Kleinfelder, 1997).
- Literature information (AFCEE, 2000) indicates that manganese is neither a primary nor secondary COPC in small arms firing range soils. This is supported by site-specific soil sampling data, which indicate an absence of manganese in other areas of the site. No other plausible source-release mechanisms involving manganese at Site 30 could be identified. Typical industrial/commercial uses of manganese are as a constituent in various ferrous and non-ferrous alloys, a colorant in certain bricks and ceramics, water treatment applications (i.e., potassium permanganate), and in welding rods and carbon-zinc dry cells batteries (U. S. Bureau of Mines, 1985 and HSDB, 2002). None of these activities are believed to have occurred at Site 30.

- The sample with the elevated manganese was collected from a location adjacent to a bedrock outcrop. A review of mineral resources in the project region (CDM, Bulletin 125, 1943 and CDMG, 1966a and b) suggests a potential for elevated levels of naturally occurring manganese. Manganese-bearing minerals such as triphylite, $Li(Fe,Mn)PO_4$, lithiophilite, $Li(Mn, Fe)PO_4$, columbite, $(Fe, Mn, Mg)(Nb, Ta)_2O_6$, spessartine, $(Mn_3Al_2(SiO_4)_3$, and rhodonite $(Mn_5SiO_3)_5$ have been found in San Diego County, particularly in the Pala Mining District located approximately 10 miles east of Camp Pendleton (CDMG, 1966a). In addition, manganese deposits of potential economic value are documented throughout portions of San Diego County (CDM, Bulletin 125, 1943; CDM, Bulletin 152, 1950). Generally, these minerals are associated with either manganese bearing chert and quartzite deposits or pegmatites/aplites rich in lithium and phosphorus minerals that are enriched by manganese.
- Locally in the vicinity of Site 30, outcrops of the Upper Miocene to Lower Pliocene San Mateo member of the Capistrano Formation occur in the small hills northeast of Site 30 (Rosenberg, 1994; Ross and Dowlen, 1975). The San Mateo member is documented to contain reworked metamorphic clasts derived from the San Onofre Breccia. The San Onofre Breccia, in turn, is characterized by a wide variety of schists, quartz schists, quartize, amphibolite, serpentinite, less common plutonic rocks, and related alternation rocks.
- Several of these rock types of the San Onofre Breccia are associated with manganese bearing minerals assemblages and manganese ores in San Diego County, and are believed to be the source of the manganese in background samples associated with Site 30. Manganese bearing quartzite deposits believed to have been metamorphosed from chert are documented in San Diego County at the "Ruby Mine" (Trask, et al., 1950 [CDM Bulletin 152]). Crystals of rhodonite have been identified in thin sections of the metamorphosed chert from this deposit, and specifically fine-grained quartzite. The manganese in the quartzite of this Ruby Mine deposit has been altered into the minerals rhodontite and spessartite. At the "Turner Prospect" of San Diego County (Trask, et al., 1950 [CDM Bulletin 152]), the ore bed includes banded siliceous rock derived from chert, with the greater part being iron-stained quartzite, which is enclosed in a quartz-mica schist. Numerous fractures in the quartzite are coated with manganese oxides, and some of this material may carry as much as 5 percent manganese. The "Clark Prospect" and Machado deposit in northwestern San Diego County are low grade manganese ores where manganese occurs as dark brown stains in aplite dikes ([Jenkins, et al., 1943 [CDM, Bulletin 125]).
- The regional presence of naturally occurring manganese is further evidenced by the ongoing problem the Base faces with water treatment needs. Specifically, Base groundwater contains excessive concentrations of naturally occurring iron and manganese. An iron-manganese reduction plant is part of the Base water treatment system.
- The location of the elevated manganese is not spatially correlated to the area(s) of elevated lead at the site. As shown in Figure 5-6, the area originally recommended for removal based on manganese (CU E16) is physically separate from the soils recommended for removal based on lead (and related metals).

Based on the above lines of evidence, the single elevated manganese detection is believed to be naturally occurring, and manganese is not considered a site COC.

Although previously existing data for Site 30 established that COCs are present above RGs, the previous data set did not provide enough certainty regarding specific quantities of soil that exceed relevant thresholds. The following decision questions were used to define the required sampling for the FS from the DQO process:

- What is the lateral and vertical extent of COCs in soil?
- What is the approximate volume of impacted soil?
- What is the approximate volume of soil above RCRA-hazardous waste limits?
- What is the volume of soil above California-designated limits?
- What is the impact of COC-impacted soils on risk to human health and environment, including threat to groundwater?

Based on these questions, the sampling was to be considered complete if the soil sampling results bounded the lateral and vertical extent of COCs in soil.

5.1.3.1 FS Sampling

Field sampling at Site 30 was conducted from 10 to 21 September 2001. The following sections describe the supplemental field data collection, which was conducted in accordance with the Draft Final OU 4 Supplemental FS FSP and QAPP (Parsons, 2001a and 2001b).

5.1.3.1.1 Soil Sampling

To adequately address the decision questions for the site, soil sampling was conducted using a systematic sampling grid and each cell in the grid was referred to as a characterization unit (CU). Enough CUs were proposed to allow for acceptable certainty in remedial cost estimates and alternatives analysis in the supplemental FS. Borings were advanced using a Geoprobe® rig or by hand auger in locations the Geoprobe® rig could not be used due to terrain or ecological constraints. Samples were collected in accordance with the procedures outlined in the Draft Final FSP and QAPP (Parsons, 2001a and 2001b). Boring logs for each CU are included in Appendix D4.

Soil sampling at Site 30 focused on the upper 5 feet because this is the exposure interval of concern for ecological receptors. Although deeper soils could be contacted under a residential exposure scenario, future residential development is considered highly unlikely for this site given its location within the flood plain.

Each CU covered a 75- by 50-foot area; their locations are shown on Figure 5-2. The original grid layout in the OU 4 supplemental FSP includes 94 CUs; however, some of these locations could not be sampled due to ecological constraints and the presence of utilities (Parsons, 2001a). Three random borings were advanced in each of the 87 CUs, and samples were collected at intervals of 0.0 to 0.5, 2.0 to 2.5, and 4.0 to 4.5 feet bgs. A total of 236 borings were advanced in the CUs, including 75 Geoprobe® borings and 161 hand auger borings. To obtain a representative sample from each depth, one discrete sample was collected from each of the three random boring locations within each CU. The discrete samples were then mixed together to form a composite sample to represent that CU. However, due to ecological constraints and the presence of utilities, only one boring could be drilled in 20 of the CUs, and the condition of these CUs is represented by discrete rather than composite samples.

5.1.3.1.2 Soil Analytical Program

The primary source of contaminants at Site 30 is from the disposal of firing range soils. COCs that may be present in soils at rifle and pistol ranges include lead, copper, zinc, and antimony in bullets (Health et al., 1991).

Rifle cartridge cases historically have been constructed of either brass (zinc and copper) or aluminum. The cap or capsule is made of either copper or brass. A nonvolatile product of propellant combustion that may be present in range soils is barium (as barium nitrate) (Burrard, 1951; Corbin, 1979). Therefore, based on bullet compositions, the metals that may be of concern at firing ranges include copper, zinc, barium, lead, and antimony. Nickel has also been reported as a constituent in jacket materials. However, a literature review and study performed by the Air Force Center for Environmental Excellence (AFCEE) at several ranges did not substantiate this assumption (AFCEE, 2000). Based on the AFCEE work, the following hierarchy of soil COCs was developed for firing-range sites:

- Primary concern: lead
- Secondary concern: antimony, barium, copper, and zinc

Based on the detailed correlation analysis in historical sampling between lead and each COC (Parsons, 2001a, Appendix B), it was determined that all samples containing nonlead COCs (i.e., antimony, arsenic, chromium, cobalt, copper, and manganese) at concentrations above their respective RGs also contained lead above its RG. Therefore, at Site 30 lead (SW6010B) was used as an indicator analyte for the composited soil samples collected from each CU.

To confirm the appropriateness of using lead as an indicator analyte, 5 percent of the total samples collected were analyzed for all metals (SW6010B/SW7000 series). A correlation analysis was performed with these results and presented in Appendix E2. Based on this correlation, lead was an appropriate indicator analyte at Site 30.

SPLP (SW1312) analysis was conducted on 5 percent of the samples (the same as those analyzed for the full suite of metals) to determine potential leachability of metals present in soil. TCLP (SW1311) analysis was also performed on these samples to estimate the amount of soil designated as RCRA-hazardous waste that may require off-site disposal.

Expray® field test kits were used to screen all of the soil samples for the presence of explosives/explosive residues. The Expray® field test kits can detect polynitro-aromatics, nitrate-esters, nitramines, and inorganic nitrate chemical class explosives present at 20 nanograms or more. No explosives were detected in the samples by the test kits. SVOCs (SW8270C), explosive/explosive residues (SW8330), and nitroglycerine (SW8332) analyses were performed on six samples collected from areas with visual evidence of bullet fragments to further confirm the field test kit results. Confirmatory analytical result reporting limits of SVOCs (SW8270C), explosives/explosive residues (SW8330), and nitroglycerine (SW8332) range from 120 to 3100 µg/kg, 200 to 470 µg/kg, and 500 to 610 µg/kg; respectively. However, the laboratory flagged and reported the presence of SVOC and explosives/explosive residues target compounds down to the laboratory method detection limits (MDLs) ranging from 24 to 840 µg/kg (for SVOCs) and 21 to 140 µg/kg (for explosives/explosive residues).

5.1.3.2 FS Results

The analytical results collected during this soil investigation at Site 30 are presented in this section along with a discussion of the nature and extent of contamination. The discussions presented in this section are based on validated analytical data. The data quality assessment is presented in Appendix F4. Chain-of-custody and cooler receipt forms for samples collected at Site 30 are provided in Appendix G4. Validated analytical data for Site 30 are provided in Appendix H4. Sampling locations are shown on Figure 5-2.

Metals

A total of 282 soil samples (256 primary samples plus 26 field duplicates) were collected for lead analysis in September 2001. Lead was detected above the previously established RG of 29 mg/kg in 76 of the 282 samples (Table 5-1).

The results of the 15 soil samples analyzed for the full suite of metals and TCLP analysis are shown on Table 5-2. COCs detected above their respective RGs include antimony, arsenic, chromium, cobalt, copper, and lead (Table 5-3). Manganese, a COC from previous studies, was not detected above its RG. The horizontal distributions of metals above their RGs are shown on Figures 5-3 (0 to 1 feet bgs), 5-4 (1 to 3 feet bgs), and 5-5 (3 to 5 feet bgs).

A correlation analysis was performed to confirm the appropriateness of using lead as an indicator analyte, as previously mentioned. Appendix E2 contains the complete results of that analysis. The results for antimony and arsenic showed a 100 percent positive correlation with lead. The results for chromium showed a 93 percent positive correlation with lead; one sample (30-D04-A) contained chromium at 37.5 mg/kg (slightly above its RG of 33), while lead was below its RG at that depth (5.5 mg/kg at 0.0 to 0.5 foot bgs). The results for copper showed an 87 percent positive correlation with lead; two samples (30-B06-C and 30-D04-A) where copper was detected at 28.3 and 30.5 mg/kg, respectively (slightly above its RG of 26 mg/kg), while lead was below its RG in those samples. The results for cobalt showed an 87 percent positive correlation with lead; however, cobalt was detected at 13.8 and 19 mg/kg in sample 30-F17-C and 30-D04-A, respectively (slightly above its RG of 13 mg/kg), while lead was below its RG in those samples.

SVOCs, Explosives/Explosive Residues, and Nitroglycerine

Expray® field test kits were used to screen 735 individual soil samples for the presence of explosives residue. The Expray® field test kits, used for field screening, can detect polynitro-aromatics, nitrate-esters, nitramines, and inorganic nitrate chemical class explosives present at 20 nanograms or more. No explosives were detected in the samples by the test kits. Six soil samples were analyzed for SVOCs, explosives/explosive residues, and nitroglycerine to confirm these results. Samples were chosen based on the visual identification of bullet fragments in the soil. SVOCs, explosives/explosive residues, and nitroglycerine were not detected.

Confirmatory analytical result reporting limits of SVOCs (SW8270C), explosives/explosive residues (SW8330), and nitroglycerine (SW8332) range from 120 to 3100 µg/kg, 200 to 470 µg/kg, and 500 to 610 µg/kg; respectively. However, the laboratory flagged and reported the presence of SVOC and explosives/explosive residues target compounds down to the laboratory MDLs ranging from 24 to 840 µg/kg (for SVOCs) and 21 to 140 µg/kg (for explosives/explosive residues).

5.1.3.2.1 Soil Volume Cleanup Estimate

There were 40 CUs where lead was detected in soil above the RG. Based on this distribution, the total volume of contaminated soil above RGs at Site 30 is estimated at approximately 15,600 cubic yards. The horizontal distributions of metals above their previously established RGs at the deepest depth in each CU are shown on Figures 5-6 and 5-7. Figure 5-8 shows vertical distribution of contaminated soil. Although metals concentrations are above their respective RGs at several of the CUs along the edges of the sampling grid (most notably in CU C5, I4, and D10), these data are considered to be adequate for determining remedial cost alternatives for this FS.

At three CUs (B6, D4, and F17) lead was detected below the RG, but there were three other metals that were detected slightly above their RGs; copper at B6, cobalt at F17, and chromium,

cobalt and copper at D4. At these three CUs, the non-lead metal concentrations in soil are only slightly greater than the 95th percentile background concentration previously established as RGs. Except for cobablt slightly exceeding its maximum background concentration at CU D4, all metal concentrations detected at these CUs are well within the range of naturally occurring background values and do not pose a significant incremental risk to potential environmental receptors. Therefore, these three CUs (B6, D4, and F17) will be excluded in the remediation estimate at Site 30. The grid areas, which were extensively sampled, mostly represent the extent of fill material based on field observations. The area outside the sampling grid is either the base of the bedrock slope (in the area of D10), or the marsh areas outside of the mounds of fill deposits (in the areas of C5 and I4). In those cells where samples were collected in the marsh area (cells E1, E2, E3, E4, and D4), metals were detected below RGs, or slightly above, in the upper foot. This is likely due to some runoff of fill soils into the area immediately adjacent to the fill. Given the conservative volume and cost estimating procedures used in this FS, total volumes and costs are considered well within the accepted FS standards.

5.1.3.2.2 Groundwater Impact Evaluation

Based on the potential threat to groundwater, SPLP analysis (SW1312) was conducted for the full suite of metals and was performed on a selected subset of soil samples to determine leachability potential and any associated threat to underlying groundwater. To evaluate the leaching potential of soils that might be left in place at the site and to determine the migration potential in highly contaminated areas, samples that exhibited a range of lead concentrations were chosen for SPLP analysis rather than simply choosing those samples having the highest concentrations.

The results from SPLP analyses conducted during the FS indicate that metal concentrations present in soil pose a potential threat to groundwater. SPLP results for aluminum, antimony, copper, iron, lead, manganese, and vanadium are above their respective MCLs or California Action Levels (Table 5-4). In the sample (30-E11-A) where no metals were detected above their respective RGs and the sample (30-F17-C) where only copper slightly exceeded its RG (13.8 mg/kg compared to RG of 13 mg/kg) in the TTLC analysis, the SPLP results for aluminum, iron, lead, and vanadium were still above their respective MCLs or California Action Levels (Table 5-4).

5.1.4 Human Health Risk Assessment

Based on the maximum detected concentrations in Site 30 soil, the total risk to a hypothetical on-site resident was estimated to be 3×10^{-4} and the total hazard was estimated to be 155 (SWDIV, 1996b) (see Appendix I4, Attachment 1). Risk assessment results are summarized in Table 5-5 However, the calculation of the total hazard index incorrectly included lead in the summation. Excluding lead, the total hazard index would have been 8.3.

The risk and hazard from naturally occurring background were calculated separately. The difference was presented as the site-related risk and hazard. Discounting the risk contributed by background metals, the site-related ILCR and hazard index were estimated to be 1×10^{-4} and 153, respectively (IT, 1998) (6.8 without lead). Arsenic (4×10^{-5}), beryllium (1×10^{-5}), and chromium (3×10^{-4}) were the primary contributors to cancer risk while antimony (HI = 5.2) and manganese (HI = 1.4) were the primary contributors to the non-cancer hazard. Organic compounds were not considered COPCs at Site 30 in the Group C RI (SWDIV, 1996b).

The maximum historical lead concentration (19,000 mg/kg) exceeded both the USEPA and Cal/EPA residential screening criteria (SWDIV, 1996b). A more refined analysis of lead based on average exposure point concentration was not performed as part of this FS given the

elevated lead concentrations at the site. Consequently, a more refined evaluation to characterize human health impacts would not impact decision-making.

The Group C RI SLRA (SWDIV, 1996b) concluded that baseline conditions at the site represent a potential threat to hypothetical future residents.

A review of the Group C RI SLRA human health risk assessment methodology and assumptions was performed to determine their appropriateness for use in decision making for this OU 4 FS. The review indicated that there have been no subsequent changes in toxicological data, calculation methodologies, exposure assumptions, or exposure point concentrations that would alter the original conclusion that the site poses a threat to a hypothetical on-site resident. However, the inclusion of lead in the overall total non-carcinogenic hazard index calculation is inappropriate and overestimates the overall hazard index. In addition, changes in toxicity data for beryllium and hexavalent chromium have resulted in changes to the PRGs (USEPA, 1995b) that were used in the Group C RI (SWDIV, 1996b). These changes have a significant effect on the estimated cancer risk associated with soil exposure at Site 30 and are discussed below.

The cancer risk from chromium (approximately 4×10^{-4}) was significantly overestimated given that all detected (total) chromium was conservatively assumed to be hexavalent along with application of the subsequently withdrawn CAL-modified PRG for hexavalent chromium (0.2 mg/kg). This value has since been updated to reflect a value of 30 mg/kg, based on the withdrawal of the California oral slope factor for hexavalent chromium.

The cancer risk from beryllium (approximately 1×10^{-5}) was also overestimated given that the evaluation utilized a soil PRG that was based on an oral slope factor that has since been withdrawn from the USEPA's IRIS database.

Excluding beryllium and chromium yields a total cancer risk of approximately 4×10^{-5} (Table 5-5). Most of this risk is attributable to arsenic, which appears to be present at this site at concentrations that are elevated relative to naturally occurring background. The maximum detected arsenic concentration at Site 30 is 16 mg/kg (SWDIV, 1996b), compared to the estimated 95th percentile background value of 4.3 mg/kg for Santa Margarita Basin soils (SWDIV, 1996b). Concentrations of arsenic in the background data population ranged up to 11.5 mg/kg. In addition, the 95 percent UTL value of the background data set was determined to be 9.4 mg/kg (see Section 1.6), which suggest that the detected arsenic is site-related.

As discussed above, the total hazard index (excluding lead) would have been 8.3 (Table 5-5), with antimony (HI = 5.2) and manganese (HI = 1.4) the primary contributors. The spatial distribution of antimony relative to lead strongly suggests that the antimony is site-related. However, as discussed in Section 5.1.3.1.2, the single elevated detection of manganese (5,140 mg/kg) is believed to be naturally occurring. This is based on a weight-of-evidence approach considering the spatial distribution of manganese at the site relative to known site-related metals (e.g., antimony and lead), regional geology, and the lack of scoping information to suggest a separate release source involving manganese at Site 30.

5.1.5 Ecological Risk Assessment

A baseline ERA for organisms potentially exposed to contaminants in Site 30 soil was conducted as part of the Group C RI Report. A full discussion of the technical approach and methodology used is included in the baseline ERA and is summarized in the draft final RI/FS for OU 3 (IT, 1998).

Habitats at Site 30 consist primarily of bulrush-cattail series, California sagebrush series, arroyo willow/black willow series, and California annual grassland series (IT, 1998). The representative

species selected for the ERA were plants, terrestrial invertebrates, California quail, coastal California gnatcatcher, Belding's savannah sparrow, deer mouse, and raccoon (IT, 1998).

Concentrations of inorganic chemicals were compared with background values for the Santa Margarita Basin (IT, 1998). Concentrations of nine preliminary inorganic compounds that exceeded the available background values were retained for the initial ecological risk screening (IT, 1998). The PLEs for birds and mammals were modified based on the size of the area of concern and the foraging range for each representative species (IT, 1998).

The ERA concluded that five metals (antimony, arsenic, cobalt, copper, and lead) were present at Site 30 in concentrations that could be directly toxic to ecological receptors or could bioaccumulate in the wildlife food chain (IT, 1998).

Based on the OU 3 RI/FS evaluation, baseline conditions at Site 30 are not protective of ecological receptors. However, it is important to note that the methodology employed was screening level and may have overestimated the actual impacts to ecological receptors.

5.1.6 Conclusions of FS

Based on the data collected for the FS, the following conclusions were developed for Site 30:

- Based on the FS data, the estimated volume of soils impacted above previously established RGs at Site 30 is approximately 15,600 cubic yards. The lateral extent of impacted soils is approximately 400 feet by 700 feet, and the depth of impacted soils varies from approximately 1 foot to 5 feet bgs.
- COCs detected in site soils above their respective RGs include antimony, arsenic, chromium, cobalt, copper, and lead. Manganese, a COC from previous studies, was not detected in the FS samples above its RG and therefore will not be retained as a COC. Lead is the most predominant and widespread COC at Site 30 and was also detected at the highest concentrations. Lead serves as a good indicator for the presence of other contaminants.
- The conclusions of the HHRA and ERA performed as part of a prior remedial investigation were found to be valid although the predicted cancer risk was likely overestimated due to subsequent changes in toxicological factors for beryllium and chromium. The site poses a threat to a hypothetical future on-site resident. Baseline conditions at Site 30 are not protective of ecological receptors (IT, 1998).
- Concentrations of lead at the site do not appear to correlate to particle size (i.e. soil size particles without visible lead fragments may also have high lead concentrations).
- No explosives or explosive residues were present in Site 30 soils.
- Site 30 is located near a suspected cultural resources site (Native American/ Archeological sites). Although no Native American or archeological artifacts were encountered during FS data collection, this issue must be considered in any future potential site remediation. Since the contamination lies within the previous fill material, it is anticipated that any artifacts would be encountered at depths below where remediation would likely occur.
- Metals-contaminated soils, if left in place untreated at Site 30, could pose a threat to groundwater underlying the site based on SPLP results.
- Any site disturbance (e.g., soil excavation) would need to be scheduled around the nesting and breeding season in order to minimize impacts to ecological receptors.

5.2 Development of Remedial Action Objectives

The purpose of this FS is to refine the characterization of the site, and, based on this refined characterization, develop and evaluate remedial action alternatives for each site that comply with ARARs, are protective of human health and the environment, and can be implemented in a cost-effective manner.

As discussed in Section 1.4, in accordance with the framework of CERCLA, NCP, and SARA, the RI/FS and subsequent remedial activities conducted at Site 30 must comply with federal and state ARARs. The ARARs/TBC that might apply to Site 30 are discussed in detail in Appendix A. USEPA guidance (USEPA, 1988b) requires that RAOs be developed during the initial phase of the FS and be used as the framework for developing the remedial alternatives. The remainder of this section addresses the soil contamination at Site 30 that requires remediation based on the site characterization data collected to date.

5.2.1 Chemicals of Concern

As discussed in Section 5.1.3.2, six metals were detected in soil samples above their respective residential soil PRGs during the OU 4 FS: antimony, arsenic, chromium, cobalt, copper, and lead (Table 5-3). Manganese, a COC from previous studies, was not detected in the FS samples above its RG. In addition, the ERA concluded that antimony, arsenic, cobalt, copper, and lead were presented at levels of concern from an ecological perspective. All of these metals were classified as RCOCs in the OU 3 ROD (IT, 1999a) and are also classified as RCOCs for this FS.

5.2.2 Exposure Routes/Receptors of Concern

Exposure routes and receptors of concern are summarized above in Sections 5.1.4 and 5.1.5.

5.2.3 Proposed Remediation Goals

The development of soil RGs for Site 30 uses RGs previously established as part of human and ecological risk assessments that were documented in the OU 3 RI/FS (IT, 1998). The soil RG values represent the more stringent of the chemical-specific residential soil PRGs and the ecological PLEs. In cases where this value is less than the upper range of naturally occurring levels, the background concentration for the Santa Margarita Basin (i.e., 95 percent UTL) was established as the RG.

5.2.4 Remedial Action Objectives

The RAOs for the Site 30 soil contamination were defined as follows:

- Minimize exposure (inhalation/dermal contact/ingestion) by humans and ecological receptors to chemicals in soil at concentrations exceeding remediation goals shown in Table 5-3.
- Protect the beneficial uses and water quality objectives of the lower Santa Margarita River Basin.

The evaluations of remedial alternatives for the site address various means of achieving these RAOs.

5.3 Identification of General Response Actions

GRAs represent general classes of technologies that have common characteristics in the way they address the risk posed by contaminated soil (i.e., the RAOs). The following GRAs considered for Site 30:

- No Action: No further remedial action for the contaminated soil.
- Institutional Action: Minimal activity including administrative and physical measures to restrict site access but no active remediation of the contaminated soil.
- Containment: Primarily physical measures such as capping to restrict soil contaminant migration (e.g., wind erosion, surface runoff) or waste movement.
- Removal: Removal (i.e., mechanical excavation) of contaminated soil.
- Treatment (in situ and ex situ): Physical, chemical, and biological measures that would reduce toxicity, mobility, or volume of a contaminant or waste by altering the physical or chemical properties of the contaminants and/or media.
- Disposal: Placement of treated or untreated waste soil in a temporary or permanent, pre-engineered, controlled environment (i.e., landfill) that would restrict contaminant migration and eliminate exposure routes.

5.4 Identification and Screening of Technology Types and Process Options

The objective of this section is to identify remedial technologies and process options for application for soil remediation at Site 30. This objective is accomplished using a variety of information including previous investigations, remedial actions at other sites, references developed by the USEPA for application at NPL sites, USEPA computerized technology databases (ATTIC, Version 1.0, VISITT, Version 2.0, and CLU-IN), and standard engineering references.

For each GRA discussed above, one or more potentially applicable remedial technologies were identified. The goal of the screening process is to evaluate a large number of technologies to identify those that are potentially implementable for the remediation of soil under the specific Site 30 conditions. In this step, both process options and entire technology types can be eliminated based on technical effectiveness and/or implementability considerations. Information on site characteristics and contaminant types and concentrations was used to eliminate technology types and process options that are neither applicable nor effectively implementable at the site.

The remedial technologies identified and evaluated in the previous feasibility studies and EE/CAs performed for Site 30 (IT, 1998; Kleinfelder, 1997) served as the starting point for the list of technology options evaluated in this FS report. These evaluations were revised as appropriate to reflect current site conditions and technology updates. In addition, relevant new technologies were included in the evaluation. A summary of the technologies considered in this FS is presented below:

Figure 5-9 lists the GRAs for the Site 30 soil contamination, identifies the remedial technologies and process types for each response action, and summarizes the screening results for each technology and process. A brief description of the technologies and process options under each GRA is provided in the following sections, along with the rationale for retaining or eliminating each technology.

- Institutional Controls
  - Access Restrictions
  - Fencing
- Containment
  - Capping
- Removal
  - Excavation
- Disposal
  - Landfill
  - Backfilling
- In Situ Physical/Chemical Treatment
  - Soil Flushing
  - Solidification/Stabilization
  - In Situ Vitrification
- In Situ Biological Treatment
  - Phytoremediation
- Ex Situ Physical/Chemical Treatment
  - Soil Washing
  - Acid Extraction
  - Solidification/Stabilization
  - Chemical Oxidation - Reduction
  - Vitrification
- Ex Situ Thermal Treatment
  - Thermal Desorption
  - Incineration

5.4.1 No Action

The no action response was retained for consideration during the development and analysis of alternatives as required by the NCP (40 CFR 300.430[e][6]). The no action response does not provide any additional remediation, containment, or security measures to reduce potential risk to human health or the environment at Site 30.

5.4.2 Institutional Action

Institutional action refers to administrative and physical actions taken to reduce or eliminate risks to public health and the environment by controlling exposure pathways rather than removing contaminants or controlling and reducing their mobility, toxicity, or volume. For soil, institutional action such as access restrictions and fencing are typically considered during the initial screening of technologies to limit exposure of potential human receptors. Institutional actions alone would not be as effective because soils at Site 30 pose a risk to ecological receptors as well as to humans. The reasonably anticipated future land use at Site 30 is neither residential nor industrial given its location in an ecologically sensitive area prone to flooding. Thus, land use and access restrictions would effectively limit future development and physical access to the site and were retained for further evaluation. Fencing or barriers may be effective in preventing certain ecological receptors (e.g., larger mammals) from accessing the site and contacting site contaminants and was also retained for further evaluation. However, DON's position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

5.4.3 Containment

Containment actions for soil contamination are intended to isolate RCOCs from potential human and/or ecological contact and to protect unimpacted media by reducing or eliminating the migration of RCOCs from soil to groundwater or surface water systems. The containment option typically is capping, such as an asphalt, concrete, or engineered soil cap. At Site 30, occasional flooding and erosion problems in the area would require construction of an extensive surface water diversion system. Without such a system, long-term cap protection and maintenance would be infeasible. Therefore, this technology was not retained for further consideration in developing remedial alternatives.

5.4.4 Removal

Removal actions are intended to remove soils containing RCOCs. The removal option considered for soil at Site 30 is excavation.

Under this process option, the contaminated soil is excavated and removed from the site and the excavated area is backfilled with clean imported soil and compacted to required standards then revegetated. Excavation is generally followed by treatment and/or disposal of the contaminated soil. This option is particularly suited for source removal. A frequent practice is to excavate and remove "hot spots" in combination with other measures such as containment (i.e., capping) of less contaminated soils. Worker health and safety concerns weigh heavily in the decision to remove highly toxic or reactive waste material.

Other factors considered include contaminant mobility, feasibility of on-site containment or in situ treatment, depth of contamination, and the cost of disposing of the waste or rendering it nonhazardous after excavation.

Air monitoring is usually required for this option to demonstrate the effectiveness of dust suppression measures to minimize contaminant exposure potential to workers and off-site receptors. Mechanical excavation using heavy equipment such as a backhoe is feasible at Site 30 because the contamination is very shallow (approximately 5 feet bgs) and covers a relatively small area of approximately 161,000 square feet. However, the potential for worker exposure to contamination from implementing this option exists at Site 30. Coordination with agencies and implementation of biological monitoring and appropriate mitigation measures could be required. Excavation is a readily implementable and was retained for further consideration in evaluation of remedial options for this site.

5.4.5 Disposal

This GRA involves disposal of excavated contaminated soil in an appropriate landfill. Two process options were considered under this GRA: on-Base landfilling and off-Base landfilling. These two options are evaluated below.

5.4.5.1 On-Base Landfilling

This process option involves disposal of excavated soil in an on-Base landfill. MCB Camp Pendleton is currently in the planning stages of developing a new on-Base CAMU facility for the purpose of consolidating wastes from the various IR sites. Pretreatment of soils would be considered as part of this technology option and would be performed at an on-Base TTU to stabilize the waste soil prior to hauling it to the CAMU disposal facility. Characterization samples would be collected from excavated stockpiles to determine contaminant concentrations prior to disposal. This process option is potentially applicable and was retained for further evaluation.

5.4.5.2 Off-Base Landfilling

Off-Base landfilling is another process option for disposal of excavated soil. Pretreatment of soils would be considered as part of this technology and would be performed at an on-Base TTU to stabilize the waste soil prior to shipping it to the off-Base disposal facility. Waste characterization testing would need to be performed during excavation to determine whether the soil exhibits hazardous characteristics that would control the selection of an appropriate disposal facility. Landfilling of hazardous waste has become increasingly difficult and expensive and is regarded as a less desirable option. This process option is potentially applicable and was retained for further evaluation.

5.4.6 In Situ Treatment

This GRA encompasses remedial technologies and process options that are designed to treat contaminated soil in place. The main advantage of in situ treatment is that it allows the soil to be treated without being excavated and transported to an off-site disposal facility, resulting in significant cost savings. However, in situ treatment generally requires longer timeframes and there is less certainty about the uniformity of treatment because of the variability in soil characteristics and the difficulty in verifying the efficacy of the process. In situ treatment technologies evaluated for contaminated soil at Site 30 fall into two broad groups: physical/chemical and biological. Physical/chemical treatment is typically cost-effective and can be completed in shorter timeframes than biological treatment. Some technologies combine both physical and chemical treatment processes.

5.4.6.1 Physical/Chemical Treatment

This process option uses the physical/chemical properties of the contaminants or contaminated media to destroy (i.e., chemically convert the contaminants to innocuous compounds), separate, or contain the contamination. Three process options were evaluated under this GRA: soil flushing, S/S, and in situ vitrification.

5.4.6.1.1 In Situ Soil Flushing

In situ soil flushing extracts contaminants from soil with water or other suitable aqueous solution. Soil flushing is accomplished by passing the extraction fluid through in-place soils using an injection or infiltration process. Soil flushing uses the contaminant's solubility in liquid to separate it from the soil. Surfactants may be added to the flushing solution to increase chemically the contaminant's solubility. Contaminants are leached with the extraction fluid into the underlying groundwater, which is then extracted and treated above ground to appropriate standards prior to recycling or release to local POTWs or receiving streams. Although this technology appears suitable for treatment of metals in high-soil-permeability conditions such as at Site 30, it has no applicability at this site because it would introduce contaminants into the groundwater. Therefore, this technology was not retained for further consideration in developing remedial alternatives.

5.4.6.1.2 In Situ Solidification/Stabilization

In situ S/S reduces the mobility of contaminants in soil through both physical and chemical means. In situ solidification seeks to trap or immobilize contaminants within their "host" medium (i.e., soil), instead of removing them through chemical or physical means. This process option works by changing the physical properties of the contaminated soil, rendering it solid (with high structural integrity), and making the contaminants less prone to mobilization via leaching (USEPA, 1986). The solubility of soil contaminants is reduced by encapsulating the contaminants in a solidifying reagent, thereby reducing the surface area exposed to leaching, and/or by coating the contaminated soil with low-permeability materials (USEPA, 2000b).

In situ stabilization treatment processes are intended to convert contaminants to less mobile forms through chemical or thermal interactions. The addition and mixing of stabilizing agents can be achieved either by flooding the ground surface with a liquid stabilizing agent or allowing it to percolate into the subsurface and react with the target contaminant. Stabilizing agents in either liquid or dry form also can be introduced and mixed with subsurface soil via auger mixing (USEPA, 1997a).

In situ S/S limits the mobility of the contaminants but does not reduce contaminant concentrations per se. Its effectiveness is highly dependent on homogenous mixing, which can be difficult to ensure in clay-rich soil environments or where the soil contains significant debris

(USEPA, 1997a). Grout injection bottom barriers (i.e., impermeable horizontal subsurface barriers) can be used to prevent vertical migration by providing a floor of impermeable material beneath the contaminated soil via directional drilling with forced grout injection. Bottom barriers may be necessary at Site 30 to ensure effectiveness of the technology at this site. In situ technologies also require long-term maintenance (of greater importance for Site 30, which may be subject to flooding and erosion), post-cure testing, and implementation of land use restrictions. Because of these limitations, this technology was not retained for further consideration in developing remedial alternatives.

5.4.6.1.3 In Situ Vitrification

This technology treats metal-contaminated soil using heat, usually applied through electrical power, to melt the soil at extremely high temperatures (typically 2,900 to 3,600°F). The molten soil forms a stable glass and crystalline structure with very low leaching characteristics that immobilizes the inorganic contaminants by entrapping them or chemically incorporating them in the melt. Because this technology does not destroy many of the metal contaminants but rather traps them inside the matrix, it is often applied to highly concentrated characteristic hazardous waste to meet applicable disposal requirements. There are several disadvantages with this technology. The high temperatures associated with this process produce emissions of toxic vapor from relatively volatile metals (i.e., mercury and lead) that must be captured and treated, the resulting solidified matrix may hinder future site use and necessitate the use of site access restrictions, implementation entails long-term maintenance, and the technology is energy intensive and costly. Because of these concerns, this technology is impractical for application at Site 30 and was therefore excluded from further consideration.

5.4.6.2 Biological Treatment (Phytoremediation)

Phytoremediation is an emerging technology that uses plants to remove, transfer, stabilize, or degrade chemical contaminants in soil, sediment, or groundwater. There are various applications of phytoremediation technologies; the most appropriate application to Site 30 is enhanced rhizosphere biodegradation, which takes place in the soil immediately surrounding plant roots. Natural substances released by plant roots supply nutrients to soil microorganisms enhancing their biological activity. Plant roots also loosen the soil and then die, leaving paths for transport of water and aeration. This process facilitates the movement of soil moisture water to the surface zone.

Research has shown that plants can be used to treat most classes of compounds including metals. Plant species are selected on the basis of their potential to evapotranspirate groundwater, the degradative enzymes they produce, their growth rate and yield, the depth of their root zone, and their ability to bioaccumulate contaminants. Although certain plants allow uptake from deeper zones, phytoremediation is best suited for use in soils that are within 2 to 3 feet bgs and are contaminated with intermediate concentrations of organic waste. Considering the few demonstrated successful applications of this technology to treat heavy metals, the long timeframe required to achieve cleanup goals, the relatively high concentrations of lead in soil at Site 30, and the limited effectiveness of this technology in soil deeper than 3 feet, phytoremediation was excluded from further consideration for this site.

5.4.7 Ex Situ Treatment

The main advantage of ex situ treatment is that it generally requires less time, and there is greater certainty about the uniformity of treatment because of the ability to monitor and thoroughly mix the contaminated soil. Ex situ treatment, however, requires excavation of the contaminated soil to the ground surface for treatment and subsequent disposal of the treated soil at an appropriate facility or beneficial reuse as fill or construction material. Compared to in

situ treatment, these ex situ options lead to increased costs and engineering support for treatment equipment, permitting, and material handling and disposal. Ex situ treatment technologies that were evaluated for metal-contaminated soil at Site 30 fall into two broad groups: physical/chemical and thermal.

5.4.7.1 Physical/Chemical Treatment

Soil washing, acid extraction, S/S, and vitrification were considered as potentially applicable ex situ physical/chemical treatment options.

5.4.7.1.1 Ex Situ Soil Washing

Soil washing is a water-based volume reduction process for scrubbing soils ex situ to remove contaminants. This process removes heavy metals from soil by suspending them in the wash solution, or by concentrating them into a smaller volume of soil through particle size or gravity separation. Washing processes that separate the fine clay and silt particles from the coarser sand and gravel particle can effectively separate and concentrate the contaminants into a smaller volume of soil that can undergo further treatment/disposal. The wash water can be augmented with pH adjustment, a leaching agent, or a chelating agent. The contaminated water generated from the process also requires further treatment. Soil washing is generally considered a media transfer technology and is ineffective in achieving cleanup goals when used alone. This process option has seen limited use in the United States. Because of these issues, it was eliminated from further consideration.

5.4.7.1.2 Ex Situ Acid Extraction

Acid extraction uses acidic (hydrochloric acid) reagents to extract heavy metal contaminants from soils. In this process, soil is first mechanically screened to remove coarse solids. Because metals are generally found on the finer soil particles such as clays and humic material, the fine soil particles containing the bulk of the metals are separated in this process, thus considerably reducing the mass of contaminated soil requiring further treatment. Hydrochloric acid is then thoroughly mixed with the separated fine soil in the extraction unit. Residence times generally range between 10 and 40 minutes depending on the soil type, contaminants, and contaminant concentrations. The soil-extraction mix is continuously pumped out of the mixing tank and the soil and extractant separated using hydrocyclones. The resulting "cleaned" soil is then filtered, rinsed, dried, and disposed of or reused. Any residual acid in the treated soil also must be neutralized. The extraction solution and rinse water are typically hazardous, and can be regenerated using commercially available precipitants, such as sodium hydroxide or lime, along with a flocculent that removes the metals and reforms the acid. The removed heavy metals are concentrated in a form that is potentially suitable for recovery. These residues often require additional treatment such as S/S or vitrification. Offgases from the process also require collection and treatment. Elevated temperatures associated with the process raise concerns of toxic metallic vapor emissions, which can be difficult to control.

This process option is applicable for organic materials but only partially oxidizes the metals that constitute the soil RCOCs at Site 30. Meeting stringent heavy metal cleanup criteria (i.e., California WET) may prove uneconomical. Capital costs can be relatively high, and the technology is typically economical only at larger sites. In addition, hazards associated with the handling of acids and residues following extraction suggest that implementation of this process option could be difficult. For these reasons, acid extraction was eliminated from further consideration.

5.4.7.1.3 Ex Situ Solidification/Stabilization

Solidification refers to techniques that encapsulate the waste in a monolithic solid of high structural integrity. Stabilization refers to those techniques that reduce the hazard potential of a waste by converting the contaminants into their least soluble, mobile, or toxic form. In ex situ S/S, contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization). There are a number of innovations in this technology; most of them modifications of proven processes directed at encapsulating or immobilizing the contaminants by processing the contaminated soil. Some of these innovative processes with potential applicability to Site 30 include bituminization, emulsified asphalt (asphalt incorporation), modified sulfur cement, polyethylene extrusion, and pozzolan/Portland cement. Of these technologies, asphalt incorporation and pozzolan/Portland cement offer the greater advantages because of their recycling potential.

Ex situ S/S has a demonstrated effectiveness in reducing the mobility and toxicity of metals, is a comparatively low-cost option, and offers the potential for beneficial on-Base use of treated soil. Implementability of this technology has been demonstrated at similar military installations and is therefore retained for further consideration in developing remedial alternatives.

5.4.7.1.4 Ex Situ Vitrification

Ex situ vitrification processes are stabilization/solidification methods that employ heat between 1,900° to 3,600°F (USEPA, 1997b) to melt and convert waste materials into a glass matrix. The high temperatures destroy organic constituents with very few by-products. Inorganics such as heavy metals are incorporated into a stable, relatively strong, and durable glass structure that is very resistant to leaching and has mechanical and chemical properties similar to granite. Vitrification is an energy-intensive and costly technology, not readily implementable, and difficult to ensure homogeneous melting and control emissions of toxic vapors of the relatively volatile metals (i.e., lead) of concern at Site 30. Therefore, this technology is impractical for Site 30 and was excluded from further consideration.

5.4.7.2 Thermal Treatment

Thermal processes use heat to increase the volatility (separate); burn, decompose or detonate (destroy); or melt (immobilize) the contaminants. Thermal desorption and incineration were considered as potentially applicable ex situ thermal treatment process options and are evaluated below.

5.4.7.2.1 Ex Situ Thermal Desorption

Thermal desorption is a separation technology that uses heat in a controlled environment to volatilize and remove contaminants from the soil. The technology is not designed to destroy organics. A carrier gas or vacuum system transports volatilized water and organics to an off-gas treatment system. The gas used can be air or an inert gas such as nitrogen. Indirect heating is applied to avoid combustion. The temperature range is usually 300° to 1,200°F (lower than that of incineration), although higher temperatures can be used with an inert gas (USEPA, 1997a). Because the operating temperature for this technology is typically far below the boiling point of metals, it is generally ineffective for metals. In addition, volatilization of the relatively volatile metals (i.e., mercury and lead) and generation of toxic fumes could pose operational and worker safety difficulties. Accordingly, thermal desorption was eliminated from further consideration.

5.4.7.2.2 Ex Situ Incineration

Incineration, which can be implemented on or off site, refers to a thermal treatment that destroys organic contaminants by oxidizing them at high temperatures. The two most important parameters for effective destruction of contaminants are temperature and residence time (Freeman, 1989). These two parameters are different for different incineration process designs. The two most commonly used designs are fluidized bed and rotary kiln incinerators. Incineration could be applicable for treatment of organics and diesel contamination, but it is ineffective for treatment of metals because a large percentage of the relatively volatile metals (e.g., lead and mercury) would be emitted as toxic vapors that are difficult to control. Another problem with incineration of metals is that they are not completely destroyed and generally are present in the ash residue, which may require additional treatment and disposal. Finally, because metals have little heat recovery value, system operation is ineffective, costly, and impractical. Therefore, incineration was eliminated from further consideration.

5.5 Evaluation of Technology Process Options

Technologies and process options judged to be potentially viable in the previous section for Site 30 contaminated soil are reviewed according to three criteria: effectiveness, implementability, and cost. These criteria are briefly discussed below.

- **Effectiveness.** The effectiveness evaluation focuses on the following elements:
  - Potential effectiveness of process options for handling the estimated areas or volumes of media and meeting the RGs identified in the RAOs
  - Potential impacts to human health and the environment during the construction and implementation phase
  - Reliability and proven effectiveness of the process with respect to the contaminants and conditions at the site
- **Implementability.** The initial technology screening eliminated technology types or process options that were clearly ineffective or unworkable at the site. This evaluation addresses both the technical and institutional feasibility of implementing each process including the following institutional aspects:
  - Ability to obtain necessary permits and rights-of-way for off-site actions
  - Availability of necessary equipment and skilled workers to implement the technology
  - Availability (including capacity) of treatment, storage, and disposal services
- **Cost.** Cost plays a limited role in the screening of technologies at this phase. Relative capital and O&M costs are considered rather than absolute costs. For this evaluation, the cost analysis is based on engineering judgment. Each technique is evaluated as to whether costs are low, moderate, or high relative to other process options in the same technology type. The greatest cost consequences in site remediation are usually associated with the degree to which different technology types are used. Using different process options within a technology type usually has a less significant effect on cost than the use of different technology types. A technology process option can be eliminated on the basis of costs only if other process options within the same technology type are comparably effective and implementable but have a much lower cost.

Figure 5-10 lists all the technologies and process options that passed the initial screening in the previous section. Based on the above criteria, the process options were evaluated relative to other processes within the same technology type to select a representative process option to be

included in a remedial alternative. At this stage of the FS, the emphasis is on the effectiveness of each option; implementability and cost are of lesser importance. Each criterion is rated as low, moderate, or high relative to the technologies within the same process option. The results of the evaluation are discussed in the following sections and are summarized in Figure 5-10.

5.5.1 No Action

The evaluation of the no action option for soil contamination at Site 30 is summarized as follows:

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. The effectiveness is rated low because both human and ecological receptors could be exposed to the contaminated soil. RAOs are not achieved.	Low
Implementability	No equipment, skilled workers, or permits are required	High
Cost	No cost is associated with no action	High

The no action option is retained for incorporation into remedial action alternatives, as required by the NCP, and will be used as a baseline for comparison of other options.

5.5.2 Institutional Action

Access/use restrictions were retained for further evaluation. Access restriction involves limiting site access and future use/development by amending the Base Master Plan.

Criterion	Evaluation	Rating
Effectiveness	Contaminants would remain in the soil. Access restriction would effectively reduce the human health exposure pathway, but it would be only partially effective to protect ecological receptors.	Low to Moderate
Implementability	Readily implementable. However, DON position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.	Moderate to High
Cost	Low capital or O&M costs.	High

Access and use restrictions are further retained for incorporation into the remedial action alternatives.

5.5.3 Containment

No containment technologies were retained after the initial screening phase.

5.5.4 Removal

The evaluation of the removal option for soil contamination at Site 30 is summarized below:

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs but without treatment, does not reduce contaminant mobility or toxicity.	High
Implementability	Necessary equipment and skilled labor typically available. Requires agency approval, Base coordination, ecological coordination and possible mitigation, and H&S planning.	Moderate to High
Cost	High capital costs (including excavation, heavy equipment, backfilling, and revegetation) and low O&M costs.	Moderate

The removal option is an important strategic option available to support remedial actions at Site 30 and is retained for further consideration in the development of remedial alternatives.

5.5.5 Disposal

Both the on-Base CAMU and off-Base disposal site landfilling of excavated soil options were retained from the initial screening phase.

Criterion	Evaluation	Rating
Effectiveness	Demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment to stabilize waste prior to disposal.	High
Implementability	Necessary equipment and skilled labor typically available. Off-Base disposal of hazardous waste is considered a worst-case alternative and is becoming an increasingly difficult and expensive option. The on-Base CAMU facility offers a relatively less expensive disposal option.	Moderate to High
Cost	On-Base Disposal: High capital (including on-Base pretreatment) and low O&M costs. On-Base CAMU: Moderate capital (including on-Base pretreatment) and O&M costs.	Low

Land disposal, both on Base and off Base, is an important strategic technology option available to support remedial actions at Site 30 and is retained for further consideration in the development of remedial alternatives.

5.5.6 In Situ Treatment

No in situ treatment technologies were retained after the initial screening phase.

5.5.7 Ex Situ Treatment

S/S for metals in soil was the ex situ treatment process option retained after the initial screening of technologies. Ex situ S/S assumes the excavation of metals-impacted soil. This process option is further evaluated below.

Criterion	Evaluation	Rating
Effectiveness	S/S is a proven process that reduces contaminant mobility and toxicity through treatment. Metals-impacted soil have been successfully stabilized by incorporation in cold-mix asphalt and used as construction fill or recycled road-building material. Generally requires treatability studies to optimize treatment effectiveness and meet RAOs.	High
Implementability	Implementability has been demonstrated at similar military installations and necessary equipment, skilled labor, and treatment additives are generally available. On-site treatment requires adequate space for treatment and staging and may be subject to various permitting requirements (Section 5.6.3.2). On-Base use of treated soil as road construction material requires agency approvals and coordination with Base construction managers. Large volumes may be difficult to use on Base.	Moderate to High
Cost	Costs for this process include treatability studies, excavation, equipment, capital costs for stabilizing reagents and binders, and post-treatment testing. Costs compare favorably to the other ex situ treatment processes being evaluated for Site 30 soil and are considered moderate.	Moderate

This option is favorably rated for the treatment of metals in soil (including lead) at a wide range of sites and installations. S/S is the second most frequently implemented source control technologies at Superfund remedial sites, surpassed only by soil vapor extraction (SVE) (USEPA, 2000b). Based on the evaluation above, this technology process option has been retained for incorporation into the remedial action alternatives.

5.5.8 Summary of Process Option Selection

As illustrated in Figure 5-10, all the process options evaluated for remediation of heavy metal contamination in soil at Site 30 are summarized below:

- The no action response is retained as required by the NCP.
- Access/use restrictions, periodic site inspection/monitoring, and detailed ERA are selected as institutional actions.
- Mechanical excavation is the selected process to remove contaminated soil from the site.
- Ex situ S/S is selected as the treatment option.
- On-Base disposal at a new CAMU facility and off-Base landfilling at a permitted hazardous waste facility were both kept as viable disposal options.

The selected process options provide the basis for the development of alternatives as discussed in the following section.

5.6 Development and Detailed Analysis of Remedial Alternatives

Guidance for the development of remedial alternatives for Site 30 was obtained from the following sources:

- 40 CFR 300 (NCP)
- Section 121 of SARA

- Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (USEPA, 1988b)
- Navy/Marine Corps Installation Restoration Manual (DON, 1992)

As recommended by USEPA guidance (USEPA, 1988b) and the NCP, acceptable engineering practices that relate to site-specific conditions were considered during development of the remedial action alternatives. The alternatives developed satisfy the requirements of 40 CFR 300.430(e), which specify that alternatives be developed to include no action, institutional actions, little to no treatment alternatives, and alternatives that reduce the toxicity, mobility, or volume of contaminants, to the extent practical.

The process options selected for Site 30 in the previous section were assembled into specific alternatives representing possible remedies for the soil contamination at the site. Because of the limited number of process options retained for further consideration, few potential remedial alternatives are appropriate for Site 30. Therefore, screening of alternatives was not necessary for Site 30. All the alternatives developed were carried forward into the detailed analysis.

5.6.1 Overview of Detailed Analysis and Nine NCP Evaluation Criteria

A general overview of the detailed analysis and evaluation of nine NCP criteria is presented in Section 2.6.1 (Site 1D) of this report.

5.6.2 Description of Remedial Alternatives

Alternatives were developed to address the seven RCOCs for Site 30. As illustrated in Figure 5-7, the estimated total area of metal contamination above previously established RGs is approximately 150,000 square feet. The impacted soils extend to approximately 5 feet bgs. The estimated total in-place volume of impacted soil is approximately 15,600 cubic yards.

The following five alternatives were developed for remediation of contaminated soil at Site 30:

- Alternative 30-1: No action
- Alternative 30-2: Institutional controls (site access restrictions with Base Master Plan Amendment, periodic site inspection/monitoring)
- Alternative 30-3: Soil excavation, backfill, ex situ S/S, and on-Base reuse of treated soil
- Alternative 30-4: Soil excavation, pretreatment, backfill, and off-Base disposal
- Alternative 30-5: Soil excavation, backfill, pretreatment, and on-Base disposal.

Each alternative is described in detail in the following sections.

5.6.2.1 Alternative 30-1: No action

The NCP (40 CFR 300.430[e][6]) requires that a no action alternative be evaluated. Under this alternative, no further action would be taken to control or clean up the soil contamination at Site 30 to reduce potential risks to human health and the environment. The no action alternative involves no remediation of soils and results in no disturbance to the existing environment.

5.6.2.2 Alternative 30-2: Institutional Controls (Site Access Restrictions with Base Master Plan Amendment).

This alternative implements institutional controls at Site 30 to reduce the risk to human health and the environment by controlling and monitoring exposure pathways rather than removing or controlling the risk source. Institutional actions refer to measures other than engineering control and treatment technologies. The institutional actions in Alternative 30-2 include implementing restrictions on the site's future development and use, detailed ERA (including faunal tissue

sampling) to confirm that adverse ecological exposures are not occurring, and periodic site inspection/monitoring of the site to prevent unauthorized use.

The intent of the land use restrictions is to limit activities that would increase the potential for exposure of receptors to buried materials. Future use of Site 30 for residential or industrial purposes would be controlled by enforcing these land use restrictions. Details of the site's institutional controls would be incorporated into the Base Master Plan. To limit erosion and reduce the potential for exposure of human and ecological receptors to the buried materials, the site would be inspected periodically, during the rainy season, for evidence of erosion. If required, measures would be implemented to limit or control site erosion.

Alternative 30-2 represents minimal administrative actions and physical measures to restrict site access in order to temporarily reduce and control exposure risks, but it does not involve any active remediation of the contaminated soil to permanently eliminate exposure risk. Site monitoring is expected to continue as long as wastes remain at the site.

5.6.2.3 Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil

Alternative 30-3 involves the excavation of impacted site soil, on-site ex situ treatment via incorporation in cold-mix asphalt product (a form of S/S), followed by on-Base use in road building, road maintenance, or other construction projects. The logistics associated with the implementation of Alternative 30-3 including utilities would be addressed in a Remedial Action Work Plan for the site. The sighting, location, and excavation for utilities are therefore not discussed in detail in this document. Prior to implementing Alternative 30-3, a treatability study would be necessary to determine the suitability of specific stabilizing reagents for the site conditions, including optimal formulation of emulsion and stabilizing reagents, appropriate mix ratios, quantities of aggregate needed, ability of the resultant asphalt to meet pavement specifications, and the effectiveness of the process in reducing the mobility of metal contaminants. At Site 30, the initial phase of this remedial alternative would involve the excavation of an estimated 15,600 cubic yards of soil containing metals at concentrations exceeding previously established RGs. A detailed description of excavation, an integral part of Alternative 30-3, is presented in Section 5.6.2.4. Given the relatively shallow depths involved (the majority of the impacted soil is confined to depths of 0 to 5 feet bgs), metals-impacted soil at Site 30 could be excavated with conventional mechanical means such as backhoes, excavators, and loaders. The implementation of appropriate mitigation measures and coordination with the USFWS and the CDFG would be required to minimize and avoid habitat disruptions during all site activities. Additional coordination with the SHPO and appropriate Native American groups would be needed to comply with the Archeological and Historic Preservation Act. Shoring would not be necessary, and the open excavation would be secured until it is backfilled with clean imported fill. Once excavated, the untreated soil would be temporarily stockpiled at an on-site staging and treatment area, tentatively identified as the flat-lying, approximately 250- by 600-foot area east of the excavation and west of Stuart Mesa Road. While the stockpiled soils await treatment, the staging area would be secured to prevent entry and inadvertent exposure to Base personnel.

Confirmation sampling would be performed shortly after excavation. Along the perimeters of the excavation area, some of these samples would be collected from the excavation sidewalls or slopes and from the bottom of the excavated area.

A licensed land surveyor would survey the final spatial limits of the excavation after confirmation sampling and analysis and prior to placement and compaction of backfill. To the maximum extent possible, backfill and compaction would be performed concurrently with excavation and confirmation sampling. Prior to placement of backfill, the exposed bottom of the excavation

would be moisture conditioned and the excavation backfilled with imported clean soil. All backfill material would be placed in lifts, moisture conditioned, and compacted. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours, surveyed, and revegetated to restore habitat and to minimize erosion.

Alternative 30-3 involves the on-site, ex situ treatment of impacted soils via incorporation in cold-mix asphalt. This technology (a form of S/S) is effective in reducing the mobility of the metallic contaminants that have been documented in Site 30 soil. Asphalt incorporation was selected over the other S/S process options for the following reasons: 1) demonstrated applicability at similar Department of Defense Installation Restoration Program sites; 2) greater likelihood of regulatory acceptance and qualification for certain state and federal recycling exemptions (from waste management regulations); 3) gross economics and anticipated on-Base demand (i.e., new paving projects or roadway repair projects); and 4) resulting solid asphalt stockpiles that are easier to manage and impermeable to water. Depending on the outcome of treatability testing, a pozzolan- or cement-based stabilizing reagent may be used Untreated, excavated soil (which has been stockpiled) would be loaded, screened to remove particles or clasts with diameters greater than approximately 3 inches, and conveyed to a pug mill where it would be mixed with a stabilizing reagent(s), aggregate, and organic emulsion in the appropriate ratio to form a cold-mix asphalt product. Mixing ratios at similar remediation sites often involve a mixture of 50 to 60 percent untreated soil, 30 to 40 percent aggregate, 2 to 5 percent stabilizing reagent, and 5 percent organic emulsion. Because the process results in a commercially viable product, soil treatment in Alternative 30-3 may qualify as recycling under applicable federal and state laws and regulations and exemptions from certain hazardous waste management requirements.

Soil stockpile would be covered with plastic and the plastic would be secured with sand bags at the end of each working day. While the stockpiles are being generated and moved, water would be applied to reduce dust emissions. The water applied during dust control activities would be managed in a fashion so as to eliminate the potential for erosion and/or impact to existing storm water utilities.

The particles and clasts with diameters greater than 3 inches (i.e., cobbles and/or boulders) would be temporarily stockpiled at the site until remedial efforts are complete. These particles/clasts cannot be placed in the S/S treatment unit and would be washed and reused as backfill at the site or transported off-Base for disposal. Particles/clasts that are partially cemented soil from the site would be crushed and sent through the treatment unit.

Depending on the textural properties of the excavated soil, additional screening (after processing with a 3-inch screen) may be necessary prior to treatment to ensure compatibility with applicable specifications for sub-base, base, or finish course paving materials. For example, State DOT specifications often require that aggregate base course meet the following general grain size criteria: (percent passing by weight) - 1 ¾-inch sieve – 100 percent, No. 4 sieve (4.75 mm or the USCS division between coarse sand and gravel) - <60 percent, and No. 40 sieve (0.425 mm or the USCS division between fine and medium sand) - <50 percent. The screened coarse material from this process would be treated in the same fashion as the cobbles and boulders retained during the initial screening.

Bullet fragments would not be screened out of excavated soils under Alternative 30-3. The removal of bullet fragments is cost prohibitive and, based on previous subcontractor knowledge from similar remedial efforts, the lead concentrations in soil are not substantially reduced when the bullet fragments are removed. In addition, bullet fragments at Site 30 are not expected to be

volumetrically significant and can be safely incorporated into the cold asphalt mix if they meet the aggregate specifications.

The treated soil, which would be permanently incorporated into a commercially viable asphalt product, would be temporarily stockpiled, sampled, and analyzed using leachability and other laboratory tests to confirm treatment effectiveness. The asphalt product also would be sampled and mechanically tested to ensure its suitability as paving material. Once confirmed, the asphalt would be transported for use in active on-Base road building, road maintenance, or construction projects.

Use of stabilized soil to fill the remedial excavation at Site 30 was not included in Alternative 30-3 due to the potential for post-treatment soil volume increases and associated difficulties in ensuring proper grading following backfilling. Without engineered storm water controls, such as the construction of dikes or levees at Site 30 (which lies in a floodplain), on-site use as replacement backfill could pose risks due to the potential for future flooding, erosion, and subsequent contact by human or ecological receptors.

5.6.2.4 Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 30-4 addresses remediation of contaminated soils exceeding the RGs through excavation, on-Base chemical stabilization, and off-Base disposal. The logistics associated with the implementation of Alternative 30-4 including utilities would be addressed in a Remedial Action Work Plan for the site. The sighting, location, and excavation for utilities are therefore not discussed in detail in this document. The following elements are associated with Alternative 30-4:

- Excavation of impacted soil
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material
- Treatment of a portion of the excavated soil to incorporate chemical stabilizer (Portland cement Type I through V) by pug mill
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles for waste characterization
- Transportation of the excavated soil to an off-Base disposal facility
- Site restoration.

Based on the volume of material (15,600 cubic yards) exceeding the previously established RGs, it is estimated that approximately 9,333 cubic yards (14,000 tons) of the excavated soil would classify as California-hazardous or nonhazardous waste, and approximately 6,267 cubic yards (9,400 tons) would classify as RCRA-hazardous waste prior to treatment (see Appendix K3).

Heavy earthmoving equipment, such as a track-mounted excavator and track- or wheeled-loaders, would be used to excavate the impacted soil within the lateral limits shown in Figure 5-6. The excavation sidewalls would be sloped at 1.5:1 (horizontal:vertical) to maintain slope stability and avoid the need for shoring.

Following excavation of individual grids to the assumed lateral limits and target depth, confirmation samples would be collected for laboratory analysis. Confirmation sampling would be performed shortly after excavation of a grid has been completed. Along the perimeters of the excavation area, some of these samples would be collected from the excavation sidewalls or

slopes and from the bottom of the excavated area. Based on the analytical results from the confirmation samples and comparison to RGs, the excavation would be backfilled or extended laterally and/or vertically until the cleanup goals are achieved. If additional excavation were required, additional confirmation sampling and analysis would be performed until the cleanup goals are met.

A licensed land surveyor would survey the final spatial limits of the excavation after confirmation sampling and analysis and prior to placement and compaction of backfill. To the maximum extent possible, backfill and compaction would be performed concurrently with excavation and confirmation sampling. Prior to placement of backfill, the exposed bottom of the excavation would be moisture conditioned and the excavation backfilled with imported clean soil. All backfill material would be placed in lifts, moisture conditioned, and compacted. Compaction tests would be performed during the backfill operation to document the percent relative compaction of the soil. The excavation would be backfilled to the original surface contours, surveyed, and revegetated to restore habitat and to minimize erosion.

An on-Base TTU would be used to remediate the California-hazardous soil to nonhazardous status, and the RCRA-hazardous soil to California-hazardous prior to off-Base transport and disposal. None of the material would be classified or manifested as RCRA waste and would not be subject to the universal treatment standards of the land disposal restrictions. Bench-scale and/or pilot testing would be required to determine the proper mixture of soil and Portland cement and to account for variations in soil types.

The chemical stabilization of the soil would be implemented using a vender-supplied TTU, which would consist of a pug mill to mix the reagents (Portland cement) and soil and conveyor belts. The soil would first be placed into the hopper of the treatment unit where screens would then remove particles or clasts with diameters greater than approximately 3 inches. A conveyor belt would then transfer the material to the pug mill for mixing with Portland cement. The treated soil would then be transferred and deposited into discrete 500-ton stockpiles.

The particles and clasts with diameters greater than 3 inches (i.e., cobbles and/or boulders) would be temporarily stockpiled at the site until remedial efforts are complete. These particles/clasts cannot be placed in the S/S treatment unit and would be washed and reused as backfill at the site or transported off-Base for disposal. Particles/clasts that are partially cemented soil from the site would be crushed and sent through the treatment unit.

Bullet fragments would not be screened out of excavated soils under Alternative 30-4. The removal of bullet fragments is cost prohibitive and, based on previous subcontractor knowledge from similar remedial efforts, the lead concentrations in soil are not substantially reduced when the bullet fragments are removed.

During the remedial action, the excavation and treatment areas would be delineated with barricades, caution tape, and warning signs to restrict access by unauthorized personnel. Potential exposure and protection procedures for site workers would be addressed in a site-specific health and safety plan. Site health and safety would be ensured by proper selection of PPE; establishing support, contaminant reduction, and exclusion zones; stockpiling, and pretreatment applying dust suppressants and/or water to reduce dust emissions, and monitoring dust using direct reading instruments. Detailed field procedures for the management and maintenance of an open excavation area and temporary soil stockpile would be provided in the remedial action documents.

A medium-sized tracked excavator would be used to excavate the soil and stockpile it adjacent to the excavation. Large-capacity front-end loaders would then transfer the soil to the nearby TTU hopper. Plastic sheeting would be required to protect the ground surface beneath the

hopper and the swinging arm of the conveyor belt. Soil stockpile would be covered with plastic and the plastic would be secured with sand bags at the end of each working day. While the stockpiles are being generated and moved, water would be applied to reduce dust emissions. The water applied during dust control activities would be managed in a fashion so as to eliminate the potential for erosion and/or impact to existing storm water utilities.

Each treated stockpile would remain on the plastic until it was transported off Base. Prior to transport, composite stockpiles samples would be collected and the analytical results would then be used to characterize and classify the waste. Based on the throughput of the TTU, this alternative would proceed at an average rate of approximately 100 cubic yards (600 tons) per day, resulting in approximately 39 working days. The cost estimate in Appendix K2 is based on 5-day work weeks (8 hours per day), which results in 56 calendar days (or approximately 8 weeks)

Fugitive dust would be greatly diminished because the cured Portland cement binds the soil particles and reduces dust emissions. The treated stockpiles would be periodically wetted and monitored to ensure control of fugitive dust emissions. Depending upon dust monitoring results and/or weather forecasts, plastic sheeting might be employed to cover the stockpiles of treated soil and control dust emissions while the soil is being profiled for disposal.

For estimating purposes, it is assumed that, upon excavation and treatment, all nonhazardous soil would be transported by truck to the Waste Management Bradley Facility in Tujunga, California, and all California-hazardous soil would be transported to Waste Management's Kettleman Hills Facility in Kettleman City, California for disposal. All contaminated soils would be transported under Uniform Hazardous Waste Manifest to the appropriate disposal facility. All required placards would be placed on vehicles prior to leaving the site. All federal and California Department of Transportation guidelines/regulations would be followed. Each transport truck is expected to safely haul 18 cubic yards (24 tons) of soil to the disposal facility. To ensure that trucks do not exceed the public highway weight limits, calibrated portable scales would be placed on site and operated by a certified weigh master. Transportation and waste profiling of the excavated soil would occur concurrently with excavation/treatment and require approximately 39 working days.

The total duration of the remedial action is expected to be 18 calendar weeks, based on an excavation and treatment rate of 400 cubic yards (600 tons) per day and concurrent transportation and disposal at a matching rate of 400 cubic yards (600 tons) per day. The mobilization would require 1 week. Excavation, treatment, stockpiling (including sampling), and transportation would require approximately 8 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately another 2 weeks. Site cleanup and restoration (final grade check, surveying, and revegetation) would require another 4 weeks.

5.6.2.5 Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 30-5 is essentially the same as Alternative 30-4, except that contaminated soils exceeding RGs would be disposed of at a new on-Base CAMU disposal facility instead of shipped off the Base. The following elements are associated with Alternative 30-5:

- Excavation of impacted soil
- Confirmation sampling and analysis of excavation areas
- Import and compaction of backfill material

- Treatment of a portion of the excavated soil to incorporate chemical stabilizer (Portland cement Type I through V) by pug mill
- Temporary storage of excavated soil stockpiles
- Sampling and analysis of soil stockpiles for waste characterization
- Hauling of the excavated soil to an on-Base CAMU disposal facility
- Site restoration.

Soil excavation, treatment of excavated soil to incorporate chemical stabilizer, temporary stockpile storage, waste characterization, confirmation sampling, backfilling, and site restoration activities would be conducted exactly as detailed in Alternative 30-4. Upon excavation and pretreatment, all contaminated soil would be hauled to an on-Base CAMU facility for disposal.

Because a specific CAMU location has not been identified at this time, there is uncertainty regarding the amount of waste pretreatment that will be needed. To account for this uncertainty, together with the waste characterization data of the impacted soil in place, it is estimated that from 25 percent to 75 percent of the excavated soil would require pretreatment. As a result, a range will be provided for the associated costs for implementation of this alternative.

For cost estimating purposes, it is assumed that each transport truck would safely haul 18 cubic yards (24 tons) of soil per trip to a CAMU facility. An average rate of 15 minutes per truck is estimated for loading, weighing, and tarping. Based on the excavation, treatment, hauling, and disposal rate of 400 cubic yards (600-ton per day), a total of 25 truck-trips per day to a CAMU facility would be needed.

The mobilization would require 1 week. Excavation, stockpiling (including sampling), and transportation would require approximately 8 weeks. Confirmation sampling and analysis would extend approximately 2 weeks beyond the excavation, assuming laboratory turn-around times of 1 week. After all excavation and confirmation sampling/analysis are complete, backfill and compaction would extend approximately another 2 weeks. Site cleanup and restoration (final grade check, surveying, and revegetation) would require 4 weeks. The total duration of the remedial action is expected to be 18 calendar weeks.

Currently an operational CAMU does not exist at MCB Camp Pendleton. The implementation of this alternative would be contingent upon the siting, design, and construction of a 10 to 15 acre CAMU. A new CAMU facility would be available to accept waste from Site 30 in 3 to 4 years.

For this proposed alternative, identification of a specific disposal site is not necessary to meet the feasibility study requirements of evaluating the alternative. If DON chooses this as the preferred alternative, a specific on-Base disposal site would need to be located that meets statutory requirements. Therefore, an appropriate addendum document would be prepared to address disposal site compliance with ARARs, and specific pre-treatment requirements, prior to preparation of the OU 4 Proposed Plan and implementation of this alternative.

5.6.3 Detailed Analysis of Site 30 Remedial Alternatives

This section presents a detailed analysis of the four remedial alternatives that were developed for Site 30. The detailed analysis of remedial alternatives consists of evaluating each selected alternative against seven of the nine NCP evaluation criteria. The objective of the detailed analysis is to present and interpret the relevant information necessary to select the most appropriate and cost-effective remedy for a site to meet the RAOs. The detailed analysis is designed to provide decision makers with sufficient information to compare the alternatives adequately, select an appropriate remedy for the site, and demonstrate satisfaction of the

CERCLA remedy selection requirements in the ROD (Table 5-6). All four alternatives for Site 30 were selected for the detailed analysis.

5.6.3.1 Overall Protection of Human Health and the Environment

An analysis of how well each alternative provides overall protection of human health and the environment is provided below.

Alternative 30-1: No Action

The no action alternative includes no treatment and no control of exposure pathways. Under this alternative, the potential long-term risks are the same as those calculated in the baseline HHRA and the ERA and are not protective of human health and the environment. SPLP analytical results for Site 30 indicate that existing metal contamination in the soil could pose a threat to groundwater. The potential for longer-term adverse human and ecological impacts exists due to the site's vulnerability to flooding, which could mobilize or expose the existing soil contamination and potentially impact surface soil and water quality if the site is flooded. Based on the site conditions, the no action alternative is not protective of human health and the environment.

Alternative 30-2: Institutional Controls

Under current conditions, Alternative 30-2 would provide for control of exposure pathways through land use and access restrictions, and periodic site inspections and monitoring. However, because the site is located in the floodplain, site contaminants could eventually wash out and potentially impact surface soil and water if the area is flooded. Therefore, this alternative would provide only limited short-term protection to human health and the environment since human and ecological receptors could still come in contact with contaminated surface and near-surface soils in the event of a flood.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

Alternative 30-3 would be protective of human health and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed, transported off site, and the excavation backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment. Removed soil would be treated via S/S. Through the use of stabilizing reagents in the asphalt incorporation and mixing process, Alternative 30-3 would chemically bind metals within the asphalt matrix. Once stabilized and incorporated in cold-mix asphalt, the mobility of metal RCOCs would be significantly reduced, which would be demonstrated by post-treatment leachability testing. Depending on the stabilizing reagent involved, the bioavailability of certain residual metals may also be reduced. Under Alternative 30-3, human health and the environment would also be protected by ensuring that the residual metals are permanently encapsulated and bound within the asphalt, thereby mitigating human or ecological exposures and/or leaching from pavement. To ensure uniformity and demonstrate that this criterion is met, the treated soil (now asphalt) would be subjected to confirmation sampling and laboratory testing at a prescribed frequency.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 30-4 would be protective of human health and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed, transported off Base, and the excavation backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment, and protective of groundwater quality.

The predicted reduction in human health risk was estimated based on residual soil concentrations meeting remediation goals. However, the actual site risk would likely be less because the excavated soil would be replaced with clean imported fill. The clean soil would eliminate exposure pathways for human receptors. Excavation would disrupt local surface conditions. The potential for degradation of sensitive ecological habitat and worker exposure to contamination from implementing this option exists at Site 30. The site vegetative characteristics would be restored following excavation and backfill.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 30-5 would protect human and ecological receptors because all contaminated soil exceeding chemical-specific RGs would be physically removed and hauled away to a CAMU facility, and the excavation backfilled with clean import soil. Residual contamination would meet RGs and would therefore be protective of human health and the environment, and protective of groundwater quality.

5.6.3.2 Compliance with ARARs

An analysis of how well each alternative complies with ARARs is provided below.

Alternative 30-1: No Action

No action-specific ARARs are identified for the no action alternative because no action is taken. Based on the previously performed human health and ecological risk assessments, Alternative 30-1 would not comply with location-specific requirements of the Endangered Species Act, and with substantive provisions of Porter-Cologne Act, as implemented through the beneficial uses and water quality objectives of San Diego Basin Water Quality Control Plan.

Alternative 30-2: Institutional Controls

Because elevated levels of lead would remain at the site, post-closure care is required. Alternative 30-2 partially meets this requirement by providing use restrictions and site monitoring/maintenance for surface soil erosion. However, based on the previously performed human health and ecological risk assessments, Alternative 30-2 would not comply with location-specific requirements of the Endangered Species Act, and with substantive provisions of Porter-Cologne Act, as implemented through the beneficial uses and water quality objectives of San Diego Basin Water Quality Control Plan.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Resources are known to exist near the site, so excavation activities would be monitored for potential identification of unknown resources because these resources have been recorded in the area. San Diego APCD rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. Soils would be wetted, covered with a synthetic material, or soil polymer to meet the air requirements.

Pilot testing would be necessary to determine the technology and demonstrate that the chosen technology would comply with pertinent performance-based regulatory criteria. Depending on the specific input materials, the stabilization process employed, and the end use, metals-impacted soil (which might otherwise be treated as characteristic RCRA-hazardous waste) that have been stabilized via mixing and incorporation in cold-mix asphalt may meet the definition of a "recyclable material" under federal laws and regulations (40 CFR 261.2 and 261.6 (c)). In

general, when hazardous waste is treated to produce end products that are applied to or placed on the ground, the products are regarded as having been "used in a manner constituting disposal" and are subject to a variety of hazardous waste management requirements under 40 CFR Part 266, Subpart C. These requirements notwithstanding, Subpart C also allows exemptions for products that have undergone a permanent chemical reaction so as to become inseparable. Previous interpretations by the USEPA Office of Solid Waste indicated that soil stabilization by asphalt incorporation may meet this condition.

Although recycling exemptions are also embodied in State laws and regulations (CA HSC Sec. 25143.2, and CCR Title 22 Sec. 66266.20), in many instances the exemptions may not apply to RCRA-hazardous waste (refer to CA HSC Sec. 25143.2 (e)(1)). Based on previous correspondence from DTSC's Resource Recovery Section, the equipment used during soil stabilization via asphalt incorporation (i.e., pug mill, hoppers, conveyors, etc.) may have to be permitted as a TTU under permit-by-rule, which would govern the recycling/asphalt incorporation process. Discussions with remediation vendors confirmed the local availability of more than one recycling unit that is currently permitted as a TTU. Although the actual treatment process may be performed under permit-by-rule, the temporary on-site storage of soil awaiting stabilization, which in its untreated state may be construed as RCRA-hazardous waste, could require the issuance of a hazardous waste storage permit. Such a permit might be necessary if the on-site waste staging area meets the definition of a hazardous waste "storage facility" under state law, which includes on-site hazardous waste storage for more than 90 days; on-site hazardous waste storage (for any duration) other than in an approved container, tank, or containment building; and off-site storage at a facility that is not a transfer station (CA HSC Section 25123.3 (b)). For other soil stabilization technologies that do not result in a recyclable end product or material (and therefore, may not be eligible for one or more of the recycling exemptions discussed above), on-site treatment of soils containing hazardous concentrations of metals could require permitting based on recent conversations with DTSC's Permitting Branch. Permitting requirements could include limitations on the location and means of on-Base reuse of treated soil as well as long-term monitoring requirements.

State Assembly Bill AB2784 also prohibits land disposal of waste containing greater than 350 mg/kg lead at a facility other than a Class I hazardous waste disposal facility. The S/S process discussed in Alternative 30-3 does not significantly change the total concentration of metals such as lead, and the use of stabilized soil containing lead at concentrations greater than 350 mg/kg in cold-mix asphalt might have to be accompanied by either a determination that the resultant asphalt represents a recycled "product" and not a regulated waste (CA HSC Section 25143 et seq.) or a DTSC land disposal variance, RWQCB-approved amendments to the facility (installation) waste discharge requirements, and other local agency amendments to the facility's solid waste permit to allow disposal of land (CA HSC Section 25157.8). Assuming that the aforementioned regulatory and permitting requirements are satisfied, Alternative 30-3 would comply with RCRA closure with no post-closure care requirements of the recycled material.

It is likely that Alternative 30-3 would also comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Pilot testing would be necessary to ensure compliance with ARARs. Implementation of this alternative would need to comply with action-specific requirements of the Archeological and Historic Preservation Act. This would likely require extensive planning and coordination with Native American Groups to minimize the likelihood that important artifacts are inadvertently disturbed or damaged. Appropriate mitigation measures and contingency plans would need to be in place if important artifacts are uncovered during site excavation.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 30-4 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Resources are known to exist near the site, so excavation activities would be monitored for potential identification of unknown resources because these resources have been recorded in the area. San Diego APCD rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. Soils would be wetted, covered with a synthetic material, or soil polymer to meet the air requirements.

It is likely that Alternative 30-4 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Implementation of this alternative would need to comply with action-specific requirements of the Archeological and Historic Preservation Act. This would likely require extensive planning and coordination with Native American Groups to minimize the likelihood that important artifacts are inadvertently disturbed or damaged. Appropriate mitigation measures and contingency plans would need to be in place if important artifacts are uncovered during site excavation.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 30-5 complies with ARARs. The clean closure requirements in 22 CCR 66264.111 (a) and (b) are met by excavating soils with concentrations of contaminants in excess of the proposed remediation cleanup goals. The historical and cultural resources protection requirements of 36 CFR 800.3 and 800.4 and 32 CFR 229.1 are identified as potential ARARs. Resources are known to exist near the site, so excavation activities would be monitored for potential identification of unknown resources because these resources have been recorded in the area. San Diego APCD rule 50(d)(1) is an ARAR for the discharge of particulate matter via fugitive dust emissions during excavation, handling, and transportation activities. To meet this requirement, soils would be wetted and covered with a synthetic material or soil polymer.

It is likely that Alternative 30-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Implementation of this alternative would need to comply with action-specific requirements of the Archeological and Historic Preservation Act. This would likely require extensive planning and coordination with Native American Groups to minimize the likelihood that important artifacts are inadvertently disturbed or damaged. Appropriate mitigation measures and contingency plans would need to be in place if important artifacts are uncovered during site excavation. In order for this alternative to be developed and selected, the proposed site and design of the CAMU would need to comply with ARARs identified in Appendix A, including CAMU requirements set forth in 40 CFR 264.552 and CCR Title 22, Section 66264.552.

5.6.3.3 Long-Term Effectiveness and Permanence

An analysis of the long-term effectiveness and permanence for each alternative is provided below.

Alternative 30-1: No Action

The risks associated with the no action alternative were evaluated in the baseline human and ecological risk assessments. This alternative would not provide actions or controls to reduce existing contaminant concentrations or risks to human health or the environment. As a result,

the reliability and adequacy of actions or controls is not evaluated for no action. No action is not considered to provide long-term effectiveness and permanence because contaminated material would remain at the site. The site is located in the floodplain and the no action alternative does not prevent the possible erosion and washout of contaminated soil and is not protective of water quality.

Alternative 30-2: Institutional Controls

This alternative would not be effective in controlling potential exposure to site contaminants over the long term. Under current use (unoccupied), this site does not pose an immediate threat to human health. The institutional measures would reduce the potential for human contact with site contaminants and limit future site development. However, given the site's location within the floodplain and the potential for flooding to expose and washout contaminated soils, this alternative does not provide long-term effectiveness and permanence for human or ecological receptors, groundwater, and surface water.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

This alternative would provide high long-term effectiveness and permanence. Removal and off-site disposition of the contaminated soil would result in acceptable levels of residual soil contamination from both a human and ecological perspective. Removal of impacted soil, stabilization using reagents such as pozzolans, cement, and/or phosphate additives result in the permanent chemical conversion of metal RCOCs to more stable and less toxic forms. Long-term reductions in the mobility of metals RCOCs, as measured by routine leachability tests, has been demonstrated for this technology. Long-term leaching of metals from treated soil due to acidic precipitation, which can be a potential long-term issue at sites in the northeast U.S., is not judged a concern at Site 30. This alternative satisfies the RAO, provides long-term effectiveness and permanence, and is protective of water quality.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

The excavation and off-Base disposal of contaminated soil provides a permanent solution for protecting human and ecological receptors at the site, and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO, provides long-term effectiveness and permanence, and is protective of water quality.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

This alternative would provide a high degree of long-term effectiveness and permanence because contaminants are removed from the site and the contaminated soil is replaced with clean import soil. The excavation of contaminated soil provides a permanent solution for protecting human receptors and results in an adequate and reliable reduction of exposure pathways. This alternative satisfies the RAO. Removal and on-Base disposal of the contaminated soil at a new CAMU facility would result in acceptable levels of residual soil contamination at the site from both a human and ecological perspective.

5.6.3.4 Reduction of Toxicity, Mobility, or Volume through Treatment

An analysis of the reduction of toxicity, mobility, or volume through treatment for each alternative is presented below.

Alternative 30-1: No Action

Because active treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 30-2: Institutional Controls

Because treatment is not a component of this alternative, there is no reduction in toxicity, mobility, or volume of soil through treatment.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The effectiveness of ex situ stabilization via asphalt mixing and incorporation in reducing the mobility and toxicity of the metal RCOCs present at Site 30 has been demonstrated at a wide range of remediation sites. Leachability of metals such as arsenic, chromium, lead, and zinc often are reduced by three to four orders of magnitude. Depending on the mix ratio employed, the asphalt product produced in Alternative 30-3 would likely result in an increase in volume on the order of 100 percent.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Alternative 30-4 would involve on-Base stabilization pretreatment of all the soil prior to off-Base transport and disposal. Although an increase in volume of soil is realized, there is a moderate reduction in mobility observed with this alternative.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 30-5 would involve on-Base stabilization pretreatment to a portion of the contaminated soil prior to disposal at an on-Base CAMU facility. Although an increase in volume of soil is realized, there is moderate reduction in mobility with this alternative.

5.6.3.5 Short-Term Effectiveness

An analysis of the short-term effectiveness for each alternative is provided below.

Alternative 30-1: No Action

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

Alternative 30-2: Institutional Controls

The short-term effectiveness for Alternative 30-2 is rated high. Implementation of use restrictions is administrative and presents no short-term effectiveness issues. Implementation of Alternative 30-2 is not expected to result in any significant, adverse environmental impacts. The area in Site 30 subject to remediation has already been disrupted by episodic vehicle traffic.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The short-term effectiveness for Alternative 30-3 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation and on-site, ex situ treatment.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported a short distance on Base (from the excavation to the staging/treatment area). Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate personal protective equipment, where applicable.

Implementation of Alternative 30-3 is not expected to result in any significant adverse environmental impacts. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Impacts to cultural resources would be minimized through the development and implementation of a contingency plan with appropriate monitoring and mitigation requirements.

Field personnel participating in the excavation, treatment, and sampling activities would wear personal protective equipment, as specified in the health and safety plan. The remedial activities in this alternative are expected to be completed in less than 1 year.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

The short-term effectiveness for Alternative 30-4 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted site soil during excavation and pretreatment.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The pretreated soil would be transported to the selected off-Base disposal facility in covered trucks traveling on pubic highways. Prior to leaving the site, trucks would be thoroughly inspected to ensure that no loose contaminated soil is present on the outside of the trucks that could pose a hazard to the public. Traffic accidents associated with driving public highways could occur in the course of soil transportation. In the case of a traffic accident, the risk to the public would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation, stockpiling, and pretreatment would be minimized by using dust suppressants and/or appropriate personal protective equipment, where applicable.

Implementation of Alternative 30-4 is not expected to result in any significant adverse environmental impacts. Some short-term impacts to ecological receptors and habitat could occur but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Impacts to cultural resources would be minimized through the development and implementation of a contingency plan with appropriate monitoring and mitigation requirements.

Field personnel participating in the excavation, pretreatment, and sampling activities would wear PPE, as specified in the health and safety plan. The remedial activities in this alternative are expected to be completed in less than 1 year.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

The short-term effectiveness for Alternative 30-5 is rated moderate. A site-specific sampling plan as well as a site-specific health and safety plan would be prepared and implemented. Potential exposure and protection procedures for workers would be addressed in the health and safety plan. Potential short-term risks to site workers would include inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site during excavation and handling.

Heavy equipment operated at the site would conform to Cal/OSHA specifications and would be operated only by authorized, trained personnel. The contaminated soil would be transported to a new CAMU disposal facility in covered trucks traveling on Base roads. Prior to leaving the

site, trucks would be thoroughly inspected to ensure that no loose contaminated soil, which could present a health hazard, is present on the outside of the trucks. In the case of a traffic accident, human health risk would be from exposure to dust from contaminated soil, in addition to the risk of physical harm due to the accident. Risks associated with exposure of site personnel and nearby receptors to dust emissions and/or direct contact with contaminated soil during excavation and stockpiling would be minimized by using dust suppressants and/or appropriate PPE, where applicable.

Implementation of Alternative 30-5 is not expected to result in any significant adverse environmental impacts. The area in Site 30 subject to remediation has already been disrupted by episodic vehicle traffic. Some short-term impacts to ecological receptors and habitat could occur, but adverse effects would be minimized through close coordination with the appropriate regulatory agencies (i.e., USFWS and CDFG). The areas affected during remediation would be revegetated following completion of the remedial alternative.

Field personnel participating in the excavation, pretreatment, and sampling activities would wear PPE, as specified in the health and safety plan.

5.6.3.6 Implementability

An analysis of the implementability of each alternative is provided below.

Alternative 30-1: No Action

No implementability concerns are posed by this alternative because no action would be taken.

Alternative 30-2: Institutional Controls

Implementability is ranked moderate for Alternative 30-2. Institutional actions comprising this alternative are readily implementable. Modifications to the Base Master Plan are administrative in nature. The Base would have primary responsibility for implementation of this alternative and has the authority and capability to establish appropriate safeguards and to monitor and enforce compliance. Existing staff with the Base Environmental Security Office coordinate all on-Base construction activities to ensure appropriate environmental review. Institutional controls for IR sites are maintained on a central GIS that is readily accessible. Furthermore, the 5-year review process provides an additional level of review to ensure that the site is not used inappropriately.

Implementation of Alternative 30-2 would require coordination with the USFWS and the CDFG. Based on the previously performed screening-level ERA, it is unlikely that these agencies would allow this alternative to be implemented because it would cause risk to ecological receptors. In addition, the DON's position is to limit the use of institutional controls (where possible) to maximize the utilization of military training lands.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

Implementability is ranked moderate for Alternative 30-3 because of the pilot testing and associated regulatory approval that would be needed (Section 5.6.3.2). Excavation and pre-treatment management of impacted soils uses standard equipment and labor skills and is readily implementable. Ex situ stabilization also uses commonly available equipment (hoppers, conveyors, pug mills, generators, loaders, etc.) and labor, although the availability of the stabilizing reagent employed could range from widely available, such as fly ash, cement, etc., to average availability in the instance of a more specialized, proprietary reagent. Efficient on-Base use of the treated soil requires coordination with installation construction projects, which could pose implementability problems due to the large volume of soil.

Implementation of Alternative 30-3 would require coordination with the USFWS and the CDFG to ensure that this alternative is protective of ecological receptors and complies with requirements of the Endangered Species Act. In addition, cultural resources coordination (SHPO and Native American groups) would be required to protect archaeological site and resources. This review process would take 6 to 12 months and would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures. If significant artifacts are identified during excavation, then additional time and cost could be required to implement mitigation requirements.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

Implementability is ranked high for Alternative 30-4. Excavation, pretreatment, and disposal of contaminated soil at an off-Base disposal facility are readily implementable. Several firms are available that can provide the necessary equipment, materials, and labor to excavate, treat and dispose of the contaminated soil. Licensed disposal facilities capable of accepting the contaminated soil currently exist within California.

Because the majority of the impacted soil would be permanently removed from the site, future soil remedial activities are not expected to be necessary. The effectiveness of soil excavation would be evaluated by collecting and screening confirmation samples during excavation.

Implementation of Alternative 30-4 would require coordination with the USFWS and the CDFG to ensure that this alternative is protective of ecological receptors and complies with requirements of the Endangered Species Act. This would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

Implementation of any excavation work would require close coordination with Native American Groups to ensure that appropriate monitoring and mitigation requirements are defined. If significant artifacts are identified during excavation, then additional time and cost could be required to implement mitigation requirements.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Alternative 30-5 is dependent on the siting, design, and construction of a new on-Base CAMU. Factors affecting the implementability of an on-Base CAMU include the time required to conduct siting studies and to design and construct the facility (estimated to take 3 to 4 years to complete), compliance with the CAMU disposal unit regulations under RCRA, availability of 10 to 15 acres of land to locate a new CAMU, and placement of institutional controls on a CAMU location in the Base Master Plan. Given that the Base mission is to support training, any area with a land use restriction would limit that function.

Excavation, treatment, and disposal of contaminated soil at a new on-Base CAMU disposal facility can be easily implemented with current technology. All the necessary equipment, materials, and labor are readily available. Because the majority of the impacted soil would be permanently removed from the site, future soil remedial activities at Site 30 are not expected to be necessary. Collecting and screening confirmation samples during excavation would be used to evaluate the effectiveness of soil excavation.

Implementation of Alternative 30-5 would require coordination with the USFWS and the CDFG to ensure that this alternative would be protective of ecological receptors and complies with

requirements of the Endangered Species Act. In addition, cultural resources coordination (SHPO and Native American groups) will be required. This would require implementation of appropriate mitigation measures to minimize habitat disruptions during earthmoving activities, including scheduling limitations on excavation work, performance of short-term biological monitoring prior to, during, and after construction activities, and long-term biological monitoring and habitat restoration measures.

Based on the above factors, Alternative 30-5 is rated moderate.

5.6.3.7 Cost

A summary of the costs is provided below.

Alternative 30-1: No Action

No costs are associated with Alternative 30-1.

Alternative 30-2: Institutional Controls

The total cost of Alternative 30-2 is estimated to be approximately $355,000. This cost covers the administrative costs for implementation of use restrictions, future maintenance costs of the site surface, annual reporting costs, and 5-year review process with subsequent reporting. If institutional controls were implemented, there would be indirect costs associated with the Base not being able to use the property for training and other purposes. This potential loss of land use is not quantified in this document, but is considered as a factor in evaluating implementability of institutional controls as a remedial alternative. A cost estimate and present worth analysis, including maintenance costs, is provided in Appendix K3.

Alternative 30-3: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil

The estimated total cost of Alternative 30-3 to achieve RAOs is estimated at $4,735,000. Because the costs would be incurred over a short time frame (i.e., less than 1 year), a net present worth was not calculated for this alternative. The estimated capital costs are presented in Appendix K3.

Alternative 30-4: Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal

The cost for Alternative 30-4 is estimated at $5,728,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; on-Base pretreatment of all of the excavated soil to incorporate chemical stabilizer; confirmation sampling and laboratory analysis; waste characterization; transportation and disposal of contaminated soil at a California hazardous waste disposal facility; excavation backfill with clean soil; surveying; and site restoration. A breakdown of the cost estimate is provided in Appendix K3.

Alternative 30-5: Soil Excavation, Backfill, Pretreatment, and On-Base Disposal

Since the required pretreatment is not known, a range will be provided for the associated costs based on 25 percent pretreatment to 75 percent pretreatment. The cost for Alternative 30-5 is estimated between $3,986,000 to $4,622,000. This cost includes the required equipment, materials, and labor to perform site preparation, including construction of the soil stockpile area; excavation and stockpiling; on-Base pretreatment of a portion of excavated soil to incorporate chemical stabilizer; confirmation sampling and laboratory analysis; waste characterization; hauling and disposal of contaminated soil at a new on-Base CAMU site; excavation backfill with clean soil; surveying; and site restoration.

The cost also includes an allocated portion of the total construction and O&M costs associated with a new CAMU. The cost for developing a new CAMU is divided equally among the eight sites from which waste could potentially originate. Thus, the cost of Alternative 30-5 includes $625,000 in capital costs toward conducting the siting study, designing, constructing and closing of a new CAMU, and $98,000 in O&M costs earmarked for maintaining and monitoring a CAMU over 30 years. A breakdown of the cost estimate is provided in Appendix K3.

The closure and design requirements for a CAMU are such that there should be no unacceptable risks to humans or the environment resulting from exposure to hazardous waste or hazardous constituents. The CAMU closure requirements are specified in 40 CFR §264.552(e)(5) for leaving waste in place. The use of a 30-year time frame assumption is common in calculating long-term O&M costs using present value analysis.

5.7 Comparative Analysis

This section provides a comparative evaluation of Alternatives 30-1 through 30-4 relative to the NCP criteria and discusses the relative advantages and disadvantages of the alternatives.

5.7.1 Overall Protection of Human Health and the Environment

Alternative 30-1 includes no treatment and no control of exposure pathways and would leave contaminant concentrations in place that pose a potential to future human health and the environment. Alternative 30-2 provides for temporary control of exposure pathways through institutional controls, but does not remove the contaminants and their potential threat. Because Site 30 is located in the floodplain, site contaminants could eventually wash out and potentially impact surface soil and water quality. In addition, SPLP analytical results for Site 30 indicate that existing metal contamination in the soil could pose a threat to groundwater. Therefore, neither of these alternatives would be protective of human health and the environment.

Alternatives 30-3, 30-4, and 30-5 would be protective of human health and the environment through removal and reuse or on-Base or off-Base disposal of impacted soils.

5.7.2 Compliance With ARARs

Based on the previously performed human health and ecological risk assessments, Alternatives 30-1 and 30-2 would not comply with location-specific requirements of the Endangered Species Act, and with substantive provisions of the Porter-Cologne Act, as implemented through the beneficial uses and water quality objectives of San Diego Basin Water Quality Control Plan. Alternative 30-4 would comply with ARARs for excavation and transportation. It is likely that Alternatives 30-3, 30-4, and 30-5 would comply with action- and location-specific requirements of the Endangered Species Act, although coordination with the USFWS and CDFG would be required. Pilot testing of Alternative 30-3 would be necessary to ensure compliance with ARARs governing disposal and reuse of stabilized materials. Alternatives 30-3, 30-4, and 30-5 would likely comply with action-specific requirements of the Archeological and Historic Preservation Act, but they would require appropriate monitoring during excavation and implementation of mitigation measures if significant artifacts are identified. Alternatives 30-3, 30-4, and 30-5 would comply with the substantive provisions of the Porter-Cologne Act.

5.7.3 Long-Term Effectiveness and Permanence

Alternative 30-1 is rated low for long-term effectiveness and permanence because no measures or controls are associated with this alternative. Alternative 30-2 would require long-term maintenance. Alternative 30-2 would provide a degree of long-term effectiveness through limiting exposure and site uses, but it would provide minimal long-term effectiveness and permanence for ecological receptors. For Alternatives 30-3, 30-4, and 30-5, the measures and controls implemented would reduce the potential for future human health exposure, and no

future actions would be necessary. Alternatives 30-3, 30-4, and 30-5 would provide a high degree of long-term effectiveness and permanence because they involve removal of the contaminated soils from the area and backfilling of the excavation with clean import soil with disposal at either an off-Base facility or an on-Base CAMU facility. In addition, the wastes would be stabilized on Base at the TTU prior to transport and disposal.

5.7.4 Reduction of Mobility, Toxicity, or Volume Through Treatment

Alternatives 30-1 and 30-2 are rated low for this evaluation criterion. Alternative 30-3 includes treatment. This alternative is rated highly effective in reducing mobility and toxicity through ex situ stabilization via asphalt mixing. This effectiveness has been demonstrated at a wide range of remediation sites with metal leachability reductions of 3 or 4 orders of magnitude. Alternatives 30-4 and 30-5 include on-Base stabilization pretreatment prior to disposal to limit the leachability of contaminants. Stabilization reduces the mobility and toxicity of contaminants but increases the overall volume of resulting treated soil; therefore, this criterion is rated moderate for Alternatives 30-4 and 30-5.

5.7.5 Short-Term Effectiveness

This criterion is not rated for Alternative 30-1 because it does not involve any actions that would disturb the site. The short-term effectiveness of Alternative 30-2 is ranked high and is expected to be the greatest of the five alternatives because minimal site disruptions would occur. For Alternatives 30-3, 30-4, and 30-5, the potential for short-term dust exposure exists during excavation, transportation, and any pretreatment. Potential impacts to ecological receptors would be minimized by scheduling excavation activities during the optimal season and conducting appropriate monitoring. Impacts to historic or prehistoric artifacts would be minimized through appropriate monitoring and implementation of mitigation measures if significant artifacts are identified. The potential for short-term impacts associated with traffic and dust would be somewhat greater with Alternatives 30-3 and 30-5, due to the presence of the on-site stabilization and the increased amount of on-Base truck traffic compared to Alternative 30-4.

5.7.6 Implementability

This criterion is not rated for Alternative 30-1 because no activities would be conducted under this alternative. Alternatives 30-2 and 30-4 are readily implementable. Alternative 30-2 is considered easier to implement because activities are largely administrative. However, given that the Base mission is to support training, any area with a land use restriction would limit that function and this potential loss of land use causes Alternative 30-2 to be rated moderate.

Equipment, materials, and labor for Alternatives 30-3, 30-4, and 30-5 are easily available, and all three alternatives involve commonly performed remedial operations. Excavation and treatment for Alternatives 30-3, 30-4, and 30-5 uses standard equipment and labor skills and are readily implementable. Stabilizing reagents range from widely available off the shelf reagents, such as fly ash, cement, etc., to less common, more specialized proprietary reagents.

Alternative 30-3 is ranked moderate to implement because of the pilot testing and associated regulatory coordination that would be needed, as well as the on-Base coordination required to use the treated soil as part of Base construction projects. Alternative 30-4 is ranked high for implementability because all components of this alternative are readily implementable. Alternative 30-5 is ranked moderate to implement because it would require 10 to 15 acres of available land to locate a new CAMU facility and 3 to 4 years to site, design, and construct the CAMU; compliance with the disposal requirements of an on-Base CAMU; significant regulatory coordination; and O&M funding uncertainty.

5.7.7 Cost

No cost is associated with Alternative 30-1. Alternative 30-2 is less expensive than Alternatives 30-3 and 30-4, with an estimated cost of $355,000. Alternatives 30-3 and 30-5 provide medium costs of $4,735,000 and between $3,986,000 to $4,622,000, respectively. Alternative 30-4 is the most expensive remedial alternative, with an estimated cost of $5,728,000.

5.7.8 Summary of Comparative Analysis

The results of the comparative analysis for Site 30 are summarized below.

Criterion	Alternative				
	1[a]	2[b]	3[c]	4[d]	5[e]
Threshold Factors					
Overall Protection of Human Health and the Environment	No	No[f]	Yes	Yes	Yes
Compliance with ARARs	No	No	Yes	Yes	Yes
Primary Balancing Factors					
Long-Term Effectiveness and Permanence	Low	Low	High	High	High
Reduction of Toxicity, Mobility, or Volume by Treatment	Low	Low	High	Moderate	Moderate
Short-Term Effectiveness	Not Rated	High	Moderate	Moderate	Moderate
Implementability	Not Rated	Moderate	Moderate	High	Moderate
Cost ($ million)	0	0.36	4.74	5.73	3.99-4.62[g]

[a]No Action
[b]Institutional Controls
[c]Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and On-Base Reuse of Treated Soil
[d]Soil Excavation, Pretreatment, Backfill, and Off-Base Disposal
[e]Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
[f]Protective of human health but not protective of ecological receptors
[g]Range based on 25 percent pretreatment to 75 percent pretreatment

Alternative 30-1 does not meet ARARs and is not protective of human health or the environment. Alternative 30-1 also does not provide long-term effectiveness and permanence. No costs are associated with Alternative 30-1.

Alternative 30-2 is protective of human health, but is not protective of the environment and does not meet ARARs. The potential for longer term adverse ecological impacts is increased due to the site's vulnerability to flooding, which could mobilize or expose the existing soil contamination and potentially impact surface soil and water quality if the site is flooded.

Alternatives 30-3, 30-4, and 30-5 are protective of human health and the environment, meet ARARs, and provide a high degree of long-term effectiveness and permanence. Alternative 30-4 has the highest ranking for implementibility. Alternative 30-3 provides the highest degree of treatment, but would likely be more difficult to implement because it involves pilot testing and additional regulatory coordination to ensure ARAR compliance and requires close coordination with potential on-Base construction users of the stabilized material. Alternative 30-5 would also be more difficult to implement because it would require 3 to 4 years to site, design, and construct an on-Base CAMU, require more regulatory involvement, long-term O&M, and the loss 10 to 15 acres of current land use with institutional controls placed on a new CAMU location.

The cost to reduce the human health risks and exposure pathways associated with site metals, with restricted land use, is estimated to be $355,000 for Alternative 30-2. To achieve a higher level of protectiveness and unrestricted future land use, Alternative 30-3 would require overall

costs of $4,735,000 and Alternative 30-4 would require $5,728,000, but with restricted future land use for a new CAMU location, Alternative 30-5 would require between $3,986,000 to $4,622,000.

THIS PAGE INTENTIONALLY BLANK

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-A06-A	0.0 - 0.5	12-Sep-01	mg/kg	1	5.1 J
30-A06-B	2.0 - 2.5	12-Sep-01	mg/kg	1	8.1 J
30-A06-C	4.0 - 4.5	12-Sep-01	mg/kg	1	4.7 J
30-A07-A	0.0 - 0.5	12-Sep-01	mg/kg	1	2.1 J
30-A07-A (D)	0.0 - 0.5	12-Sep-01	mg/kg	1	3.1 J
30-A07-B	2.0 - 2.5	12-Sep-01	mg/kg	1	4.6 J
30-A07-C	4.0 - 4.5	12-Sep-01	mg/kg	1	4.4 J
30-B06-A	0.0 - 0.5	13-Sep-01	mg/kg	1	6.3
30-B06-B	2.0 - 2.5	13-Sep-01	mg/kg	1	4.5
30-B06-C	4.0 - 4.5	13-Sep-01	mg/kg	4	8.8
30-B07-A	0.0 - 0.5	12-Sep-01	mg/kg	1	6.7 J
30-B07-A (D)	0.0 - 0.5	12-Sep-01	mg/kg	1	5.7 J
30-B07-B	2.0 - 2.5	12-Sep-01	mg/kg	1	4.8 J
30-B07-C	4.0 - 4.5	12-Sep-01	mg/kg	1	6.3 J
30-C06-A	0.0 - 0.5	13-Sep-01	mg/kg	1	40.7 J
30-C06-B	2.0 - 2.5	13-Sep-01	mg/kg	1	4.8 J
30-C06-C	4.0 - 4.5	13-Sep-01	mg/kg	1	9.4 J
30-C07-A	0.0 - 0.5	13-Sep-01	mg/kg	20	11300 J
30-C07-B	2.0 - 2.5	13-Sep-01	mg/kg	1	360 J
30-C07-B (D)	2.0 - 2.5	13-Sep-01	mg/kg	10	550 J
30-C07-C	4.0 - 4.5	13-Sep-01	mg/kg	1	9.7 J
30-C08-A	0.0 - 0.5	13-Sep-01	mg/kg	1	11.2
30-C08-B	2.0 - 2.5	13-Sep-01	mg/kg	1	18.8
30-C08-C	4.0 - 4.5	13-Sep-01	mg/kg	1	14.6 J
30-C17-A	0.0 - 0.5	19-Sep-01	mg/kg	1	12.8 J
30-C17-B	2.0 - 2.5	19-Sep-01	mg/kg	1	4.4 J
30-C17-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4 J
30-C17-C (D)	4.0 - 4.5	19-Sep-01	mg/kg	1	3.3 J
30-C18-A	0.0 - 0.5	11-Sep-01	mg/kg	1	4
30-C18-B	2.0 - 2.5	11-Sep-01	mg/kg	1	4.5
30-C18-C	4.0 - 4.5	11-Sep-01	mg/kg	1	3
30-D04-A	0.0 - 0.5	21-Sep-01	mg/kg	4	5.5
30-D04-B	2.0 - 2.5	21-Sep-01	mg/kg	1	7.7
30-D05-A	0.0 - 0.5	12-Sep-01	mg/kg	1	14.8 J
30-D05-B	2.0 - 2.5	12-Sep-01	mg/kg	1	4.7 J
30-D05-C	4.0 - 4.5	12-Sep-01	mg/kg	1	4.8 J
30-D05-C (D)	4.0 - 4.5	12-Sep-01	mg/kg	1	4.8 J
30-D05-A4	0.0 - 0.5	20-Sep-01	mg/kg	1	5.6 J
30-D06-A	0.0 - 0.5	13-Sep-01	mg/kg	100	18100 J
30-D06-B	2.0 - 2.5	13-Sep-01	mg/kg	1	284 J
30-D06-C	4.0 - 4.5	13-Sep-01	mg/kg	10	717 J

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-D07-A	0.0 - 0.5	13-Sep-01	mg/kg	100	13100
30-D07-B	2.0 - 2.5	13-Sep-01	mg/kg	10	1040
30-D07-C	4.0 - 4.5	13-Sep-01	mg/kg	1	94.4
30-D08-A	0.0 - 0.5	13-Sep-01	mg/kg	100	14500 J
30-D08-A (D)	0.0 - 0.5	13-Sep-01	mg/kg	20	8880 J
30-D08-B	2.0 - 2.5	13-Sep-01	mg/kg	1	13.7 J
30-D08-C	4.0 - 4.5	13-Sep-01	mg/kg	1	29.9 J
30-D09-A	0.0 - 0.5	13-Sep-01	mg/kg	1	6 J
30-D09-B	2.0 - 2.5	13-Sep-01	mg/kg	1	4.7 J
30-D09-C	4.0 - 4.5	13-Sep-01	mg/kg	1	4.7 J
30-D16-A	0.0 - 0.5	11-Sep-01	mg/kg	1	6.2
30-D16-A (D)	0.0 - 0.5	11-Sep-01	mg/kg	1	3.9
30-D16-B	2.0 - 2.5	11-Sep-01	mg/kg	1	2.5
30-D16-C	4.0 - 4.5	11-Sep-01	mg/kg	1	4.5
30-D17-A	0.0 - 0.5	11-Sep-01	mg/kg	1	8.3 J
30-D17-B	2.0 - 2.5	11-Sep-01	mg/kg	1	4.7 J
30-D17-C	4.0 - 4.5	11-Sep-01	mg/kg	1	6.3 J
30-D18-A	0.0 - 0.5	19-Sep-01	mg/kg	1	7.5 J
30-D18-B	2.0 - 2.5	19-Sep-01	mg/kg	1	4.1 J
30-D18-C	4.0 - 4.5	19-Sep-01	mg/kg	1	5.9 J
30-D18-C (D)	4.0 - 4.5	19-Sep-01	mg/kg	1	5.3 J
30-E01-A	0.0 - 0.5	21-Sep-01	mg/kg	1	46.3
30-E01-B	2.0 - 2.5	21-Sep-01	mg/kg	1	9.8
30-E02-A	0.0 - 0.5	21-Sep-01	mg/kg	1	32.6
30-E02-B	2.0 - 2.5	21-Sep-01	mg/kg	1	44
30-E02-B (D)	2.0 - 2.5	21-Sep-01	mg/kg	1	8
30-E03-A	0.0 - 0.5	21-Sep-01	mg/kg	1	10.8
30-E03-B	2.0 - 2.5	21-Sep-01	mg/kg	1	5.6
30-E04-A	0.0 - 0.5	21-Sep-01	mg/kg	1	3.7
30-E04-B	2.0 - 2.5	21-Sep-01	mg/kg	1	5.7
30-E05-A	0.0 - 0.5	12-Sep-01	mg/kg	1	123 J
30-E05-B	2.0 - 2.5	12-Sep-01	mg/kg	1	14.7 J
30-E05-B (D)	2.0 - 2.5	12-Sep-01	mg/kg	1	6.9 J
30-E05-C	4.0 - 4.5	12-Sep-01	mg/kg	1	6.6 J
30-E06-A	0.0 - 0.5	13-Sep-01	mg/kg	50	5590
30-E06-B	2.0 - 2.5	13-Sep-01	mg/kg	4	1390
30-E06-C	4.0 - 4.5	13-Sep-01	mg/kg	1	8.2
30-E07-A	0.0 - 0.5	13-Sep-01	mg/kg	4	8390
30-E07-B	2.0 - 2.5	13-Sep-01	mg/kg	1	159
30-E07-C	4.0 - 4.5	13-Sep-01	mg/kg	1	44.9
30-E08-A	0.0 - 0.5	10-Sep-01	mg/kg	5	3650
30-E08-B	2.0 - 2.5	10-Sep-01	mg/kg	1	413
30-E08-C	4.0 - 4.5	10-Sep-01	mg/kg	1	179

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-E09-A	0.0 - 0.5	10-Sep-01	mg/kg	10	**8810**
30-E09-A (D)	0.0 - 0.5	10-Sep-01	mg/kg	10	**8860**
30-E09-B	2.0 - 2.5	10-Sep-01	mg/kg	5	**3740**
30-E09-C	4.0 - 4.5	10-Sep-01	mg/kg	2	**1490**
30-E10-A	0.0 - 0.5	10-Sep-01	mg/kg	5	**3860**
30-E10-B	2.0 - 2.5	10-Sep-01	mg/kg	5	**2060**
30-E10-C	4.0 - 4.5	10-Sep-01	mg/kg	4	**3090**
30-E11-A	0.0 - 0.5	10-Sep-01	mg/kg	4	12.8
30-E11-B	2.0 - 2.5	10-Sep-01	mg/kg	1	3.5
30-E11-C	4.0 - 4.5	10-Sep-01	mg/kg	1	2.7
30-E12-A	0.0 - 0.5	10-Sep-01	mg/kg	1	8.3
30-E12-B	2.0 - 2.5	10-Sep-01	mg/kg	1	3.4
30-E12-C	4.0 - 4.5	10-Sep-01	mg/kg	1	3.1
30-E13-A	0.0 - 0.5	10-Sep-01	mg/kg	1	11.1
30-E13-B	2.0 - 2.5	10-Sep-01	mg/kg	1	4.6
30-E13-C	4.0 - 4.5	10-Sep-01	mg/kg	1	2.3
30-E14-A	0.0 - 0.5	10-Sep-01	mg/kg	1	9.6
30-E14-B	2.0 - 2.5	10-Sep-01	mg/kg	1	6.1
30-E14-C	4.0 - 4.5	10-Sep-01	mg/kg	1	4.2
30-E14-C (D)	4.0 - 4.5	10-Sep-01	mg/kg	1	3.1
30-E15-A	0.0 - 0.5	10-Sep-01	mg/kg	1	5.6
30-E15-B	2.0 - 2.5	10-Sep-01	mg/kg	1	1.4
30-E15-C	4.0 - 4.5	10-Sep-01	mg/kg	1	3.8
30-E16-A	0.0 - 0.5	11-Sep-01	mg/kg	1	5
30-E16-B	2.0 - 2.5	11-Sep-01	mg/kg	1	3.7
30-E16-C	4.0 - 4.5	11-Sep-01	mg/kg	1	10.4
30-E17-A	0.0 - 0.5	19-Sep-01	mg/kg	1	3.5 J
30-E17-B	2.0 - 2.5	19-Sep-01	mg/kg	1	5.1 J
30-E17-C	4.0 - 4.5	19-Sep-01	mg/kg	1	3.8 J
30-E18-A	0.0 - 0.5	19-Sep-01	mg/kg	1	6 J
30-E18-B	2.0 - 2.5	19-Sep-01	mg/kg	1	4.2 J
30-E18-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4.1 J
30-F01-A	0.0 - 0.5	20-Sep-01	mg/kg	1	14.4
30-F01-B	2.0 - 2.5	20-Sep-01	mg/kg	1	4.6
30-F01-C	4.0 - 4.5	20-Sep-01	mg/kg	1	4.8
30-F02-A	0.0 - 0.5	20-Sep-01	mg/kg	1	5
30-F02-B	2.0 - 2.5	20-Sep-01	mg/kg	1	3.4
30-F02-C	4.0 - 4.5	20-Sep-01	mg/kg	1	2.7
30-F03-A	0.0 - 0.5	20-Sep-01	mg/kg	1	3.6 J
30-F03-B	2.0 - 2.5	20-Sep-01	mg/kg	1	2.3
30-F03-C	4.0 - 4.5	20-Sep-01	mg/kg	1	5.4

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-F04-A	0.0 - 0.5	20-Sep-01	mg/kg	1	18.7
30-F04-B	2.0 - 2.5	20-Sep-01	mg/kg	1	2.4
30-F04-B (D)	2.0 - 2.5	20-Sep-01	mg/kg	1	2.9
30-F04-C	4.0 - 4.5	20-Sep-01	mg/kg	1	3
30-F05-A	0.0 - 0.5	20-Sep-01	mg/kg	1	16.6
30-F05-B	2.0 - 2.5	20-Sep-01	mg/kg	1	3.1
30-F05-C	4.0 - 4.5	20-Sep-01	mg/kg	1	5 J
30-F06-A	0.0 - 0.5	13-Sep-01	mg/kg	1	**267**
30-F06-B	2.0 - 2.5	13-Sep-01	mg/kg	1	**49.3**
30-F06-C	4.0 - 4.5	13-Sep-01	mg/kg	1	**80.2**
30-F07-A	0.0 - 0.5	20-Sep-01	mg/kg	5	**495 J**
30-F07-B	2.0 - 2.5	20-Sep-01	mg/kg	1	7.5 J
30-F07-C	4.0 - 4.5	20-Sep-01	mg/kg	1	10.6 J
30-F08-A	0.0 - 0.5	20-Sep-01	mg/kg	1	11.9 J
30-F08-A (D)	0.0 - 0.5	20-Sep-01	mg/kg	1	11.1 J
30-F08-B	2.0 - 2.5	20-Sep-01	mg/kg	1	11 J
30-F08-C	4.0 - 4.5	20-Sep-01	mg/kg	1	19.5 J
30-F09-A	0.0 - 0.5	20-Sep-01	mg/kg	5	**540 J**
30-F09-B	2.0 - 2.5	20-Sep-01	mg/kg	1	**190 J**
30-F09-C	4.0 - 4.5	20-Sep-01	mg/kg	1	**49.8 J**
30-F10-A	0.0 - 0.5	20-Sep-01	mg/kg	1	**444 J**
30-F10-B	2.0 - 2.5	20-Sep-01	mg/kg	1	10.2 J
30-F10-C	4.0 - 4.5	20-Sep-01	mg/kg	1	11.1 J
30-F11-A	0.0 - 0.5	20-Sep-01	mg/kg	10	**25600 J**
30-F11-B	2.0 - 2.5	20-Sep-01	mg/kg	1	3.7 J
30-F11-C	4.0 - 4.5	20-Sep-01	mg/kg	1	25.6 J
30-F12-A	0.0 - 0.5	20-Sep-01	mg/kg	1	**8390 J**
30-F12-B	2.0 - 2.5	20-Sep-01	mg/kg	1	**132 J**
30-F12-C	4.0 - 4.5	20-Sep-01	mg/kg	1	14.6 J
30-F13-A	0.0 - 0.5	20-Sep-01	mg/kg	1	14.9 J
30-F13-B	2.0 - 2.5	20-Sep-01	mg/kg	1	12.4 J
30-F13-C	4.0 - 4.5	20-Sep-01	mg/kg	1	6.8 J
30-F13-C (D)	4.0 - 4.5	20-Sep-01	mg/kg	1	**33.3 J**
30-F14-A	0.0 - 0.5	20-Sep-01	mg/kg	1	9.6 J
30-F14-B	2.0 - 2.5	20-Sep-01	mg/kg	1	5.4 J
30-F14-C	4.0 - 4.5	20-Sep-01	mg/kg	1	5.8 J
30-F15-A	0.0 - 0.5	19-Sep-01	mg/kg	1	5.1 J
30-F15-B	2.0 - 2.5	19-Sep-01	mg/kg	1	4 J
30-F15-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4.1 J
30-F16-A	0.0 - 0.5	19-Sep-01	mg/kg	1	6.4 J
30-F16-B	2.0 - 2.5	19-Sep-01	mg/kg	1	5.5 J
30-F16-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4.8 J

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-F17-A	0.0 - 0.5	19-Sep-01	mg/kg	1	8.1 J
30-F17-B	2.0 - 2.5	19-Sep-01	mg/kg	1	2.6 J
30-F17-C	4.0 - 4.5	19-Sep-01	mg/kg	4	8.2
30-G01-A	0.0 - 0.5	19-Sep-01	mg/kg	1	16.5 J
30-G01-B	2.0 - 2.5	19-Sep-01	mg/kg	1	8.4 J
30-G01-B (D)	2.0 - 2.5	19-Sep-01	mg/kg	1	8.2 J
30-G01-C	4.0 - 4.5	19-Sep-01	mg/kg	1	6.2 J
30-G02-A	0.0 - 0.5	18-Sep-01	mg/kg	1	39.1
30-G02-B	2.0 - 2.5	18-Sep-01	mg/kg	1	5.5
30-G02-C	4.0 - 4.5	18-Sep-01	mg/kg	1	5.8
30-G03-A	0.0 - 0.5	11-Sep-01	mg/kg	1	4 J
30-G03-B	2.0 - 2.5	11-Sep-01	mg/kg	1	2.5 J
30-G03-C	4.0 - 4.5	11-Sep-01	mg/kg	1	3.7 J
30-G04-A	0.0 - 0.5	11-Sep-01	mg/kg	1	8.5
30-G04-B	2.0 - 2.5	11-Sep-01	mg/kg	1	2.9
30-G04-C	4.0 - 4.5	11-Sep-01	mg/kg	1	3.1 J
30-G04-C (D)	4.0 - 4.5	11-Sep-01	mg/kg	1	4.6 J
30-G05-A	0.0 - 0.5	11-Sep-01	mg/kg	1	1610 J
30-G05-B	2.0 - 2.5	11-Sep-01	mg/kg	100	15600 J
30-G05-C	4.0 - 4.5	11-Sep-01	mg/kg	100	7450 J
30-G06-A	0.0 - 0.5	11-Sep-01	mg/kg	1	688
30-G06-B	2.0 - 2.5	11-Sep-01	mg/kg	1	2840
30-G06-C	4.0 - 4.5	11-Sep-01	mg/kg	1	697 J
30-G07-A	0.0 - 0.5	18-Sep-01	mg/kg	5	680
30-G07-B	2.0 - 2.5	18-Sep-01	mg/kg	1	11.3
30-G07-C	4.0 - 4.5	18-Sep-01	mg/kg	1	9.2
30-G08-A	0.0 - 0.5	18-Sep-01	mg/kg	1	143
30-G08-B	2.0 - 2.5	18-Sep-01	mg/kg	1	7
30-G08-C	4.0 - 4.5	18-Sep-01	mg/kg	1	5.2
30-G09-A	0.0 - 0.5	18-Sep-01	mg/kg	1000	178000
30-G09-A (D)	0.0 - 0.5	18-Sep-01	mg/kg	5	1070 J
30-G09-B	2.0 - 2.5	18-Sep-01	mg/kg	1	8.4
30-G09-C	4.0 - 4.5	18-Sep-01	mg/kg	1	6
30-G10-A	0.0 - 0.5	18-Sep-01	mg/kg	1	170 J
30-G10-B	2.0 - 2.5	18-Sep-01	mg/kg	1	14.8 J
30-G10-C	4.0 - 4.5	18-Sep-01	mg/kg	1	98.9 J
30-G11-A	0.0 - 0.5	18-Sep-01	mg/kg	5	934 J
30-G11-B	2.0 - 2.5	18-Sep-01	mg/kg	1	71 J
30-G11-C	4.0 - 4.5	18-Sep-01	mg/kg	1	16.1 J
30-G12-A	0.0 - 0.5	18-Sep-01	mg/kg	1	18.8 J
30-G12-B	2.0 - 2.5	18-Sep-01	mg/kg	1	4 J
30-G12-C	4.0 - 4.5	18-Sep-01	mg/kg	1	3.3 J

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-G13-A	0.0 - 0.5	18-Sep-01	mg/kg	1	35.5 J
30-G13-B	2.0 - 2.5	18-Sep-01	mg/kg	1	4.2 J
30-G13-C	4.0 - 4.5	18-Sep-01	mg/kg	1	7.3 J
30-G14-A	0.0 - 0.5	18-Sep-01	mg/kg	1	8.5 J
30-G14-B	2.0 - 2.5	18-Sep-01	mg/kg	1	3.5 J
30-G14-C	4.0 - 4.5	18-Sep-01	mg/kg	1	4.2 J
30-G15-A	0.0 - 0.5	19-Sep-01	mg/kg	1	7.3 J
30-G15-B	2.0 - 2.5	19-Sep-01	mg/kg	1	4.5 J
30-G15-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4.6 J
30-G16-A	0.0 - 0.5	19-Sep-01	mg/kg	1	7.1 J
30-G16-A (D)	0.0 - 0.5	19-Sep-01	mg/kg	1	6.6 J
30-G16-B	2.0 - 2.5	19-Sep-01	mg/kg	1	5.7 J
30-G16-C	4.0 - 4.5	19-Sep-01	mg/kg	1	4.2 J
30-H04-A	0.0 - 0.5	13-Sep-01	mg/kg	1	309 J
30-H04-B	2.0 - 2.5	13-Sep-01	mg/kg	1	12.8 J
30-H04-C	4.0 - 4.5	13-Sep-01	mg/kg	1	22 J
30-H05-A	0.0 - 0.5	14-Sep-01	mg/kg	5	2230
30-H05-B	2.0 - 2.5	14-Sep-01	mg/kg	10	2790
30-H05-B (D)	2.0 - 2.5	14-Sep-01	mg/kg	50	12500
30-H05-C	4.0 - 4.5	14-Sep-01	mg/kg	100	19300
30-H06-A	0.0 - 0.5	14-Sep-01	mg/kg	400	26000
30-H06-B	2.0 - 2.5	14-Sep-01	mg/kg	10	4450
30-H06-C	4.0 - 4.5	14-Sep-01	mg/kg	5	1900
30-H07-A	0.0 - 0.5	14-Sep-01	mg/kg	10	2740
30-H07-B	2.0 - 2.5	14-Sep-01	mg/kg	1	3.7
30-H07-C	4.0 - 4.5	14-Sep-01	mg/kg	1	5.4
30-H08-A	0.0 - 0.5	14-Sep-01	mg/kg	1	40.1
30-H08-A (D)	0.0 - 0.5	14-Sep-01	mg/kg	1	136
30-H08-B	2.0 - 2.5	14-Sep-01	mg/kg	1	6
30-H08-C	4.0 - 4.5	14-Sep-01	mg/kg	1	5.1
30-H09-A	0.0 - 0.5	17-Sep-01	mg/kg	1	117
30-H09-B	2.0 - 2.5	17-Sep-01	mg/kg	1	4
30-H09-C	4.0 - 4.5	17-Sep-01	mg/kg	1	0.88
30-H09-C (D)	4.0 - 4.5	17-Sep-01	mg/kg	1	1.4
30-H10-A	0.0 - 0.5	17-Sep-01	mg/kg	1	108
30-H10-B	2.0 - 2.5	17-Sep-01	mg/kg	1	3.1
30-H10-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.3
30-H11-A	0.0 - 0.5	17-Sep-01	mg/kg	4	85.5
30-H11-B	2.0 - 2.5	17-Sep-01	mg/kg	1	1.7
30-H11-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.4

Table 5-1
Site 30 Lead Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	DF	Lead
		PQL:	mg/kg		0.04-71
		MDL:	mg/kg		0.3-300
		RG (0 to 5 ft):	mg/kg		29 [a]
30-H12-A	0.0 - 0.5	17-Sep-01	mg/kg	1	21
30-H12-B	2.0 - 2.5	17-Sep-01	mg/kg	1	1
30-H12-B (D)	2.0 - 2.5	17-Sep-01	mg/kg	1	1.4
30-H12-C	4.0 - 4.5	17-Sep-01	mg/kg	1	3.6
30-I05-A	0.0 - 0.5	21-Sep-01	mg/kg	1	110
30-I05-B	2.0 - 2.5	21-Sep-01	mg/kg	1	5
30-I06-A	0.0 - 0.5	14-Sep-01	mg/kg	1	21.6
30-I06-B	2.0 - 2.5	14-Sep-01	mg/kg	1	4
30-I06-C	4.0 - 4.5	14-Sep-01	mg/kg	1	1.6
30-I07-A	0.0 - 0.5	14-Sep-01	mg/kg	1	34.2
30-I07-B	2.0 - 2.5	14-Sep-01	mg/kg	1	2.4
30-I07-C	4.0 - 4.5	14-Sep-01	mg/kg	1	2.3
30-I08-A	0.0 - 0.5	17-Sep-01	mg/kg	1	3
30-I08-B	2.0 - 2.5	17-Sep-01	mg/kg	5	793
30-I08-C	4.0 - 4.5	17-Sep-01	mg/kg	1	0.85
30-I09-A	0.0 - 0.5	17-Sep-01	mg/kg	1	4.6
30-I09-B	2.0 - 2.5	17-Sep-01	mg/kg	1	1.2
30-I09-B (D)	2.0 - 2.5	17-Sep-01	mg/kg	1	1.7
30-I09-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.2
30-I10-A	0.0 - 0.5	17-Sep-01	mg/kg	1	13.3
30-I10-B	2.0 - 2.5	17-Sep-01	mg/kg	1	3.4
30-I10-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.2
30-I11-A	0.0 - 0.5	17-Sep-01	mg/kg	1	10.3
30-I11-B	2.0 - 2.5	17-Sep-01	mg/kg	1	1
30-I11-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.5
30-I11-C (D)	4.0 - 4.5	17-Sep-01	mg/kg	1	1.9
30-J07-A	0.0 - 0.5	14-Sep-01	mg/kg	1	2.9
30-J07-A (D)	0.0 - 0.5	14-Sep-01	mg/kg	1	4.6
30-J07-B	2.0 - 2.5	14-Sep-01	mg/kg	1	3.1
30-J07-C	4.0 - 4.5	14-Sep-01	mg/kg	1	0.95
30-J08-A	0.0 - 0.5	17-Sep-01	mg/kg	1	9.4
30-J08-B	2.0 - 2.5	17-Sep-01	mg/kg	1	2.7
30-J08-C	4.0 - 4.5	17-Sep-01	mg/kg	1	1.2

mg/kg = milligrams per kilogram DF = Dilution Factor

<2 = not detected at indicated value J = Estimated value

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

RG = Remediation Goal

793 Concentration above RG

(D) = Duplicate Sample

a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)

Table 5-2
Site 30 Metals Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			TTLC MDL:	mg/kg	0.81 - 1.2	0.28 - 0.41	0.3 - 0.44	0.15 - 0.22	0.03 - 0.044	0.049 - 0.07	9.7 - 14	0.026 - 0.038	0.085 - 0.12	0.32 - 0.47	0.69 - 0.99	0.04 - 71	0.97 - 1.4	0.077 - 0.11	0.13 - 0.18	0.11 - 0.16	1 - 1.5	0.34 - 0.5	0.057 - 0.082	29 - 41	0.2 - 0.29	0.057 - 0.082	0.14 - 0.2
			TTLC PQL:	mg/kg	20 - 29	20 - 29	1.2 - 1.8	4 - 5.8	0.81 - 1.2	0.81 - 1.2	40 - 58	2 - 2.9	2 - 2.9	2 - 2.9	12 - 18	0.3 - 300	40 - 58	2 - 2.9	0.81 - 1.2	1.2 - 1.8	81 - 120	2 - 2.9	2 - 2.9	400 - 580	2 - 2.9	2 - 2.9	2 - 2.9
			TCLP MDL:	µg/L	7.8	2.8	3	1.5-2.2	0.3	0.46	230	0.26	0.82	3.2	6.8	1.6-160	9.6	0.74	1.2	1.1	9.8	3.4	0.56	910	2	0.54	1.4
			TCLP PQL:	µg/L	200	20	10	20	4	4	400	10	10	20	100	10-1000	200	10	10	10	800	20	20	4000	20	20	20
			RG (0 to 5 ft):	mg/kg	NA	8.8 [a]	4.3 [b]	NA	NA	NA	NA	33 [b]	13 [a]	26 [a]	NA	29 [a]	NA	3,200 [b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
		RCRA Hazardous Waste TTLC Limit [c]:		mg/kg	NE	500	500	10,000	75	100	NE	500 [e]	8,000	2,500	NE	1,000	NE	NE	3,500	2,000	NE	100	500	NE	700	2,400	5,000
		RCRA Hazardous Waste TCLP Limit [d]:		µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	NE	NE	NE	1,000	5,000	NE	NE	NE	NE
30-B06-C	4.0 - 4.5	13-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	6.6	--	--	--	--	--	--	--	--	--	--	--
30-B06-C	4.0 - 4.5	13-Sep-01	TTLC	mg/kg	11400	< 0.45	4.2	106	< 0.91	0.061 J1	10500 J	17	10.7	28.3	20600	8.8	5790	873	< 0.21	9.6	3810	< 1.2	< 2.3	< 412	< 2.3	42	50.1
30-B06-C	4.0 - 4.5	13-Sep-01	TCLP	µg/L	631	< 20	3.6 J1	163	< 4	< 4	290000	< 4.8	< 10	< 12.6	679	< 10	25700	700	< 10	< 5.7	7610	< 11.7	< 0.6	NR	< 20	3.9 J1	< 41.2
30-D04-A	0.0 - 0.5	21-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	5.2	--	--	--	--	--	--	--	--	--	--	--
30-D04-A	0.0 - 0.5	21-Sep-01	TTLC	mg/kg	21100 J	< 28	3.9 J	296	< 1.1	0.24 J1	5530 J	37.5	19	30.5	32600	5.5	14100	538 J	< 1.1	17.7 J	7810	< 0.72	< 2.8	< 570 J	< 2.8 J	92	96.4 J
30-D04-A	0.0 - 0.5	21-Sep-01	TCLP	µg/L	622	< 2.9	7.8 J1	122	< 4	< 4	71700	< 3.8	< 10	< 6.5	694	< 3.2	26000	734	< 10	< 9	17200	< 17.5	< 0.87	NR	< 20	7.1 J1	< 38.4
30-D06-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	18100 J	--	--	--	--	--	--	--	--	--	--	--
30-D06-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	8610	64.4	5.4	60.7	< 0.82	0.066 J1	2190 J	27.1	11.1	255	18000	5820	3740	338	< 0.82	12.7	2710	< 1.1	< 2.1	< 410	< 2.1	41.5	72.3
30-D06-A	0.0 - 0.5	13-Sep-01	TCLP	µg/L	1730	1760	105	217	< 4	< 1.6	38600	< 10.6	< 28.7	578	2320	114000	12500	1270	< 10	< 27.1	27800	< 12.4	< 20	NR	< 3.3	5.3 J1	293
30-D08-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	14500 J	--	--	--	--	--	--	--	--	--	--	--
30-D08-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	10100	205	6.2	59.6	< 0.82	< 0.82	2300 J	33.9	12.2	216	19300	6740	4380	329	< 0.82	17.2	2390	< 0.78	< 2.1	< 410	< 2.1	46.3	61.3
30-D08-A	0.0 - 0.5	13-Sep-01	TCLP	µg/L	1490	1140	72.1	306	< 4	< 0.61	36200	< 6.7	< 42	1200	2340	234000	11800	1640	< 10	< 32.2	6700	< 9.6	< 20	NR	< 11	4.8 J1	413
30-E06-B	2.0 - 2.5	13-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	667	--	--	--	--	--	--	--	--	--	--	--
30-E06-B	2.0 - 2.5	13-Sep-01	TTLC	mg/kg	13500	19.9 J1	4.1	95.3	< 0.88	< 0.88	3770 J	24.4	10.7	54.2	21800	1390	5890	243	< 0.14	11.3	4020	< 2.2	< 2.2	< 362	< 2.2	52.7	56.1
30-E06-B	2.0 - 2.5	13-Sep-01	TCLP	µg/L	1670	109	< 10	103	< 4	< 4	71400	< 4.7	< 4.1	< 27.2	2060	1110	20300	225	< 10	< 8.7	5990	< 16.1	< 20	NR	< 20	4.8 J1	63.4
30-E07-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	4410	--	--	--	--	--	--	--	--	--	--	--
30-E07-A	0.0 - 0.5	13-Sep-01	TTLC	mg/kg	9810	383	5.5	76.8	< 0.84	< 0.84	2050 J	33.5	13.2	298	21700	8390	4790	402	< 0.84	15.3	2810	< 0.88	< 2.1	< 161	< 2.1	54.8	99.9
30-E07-A	0.0 - 0.5	13-Sep-01	TCLP	µg/L	850	782	35.3	234	< 4	< 0.56	35600	< 4.5	< 30.3	1070	958	99700	18400	1190	< 10	< 25	8400	< 7.9	< 20	NR	< 2.5	1.5 J1	453
30-E10-C	4.0 - 4.5	10-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	2850	--	--	--	--	--	--	--	--	--	--	--
30-E10-C	4.0 - 4.5	10-Sep-01	TTLC	mg/kg	9510	117	4.5	59.9	< 0.87	< 0.87	1380 J	20.7	8.7	93.4	18700	3090	4580	193	< 0.48	8.5	2940	< 2.2	< 2.2	< 219	< 2.2	45.1	51.3
30-E10-C	4.0 - 4.5	10-Sep-01	TCLP	µg/L	497	516	7 J1	61.2	< 4	< 4	24200	< 2.2	< 12.2	< 33.3	649	11000	17400	246	< 10	< 14.9	4400	< 11.8	< 20	NR	< 20	1.5 J1	64.7
30-E11-A	0.0 - 0.5	10-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	7.3	--	--	--	--	--	--	--	--	--	--	--
30-E11-A	0.0 - 0.5	10-Sep-01	TTLC	mg/kg	10200	< 1.7	2.7	59.2	< 0.87	< 0.87	2460 J	14.4	6.5	11.3	15500	12.8	5410	127	< 0.54	5	3610	< 2.2	< 2.2	1430	< 2.2	33.2	41.8
30-E11-A	0.0 - 0.5	10-Sep-01	TCLP	µg/L	3680	< 3.6	3 J1	25.8	< 4	< 4	42700	< 7.4	< 3.2	< 15.4	4260	< 9.2	28300	66.6	< 2.8	< 14.4	8230	< 10	< 0.73	NR	< 20	13 J1	95.7
30-F17-C	4.0 - 4.5	19-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	7.1 J	--	--	--	--	--	--	--	--	--	--	--
30-F17-C	4.0 - 4.5	19-Sep-01	TTLC	mg/kg	21800	< 29	4.2	149	< 1.2	< 1.2	7390 J	32.8	13.8	24.7	33300	8.2	10400	368	< 1.2	14.3	7100	< 0.89	< 2.9	3560	< 2.9	64.8	79.3
30-F17-C	4.0 - 4.5	19-Sep-01	TCLP	µg/L	1110	< 20	< 10	134	< 4	< 4	104000	< 2.1	< 21.6	< 7	1370	< 3.4	41000	2510	< 10	< 18.4	23900	< 11	< 20	NR	< 20	6.6 J1	55.9
30-G05-B	2.0 - 2.5	11-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	15600 J	--	--	--	--	--	--	--	--	--	--	--
30-G05-B	2.0 - 2.5	11-Sep-01	TTLC	mg/kg	21200	2.8 J1	3.2	247	< 1	0.066 J1	7320 J	33.2	15.6	36.3	29200	432	10500	430	< 1	14.4	7910	< 2.5	< 2.5	11600	< 2.5	76.8	86
30-G05-B	2.0 - 2.5	11-Sep-01	TCLP	µg/L	843	63.6	9.1 J1	51	< 4	< 4	99300	< 2.3	< 10	< 9.5	999	1090	38100	251	< 10	< 4.5	21900	< 8.1	< 20	NR	< 20	4.6 J1	< 35.5
30-G09-A	0.0 - 0.5	18-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	178000	--	--	--	--	--	--	--	--	--	--	--
30-G09-A	0.0 - 0.5	18-Sep-01	TTLC	mg/kg	12900	< 1.4	3.4	84.7	< 0.81	< 0.81	20900 J	38.9	13.1	48.9	19900	473	5570	392	< 0.81	22.4	2510	< 0.57	< 2	< 400	< 2	46.7	47.1
30-G09-A	0.0 - 0.5	18-Sep-01	TCLP	µg/L	913	< 18.3	< 10	352	< 4	< 4	404000	< 6.3	< 1.6	< 21.2	1070	414	17100	362	< 10	< 17.1	11100	< 11.6	< 20	NR	< 20	3.8 J1	< 37
30-H05-C	4.0 - 4.5	14-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	19300	--	--	--	--	--	--	--	--	--	--	--
30-H05-C	4.0 - 4.5	14-Sep-01	TTLC	mg/kg	15500	52.4	3.7	171	< 0.98	< 0.98	3620 J	33	15.6	157	22900	4130	6090	615	< 0.98	17.3	4500	< 0.75	< 2.5	< 490	< 2.5	59.5	84.3
30-H05-C	4.0 - 4.5	14-Sep-01	TCLP	µg/L	1610	669	32.1	223	< 4	< 0.9	46100	< 4.5	< 13.4	413	1740	31300	12900	560	< 10	< 23.3	12100	< 10.1	< 20	NR	< 20	4 J1	250

Table 5-2
Site 30 Metals Detected in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			TTLC MDL:	mg/kg	0.81 - 1.2	0.28 - 0.41	0.3 - 0.44	0.15 - 0.22	0.03 - 0.044	0.049 - 0.07	9.7 - 14	0.026 - 0.038	0.085 - 0.12	0.32 - 0.47	0.69 - 0.99	0.04 - 71	0.97 - 1.4	0.077 - 0.11	0.13 - 0.18	0.11 - 0.16	1 - 1.5	0.34 - 0.5	0.057 - 0.082	29 - 41	0.2 - 0.29	0.057 - 0.082	0.14 - 0.2
			TTLC PQL:	mg/kg	20 - 29	20 - 29	1.2 - 1.8	4 - 5.8	0.81 - 1.2	0.81 - 1.2	40 - 58	2 - 2.9	2 - 2.9	2 - 2.9	12 - 18	0.3 - 300	40 - 58	2 - 2.9	0.81 - 1.2	1.2 - 1.8	81 - 120	2 - 2.9	2 - 2.9	400 - 580	2 - 2.9	2 - 2.9	2 - 2.9
			TCLP MDL:	µg/L	7.8	2.8	3	1.5-2.2	0.3	0.46	230	0.26	0.82	3.2	6.8	1.6-160	9.6	0.74	1.2	1.1	9.8	3.4	0.56	910	2	0.54	1.4
			TCLP PQL:	µg/L	200	20	10	20	4	4	400	10	10	20	100	10-1000	200	10	10	10	800	20	20	4000	20	20	20
			RG (0 to 5 ft):	mg/kg	NA	8.8 [a]	4.3 [b]	NA	NA	NA	NA	33 [b]	13 [a]	26 [a]	NA	29 [a]	NA	3,200 [b]	NA	NA	NA	NA	NA	NA	NA	NA	NA
		RCRA Hazardous Waste TTLC Limit [c]:		mg/kg	NE	500	500	10,000	75	100	NE	500 [e]	8,000	2,500	NE	1,000	NE	NE	3,500	2,000	NE	100	500	NE	700	2,400	5,000
		RCRA Hazardous Waste TCLP Limit [d]:		µg/L	NE	NE	5,000	100,000	NE	1,000	NE	5,000	NE	NE	NE	5,000	NE	NE	NE	NE	NE	1,000	5,000	NE	NE	NE	NE
30-H06-A	0.0 - 0.5	14-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	8030	--	--	--	--	--	--	--	--	--	--	--
30-H06-A	0.0 - 0.5	14-Sep-01	TTLC	mg/kg	9210	284	9.4	94.5	< 0.86	0.067 J1	2920 J	40.7	15	399	20200	26000	4430	465	< 0.86	19.2	2310	< 0.8	0.67 J1	1410	< 2.1	55.1	91.8
30-H06-A	0.0 - 0.5	14-Sep-01	TCLP	µg/L	1190	2110	70.1	201	< 4	< 1.5	55500	< 5.3	< 40.4	1110	1770	232000	24700	2140	< 10	< 33	12800	< 13	< 20	NR	< 9.7	3.7 J1	464
30-H11-A	0.0 - 0.5	17-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	63.4	--	--	--	--	--	--	--	--	--	--	--
30-H11-A	0.0 - 0.5	17-Sep-01	TTLC	mg/kg	24500	< 0.58	3.9	245	< 0.92	0.12 J1	6130 J	37.4	17.3	34.9	33600	85.5	10200	488	< 0.92	16.5	6900	< 1.4	< 2.3	< 460	< 2.3	84.2	94.8
30-H11-A	0.0 - 0.5	17-Sep-01	TCLP	µg/L	18200	< 7.2	3.1 J1	288	< 4	< 4	57900	20.6	< 7.8	< 30.9	19900	65.2	27700	608	< 10	< 12.4	23900	< 6.8	< 20	NR	< 20	49.5	94.7
30-I08-B	2.0 - 2.5	17-Sep-01	TTLC	mg/kg	--	--	--	--	--	--	--	--	--	--	--	793	--	--	--	--	--	--	--	--	--	--	--
30-I08-B	2.0 - 2.5	17-Sep-01	TTLC	mg/kg	14900	< 25	2.6	212	< 1	0.067 J1	7560 J	25.9	15.2	17.7	24700	105	8360	402	< 1	10.9	6190	< 0.44	< 2.5	< 510	< 2.5	67.6	69
30-I08-B	2.0 - 2.5	17-Sep-01	TCLP	µg/L	2130	< 20	< 10	232	< 4	< 4	70400	< 3.8	< 1.8	< 10.2	2860	< 9.8	10300	469	< 10	< 7.5	12100	< 10.7	< 20	NR	< 20	9.5 J1	67.8

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
RG = Remediation Goal
TTLC Extraction Concentration above RG shown in BOLD
a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)
b) RG based on Background calculated for Human Health Risk Evaluation (SWDIV, 1996b)

-- = not analyzed for this compound
NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable
TCLP analysis

c) Any waste is a hazardous waste if it contains a metal listed above at: 1) a total concentration that exceeds its Total Threshold Limit Concentration (TTLC) value;
2) a concentration, after a Waste Extraction Test (WET), that exceeds its Soluble Threshold Limit Concentration (STLC) value.
d) A solid waste exhibits the characteristic of toxicity if, using the Toxicity Characteristic Leaching Procedure (TCLP), the extract from a representative sample of the waste contains any of the contaminants at concentrations equal to or greater than the respective value given in this table.
e) The TTLC value listed for chromium is the chromium IV value to be conservative; The chromium III (or compounds) TTLC value is 2,500 mg/kg

Table 5-3
Site 30 Metals Detected Compared to Remedial Goals in Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Units	Antimony	Arsenic	Chromium	Cobalt	Copper	Lead
		MDL:	mg/kg	0.28-0.41	0.3-0.44	0.026-0.038	0.085-0.12	0.32-0.47	0.04-71
		PQL:	mg/kg	20-29	1.2-1.8	2-2.9	2-2.9	2-2.9	0.3-300
		RG (0 to 5 ft):	mg/kg	8.8 [a]	4.3 [b]	33 [b]	13 [a]	26 [a]	29 [a]
30-B06-C	4.0 - 4.5	13-Sep-01	mg/kg	--	--	--	--	--	6.6
30-B06-C	4.0 - 4.5	13-Sep-01	mg/kg	< 0.45	4.2	17	10.7	28.3	8.8
30-D04-A	0.0 - 0.5	21-Sep-01	mg/kg	--	--	--	--	--	5.2
30-D04-A	0.0 - 0.5	21-Sep-01	mg/kg	< 28	3.9 J	37.5	19	30.5	5.5
30-D06-A	0.0 - 0.5	13-Sep-01	mg/kg	--	--	--	--	--	18100 J
30-D06-A	0.0 - 0.5	13-Sep-01	mg/kg	64.4	5.4	27.1	11.1	255	5820
30-D08-A	0.0 - 0.5	13-Sep-01	mg/kg	--	--	--	--	--	14500 J
30-D08-A	0.0 - 0.5	13-Sep-01	mg/kg	205	6.2	33.9	12.2	216	6740
30-E06-B	2.0 - 2.5	13-Sep-01	mg/kg	--	--	--	--	--	667
30-E06-B	2.0 - 2.5	13-Sep-01	mg/kg	19.9 J1	4.1	24.4	10.7	54.2	1390
30-E07-A	0.0 - 0.5	13-Sep-01	mg/kg	--	--	--	--	--	4410
30-E07-A	0.0 - 0.5	13-Sep-01	mg/kg	383	5.5	33.5	13.2	298	8390
30-E10-C	4.0 - 4.5	10-Sep-01	mg/kg	--	--	--	--	--	2850
30-E10-C	4.0 - 4.5	10-Sep-01	mg/kg	117	4.5	20.7	8.7	93.4	3090
30-E11-A	0.0 - 0.5	10-Sep-01	mg/kg	--	--	--	--	--	7.3
30-E11-A	0.0 - 0.5	10-Sep-01	mg/kg	< 1.7	2.7	14.4	6.5	11.3	12.8
30-F17-C	4.0 - 4.5	19-Sep-01	mg/kg	--	--	--	--	--	7.1 J
30-F17-C	4.0 - 4.5	19-Sep-01	mg/kg	< 29	4.2	32.8	13.8	24.7	8.2
30-G05-B	2.0 - 2.5	11-Sep-01	mg/kg	--	--	--	--	--	15600 J
30-G05-B	2.0 - 2.5	11-Sep-01	mg/kg	2.8 J1	3.2	33.2	15.6	36.3	432
30-G09-A	0.0 - 0.5	18-Sep-01	mg/kg	--	--	--	--	--	178000
30-G09-A	0.0 - 0.5	18-Sep-01	mg/kg	< 1.4	3.4	38.9	13.1	48.9	473
30-H05-C	4.0 - 4.5	14-Sep-01	mg/kg	--	--	--	--	--	19300
30-H05-C	4.0 - 4.5	14-Sep-01	mg/kg	52.4	3.7	33	15.6	157	4130
30-H06-A	0.0 - 0.5	14-Sep-01	mg/kg	--	--	--	--	--	8030
30-H06-A	0.0 - 0.5	14-Sep-01	mg/kg	284	9.4	40.7	15	399	26000
30-H11-A	0.0 - 0.5	17-Sep-01	mg/kg	--	--	--	--	--	63.4
30-H11-A	0.0 - 0.5	17-Sep-01	mg/kg	< 0.58	3.9	37.4	17.3	34.9	85.5
30-I08-B	2.0 - 2.5	17-Sep-01	mg/kg	--	--	--	--	--	793
30-I08-B	2.0 - 2.5	17-Sep-01	mg/kg	< 25	2.6	25.9	15.2	17.7	105

mg/kg = milligrams per kilogram

<2 = not detected at indicated value

J = Estimated value

RG = Remediation Goal

284 Concentration above RG

(D) = Duplicate Sample

-- = not analyzed for this compound

MDL = method detection limit, range shown where applicable

PQL = practical quantification limit, range shown where applicable

a) RG based on Background calculated for Ecological Risk Evaluation (SWDIV, 1996b)

b) RG based on Background calculated for Human Health Risk Evaluation (SWDIV, 1996b)

Table 5-4
Site 30 SPLP Metals Results Compared to MCLs and Tap Water PRGs
OU 4 Supplemental FS, MCB Camp Pendleton, California

Sample ID	Depth (ft)	Date Collected	Extraction	Units	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Molybdenum	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc
			MDL Range:	µg/L	3.9	1.400	1.5	0.76-1.1	0.15	0.23	110	0.13	0.41	1.6	3.4	0.78	4.8	0.37	0.61	0.54	4.9	1.7	0.28	140	0.99	0.27	0.7
			PQL Range:	µg/L	100	10.000	5	10	2	2	200	5	5	10	50	5	100	5	5	5	400	10	10	2000	10	10	10
			MCL:	µg/L	200 [a]	6	50	1000	4	5	NE	50	NA	1300 [c]	300 [b]	15 [c]	NE	50 [a]	NE	100	NA	50	100 [a]	NA	2	15 [b]	5000 [a]
			PRG:	µg/L	36000	15	0.045	2600	73	18	NE	110	2200	1400	11000	NE	NE	880	180	730	NE	180	180	NE	2.6	260	11000
30-B06-C	4.0 - 4.5	13-Sep-01	SPLP	µg/L	552	< 4.8	< 5	41.8	< 2	< 2	95600	5.5	< 1	12.4	729	12	13700	16.5	< 3.5	5.1	2430	< 3.4	< 10	37700	< 10	5.7 J1	98.2
30-D04-A	0.0 - 0.5	21-Sep-01	SPLP	µg/L	6120	< 10	< 8.1	199	< 1.4	1 J1	29800	6.8	26.3	64.8	5980	26.9	23400	1020	< 1.5	24.2	5030	< 2.3	< 10	24300	< 1.4	243	86.3
30-D06-A	0.0 - 0.5	13-Sep-01	SPLP	µg/L	2560	212	< 2.9	27.5	< 2	< 2	2750	10.8	3.3 J1	210	4110	2280	1260	109	< 1.3	10.4	3240	< 10	< 10	15800	< 10	13.2	93.7
30-D08-A	0.0 - 0.5	13-Sep-01	SPLP	µg/L	3800	453	< 6.7	86.2	< 0.35	0.34 J1	5630	31	14.2	641	7210	7810	2880	488	< 3.1	22.1	1280	< 4.4	< 10	18100	< 10	38	236
30-E06-B	2.0 - 2.5	13-Sep-01	SPLP	µg/L	2520	33.8	< 5	44.5	< 2	0.26 J1	22900	10.7	< 2.7	43.2	3080	249	9500	70.5	< 1.5	7.9	1610	< 1.9	< 10	48800	< 10	14.3	60.9
30-E07-A	0.0 - 0.5	13-Sep-01	SPLP	µg/L	2610	274	< 3	49.7	< 0.16	< 2	3830	9.6	6.6	371	2930	5650	1990	147	< 4.6	26.2	891	< 2.2	< 10	18800	< 10	18.6	350
30-E10-C	4.0 - 4.5	10-Sep-01	SPLP	µg/L	6510	26.9	< 1.8	27.6	< 2	0.29 J1	4120	13.3	3.9 J1	41	6220	279	3890	63.6	< 2.5	11.4	1550	< 4.8	< 10	40100	< 10	29.2	85
30-E11-A	0.0 - 0.5	10-Sep-01	SPLP	µg/L	338	< 3.2	< 1.6	10.5	< 2	< 2	43400	17.2	< 1.7	< 11.7	432	57	23700	33.5	< 1.8	21.1	2240	< 1.9	< 10	91500	< 10	4.3 J1	150
30-F17-C	4.0 - 4.5	19-Sep-01	SPLP	µg/L	1990	< 2.8	< 5	30.4	< 2	< 2	49500	12.1	< 0.95	< 7.5	2290	6	23400	16.3	9.1	7.4	8700	< 10	< 10	101000	< 1.3	16.8	69.5
30-G05-B	2.0 - 2.5	11-Sep-01	SPLP	µg/L	935	61	< 5	10.9	< 2	< 2	38400	8.7	< 0.9	< 6.6	1080	41.6	27800	15.5	12.1	3.7 J1	10200	< 2.7	< 10	363000	< 10	5.9 J1	26.7
30-G09-A	0.0 - 0.5	18-Sep-01	SPLP	µg/L	3710	< 10	< 2	59.4	< 2	< 2	14000	13.9	5.1	44.9	4540	564	3210	183	< 3.3	12.2	1770	< 2.6	< 10	16600	< 10	22.5	55
30-H05-C	4.0 - 4.5	14-Sep-01	SPLP	µg/L	1390	405	< 6.9	203	< 0.84	0.5 J1	24300	4.1 J1	4.9 J1	1140	799	11800	7630	280	< 0.83	14.2	2390	< 10	< 10	37000	< 10	54.5	273
30-H06-A	0.0 - 0.5	14-Sep-01	SPLP	µg/L	5570	1460	18.2	182	< 0.46	0.41 J1	15700	38.4	24.4	1600	10300	24200	11400	869	< 3.4	34.1	4730	< 4	< 10	79100	< 2.8	61.2	334
30-H11-A	0.0 - 0.5	17-Sep-01	SPLP	µg/L	2330	< 5.1	< 3.9	245	< 0.65	0.64 J1	22900	3.8 J1	7	35.2	2270	113	10000	361	< 0.81	7.9	5330	< 4	< 10	62400	< 10	50.3	72.2
30-I08-B	2.0 - 2.5	17-Sep-01	SPLP	µg/L	4330	< 9.2	< 6.9	109	< 0.19	0.38 J1	19100	25.3	11.7	49.1	13700	178	4110	656	< 5.5	17	2180	< 5	< 10	14800	< 10	77.7	70.2

µg/L = micrograms per liter
<2 = not detected at indicated value
J = Estimated value
(D) = Duplicate Sample
PRG = preliminary remediation goal
113
MCL = Maximum Contaminant Level
a Secondary Ca Concentration above MCL
b Action Level (AL) = health-based advisory levels established by the California Department of Health Services (DHS) for chemicals in drinking water for which primary MCLs have not been adopted.
c Lead and copper are not regulated by MCLs, but in a Treatment Technique for water pipeline systems

113 Concentration above MCL
NA = not applicable
NE = not established
NR = not reported
MDL = method detection limit, range shown where applicable
PQL = practical quantification limit, range shown where applicable

Table 5-5
Site 30 Summary of Human Health Screening-Level Evaluation
OU 4 Supplemental FS, MCB Camp Pendleton, California

Exposure Scenario	Total Cancer Risk[a]	Total Hazard Index[a]
Hypothetical Residential Receptor (0 - 10 ft bgs)		
Antimony	-	5.2
Arsenic	4×10^{-5}	0.7
Beryllium	1×10^{-5}	< 0.1
Chromium[a,b]	3×10^{-4}	0.1
Lead	-	146[d]
Manganese	-	1.4
Other Detected Chemicals	4×10^{-7}	
Total (All COPCs)	**(4×10^{-5})[c]**	**155 (8.3)[d]**

[a] Source: SWDIV, 1996b (Draft Final RI Report for Group C Sites)

[b] The cancer risk estimate for chromium assumed that all detected chromium is hexavalent and is based on toxicity data that has been withdrawn by California The actual cancer risk from chromium is likely less than 1×10^{-6}.

[c] The risk value shown in parentheses excludes beryllium and chromium (see text).

d A non-cancer hazard was calculated for lead and was incorrectly assumed to be additive to the hazard quotients for the other COPCs. The value shown in parentheses is the hazard index without lead.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Overall Protection of Human Health and the Environment					
Human Health Protection	Provides no reduction in baseline risks. Existing soil contamination will remain. Not protective of human health.	Existing soil contamination will remain. Eliminates potential exposure by controlling site use. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs. Site would be backfilled with clean imported soil. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it in an off-base licensed disposal facility. Site would be backfilled with clean imported soil. Protective of human health.	Reduces risks by excavating and removing all contaminated soil exceeding RGs, and disposing of it at the on-Base CAMU facility. Site would be backfilled with clean imported soil. Protective of human health.
Environmental Protection	Soil contamination poses a risk to local habitats and potential ecological receptors. Existing soil contamination could pose a threat to groundwater. Site is located in the floodplain and the cover could wash out if the area was flooded. Not protective of the environment.	Soil contamination poses a risk to local habitats and potential ecological receptors. Existing soil contamination could pose a threat to groundwater. Site is located in the floodplain and the cover could wash out if the area was flooded. Not protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.	Reduces risks by excavating and removing all contaminated soil exceeding ecological risk and groundwater impact levels. Site would be backfilled with clean imported soil. Protective of the environment.
Compliance with ARARs					
Chemical-Specific ARARs	Does not comply with risk-based residential PRG or ecological risk ARARs.	Complies with risk-based residential PRG ARARs through use restrictions, but does not comply with ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.	Complies with risk-based residential PRG and ecological risk ARARs.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1 No Action	Alternative 30-2 Institutional Controls	Alternative 30-3 Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Alternative 30-4 Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Alternative 30-5 Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Compliance with ARARs (continued)					
Location-Specific ARARs	Does not comply with location-specific ARARs of the Endangered Species Act and the Migratory Birds Act.	Does not comply with location-specific ARARs of the Endangered Species Act and the Migratory Birds Act.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.	On-site construction would comply with action- and location-specific requirements of the Endangered Species Act, the Migratory Birds Act, and the Archeological Resources Protection Act. Coordination with the USFWS and CDFG would be required.
Action-Specific ARARs	Does not comply with RCRA closure and post-closure requirements.	Complies with RCRA closure with post-closure requirements.	On-site construction would meet APCD emission ARARs. Recycled products would be required to meet applicable LDRs before reuse. Complies with RCRA closure with no post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.	On-site excavation and transportation would meet RCRA ARARs and APCD emission ARARs. Complies with RCRA clean closure with no post-closure requirements.
Long-Term Effectiveness and Permanence					
Effectiveness to reduce risk	Existing risk will remain because the contamination will not be removed. Would not provide long-term effectiveness and permanence.	Would reduce risk by eliminating potential exposure to soil contaminants. Provides long-term effectiveness for human health protection as long as institutional controls are enforced. Provides minimal long-term effectiveness for ecological risk protection due to flooding potential.	Would reduce risk by excavating and removing all contaminated soil above action levels. Would result in acceptable levels of residual soil contamination from both a human and ecological perspective. Provides long-term effectiveness and permanence.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.	Would reduce risk by excavating and removing all contaminated soil above action levels. Provides long-term effectiveness and permanence.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	**Institutional Controls**	**Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil**	**Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal**	**Soil Excavation, Backfill, Pretreatment, and On-Base Disposal**
Long-Term Effectiveness and Permanence (continued)					
Adequacy and Reliability of Controls	Provides no reliable or adequate controls for remaining contamination.	Institutional actions would adequately and reliably reduce human health exposure pathways and risks. However, site is subject to flooding and there is potential existing cover could wash out. Therefore, not protective of ecological receptors.	Excavation and off-site disposition/ recycling of treated excavated soil would adequately, reliably and permanently reduce human health exposure pathways and risks.	Excavation and off-base disposal will adequately, reliably, and permanently reduce human health exposure pathways and risks.	Excavation and on-base disposal at CAMU facility will adequately, reliably, and permanently reduce human health exposure pathways and risks.
Need for 5-Year Review	No review will be conducted.	A 5-year review will be conducted.	No review will be done.	No review will be conducted.	No review will be conducted.
Reduction of Toxicity, Mobility, or Volume Through Treatment					
Treatment Process Used	None.	None.	On-Base chemical S/S via asphalt mixing and incorporation.	On-Base chemical fixation/ solidification (TTU).	On-Base chemical fixation/ solidification (TTU).
Amount Destroyed or Treated	None.	None.	Approximately 16,500 cubic yards of (in-place) contaminated soil.	Approximately 16,500 cubic yards of (in-place) contaminated soil.	Approximately 16,500 cubic yards of (in-place) contaminated soil.
Reduction of Toxicity, Mobility, or Volume	None.	None.	Demonstrated reduction in mobility and toxicity at wide range of sites based on routine leachability tests. Increase in volume through stabilization.	Reduction of mobility but increase in volume through stabilization.	Reduction of mobility but increase in volume through stabilization.
Irreversible Treatment	None.	None.	Demonstrated long-term irreversibility of process.	Long-term irreversibility of stabilization is not well documented.	Long-term irreversibility of stabilization is not well documented.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Reduction of Toxicity, Mobility, or Volume Through Treatment (continued)					
Type and Quantity of Residuals Remaining After Treatment	No treatment.	No treatment.	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).	Contaminant concentrations remaining in the soil at the site would be at or below acceptable levels (i.e., remedial goals).
Statutory Preference for Treatment	Does not satisfy the statutory preference for treatment.	Does not satisfy the statutory preference for treatment.	Satisfies the statutory preference for treatment.	Partially satisfied because the soil will be treated on base before disposal.	Partially satisfied because the soil will be treated on base before disposal.
Short-Term Effectiveness					
Community Protection	Risk to community will remain the same as the baseline risk. Baseline human health risk (3×10^{-5}) is within EPA's acceptable range; Arsenic primary contributor to cancer risk.	No risk to community from planned institutional actions.	Temporary increase in potential risks due to dust emissions from soil excavation, handling, moving, stockpiling, and treatment at on-Base location.	Temporary increase in potential risks due to dust emissions from soil, excavation, handling, transportation, and treatment at off-Base facility.	Temporary increase in potential risks due to dust emissions from soil, excavation, treatment, handling, hauling, and disposal at on-Base CAMU facility.
Worker Protection	Not applicable because no remedial action will be implemented.	Limited protection would be required during site erosion control maintenance activities.	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation and treatment (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation, and off-site disposal (use of PPE and dust suppressants).	Protection would be required against potential inhalation of fugitive dust, dermal contact, and ingestion of impacted soil site soil during excavation, transportation and on-site disposal (use of PPE and dust suppressants).

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

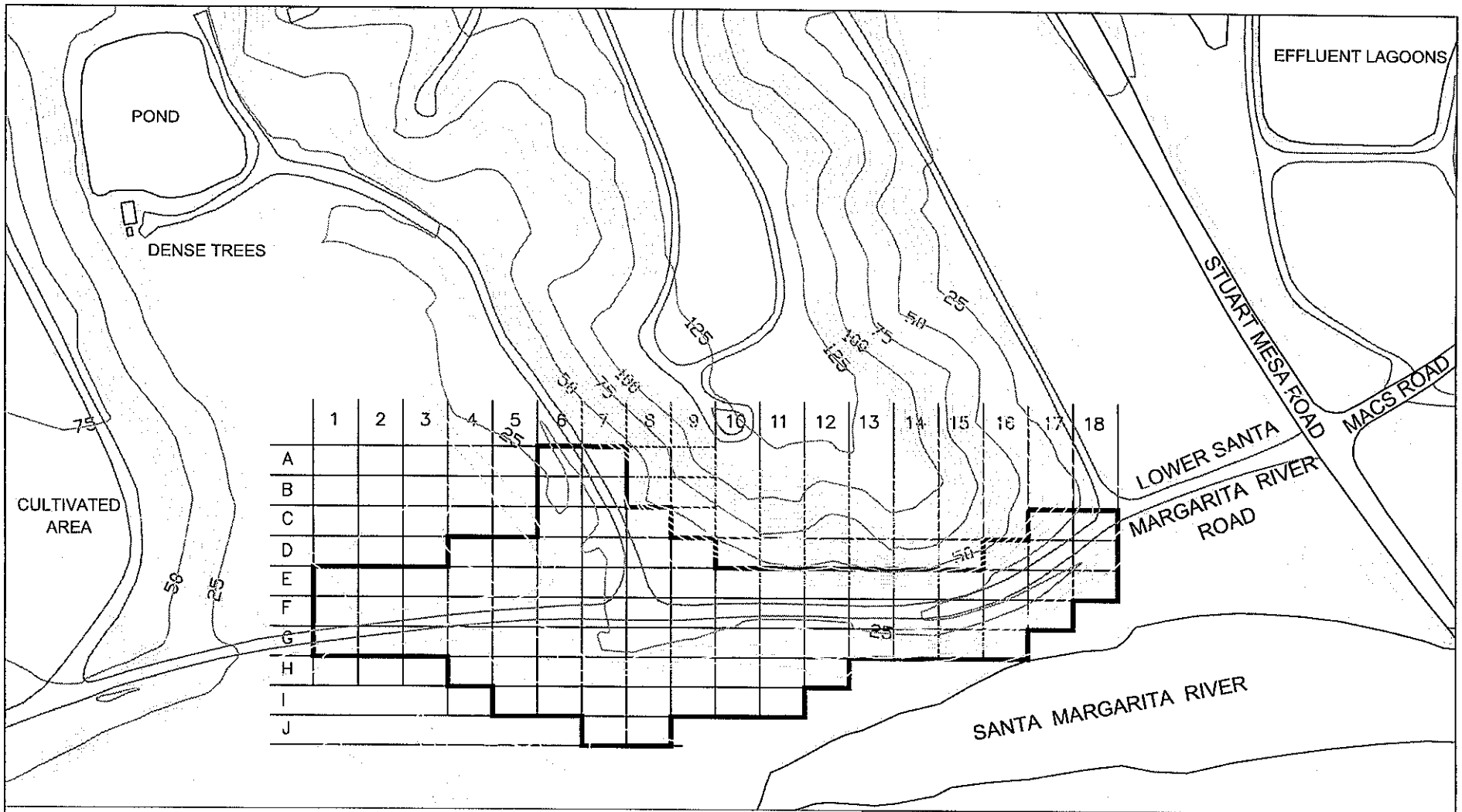
NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Short Term Effectiveness (continued..)					
Environmental Impacts	Risk to local habitats and potential ecological receptors from existing conditions will remain.	No adverse environmental impact from institutional actions. Risk to local habitats and potential ecological receptors from existing conditions will remain.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.	No significant adverse impacts to environment. Some short-term impacts to ecological receptors and habitats could occur. Affected area would be revegetated following completion of remedial actions. Close coordination with the appropriate regulatory agencies would be required.
Time Until Action Is Completed	Not applicable.	Continued site maintenance.	< 2 years (including permitting).	18 weeks.	18 weeks.
Implementability					
Ability to Construct and Operate	No construction or operation is involved.	Land use restrictions and site maintenance are readily implementable.	Excavation, pretreatment and ex-situ stabilization of contaminated soil use standard and readily available labor skills, equipment, and materials.	Excavation, stabilization, and disposal are readily implementable.	Excavation, stabilization, and disposal are readily implementable.
Ease of Doing More Action if Needed	Because no action is involved, there will be no interference with future actions.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can be easily implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.	Soil remedial actions can easily be implemented, if required in the future.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Implementability (continued)					
Ability to Monitor Effectiveness	Not applicable because no remedial action will be implemented.	Site will be periodically monitored for erosion control. Base Master Plan restrictions for land use will be enforced.	Effectiveness will be monitored through confirmation sampling and analysis during excavation, and through routine leachability testing during treatment.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.	Effectiveness will be monitored through confirmation sampling and analysis during excavation.
Ability to Obtain Approvals and Coordinate with Other Agencies	No approval is necessary.	No approval is necessary.	Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors. Would require monitoring for archeological artifacts during excavation activities. May have to be permitted as a TTU under permit-by-rule, which would govern the recycling/asphalt incorporation process. Storage of untreated soil (designated as RCRA-hazardous waste) awaiting stabilization could require a hazardous waste storage permit.	Manifests will be required for transportation of wastes. Off-base facility has existing permits for treatment and disposal. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors and monitoring for archeological artifacts during excavation activities.	No manifests will be required for on-Base hauling of wastes. On-Base CAMU facility will have required permits for disposal of contaminated soil. Would require coordination with and approval from USFWS and CDFG to ensure protection of ecological receptors and monitoring for archeological artifacts during excavation activities.
Availability of Services and Capacities	Not applicable.	Services are available for the proposed institutional actions.	Services are commercially available for the excavation/earthwork and on-Base soil solidification/stabilization process.	Services are commercially available for the excavation/earthwork and off-Base disposal.	Services are commercially available for the excavation/earthwork and on-Base disposal.

Table 5-6
Site 30 Summary of Detailed Analysis of Alternatives
OU 4 Supplemental FS, MCB Camp Pendleton, California

NCP Criterion	Alternative 30-1	Alternative 30-2	Alternative 30-3	Alternative 30-4	Alternative 30-5
	No Action	Institutional Controls	Soil Excavation, Backfill, Ex-Situ Solidification/ Stabilization, and on-Base Reuse of Treated Soil	Soil Excavation, Backfill, Pretreatment, and Off-Base Disposal	Soil Excavation, Backfill, Pretreatment, and On-Base Disposal
Implementability (continued)					
Availability of Equipment, Specialists, and Materials	Not applicable.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.	All services require commercially available standard equipment and machinery.
Availability of Technologies	Not applicable.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.	All technologies are proven and available.
Cost					
Overall Cost	$0	$354,600	$4,734,800	$5,727,500	$3,985,900 - $4,621,900



Legend

Site 30 OU 4 SFS Characterization Unit Grid

N

0 250 500
Scale in Feet

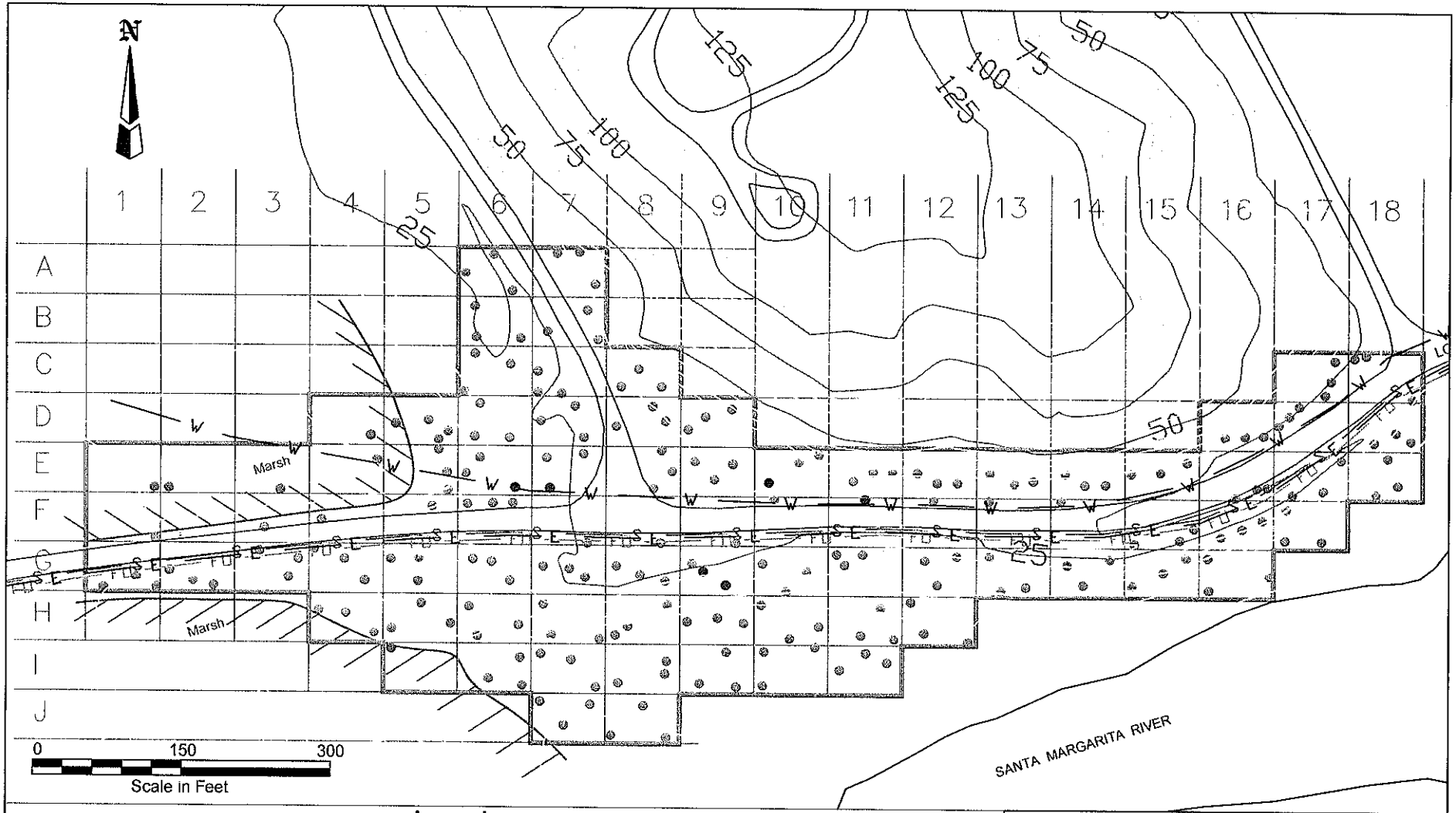
Figure 5-1

Site 30
Location Map

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS
Pasadena, CA

k:\cad\esmiss\ce\camppendleton\OU4FS\IOU4Survey\S30base.dwg



Legend

- W — Approximate Location of Water Line
- S — Approximate Location of Sewer
- FO — Approximate Location of Fiber Optics
- E — Approximate Location of Power Lines
- Boring, No Lead Fragments Encountered
- Boring In Marsh Area, No Lead Fragments Encountered
- Boring, Lead Fragments Encountered (surface)
- Boring, Lead Fragments Encountered (4 ft bgs or deeper)
- Marsh

Figure 5-2

Site 30
Sampling Locations

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS
Pasadena, CA

k:\cad\esmiss\ce\comppendleton\OU4FS\IOU4Survey\5-2_S30.dwg

Figure 5-3
Site 30 Lead Detected in Soil, from 0 to 1 ft bgs
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A						5.1 J	3.1 J											
B						6.3	6.7 J											
C						40.7 J	11300 J	11.2									12.8 J	4
D				5.5	14.8 J	18100 J	13100	14500 J	6 J							6.2	8.3 J	7.5 J
E	46.3	32.6	10.8	3.7	123 J	5590	8390	3650	8860	3860	12.8	8.3	11.1	9.6	5.6	5	3.5 J	6 J
F	14.4	5	3.6 J	18.7	16.6	267	495 J	11.9 J	540 J	444 J	25600 J	8390 J	14.9 J	9.6 J	5.1 J	6.4 J	8.1 J	
G	16.5 J	39.1	4 J	8.5	1610 J	688	680	143	178000	170 J	934 J	18.8 J	35.5 J	8.5 J	7.3 J	7.1 J		
H				309 J	2230	26000	2740	136	117	108	85.5	21						
I					110	21.6	34.2	3	4.6	13.3	10.3							
J							4.6	9.4										

results shown in milligrams per kilogram (mg/kg)
J = Estimated value
40.7 J Lead (unless otherwise indicated) detected in soil above RG (29 mg/kg) from 0 to 1 ft bgs

Figure 5-4
Site 30 Lead Detected in Soil, from 1 to 3 ft bgs
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A						8.1 J	4.6 J											
B						4.5	4.8 J											
C						4.8 J	550 J	18.8									4.4 J	4.5
D				7.7	4.7 J	284 J	1040	13.7 J	4.7 J							2.5	4.7 J	4.1 J
E	9.8	44	5.6	5.7	14.7 J	1390	159	413	3740	2060	3.5	3.4	4.6	6.1	1.4	3.7	5.1 J	4.2 J
F	4.6	3.4	2.3	2.9	3.1	49.3	7.5 J	11 J	190 J	10.2 J	3.7 J	132 J	12.4 J	5.4 J	4 J	5.5 J	2.6 J	
G	8.4 J	5.5	2.5 J	2.9	15600 J	2840	11.3	7	8.4	14.8 J	71 J	4 J	4.2 J	3.5 J	4.5 J	5.7 J		
H				12.8 J	12500	4450	3.7	6	4	3.1	1.7	1.4						
I					5	4	2.4	793	1.7	3.4	1							
J							3.1	2.7										

results shown in milligrams per kilogram (mg/kg)
J = Estimated value
667 Lead detected in soil above RG (29 mg/kg) from 1 to 3 ft bgs

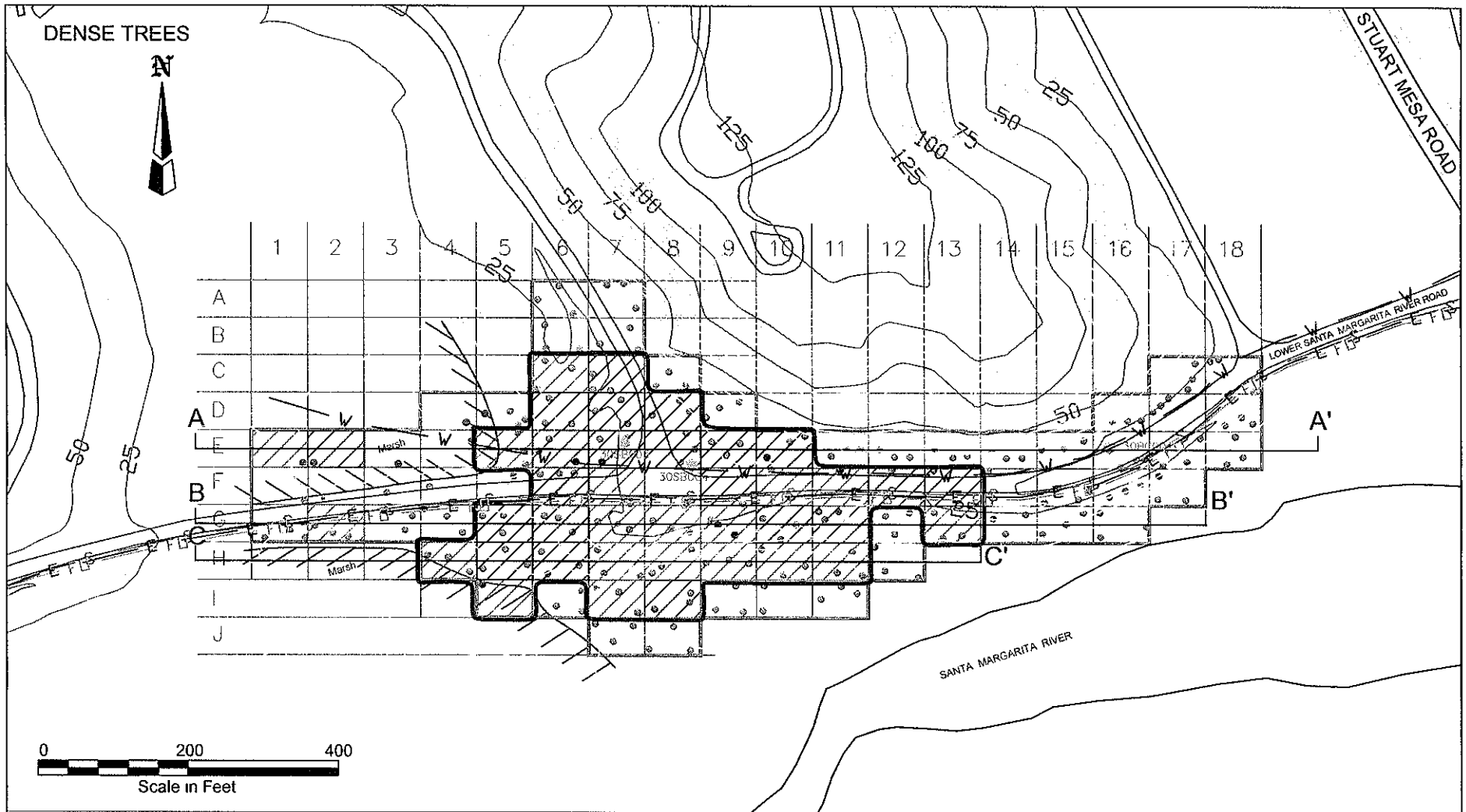
Figure 5-5
Site 30 Lead Detected in Soil, from 3 to 5 ft bgs
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A						4.7 J	4.4 J											
B						8.8	6.3 J											
C						9.4 J	9.7 J	14.6 J									4 J	3
D					4.8 J	717 J	94.4	29.9 J	4.7 J							4.5	6.3 J	5.9 J
E					6.6 J	8.2	44.9	179	1490	3090	2.7	3.1	2.3	4.2	3.8	10.4	3.8 J	4.1 J
F	4.8	2.7	5.4	3	5 J	80.2	10.6 J	19.5 J	49.8 J	11.1 J	25.6 J	14.6 J	33.3 J	5.8 J	4.1 J	4.8 J	8.2	
G	6.2 J	5.8	3.7 J	4.6 J	7450 J	697 J	9.2	5.2	6	98.9 J	16.1 J	3.3 J	7.3 J	4.2 J	4.6 J	4.2 J		
H				22 J	19300	1900	5.4	5.1	1.4	1.3	1.4	3.6						
I						1.6	2.3	0.85	1.2	1.2	1.9							
J							0.95	1.2										

results shown in milligrams per kilogram (mg/kg)

J = Estimated value

697 J Lead (unless otherwise indicated) detected in soil above RG (29 mg/kg) from 3 to 5 ft bgs



Legend

- Boring, No Lead Fragments
- Boring In Marsh Area, No Lead Fragments
- Boring, Lead Fragments (surface)
- Boring, Lead Fragments (4 ft bgs or deeper)
- RI Boring (SWDIV, 1996b)
- Characterization Unit, 0-1 ft bgs > RG
- Characterization Unit, 0-3 ft bgs > RG
- Characterization Unit, 0-5 ft bgs > RG
- Marsh
- OU 4 SFS Approximate Extent
- A A' Cross Section Line

Figure 5-6

Site 30
Distribution of Metals Above RGs and Visible Lead Fragments

OU 4 Supplemental FS
MCB Camp Pendleton, California

PARSONS
Pasadena, CA

k:\cad\esmiss\ce\campendleton\OU4FS\IOU4Survey\5-6_S30.dwg

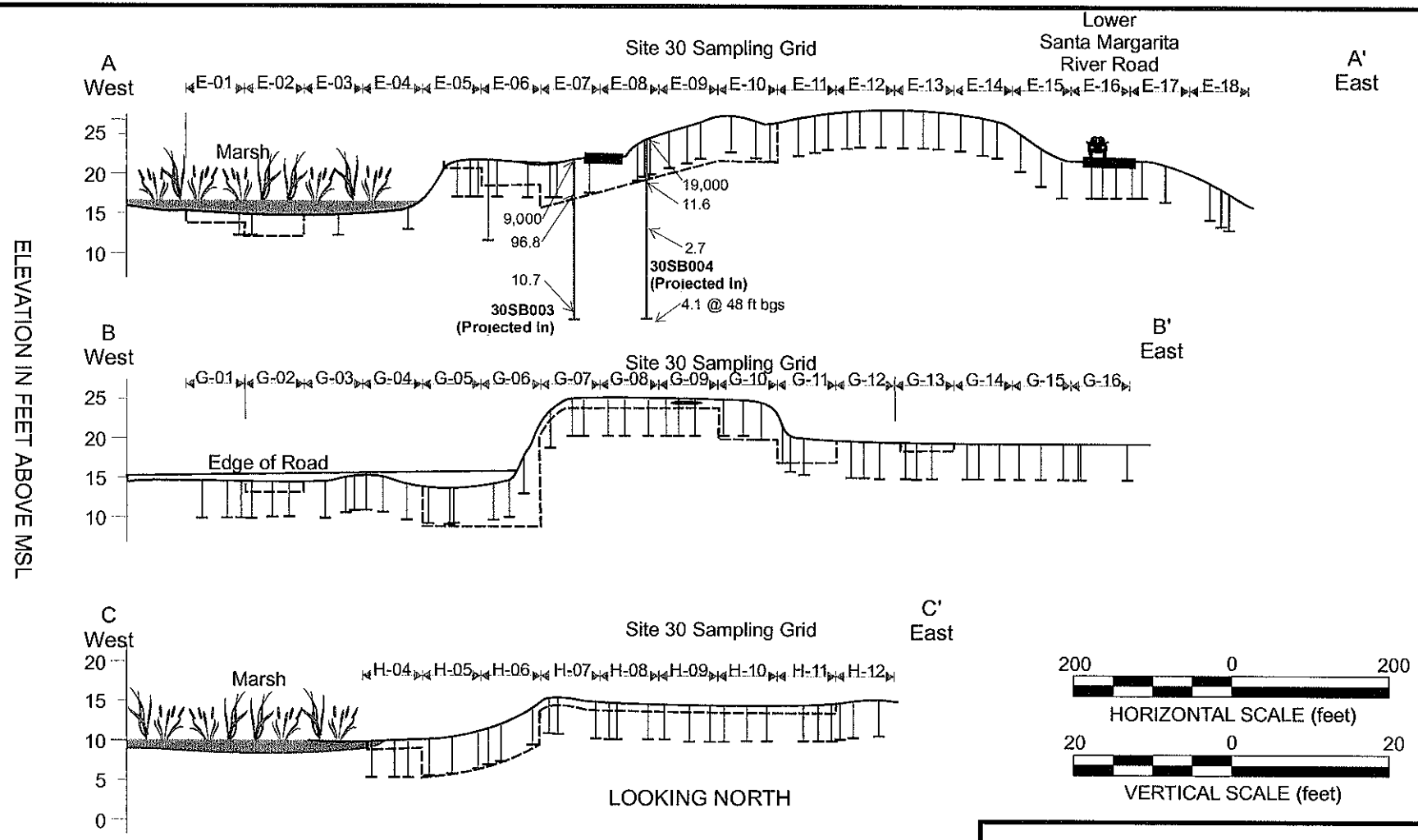
Figure 5-7
Site 30 Distribution of Metals Above RGs By Deepest Depth
OU 4 Supplemental FS, MCB Camp Pendleton, California

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
A																		
B																		
C						40.7 J	550 J											
D						717 J	94.4	29.9 J										
E	46.3	44			123 J	1390	44.9	179	1490	3090								
F						80.2	495 J		49.8 J	444 J	25600 J	132 J	33.3 J					
G		39.1			7450 J	697 J	680	143	178000	98.9 J	71 J		35.5 J					
H				309 J	19300	1900	2740	136	117	108	85.5							
I					110		34.2	793										
J																		

results shown in milligrams per kilogram (mg/kg)
J = Estimated value
Lead Concentractions Above RG Shown for Deepest Depth
40.7 J Lead detected in soil above RG from 0 to 1 ft bgs
667 Lead detected in soil above RG from 1 to 3 ft bgs
697 J Lead detected in soil above RG from 3 to 5 ft bgs
Approximate Volume of Soil > Lead RG of 29 mg/kg

CU = 75 x 50 ft | Area Extent = 150,000 sq ft = 3.4 acres

Excavation Depth	# of CUs	Volume
0 to 1 ft bgs	19	2,639
1 to 3 ft bgs	6	2,500
3 to 5 ft bgs	15	10,417
	Total:	**15,556 cu yd**



LEGEND

Approximate Bottom of Impacted Soil (Based on Supplemental FS 2002 Analytical Data)

Lead Fragments Encountered in Boring

RI Boring Location (SWDIV, 1996b) with Lead Concentrations Shown in mg/kg at Indicated Depth

Figure 5-8

Site 30
Generalized Cross Sections

OU 4 Supplemental FS
Camp Pendleton, CA

PARSONS

Pasadena, CA

K:\DEPTS\DEPT48\CAMPPENDLETONRIFS\740012\FIELD\OU4FS Report\DraftFinal\Figures\Fig5-8.cdr

Figure 5-9
Site 30 Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 1 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
No Action	None	None	No action is taken.	Required for consideration by NCP.
Institutional Action	Access Restrictions	Use Restrictions / Fencing	Administrative / physical measures are taken to limit site access and use and secure the site.	Potentially applicable. Only partially effective for ecological receptors.
Containment	Capping	Asphalt Cap	Single-layer bituminous asphalt surface cover is placed over site.	Not applicable due to site conditions (i.e., floodplain).
		Concrete Cap	Single-layered concrete cover composed of aggregate and cementitious mixtures is placed over site.	Not applicable due to site conditions (i.e., floodplain).
		Engineered Soil Cover	Single- or multi-layered soil cover designed to required performance standards.	Not applicable due to site conditions (i.e., floodplain).
Removal	Excavation	Mechanical Excavation	Contaminated soil is excavated using heavy equipment.	Potentially applicable.
Disposal	Land Disposal	Backfilling	Treated soil is used as a backfill for the excavated site area.	Potentially applicable.
		On-Base Landfilling	Treated soil is transported to an on-Base landfill.	Potentially applicable.
		Off-Base Landfilling	Contaminated soil is transported to a permitted off-Base disposal facility.	Potentially applicable.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 5-9
Site 30 Initial Screening of Technologies for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California
(Page 2 of 2)

Soil General Response Actions	Remedial Technology	Process Options	Description	Screening Comments
In Situ Treatment	Physical / Chemical	Soil Flushing	Flushes contaminants out of soil via injection or infiltration of water or aqueous solution. Groundwater collection and treatment required.	Not readily implementable. Degrades groundwater where it is not currently a concern.
		Solidification / Stabilization	Chemical reagents are mechanically mixed with soil matrix to reduce the toxicity and mobility of metals.	Not effective for site conditions.
		In-Situ Vitrification	Soil waste is heated to the melting point through electrically-charged probes; glassy monolith results.	Difficult to implement and impractical for site contamination.
	Biological	Phytoremediation	Plants are used to extract contaminants from shallow soils.	Not effective for metals and depth of contamination.
Ex-Situ Treatment	Physical / Chemical	Soil Washing	Water-based waste removal process. Water can be augmented with surfactant, leaching agent or chelating agent.	Not effective for site conditions.
		Acid Extraction	Metals are solubilized and removed from the soil using acidic (i.e., hydrochloric acid) reagents.	Not very effective for metals and difficult to implement.
		Solidification / Stabilization	Chemical reagents are mixed with excavated soils to reduce the toxicity and mobility of metals.	Effective in reducing contaminant mobility. Potentially applicable.
		Vitrification	Excavated soil is heated to the melting point through electrical power to form stable glass and crystalline structure.	Difficult to implement and impractical for site contamination.
	Thermal	Thermal Desorption	Uses heat in a controlled environment to desorb and remove contaminants from the soil.	Not effective for metals.
		Incineration	Contaminated soil is burned in a controlled environment to remove organic contaminants.	Not effective for metals.

Process Option Screened Out Durning Initial Screening

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Screening.vsd

Figure 5-10
Site 30 Evaluation of Process Options for Soil
OU 4 Supplemental FS, MCB Camp Pendleton, California

Soil General Response Actions	Remedial Technology	Process Options	Effectiveness	Implementability	Cost
No Action	None	None	Low; contaminants would remain in the soil. Both human and ecological receptors could be exposed. RAOs are not achieved.	High; no action is needed.	High; there are no costs.
Institutional Action	Access Restrictions	Use Restrictions / Fencing	Low to moderate; contaminants would remain in the soil. Effective to reduce human exposure but not protective of ecological receptors.	Moderate to high; readily implementable. DON position is to limit the use of institutional controls to maximize the utilization of military training lands.	High; low capital and O&M costs.
Removal	Excavation	Mechanical Excavation / Backfilling	High; removes contaminated soil and backfills excavation with clean soil. Demonstrated ability to meet RAOs but without treatment; does not reduce contaminant mobility or toxicity.	Moderate to high; readily implementable. Requires agency approval, Base coordination, and H&S planning.	Moderate; high capital costs, low O&M costs.
Disposal	Land Disposal	Off-Base Landfilling	High; demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment requirements by off-Base disposal facility.	High; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option.	Moderate; high capital costs, low O&M costs.
		On-Base Landfilling	High; demonstrated ability to meet RAOs. Reduces contaminant mobility and toxicity through pretreatment requirements by on-Base disposal facility.	Moderate; readily implementable. Landfilling of hazardous waste viewed unfavorably; increasingly difficult and expensive option; dependent on siting, design, and construction of on-Base disposal facility.	Moderate; moderate capital costs, moderate O&M costs.
Ex-Situ Treatment	Physical / Chemical	Solidification / Stabilization	High; permanent treatment effectively reduces contaminant mobility and toxicity. Generally requires treatability studies to optimize effectiveness and meet RAOs.	Moderate; implementability has been demonstrated at similar military installations; will require pilot testing and additional regulatory coordination.	Moderate; moderate capital costs, low O&M costs.

K:\Depts\Dept48\CampPendletonRIFS\740012\OU4FS Report\1D_Evaluation.vsd

6.0 REFERENCES

Air Force Center for Environmental Excellence (AFCEE). 2000. Technical Protocol for Determining the Remedial Requirements for Soils at Small-Arms Firing Ranges. Prepared by Parsons Engineering Science. August.

Air Quality Management District. (AQMD), (South Coast) 1988. Policy on Implementation of Rule 1303.

Agency for Toxic Substances and Disease Registry (ATSDR). 1990. *Toxicological Profile for Copper*. US Public Health Service. September.

ATSDR. 1992a. *Toxicological Profile for Cobalt*. US Public Health Service. September.

ATSDR. 1992b. *Toxicological Profile for Vanadium*. US Public Health Service. September.

ATSDR, 1996. *Toxicological Profile for Methyl tert-Butyl Ether*. Prepared by Research Triangle Institute. August.

ATSDR. 1998. *Toxicological Profile for Chlorinated Dibenzo-p-Dioxins*. US Public Health Service. December.

ATSDR. 1999. *Toxicological Profile for Cadmium*. US Public Health Service. September.

ATSDR. 2000a. *Toxicological Profile for Arsenic*. US Public Health Service. September.

ATSDR. 2000b. *Toxicological Profile for Beryllium*. US Public Health Service. September.

Baes, C.F. III, R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. *A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides Through Agriculture*. Oak Ridge National Laboratory, ORNL-5786.

Bechtel Jacobs Company (BJC). 1998. *Empirical Models for the Uptake of Inorganic Chemicals from Soil by Plants*. BJC/OR-133, Oak Ridge National Laboratory, Oak Ridge, Tennessee.Brown, B.T. 1993. The Bell's vireo. In: A. Poole and F. Gills (eds.). *The Birds of North America*. No. 35. Academy of Natural Sciences. Washington, D.C.

Beyer, W.N., E.E. Connor, and S. Gerould. 1994. Estimates of soil ingestion by wildlife. *Journal of Wildlife Management*. 58:375-382.

Bowers, M.A. and H.D. Smith. 1979. Differential habitat utilization by sexes of the deer mouse, Peromyscus maniculatus. *Ecology*. 60:869-875.

Brown, B.T. 1993. The Bell's vireo. In: A. Poole and F. Gills (eds.). *The Birds of North America*. No. 35. Academy of Natural Sciences. Washington, D.C.

Burrard, G., 1951. *The Identification of Firearms and Forensic Ballistics*. Herbert Jenkins Ltd., London.

California Coastal Commission (CCC). 1993. Maps indicating coastal zone designations for County of San Diego. June.

California Environmental Protection Agency (Cal/EPA). 1994. *Preliminary Endangerment Assessment Guidance Manual*. January.

Cal/EPA. 1996. *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities. Chapter 9: A Toxicity Equivalency Factor Procedure for Estimating 2,3,7,8-Tetrachlorodinzo-p-dioxin Equivalents in Mixtures of Polychlorinated Dibenzo-p-Dioxins and Polychlorinated Dibenzofurans.* Department of Toxic Substances Control. August.

Cal/EPA. 2002. *California Cancer Potency Values.* Toxicity Criteria Database. Office of Environmental Health Hazard Assessment (OEHHA).

CDM. (California Division of Mines), Bulletin 125, 1943.

CDMG. (California Division of Mines and Geology), 1966.

Corbin, D., 1979. *Discover Swaging.* Stackpole Books, Harrisburg, Pennsylvania.

Cronin, K.L. and E.L. Bradley. 1988. The relationship between food intake, body fat and reproductive inhibition in prairie deer mice (*Peromyscus maniculatus bairdii*). *Comp. Biochem. Physiol. and Comp. Physiol.*:89(4):669-673.

DeSesso, J.M., and F.T. Price. 1990. *General Guidance for Ecological Risk Assessments at Air Force Installations.* The MITRE Corporation, Brooks AFB, Texas.

Department of Defense. (DOD), (United States), 1998. Military Munitions Rule Implementation Policy. 01 July 1998.

DOD. 1999. Range Rule Risk Methodology: Tools, Models, and Protocols (R3M). August.

Department of Health Services (DHS), (California) 2002a. *Determination of 1,2,3-Trichloropropane in Drinking Water by Continuous Liquid-Liquid Extraction and Gas Chromatography/Mass Spectrometry.* Division of Drinking Water and Environmental Management Sanitation and Radiation Laboratories Branch. February.

DHS, 2002b. *Determination of 1,2,3-Trichloropropane in Drinking Water by Purge and Trap Gas Chromatography/Mass Spectrometry.* Division of Drinking Water and Environmental Management Sanitation and Radiation Laboratories Branch. February.

Department of the Navy, (DON), (United States). 1998. Letter from Tom Huetteman Region IX to Henry Gee, Department of the Navy, regarding groundwater classification as a potential drinking water source. 30 June 1998.

DON. 1992. *Navy/Marine Corps Installation Restoration Manual.*

DON. 2000. Memorandum of Agreement Between the United States Department of the Navy and the California [Environmental Protection Agency] Department of Toxic Substances Control. Signed 10 March 2000.

Department of Toxic Substances Control (DTSC). (California Environmental Protection Agency), 1992. *Supplemental Guidance for Human Health, Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities.* Office of Scientific Affairs.

DTSC. 1996. *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities.* Human and Ecological Risk Division (HERD). 4 July.

DTSC, 1997. Selecting Inorganic Constituents as Chemicals of Potential Concern at Risk Assessments at Hazardous Waste Sites and Permitted Facilities. February 1997.

DTSC, 1998. Establishment of 'Ambient Dioxin/Furan Concentration [PCA 14740 SITE 400136-47 H:30]. Memorandum From James Polisini, Ph.D., TR Hathaway, DVM; John P. Christopher, Ph.D. Staff Toxicologists Human and Ecological Risk Division to Mike Wade, Ph.D., Senior Toxicologist Human and Ecological Risk Division. December 17.

DTSC, 2000. LEADSPREAD 7 Microsoft Excel Spreadsheet. http://www.cwo.com/~herd1/ledspred.htm.

Drexler, J.W., 1997. University of Colorado at Boulder. Personal Communication. August.

EFA West. 1998. Development of Toxicity Reference Values for Conducting Ecological Risk Assessments at Naval Facilities in California. Interim final. Engineering Field Activity (EFA), West, Naval Facilities Engineering Command, United States Navy. San Bruno, California.

Efron, B. 1981. "Censored Data and the Bootstrap". *Journal of the American Statistical Association*. Volume 76, No. 374. June.

Efron, B. and R.J. Tibshirani. 1993. *An Introduction to the Bootstrap. Monographs on Statistics and Applied Probability 57*. Chapman & Hall.

Eisler, R. 1993. *Zinc Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. Contaminant Hazard Reviews, Report 26, Biological Report 10. U.S. Fish and Wildlife Service. Washington, D.C. 106pp.

Federal Register. *2000. Endangered and Threatened Wildlife and Plants: Proposed Determination of Critical Habitat for the Coastal California Gnatcatcher*. Proposed Rule. Department of the Interior, Fish and Wildlife Service. 50 CFR Part 17. February 7.

Fetter, C.W. 1988. *Applied Hydrology*, 2d. ed. New York, New York: Macmillen Publishing Company, 588 p.

Fetter, C.W. 1993. *Contaminant Hydrogeology*, New York, New York: Macmillan Publishing Company, 458 p.

Freeman, H.M., 1989. *Standard Handbook of Hazardous Waste Treatment and Disposal*. McGraw-Hill, Inc., New York, New York.

Gibbons, R.D. 1994. *Statistical Methods for Groundwater Monitoring*. John Wiley & Sons, Inc. New York.

Gilbert, Richard O., 1987. *Statistical Methods for Environmental Pollution Monitoring*. Van Nostrand Reinhold. New York.

Graedel, T.E. et al., 1986. *Atmospheric Chemical Compounds*. NY, NY: Academic Press p. 263.

Ground-Water Remediation Technologies Analysis Center (GWRTAC), 1996. *Air Sparging Technology Overview Report*. Report TO-96-04, October 1996.]

HSDB, 2002. Hazardous Substances Data Bank. On-line Database. March.

Health, J.C., L. Karr, V. Novstrup, B. Nelson, S.K. Ong, P. Aggarwal, J. Means, S. Pomeroy, and S. Clark, 1991. *Environmental Effects of Small-Arms Ranges*. Naval Facilities Engineering Command. October.

Hill, E.F. and M.B. Camardese. 1986. *Lethal Dietary Toxicities of Environmental Contaminants and Pesticides to Coturnix*. U.S. Fish and Wildlife Service. Washington, D.C. Technical Report 2.

Innis-Tennebaum Architects, Inc., 1990, Marine Corps Base Camp Pendleton, California, September, revised February 1989.

Integrated Risk Information System (IRIS). USEPA. 2001. IRIS Database. Office of Emergency and Remedial Response. Online Searches. *http:/www.epa.gov/iris/search.htm*

IT Corporation (IT), 1998. Remedial Investigation and Feasibility Study for Operable Unit 3, Marine Corps Base Camp Pendleton, California. 1 May.

IT, 1999a. Record of Decision, Operable Unit 3, Marine Corps Base Camp Pendleton, California. 11 January.

IT, 1999b. Biological Assessments for Sites 1A, 1D, 1E, 1F, 2A, and 30, Marine Corps Base Camp Pendleton, California. 13 May.

IT, 1999c. Draft Engineering Evaluation and Cost Analysis, Site 30, Marine Corps Base Camp Pendleton, California. 6 May.

IT, 2000. Phase I Interim Confirmation Report, Site 1E Remedial Action, Marine Corps Base Camp Pendleton, California. 19 July.

IT, 2001. Draft Corrective Action Plan, 22 Area Marine Corps Exchange Gas Station, Marine Corps Base Camp Pendleton, California, July 19.

Janvandel, I., and C-F Tsang. 1986. Capture zone type curves: a tool for aquifer cleanup. Groundwater 24, no. 5:616-25.

Kleinfelder, 1997. Draft Engineering Evaluation/Cost Analysis (EE/CA) For Sites 1D/1003, 1E/1004, 30, and 35, Marine Corps Base Camp Pendleton, California, March 18.

Leadshill-Herkenhoff, Inc., 1988. Basewide Water Requirement/Availability Study, September, revised February 1989.

LSA Associates, Inc. (LSA) 2000. Monitoring and Discovery Plan for Six Waste Remediation Areas on Marine Corps Base Camp Pendleton, San Diego County, California. February.

Marple, L.; Brunck, R.; Berridge, B.; Throop, L. 1987. "Experimental and Calculated Physical Constants for 2,3,7,8-Tetrachlorodibenzo-p-dioxin." Appeared in Solving Hazardous Waste Problems from the ACS Symposium Series 338, eds. J.H. Exner. Sponsored by the Division of Environmental Chemistry at the 191st meeting of the American Chemical Society. April 1986.

Marshack, J. B.,1986, Updated June 1989, Staff Report, Designated Level Methodology for Waste Classification and Cleanup Level Determination: RWQCB, Central Valley Region.

Mineau, P., S. Collins, and A. Baril. 1996. "On the Use of Scaling Factors to Improve Interspecies Extrapolation of Acute Toxicity in Birds." Regulatory Toxicology and Pharmacology. Vol. 24, pp. 24-29.

Mohr, 2001, "Solvent Stabilizers White Paper", Santa Clara Valley Water District, June 14.

Montgomery, J.H., and L.M. Welkom. 1989. *Groundwater Chemicals Desk Reference*. Lewis Publishers, Inc. Chelsea, Michigan.

Morton, Paul, K, et al., 1976, Environmental Geology of Orange County, California Division of Mines and Geology Open File Report 79-8 LA, California Division of Mines and Geology, Sacramento, California.

Moyle, 1973a, Geologic Map of Eastern Part of Camp Pendleton, Southern California, USGS Open File Map.

Moyle, 1973b, Geologic Map of Western Part of Camp Pendleton, Southern California, USGS Open File Map.

Nagy, K.A. 1987. Field metabolic rate and food requirement scaling in mammals and birds. *Ecol. Monogr.* 57-111-128.

National Academy of Sciences (NAS). 1989. *Recommended Dietary Allowances; 10th ed.* National Academy of Sciences.

Naval Energy and Environmental Support Activity (NEESA), 1984. Initial Assessment Study, Marine Corps Base, Camp Pendleton, California. Prepared by SCS Engineers, Inc. NEESA 13-057.

NOAA. (National Oceanic and Atmospheric Administration). 1999. M. F. Buchman. *NOAA Screening Quick Reference Tables*. NOAA HAZMAT Report 99-1. Coastal Protection and Restoration Division.

Nyer, et al., 1996. *In Situ Treatment Technology*. Lewis Publishers. April.

Office of Environmental Health Hazard Assessment (OEHHA), 1999. *Technical Support Document for Describing Available Cancer Potency Factors*, April.

OHM, 1997. Draft Final Removal Action Site Closure Report, Non-Time Critical Removal Action, Installation Restoration Program, Group A, Site 6. September.

OHM, 1999. Draft Final Remedial Design and Remedial Action Work Plan for Operable Unit 3, Sites, 1A, 2A, 1D, 1E, and 1F.

Parsons Inc. (Parsons), 1998. Draft Work Plan Supplemental Remedial Investigation/Feasibility Study for Sites 21, 33, and 1111, Marine Corps Base Camp Pendleton, California. 27 January.

Parsons, 1999. Draft Remedial Investigation and Feasibility Study, Operable Unit 4, Marine Corps Base Camp Pendleton, California. 29 April.

Parsons, 2000a. Project Note No. 2, Marine Corps Base Camp Pendleton RPM Meeting No. 57. Held 20 June 2000. 6 July.

Parsons, 2000b. Project Note No. 5, Marine Corps Base Camp Pendleton RPM Meeting No. 58. Held 17-18 July 2000. 28 July.

Parsons, 2000c. Project Note No. 7, Marine Corps Base Camp Pendleton FFA Meeting No. 59. Held 28-29 August. 6 September.

Parsons, 2000d. Project Note No. 8, Marine Corps Base Camp Pendleton FFA Meeting No. 61. Held 5 October. 10 October.

Parsons, 2001a. Draft Final Field Sampling Plan for Operable Unit 4 Supplemental Feasibility Study, Marine Corps Base Camp Pendleton, California, March.

Parsons, 2001b. Draft Final Quality Assurance Project Plan Supplemental Operable Unit 4 Remedial Investigation and Feasibility Study, Marine Corps Base Camp Pendleton, California, March.

Parsons, 2001c. Project Note No. 10, Marine Corps Base Camp Pendleton RPM Meeting No. 63. Held 8 February 2001. 12 February.

Parsons, 2001d. Project Note No. 12, Marine Corps Base Camp Pendleton RPM Meeting No. 64. Held 17 May 2001. 31 May.

Parsons, 2001e. Project Note No. 13, Marine Corps Base Camp Pendleton RPM Meeting No. 65. Held 25 July 2001. 14 August.

Perry, Robert H. and Cecil H. Chilton, 1973. *Chemical Engineers' Handbook*, 5th Edition. McGraw-Hill, Inc., New York, New York.

PRC. 1998. Development of Toxicity Reference Values for Conducting Ecological Risk Assessments at Naval Facilities in California. Interim final Technical Memorandum. September. CTO-027, contract number N62474-94-D-7609.

Regional Water Quality Control Board (RWQCB), 1989. Staff Report: The Designated Level Methodology for Waste Classification and Cleanup Level Determination: RWQCB Central Valley Region. June.

RWQCB 1994, Water Quality Control Plan for the San Diego Basin (9), California Regional Water Quality Control Board (San Diego region), September 8.

Ross, Arnold, editor. *Studies on the Geology of Camp Pendleton, and Western San Diego County California*. San Diego County Association of Engineering Geologists.

Ross, R.B., 1980. *Metallic Materials Specification Handbook*. Third Edition. E&F.N. Spon. Ltd., London, England.

Sawyer, D.T. and T.T. Fendley. 1990. Seasonal home range size and movement behavior of the gray fox on the Savannah River Site, South Carolina. *Proc. Annual Conference S.E. Association of Fish and Wildlife Agencies*. 44:379-389.

Sample, B.E., D.M. Opresko, and G.W. Suter II. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision*. Oak Ridge National Laboratory, Health Sciences Research Division. Oak Ridge, Tennessee. ES/ER/TM-86/R3.

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, T.L. Ashwood, 1998a. *Development and Validation of Bioaccumulation Models for Earthworms,* ES/ER/TM-220. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Sample, B.E., J.J. Beauchamp, R.A. Efroymson, G.W. Suter, II, 1998b. *Development and Validation of Bioaccumulation Models for Small Mammals,* ES/ER/TM-219. Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Southwest Division Naval Facilities Engineering Command (SWDIV), 1993. Remedial Investigation/Feasibility Study, RI Report for Group A Sites, Draft Final, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group, Inc., 15 October.

SWDIV, 1995. Draft Final Engineering Evaluation/Cost Analysis (EE/CA) for Group A Site 3, Pest Control Wash Rack, and Site 6, DPDO (DRMO) Scrap Yard. September.

SWDIV, 1996a. Draft Technical Addendum to the RI Report for Group B Sites, Remedial Investigation/Feasibility Study, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 5 March.

SWDIV, 1996b. Draft Final RI Report for Group C Sites, Remedial Investigation/Feasibility Study, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 12 November.

SWDIV, 1996c. Remedial Investigation and Feasibility Study for Operable Unit 2, Site 8 and 22/23 Area Sites, Draft Final, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 23 September.

SWDIV, 1997. Draft Final Remedial Investigation Report for Group D Sites, Remedial Investigation/Feasibility Study, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 16 July.

SWDIV, 1998a. Energy Dispersive X-Ray Fluorescence Field Investigation Report, Sites 1A, 1D, 1E, 1F, and 2A, Marine Corps Base, Camp Pendleton, California.

SWDIV. 1998b. Draft Final Remedial Investigation and Feasibility Study for Operable Unit 3, Marine Corps Base Camp Pendleton, California. Prepared by International Technology Corporation. May 1.

State Water Resources Control Board (SWRCB), (California). 1968. Resolution No. 68-16. Statement of Policy With Respect to Maintaining High Quality Waters in California.

SWRCB, 1988. Resolution No. 88-63. Sources of Drinking Water.

SWRCB. 1992. Resolution No. 92-49 (as amended on 21 April 1994 and 02 October 1996): Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304.

SWRCB. 1997. Resolution No. 97-026. California Ocean Plan. 23 July.

SWRCB. 2000. Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan).

Suter, G.W. II. 1993. *Ecological Risk Assessment*. Lewis Publishing Company. Boca Raton, Florida.

Travis, C.C., and A.D. Arms. 1988. "Bioconcentration of Organics in Beef, Milk, and Vegetation." *Environmental Science and Technology*. 22(3): 271-274.

United States Environmental Protection Agency (USEPA). 1983. Methods for Chemical Analysis of Water and Wastes.

USEPA. 1986. *Handbook for Stabilization/Solidifcation of Hazardous Wastes*. Hazardous Waste Engineering Research Laboratory. EPA/540/2-86/001. June 1986.

USEPA, 1988a. *CERCLA Compliance With Other Laws Manual*, Draft Guidance. EPA/540/G-89/006, Office of Emergency and Remedial Response, Washington, DC. August.

USEPA, 1988b. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*. Interim Final, EPA/540/G-89/004, OSWER 9355.3-01, Office of Emergency and Remedial Response, Washington, D.C. October.

USEPA, 1989a. *Interim Procedures for Estimating Risks Associated with Exposures to Mixtures of Chlorinated Dibenzo-p-Doxins and Dibenzofurans (CDDs and CDFs) and 1989 Update*. Washington DC: Risk Assessment Forum. EPA/625/3-89/016.

USEPA, 1989b. *Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities: Interim Final Guidance*. EPA/530-SW-89-026.

USEPA. 1989c. *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual Supplemental Guidance. "Standard Default* Exposure Factors". Interim Final. Office of Solid Waste and Emergency Response. OSWER Directive 9285.6-03. March 25.

USEPA. 1989d. *CERCLA Compliance With Other Laws Manual*: Part II – Clean Air Act and Other Environmental Statutes and State Requirements, EPA/540/G-89/009, OSWER Directive 9234.1-02, Office of Solid Waste and Emergency Response, Washington, DC. August.

USEPA. 1989e. Memorandum, Subject: Land Disposal Restrictions as Relevant and Appropriate Requirements for CERCLA Contaminated Soil and Debris, OSWER Directive No. 9347.2-01, Office of Solid Waste and Emergency Response. June.

USEPA. 1989f. Determining When Land Disposal Restrictions Are Applicable to Response Actions. OSWER Directive 9347.3-05FS. July.

USEPA. 1990a. National Ambient Air Quality Standards (NAAQS).

USEPA, 1990b. EPA Region IX/State of California/Marine Corps Federal Facility Agreement, Marine Corps Base Camp Pendleton. October.

USEPA, 1991a. *Risk Assessment Guide for Superfund: Volume 1 – Human Health Evaluation Manual Supplemental Guidance.* "Standard Default Exposure Factors." Interim Final. Office of Solid Waste and Emergency Response. OSWER Directive 9285.6-03.

USEPA. 1991b. ARARs Q's and A's: General Policy, RCRA, CWA, SDWA, Post-ROD Information, and Contingent Waivers. OSWER Directive No. 9234.2-01/FS-A, Washington, DC. June.

USEPA. 1991c. *Management of Investigation-Derived Wastes During Site Inspections.* EPA/540/G-91/009. May.

USEPA. 1992a. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities. Addendum to Interim Final Guidance.* EPA/530-R-93-003. July

USEPA. 1992b. *Guidance for Data Useability in Risk Assessment (Part A)* Final. Office of Emergency and Remedial Response. Publication Number 9285.7-09A. April.

USEPA. 1992c. *Supplemental Guidance to RAGS: Calculating the Concentration Term.* Publication 9285.7-081, May.

USEPA. 1992d. *Framework for Ecological Risk Assessment.* EPA/630/R-92/001, February.

USEPA. 1993. *Wildlife Exposure Factors Handbook.* Volumes I and II. Office of Research and Development. Washington, D.C. EPA/600/R-93/187a. December.

USEPA. 1994a. Application of the Trophic Level Concept to Analysis of Environmental Contaminant Transfer through Terrestrial Food Webs: Issues and Comparison with Aquatic Trophic Levels (Draft). Office of Science and Technology and Office of Water.

USEPA. 1994b. Guidance Manual for Integrated Exposure Uptake Biokinetic Model for Lead in Children. Office of Emergency and Remedial Response, EPA/540/R-93/081, February.

USEPA. 1994c. Resolution No. 94-16. Approval of Revised Water Quality Control Plan for the San Diego Region, "Basin Plan."

USEPA. 1994d. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February.

USEPA. 1995a. *Great Lakes Water Quality Initiative Criteria Documents for the Protection of Wildlife.* Office of Water. Washington, DC. EPA-820\b-95\008. March.

USEPA. 1995b Region IX Preliminary Remediation Goals (PRGs) first half 1995. Memorandum from Stanford J. Smucker, Regional Toxicologist. 1 February.

USEPA. 1996a. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. December. http://www.epa.gov/superfund/programs/lead/adult.htm.

USEPA, 1996b. Soil Screening Guidance: Technical Background Document. Office of Solid Waste and Emergency Response, Washington, DC. EPA 540/R-95/128.

USEPA. 1996c. Resolution No. 96-86. Amendment to San Diego Basin Plan.

USEPA. 1996d. SW 846, Third Edition, *Test Methods for Evaluating Solid Waste*, update I, July 1992; update IIA, August 1993, update II, September 1994; update IIB, January 1995; update III, December.

USEPA, 1997a. Recent Developments for In Situ Treatment of Metal Contaminated Soils. Prepared by PRC Env. Mgmt., Inc. for USEPA Office of Solid Waste and Emergency Response Technology Innovation Office. March 5, 1997.

USEPA, 1997b. User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings. Office of Emergency and Remedial Response. September.

USEPA, 1997c. The Lognormal Distribution in Environmental Applications. Office of Research and Development and Office of Solid Waste and Emergency Response. EPA/600/R-97/006. December.

USEPA. 1997d. ERA Guidance for Superfund: Process for Designing and Conducting ERAs. Interim Final. Washington, DC. EPA/540/R-97/006.

USEPA. 1997e. Resolution No. 97-084. Amendment to San Diego Basin Plan.

USEPA, 1997f. *Exposure Factors Handbook*, Volumes I, II, III. Office of Research and Development, National Center for Environmental Assessment, EPA/600P-95/002F(a-c), August.

USEPA, 1998a. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Groundwater. Office of Research and Development, Washington DC. EPA/600/R-98/128. September.

USEPA. 1998b. Guidelines for Ecological Risk Assessment. Risk Assessment Forum. EPA/630/R-95/002F Final. January.

USEPA. 1998c. Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (Volumes 1, 2, and 3). Office of Solid Waste and Emergency Response. EPA/530/D-98-001A. July.

USEPA. 1998d. Current Drinking Water Standards, National Primary Drinking Water Regulations Office of Water, Washington DC. July.

USEPA. 1998e. Preliminary Remediation Goals, Region IX. Noncancer Endpoints. August.

USEPA, 1999a. Regional Interim Policy for Determination of Volatile Organic Compound (VOC) Concentrations in Soil and Solid Matrices, Memorandum, 23 June.

USEPA. 1999b. *Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities. Volume Three.* EPA/530/D-99/001A. August.

USEPA. 1999c. National Recommended Water Quality Criteria – Correction. Office of Water, EPA 822-Z-99-001. April.

USEPA. 1999d, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October.

USEPA, 2000a. Preliminary Remediation Goals (PRGs), USEPA Region 9, San Francisco, California, Version 7, November 1, 2000.

USEPA, 2000b. Solidification/Stabilization Use at Superfund Sites. Office of Solid Waste and Emergency Response. EPA/542/R-00/010. September 2000.

USEPA, 2000c. Letter from Sheryl Lauth (USEPA) to Micheal Radicki (SWDIV) regarding FFA realignment and schedule.

USEPA, 2000d. A Guide to Developing and Documenting Cost Estimates During the Feasibility Study, EPA 540-R-00-002, OSWER 9355.0-75, jointly prepared by the USEPA Office of Emergency and Remedial Response (OERR) and the United States Army Corps of Engineers (USACE) Hazardous, Toxic, and Radioactive Waste (HTRW) Center of Expertise (CX), July 2000.

USEPA, 2000e. Exposure and HHRA of 2,3,7,8-Tetradibenzo-p-Dioxin (TCDD) and Related Compounds. Part 1 Estimating Exposure to Dioxin-Like Compounds. Volume 3: Properties, Environmental Levels, and Background Exposures. EPA/600/P-00/001Bc.Draft Final Report Do Not Cite or Quote. September.

USEPA. 2000f. Guidance for Data Quality Assessment, Practical Methods for Data Analysis. EPA QA/G-9.

USEPA. 2000g. Statement of Work for Analysis of Chlorinated Dibenzo-p-Dioxins (CDDs) and Chlorinated Dibenzofurans (CDFs) Multi-Media, Multi-Concentration DLM01.4. January.

USEPA, 2000h. Exposure and Human Health Risk Assessment of 2,3,7,8-Tetrachlorodibenzo-p-Dioxin (TCDD) and Related Compounds. Part I: Estimating Exposure to Dioxin-Like Compounds Volume 2: Sources of Dioxin-Like Compounds in the United States. EPA/600-P-00/001Bb. Draft Final Report No Note Cite or Quote. September.

USEPA. 2000i. Ecological Soil Screening Level Guidance, Draft. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Washington, D.C. June.

USEPA. 2000j. Interim Policy on Land Use Controls Associated With Environmental Restoration Activities. Memorandum. 31 August.

USEPA, 2001. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.* Office of Solid Waste and Emergency Response, Washington, DC. 9355.4-24. March.

USEPA, 2002a. Preliminary Remediation Goals (PRGs), USEPA Region 9, San Francisco, California, Version 7, October 2002.

USEPA, 2003. EPA Response to September 11 Web Site, Dioxin in Air. http://www.epa.gov/wtc/dioxin/dioxin_fact_sheet.html. Last Updated January 6.

Vogel, T.M., and McCarty, P.L., 1985, "Biotransformation of Tetrachloroethylene to Trichloroethylene, Dichloroethylene, Vinyl Chloride, and Carbon Dioxide Under Methanogenic Conditions." Applied and Environmental Microbiology, v. 49, no. 5, p. 1080-1083.

Vogel, T.M., Criddle, C.S., and McCarty, P.L., 1987, "Transformations of Halogenated Compounds." Environmental Science and Technology, v. 21, p. 722-735.

Walters, R.W.; Ostazeski, S.A.; Guiseppi-Elie, A., 1989, "Sorption of 2,3,7,8-Tetrachorodibenzo-p-dioxin from Water by Surface Soils." Environmental Science Technology, Volume 23.

West, G.B., J.H. Brown, and B.J. Enquist. 1997. A general model for the origin of allometric scaling laws in biology. *Science.* 276:122-126.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer, and M. White, 1990. *California's Wildlife Volume II Birds,* California Department of Fish and Game, Sacramento, California. November.

APPENDIX A
APPLICABLE AND RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

A1.0 INTRODUCTION 1-1

A1.1 Summary of CERCLA and NCP Requirements 1-1

A1.2 Methodology Description 1-3
A1.2.1 General 1-3
A1.2.2 Identifying and Evaluating Federal ARARs 1-4
A1.2.3 Identifying and Evaluating State ARARs 1-4

A1.3 Other General Issues 1-5
A1.3.1 General Approach to State ARARs 1-5
A1.3.2 General Approach to Requirements of the Federal Resource Conservation and Recovery Act 1-5
A1.3.3 California Environmental Quality Act 1-6

A1.4 Waste Characterization 1-6
A1.4.1 RCRA-Hazardous Waste Determination 1-7
A1.4.2 California-Regulated, Non-RCRA-Hazardous Waste 1-9
A1.4.3 Conclusions About RCRA Applicability 1-9
A1.4.4 Other California Waste Classifications 1-10
A1.4.5 On-Base CAMU Disposal Facility ARARs 1-10

A2.0 CHEMICAL-SPECIFIC ARARs 2-1

A2.1 Summary of ARARS Conclusions by Medium 2-1
A2.1.1 Groundwater ARARs Conclusions 2-1
A2.1.2 Surface-Water ARARs Conclusions 2-1
A2.1.3 Soil ARARs Conclusions 2-1
A2.1.4 Air ARARs Conclusions 2-2

A2.2 Detailed Discussion of ARARs by Medium 2-2
A2.2.1 Groundwater ARARs 2-2
A2.2.2 Surface-Water ARARs 2-7
A2.2.3 Soil ARARs 2-7
A2.2.4 Sediments ARARs 2-10
A2.2.5 Air ARARs 2-10

A3.0 LOCATION-SPECIFIC ARARs 3-1

A3.1 Summary of Location-Specific ARARS 3-1
A3.1.1 Cultural Resources ARARs Conclusions 3-1
A3.1.2 Wetlands Protection and Floodplain Management Conclusions 3-2
A3.1.3 Hydrologic Resources Conclusions 3-2
A3.1.4 Biological Resources Conclusions 3-2
A3.1.5 Coastal Resources Conclusions 3-3
A3.1.6 Geologic Characteristics Conclusions 3-3

A3.2 Detailed Discussion of ARARs 3-3
A3.2.1 Cultural Resources ARARs 3-3
A3.2.2 Wetlands Protection and Floodplains Management ARARs 3-5
A3.2.3 Hydrologic Resources ARARs 3-6
A3.2.4 Biological Resources ARARs 3-7

A3.2.5 Coastal Resources ARARs 3-9
A3.2.6 Geologic Characteristics ARARs 3-10

A4.0 ACTION-SPECIFIC ARARs 4-1

A4.1 Soil Alternative 1: No Action 4-1

A4.2 Soil Alternative 2: Institutional Controls 4-1
A4.2.1 Federal ARARs 4-1
A4.2.2 State ARARs 4-2
A4.2.3 Conclusions 4-3

A4.3 Soil Alternative 3: Capping 4-3
A4.3.1 Federal ARARs 4-3
A4.3.2 State ARARs 4-5
A4.3.3 Conclusions 4-5

A4.4 Alternatives 4, 5 and 6: Excavation 4-6
A4.4.1 Federal ARARs 4-6
A4.4.2 State ARARs 4-7
A4.4.3 Conclusions 4-7

A4.5 Alternative 4: On-Site Solidification/Stabilization 4-8
A4.5.1 Federal ARARs 4-8
A4.5.2 State ARARs 4-9

A4.6 Alternative 5: Off-Site Disposal 4-9

A4.7 Alternative 6: On-Base CAMU Disposal 4-9

A5.0 SUMMARY 5-1

A6.0 REFERENCES 6-1

TABLES

A-1 Potential Federal Chemical-Specific ARARs by Medium

A-2 Potential State Chemical-Specific ARARs by Medium

A-3 Potential Federal Location-Specific ARARs

A-4 Potential State Location-Specific ARARs

A-5 Potential Federal Action-Specific ARARs – Soil

A-6 Potential State Action-Specific ARARs – Soil

A1.0 INTRODUCTION

This appendix identifies and evaluates potential federal and State of California applicable or relevant and appropriate requirements (ARARs) from the universe of regulations, requirements, and guidance and sets forth the Department of the Navy (DON) determinations regarding those potential ARARs for each response action alternative retained for detailed analysis in this supplemental feasibility study (FS) report for Operable Unit (OU) 4 sites, Marine Corps Base (MCB) Camp Pendleton, San Diego, California.

This evaluation includes an initial determination of whether the potential ARARs actually qualify as ARARs, and a comparison for stringency between the federal and state regulations to identify the controlling ARARs. The identification of ARARs is an iterative process. The final determination of ARARs will be made by the DON in the record of decision (ROD) or action memorandum (AM), after public review, as part of the response action selection process.

A1.1 Summary of CERCLA and NCP Requirements

Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, 42 United States Code [USC] Section [§] 9621[d]), as amended, states that remedial actions on CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate.

Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address the situation at a CERCLA site. The requirement is applicable if the jurisdictional prerequisites of the standard show a direct correspondence when objectively compared to the conditions at the site. An applicable federal requirement is an ARAR. An applicable state requirement is an ARAR only if it is more stringent than federal ARARs.

If the requirement is not legally applicable, then the requirement is evaluated to determine whether it is relevant and appropriate. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable, address problems or situations similar to the circumstances of the proposed response action and are well suited to the conditions of the site (USEPA 1988a). A requirement must be determined to be both relevant <u>and</u> appropriate in order to be considered an ARAR.

The following criteria for determining relevance and appropriateness are listed in Title 40 Code of Federal Regulations (CFR) § 300.400(g)(2):

- The purpose of the requirement and the purpose of the CERCLA action
- The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site
- The substances regulated by the requirement and the substances found at the CERCLA site
- Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site
- The type of place regulated and the type of place affected by the release or CERCLA action

- The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action
- Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resources at the CERCLA site.

According to CERCLA ARARs guidance (USEPA, 1988a), a requirement may be "applicable" or "relevant and appropriate," but not both. ARARs must be identified on a site-specific basis that involves a two-part analysis: first, a determination whether a given requirement is applicable; then, if it is not applicable, a determination whether it is nevertheless both relevant and appropriate. It is important to explain that some regulations may be applicable or, if not applicable, may still be relevant and appropriate. When the analysis determines that a requirement is both relevant and appropriate, such a requirement must be complied with to the same degree as if it were applicable (USEPA, 1988a).

Tables included in this appendix present each potential ARAR with a determination of ARAR status (i.e., applicable, relevant and appropriate, or not an ARAR). To determine the relevance and appropriateness, the pertinent criteria were examined to determine whether the requirements addressed problems or situations sufficiently similar to the circumstances of the release or response action contemplated, and whether the requirement was well suited to the site. A negative determination of relevance and appropriateness indicates that the requirement did not meet the pertinent criteria. Negative determinations are documented in the tables of this appendix and are discussed in the text only for specific cases.

To qualify as a state ARAR under CERCLA and the National Contingency Plan (NCP), a state requirement must be:

- A state law
- An environmental or facility siting law
- Promulgated (of general applicability and legally enforceable)
- Substantive (not procedural or administrative)
- More stringent than the federal requirement
- Identified in a timely manner
- Consistently applied.

To constitute an ARAR, a requirement must be substantive. Therefore, only the substantive provisions of requirements identified as ARARs in this analysis are considered to be ARARs. Permits are considered to be procedural or administrative requirements. Provisions of generally relevant federal and state statutes and regulations that were determined to be procedural or nonenvironmental (including permit requirements) are not considered to be ARARs. CERCLA 121(e)(1), 42 USC § 9621(e)(1), states that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out in compliance with this section." For this ARARs discussion, *on-site* is defined as "the aerial extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation of the response action" (40 CFR § 300.5).

Nonpromulgated advisories or guidance issued by federal or state governments are not legally binding and do not have the status of ARARs. Such requirements may, however, be useful, and are "to be considered" (TBC). TBC (40 CFR § 300.400[g][3]) requirements complement ARARs, but they do not override them. They are useful for guiding decisions regarding cleanup levels or methodologies when regulatory standards are not available.

Pursuant to United States Environmental Protection Agency (USEPA) guidance (USEPA 1988a), ARARs are generally divided into three categories: chemical-specific, location-specific, and action-specific requirements. This classification was developed to aid in identifying ARARs; some ARARs do not fall precisely into one group or another. ARARs are identified on a site basis for remedial actions where CERCLA authority is the basis for cleanup.

As the lead federal agency, the DON has primary responsibility for identifying federal ARARs at MCB Camp Pendleton. Potential federal ARARs that have been identified for the OU 4 sites are discussed in Section A1.2.2. Pursuant to the definition of *on-site* in 40 CFR § 300.5, the on-Base areas are part of this action. Regulatory requirements that apply to off-site actions are not ARARs. Off-site actions (i.e., off-site disposal) are required to comply with applicable requirements only and are not required to comply with relevant and appropriate requirements identified as ARARs for on-site actions.

Identification of potential state ARARs was initiated through DON requests that the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) identify potential state ARARs, an action described in more detail in Section A1.2.3. Potential state ARARs that have been identified for OU 4 sites are discussed below.

A1.2 Methodology Description

This section describes the process of identifying and evaluating potential federal and state ARARs.

A1.2.1 General

As the lead federal agency, the DON has primary responsibility for identifying potential ARARs for OU 4 sites at MCB Camp Pendleton. In preparing this ARARs analysis, the DON undertook the following measures, consistent with CERCLA and the NCP:

- Identified federal ARARs for each response action alternative addressed in the OU 4 supplemental FS report, taking into account site-specific information for Sites 1D, 1E-1, 1H, and 30.
- Reviewed potential state ARARs identified by the state 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 or are in addition to the federally required actions.
- Reached a conclusion as to which federal and state ARARs are the most stringent and/or "controlling" ARARs for each alternative.

As outlined in this supplemental FS report, the remedial action objectives (RAOs) for the OU 4 soil sites at MCB Camp Pendleton (Sites 1D, 1E-1, 1H, and 30) are to:

- Minimize exposure (inhalation/dermal contact/ingestion) by humans and ecological receptors to chemicals in soil at concentrations exceeding remediation goals (RGs)
- Protect the beneficial uses and water-quality objectives of the lower Santa Margarita River Basin.

Remedial action alternatives retained for detailed analysis in this supplemental FS are designed to accomplish these RAOs. The alternatives for each site use similar technologies to accomplish the goals, but differ in the conceptual approach to their implementation.

The following remedial action alternatives for soil sites are evaluated in this potential ARARs analysis for Sites 1D, 1E-1, 1H, and 30:

- Alternative 1: No Action
- Alternative 2: Institutional Controls (site access restrictions with Base Master Plan amendment, periodic site inspection/monitoring)
- Alternative 3: Capping with Engineered Soil Cover and Institutional Controls (Site 1H only)
- Alternative 4: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil (Sites 1D and 30 only)
- Alternative 5: Soil Excavation, Pretreatment, Backfill, and Off-Base Disposal (pretreatment applies to Sites 1D and 30 only)
- Alternative 6: Soil Excavation, Backfill, Pretreatment, and On-Base CAMU Disposal (pretreatment applies to Sites 1D and 30 only).

A1.2.2 Identifying and Evaluating Federal ARARs

As the lead federal agency under CERCLA and the NCP, the DON is responsible for identifying federal ARARs. The final determination of federal ARARs will be made when the DON issues the ROD/AM. The federal government implements a number of federal environmental statutes that are the source of potential federal ARARs, either in the form of the statutes or regulations promulgated thereunder. Examples include the Resource Conservation and Recovery Act (RCRA), the Clean Water Act (CWA), the Safe Drinking Water Act (SDWA), the Toxic Substances Control Act (TSCA), and their implementing regulations. See the NCP preamble at 55 Federal Register (FR) 8764–8765 (1990) for a more complete listing.

The proposed response action and alternatives were reviewed against all potential federal ARARs, including but not limited to those set forth at 55 FR 8764–8765 (1990), to determine if they were applicable or relevant and appropriate using the CERCLA and NCP criteria and procedures for ARARs identification by lead federal agencies.

A1.2.3 Identifying and Evaluating State ARARs

The process of identifying and evaluating potential state ARARs by the state and the DON is described in this subsection.

A1.2.3.1 Solicitation of State ARARs Under NCP

USEPA guidance (USEPA, 1988b) recommends that the lead federal agency consult with the state when identifying state ARARs for remedial actions. In essence, the CERCLA/NCP requirements of 40 CFR § 300.515 for remedial actions provide that the lead federal agency request that the state identify chemical- and location-specific state ARARs when the site characterization is complete. The requirements also provide that the lead federal agency request identification of all categories of state ARARs (chemical-, location-, and action-specific) for detailed analysis after the remedial alternatives have been identified. The state must respond within 30 days of receipt of the lead federal agency requests. The remainder of this subsection documents the DON's efforts to date to identify and evaluate state ARARs.

The DON followed the procedures of the process set forth in 40 CFR § 300.515 and Section 7.6 of the Federal Facility Agreement (FFA) for remedial actions in seeking state assistance in identifying state ARARs.

A1.2.3.2 Chronology of Efforts to Identify State ARARS

The following chronology summarizes the DON's efforts to obtain state assistance in identifying state ARARs for the response action at MCB Camp Pendleton OU 4 sites. Key correspondence between the DON and the state agencies relating to this effort has been included in the Administrative Record (AR) for this supplemental FS.

The efforts made by DON to identify state ARARs for Sites 3 and 6 were discussed in detail in the engineering evaluation/cost analysis (EE/CA) for Sites 3 and 6 at MCB Camp Pendleton (SWDIV, 1995). The DON feels that these previous efforts are sufficient for this FS and the resulting potential state ARARs are generally pertinent to the remedial alternatives for the OU 4 Sites. The agencies have an opportunity to evaluate this ARAR's evaluation during the iterations of the FS.

A1.3 Other General Issues

General issues identified during the evaluation of ARARs for OU 4 sites are discussed in this section.

A1.3.1 General Approach to State ARARs

The requirements of the following state and local agencies were reviewed for pertinence to the OU 4 remedial alternatives:

- Department of Toxic Substances Control (DTSC)
- Department of Fish and Game
- San Diego Regional Water Quality Control Board (RWQCB)
- Integrated Waste Management Board
- San Diego County Air Pollution Control District (APCD).

The narrative discussion and tables in this appendix address the potential state ARARs identified by the review of previously identified potential ARARs for IR Sites 3 and 6. The DON has accepted many of the potential state ARARs identified by these agencies and departments. All references to accepted state ARARs in the discussion and text are deemed references only to the substantive provisions of the cited requirements. Some statutory provisions, regulations, and policy guidance documents identified by the state that do not qualify as ARARs are specifically addressed. The DON has determined that those potential state ARARs not specifically identified or discussed herein do not constitute state ARARs for the alternatives addressed for Sites 1D, 1E-1, 1H, and 30 for one or more of the following reasons:

- Not pertinent to the scope of the alternatives
- Not substantive but procedural or administrative
- Not properly promulgated
- Not more stringent than federal ARARs
- Not properly identified with sufficient specificity as required under the NCP.

A1.3.2 General Approach to Requirements of the Federal Resource Conservation and Recovery Act

RCRA is a federal statute passed in 1976 to meet four goals: protect human health and the environment, reduce waste, conserve energy and natural resources, and eliminate the generation of hazardous waste as expeditiously as possible. The Hazardous and Solid Waste

Amendments (HSWA) of 1984 significantly expanded the scope of RCRA by adding new corrective action requirements, land disposal restrictions, and technical requirements. RCRA, as amended, contains several provisions that are potential ARARs for CERCLA sites.

Substantive RCRA requirements are applicable to response actions on CERCLA sites if the waste is an RCRA hazardous waste, and either:

- The waste was initially treated, stored, or disposed of after the effective date of the particular RCRA requirement; or
- The activity at the CERCLA site constitutes treatment, storage, or disposal, as defined by RCRA (USEPA, 1988a).

The preamble to the NCP indicates that state regulations that are components of a federally authorized or delegated state program are generally considered federal requirements and potential federal ARARs for the purposes of ARARs analysis (55 FR 8666, 8742 [1990]). The State of California received approval for its base RCRA hazardous waste management program on 23 July 1992 (57 FR 32726 [1992]). The State of California "Environmental Health Standards for the Management of Hazardous Waste," set forth in Title 22 California Code of Regulations (CCR), Division 4.5 (22 CCR Div. 4.5), were approved by USEPA as a component of the federally authorized State of California RCRA program. The regulations of 22 CCR Div. 4.5 are, therefore, a source of potential federal ARARs for CERCLA response actions. The exception is when a state regulation is "either broader in scope or more stringent" than the corresponding federal RCRA regulations. In that case, such regulations are not considered part of the federally authorized program or potential federal ARARs. Instead, they are purely state law requirements and potential state ARARs.

The USEPA's 23 July 1992 notice approving the State of California RCRA program (57 FR 32726 [1992]) specifically indicated that the state regulations addressed certain non-RCRA, state-regulated hazardous wastes that fell outside the scope of federal RCRA requirements. 22 CCR Div. 4.5 requirements would be potential state ARARs for such non-RCRA, state-regulated wastes.

A key threshold question for the ARARs analysis is whether the contaminants at OU 4 sites constitute federal hazardous waste as defined under RCRA and the state's authorized program or whether they qualify as non-RCRA, state-regulated hazardous waste. A discussion of waste characterization is included in Section A1.4.

A1.3.3 California Environmental Quality Act

The California Environmental Quality Act (CEQA) is applicable to state actions but not to actions of the federal government. Furthermore, USEPA and the DON have determined that the requirements of the National Environmental Policy Act (NEPA) and CEQA are no more stringent than the requirements for environmental review under CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA). Pursuant to the provisions of CERCLA, the NCP, and other federal environmental impact evaluation requirements, selecting a remedial action with feasible mitigation measures and provision for public review is designed to ensure that the proposed action provides for short- and long-term protection of the environment and public health. Hence, CERCLA performs the same function as, and is substantially parallel to, the state's requirements under CEQA. For the reasons set forth above, NEPA and CEQA are not ARARs for CERCLA actions.

A1.4 Waste Characterization

Selection of ARARs involves the characterization of wastes as described below.

A1.4.1 RCRA-Hazardous Waste Determination

The first step in the RCRA-hazardous waste characterization process was to evaluate contaminated soil at Sites 1D, 1E-1, 1H, and 30 to determine whether it constitutes a listed RCRA waste. Federal RCRA-hazardous waste determination is necessary to determine whether a waste is subject to RCRA requirements at 22 CCR Div. 4.5 and other state requirements at 23 CCR Div. 3, Chapter 15. The preamble to the NCP states that "....it is often necessary to know the origin of the waste to determine whether it is a listed waste and that, if such documentation is lacking, the lead agency may assume it is not a listed waste" (55 FR 8666, 8758 [1990]).

This approach is confirmed in USEPA guidance for CERCLA compliance with other laws (USEPA 1988a), as follows:

> "To determine whether a waste is a listed waste under RCRA, it is often necessary to know the source. However, at many Superfund sites, no information exists on the source of wastes. The lead agency should use available site information, manifests, storage records, and vouchers in an effort to ascertain the nature of these contaminants. When this documentation is not available, the lead agency may assume that the wastes are not listed RCRA hazardous wastes, unless further analysis or information becomes available that allows the lead agency to determine that the wastes are listed RCRA hazardous wastes."

RCRA-hazardous wastes that have been assigned USEPA hazardous waste numbers (or codes) are listed in 22 CCR §§ 66261.30–66261.33. The lists include hazardous waste codes beginning with the letters "F," "K," "P," and "U."

Knowledge of the exact source of a waste is required for source-specific listed wastes ("K" waste codes). Some knowledge of the nature or source of the waste is required even for listed wastes from nonspecific sources, such as spent solvents ("F" waste codes) or commercial chemical products ("P" and "U" waste codes). These listed RCRA-hazardous wastes are restricted to commercially pure chemicals used in particular processes such as degreasing.

P and U wastes cover only unused and unmixed commercial chemical products, particularly spilled or off-spec products (USEPA, 1991c). Not every waste containing a P or U chemical is a hazardous waste. To determine whether a CERCLA investigation-derived waste (IDW) contains a P or U waste, there must be direct evidence of product use. In particular, all the following criteria must be met. The chemicals must be:

- Discarded (as described in 40 CFR § 261.2[a][2])
- Either off-spec commercial products or a commercially sold grade
- Not used (soil contaminated with spilled unused wastes is a P or U waste)
- The sole active ingredient in a formulation.

The history of wastes placed at the refuse burning grounds, which includes sites 1D, 1E-1, 1H, and 30, does not include specific chemical information. Available historical information did not specify any of the actual sources for hazardous wastes in the OU 4 sites. The chemicals detected in Sites 1D, 1E-1, 1H, and 30 during the supplemental FS are not considered potential RCRA-listed wastes. Therefore, contaminated soils at the OU 4 sites are not considered potential RCRA-listed hazardous waste.

The second step in the RCRA hazardous waste characterization process was to evaluate potential hazardous characteristics of the contaminated soil. The evaluation of characteristic waste is described in USEPA guidance as follows (USEPA, 1988a):

"Under certain circumstances, although no historical information exists about the waste, it may be possible to identify the wastes as RCRA characteristic wastes. This is important in the event that (1) remedial alternatives under consideration at the site involve on-site treatment, storage, or disposal, in which case RCRA may be triggered as discussed in this chapter; or (2) a remedial alternative involves off-site shipment. Since the generator (in this case, the agency or responsible party conducting the Superfund action) is responsible for determining if the wastes exhibit any of these characteristics (defined in Title 40 Code of Federal Regulations [CFR] Section 261.21-24), testing may be required. The lead agency must use best professional judgment to determine, on a site-specific basis, if testing for hazardous characteristics is necessary.

In determining whether to test for the toxicity characteristic using the Extraction Procedure (EP) Toxicity Test, it may be possible to assume that certain low concentrations of waste are not toxic. For example, if the total waste concentration is 20 times or less the EP toxicity concentration, the waste cannot be characteristic hazardous waste. In such a case, RCRA requirements would not be applicable. In other instances, where it appears that the substances may be characteristic hazardous waste (ignitable, corrosive, reactive, or EP toxic), testing should be performed".

Hazardous waste characteristics, as defined in 40 CFR §§ 261.21–261.24, are commonly referred to as ignitability, corrosivity, reactivity, and toxicity. California environmental health standards for the management of hazardous waste set forth in 22 CCR Div. 4.5 were approved by USEPA as a component of the federally authorized California RCRA program. Therefore, the characterization of RCRA waste at Sites 1D, 1E-1, 1H, and 30 is based on the state requirements.

The characteristics of ignitability, corrosivity, reactivity, and toxicity are defined in 22 CCR §§ 66261.21–66261.24. According to 22 CCR § 66261.24(a)(1)(A), "A waste that exhibits the characteristic of toxicity pursuant to subsection (a)(1) of this section has the USEPA Hazardous Waste Number specified in Table I of this section which corresponds to the toxic contaminant causing it to be hazardous." Table I assigns hazardous waste codes beginning with the letter "D" to wastes that exhibit the characteristic of toxicity; D waste codes are limited to "characteristic" hazardous wastes.

According to 22 CCR § 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste provided that the waste has already been reliably tested or if there is documentation of chemicals used. Soil contamination at Sites 1D, 1E-1, 1H, and 30 are not ignitable, corrosive, or reactive, as defined in 22 CCR 66261.21-66261.23. This determination was based on knowledge of the nature and concentrations of contaminants and professional judgment.

The requirements at 22 CCR § 66261.24 list the toxic contaminant concentrations that determine the characteristic of toxicity. The concentration limits are in milligrams per liter (mg/L). For waste soils, these concentrations apply to the extract or leachate produced by the toxicity characteristic leachate procedure (TCLP).

Title 22 CCR, Division 4.5, Chapter 18, Appendix I, defines the scope and application of the TCLP method as required by the state. Section 1.2 of Appendix I states that "If a total analysis of the waste demonstrates that individual analytes are not present in the waste, or that they are present but at such low concentrations that the appropriate regulatory levels could not possibly be exceeded, the TCLP need not be run." Federal regulations consider a waste hazardous if the contaminant concentrations in the TCLP extract equal or exceed the TCLP limits. For soils, TCLP testing is required only if total contaminant concentrations in soil equal or exceed 20 times the TCLP limits because TCLP uses a 20-to-1 dilution for the extract (USEPA, 1988b).

The potential toxicity of contaminated soil at Sites 1D, 1E-1, 1H, and 30 was evaluated. RI soil samples from these sites were tested for total contaminant concentrations using analytical methods for potential federal and state toxic contaminants. Maximum detected concentrations of site-related chemicals in soil were compared with 20 times the TCLP. If the test results equaled or exceeded 20 times the TCLP limits, the soil was considered a RCRA-hazardous waste. If the analytical results were less than 20 times the TCLP, the soil was not considered a RCRA hazardous waste. Because TCLP analyses were not routinely performed, the following assumptions were made when TCLP data were not available: Soil is classified as RCRA hazardous if the total lead concentrations exceed 1,000 mg/kg, California (non-RCRA) hazardous if the total lead concentration is between 350 and 1,000 mg/kg, and nonhazardous if the total lead concentration is less than 350 mg/kg.

Using the above approach, most of the impacted soil from Site 1D was classified as California-hazardous or nonhazardous, with only 6 percent classified as RCRA-hazardous; most impacted soil from Site 1H was classified as nonhazardous with 13 percent classified as California-hazardous; approximately 40 percent of the impacted soil at Site 30 exceeded RCRA-hazardous waste criteria; and all impacted soil from Site 1E-1 was classified as nonhazardous.

According to the USEPA, a waste (or media containing a waste) that is hazardous because it once exhibited a characteristic will not be subject to Subtitle C regulations if it no longer exhibits that characteristic. Soil that was determined to be hazardous waste based on its toxicity but is treated to levels below the toxicity criteria levels would no longer be considered hazardous waste.

A1.4.2 California-Regulated, Non-RCRA-Hazardous Waste

A waste determined not to be a RCRA-hazardous waste may still be considered a state-regulated non-RCRA-hazardous waste. The state is broader in scope in its RCRA program in determining hazardous waste. Title 22 CCR § 66261.24(a)(2) lists the total threshold limit concentrations (TTLCs) and the soluble threshold limit concentrations (STLCs) for non-RCRA hazardous waste. The state applies its own leaching procedure, WET, that uses a different acid reagent and has a different dilution factor (tenfold). Other state requirements may be broader in scope than federal ARARs for identifying non-RCRA wastes regulated by the state; these may be potential ARARs for wastes not covered under federal ARARs. See additional subsections of 22 CCR § 66261.24. A waste is considered hazardous if its total concentrations exceed the TTLCs or if the extract concentrations from the waste extraction test (WET) exceed the STLCs. A WET is required when the total concentrations exceed the STLC but are less than the TTLCs (22 CCR Div. 4.5, Ch. 11, Appendix [app.] II [b]).

A1.4.3 Conclusions About RCRA Applicability

The pertinent substantive hazardous waste management requirements set forth in Title 22, Division 4.5, are potentially "applicable" federal ARARs for on-site treatment, storage, or disposal of excavated soil from Sites 1D and 30 because it was determined that soil excavated from these sites would meet the definition of RCRA-hazardous waste (Section A1.4.1). For soil left in place, the RCRA requirements are not potentially applicable because the waste was not generated and RCRA treatment, storage, and disposal activities were not performed after the effective date of the requirements. However, the DON has determined that portions of RCRA requirements may be relevant and appropriate for contaminated soil left in place, as identified in this appendix.

A1.4.4 Other California Waste Classifications

For waste discharged after 18 July 1997, solid waste classifications at 27 CCR §§ 20210, 20220, and 20230 are used to determine applicability of waste management requirements, which are summarized below. For response actions that generate waste, these requirements may be "applicable" state ARARs. Waste classification under these sections should determine whether the waste management requirements of 27 CCR are potential ARARs. Their stringency must be compared to federal ARARs to determine if they are ARARs.

A "designated waste" under 27 CCR § 20210 is defined at California (Cal.) Water Code § 13173. Under Cal. Water Code § 13173, designated waste is hazardous waste that has been granted a variance from hazardous waste management requirements or nonhazardous waste that consists of or contains pollutants that, under ambient environmental conditions at a waste management unit, could be released in concentrations exceeding applicable water quality objectives or that could reasonably be expected to affect beneficial uses of the waters of the state.

A nonhazardous solid waste under 27 CCR § 20220 is all putrescible and nonputrescible solid, semisolid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semisolid wastes, and other discarded waste (whether of solid or semisolid consistency), provided that such wastes do not contain wastes that must be managed as hazardous wastes or wastes that contain soluble pollutants in concentrations that exceed applicable water quality objectives or could cause degradation of waters of the state.

Under 27 CCR § 20230, inert waste is that subset of solid waste that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives and does not contain significant quantities of decomposable waste.

A1.4.5 On-Base CAMU Disposal Facility ARARs

Implementability of the on-Base land disposal alternatives for Sites 1D, 1H, and 30 in this OU 4 supplemental FS is contingent upon the availability of a Corrective Action Management Unit (CAMU) facility to accept waste from these sites. It is estimated that it would take from 3 to 4 years to conduct a siting study, design, and construct a new CAMU facility. A full evaluation of a new CAMU facility for compliance with ARARs is not provided in this supplemental FS because a CAMU site has not been selected or evaluated. However, this section provides a discussion of the potential ARARs that would affect the implementation of a new on-Base CAMU, provided a suitable site is located at MCB Camp Pendleton.

An evaluation of specific ARARs for the on-Base disposal alternative for each site is presented in subsequent sections of this appendix. In addition, potential CAMU ARARs identified by DTSC and submitted to DON for consideration were analyzed and DON responses presented in Appendix M. Tables A-1 through A-6 of this appendix were revised to incorporate DTSC-identified potential ARARs that were also determined by the DON to be potential ARARs. An appropriate addendum document will be prepared to address disposal site compliance with ARARs, and specific pretreatment requirements, prior to preparation of the OU 4 Proposed Plan and implementation of this alternative. The addendum document will be subject to agency review and concurrence.

A new on-Base CAMU would have to comply with the CAMU requirements set forth in 40 CFR § 264.552 and CCR tit. 22, § 66264.552(c) and (e). The CAMU rule was amended on 22 April 2002 and, although California has interim authorization-by-rule for the new requirements, the federal citations are used until the state has its own regulations approved.

A CAMU allows consolidation of CAMU-eligible waste on site without triggering RCRA land disposal restrictions (LDRs) or minimum technology requirements (MTRs). LDRs and MTRs, which vary depending on the type of hazardous waste being treated, are concentration- and technology-based standards designed to reduce the mobility and toxicity of hazardous constituents present in hazardous wastes. For the LDRs and MTRs to be applicable to a CERCLA response, the action must constitute placement of a restricted RCRA hazardous waste. USEPA uses the concept of "area of contamination" (AOC) to assist in determining when placement does and does not occur for CERCLA actions. Essentially, placement does not occur when restricted hazardous wastes are moved or treated within a single AOC, which is a discrete zone delineated by the aerial extent of continuous contamination (USEPA, 1989). The CAMU regulations add further flexibility for on-Base management of CERCLA remediation waste by allowing on-site land disposal of CAMU-eligible waste when the waste is moved from an AOC to a CAMU facility.

Without the structures of LDRs and MTRs, response actions can be designed to use a more cost-effective approach. The DON designates CAMUs by complying with substantive CAMU regulations but does not implement the procedural elements of the CAMU regulations. The procedural aspects of the CAMU regulations are not ARARs. For example, the requirement for regulatory approval of CAMU designation under RCRA regulation is a procedural aspect of the CAMU regulations and thus is not listed as an ARAR. Under 40 CFR § 264.552(a), a CAMU is an area within a facility that is used only for managing CAMU-eligible waste for implementing corrective action or cleanup at the facility. A CAMU must be located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated. CAMU-eligible waste means all solid and hazardous wastes and all media (including groundwater, surface water, soils, and sediments) and debris that are managed while implementing cleanup except when the wastes are found during cleanup in intact or substantially intact containers, tanks, or other nonland-based units found aboveground, unless the wastes are first placed in tanks, containers, or nonland-based units as part of the cleanup or the containers or tanks are excavated during the course of cleanup. As-generated wastes (either hazardous or nonhazardous) from ongoing industrial operations at a site are not eligible except where nonhazardous as-generated waste is placed in a CAMU to facilitate treatment or the performance of the CAMU. Bulk or noncontainerized liquid hazardous waste or free liquids are prohibited from placement in CAMUs unless it facilitates the selected remedy. Nonhazardous free liquids are prohibited unless they facilitate the remedy.

The following seven criteria of 40 CFR § 264.552(c) would apply to the placement of a new CAMU.

1. The CAMU shall facilitate the implementation of reliable, effective, protective, and cost-effective remedies.
2. Waste management activities associated with the CAMU shall not create unacceptable risks to humans or to the environment resulting from exposure to hazardous wastes, hazardous substances, or hazardous constituents.
3. The CAMU shall include uncontaminated areas only if including such areas for managing CAMU-eligible waste is more protective than managing such wastes at contaminated areas of the facility.
4. Areas within the CAMU, where wastes remain in place after closure of the CAMU, shall be managed and contained so as to minimize future releases, to the extent practicable.
5. The CAMU shall expedite the timing of remedial activity implementation, when appropriate and practicable.

6. The CAMU shall enable the use, when appropriate, of treatment technologies (including innovative technologies) to enhance the long-term effectiveness of remedial actions by reducing the toxicity, mobility, or volume of wastes that will remain in place after closure of the CAMU.
7. The CAMU shall, to the extent practicable, minimize the land area of the facility on which wastes will remain in place after closure of the CAMU.

In addition, the substantive provisions of 40 CFR § 264.552(e) require the following to be specified:

- The aerial configuration of the CAMU;
- Requirements for CAMU-eligible waste management including design, operation, treatment, and closure requirements;
- Minimum design requirements:
  - Composite liner and leachate collection system must maintain less than a 30-cm depth of leachate over the liner.
  - Composite liner must have an upper minimum 30-mil flexible membrane liner (FML) installed in direct and uniform contact with a lower layer of at least 2 feet of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} centimeters per second.
  - If FML is high density polyethylene (HDPE), it must be 60 mils thick.
  - Alternative design and operation must prevent the migration of any hazardous constituents into the groundwater or surface water at least as effectively as the liner and leachate collection systems, or the CAMU is located in an area with existing significant levels of contamination and the alternative design would prevent migration from the unit that would exceed long-term remedial goals.
- Requirements for groundwater monitoring; and
- Closure and postclosure requirements.

CAMUs used only for material that already meets the cleanup goals do not have to comply with liner, cap, and groundwater monitoring requirements (40 CFR § 264.552[g]).

The substantive provisions of the following minimum treatment requirements at 40 CFR § 264.552(e)(4)(iv) must be complied with for waste that would otherwise be subject to LDRs if the waste will remain after closure of the CAMU for principal hazardous constituents (those that pose a substantially higher risk than cleanup goals) including potential migration to groundwater.

- For nonmetals, treatment must achieve 90 percent reduction in total concentrations.
- For metals, treatment must achieve 90 percent reduction in leachate or 90 percent reduction in total concentrations when a metal removal technology is used.
- Treatment less than 10 times the universal treatment standards is not required.
- For waste exhibiting the hazardous characteristic of ignitability, corrosivity, or reactivity, the waste must be treated to eliminate these characteristics.
- For debris, treatment must achieve the LDRs for hazardous debris or the levels cited above.

Treatment levels cited above may be adjusted higher or lower as long as they are protective of human health and the environment based on the following:

- Technical impracticability of treatment to the above levels
- Significantly above or below applicable cleanup standards
- Views of the affected local community
- Short-term risks of the on-site treatment
- Long-term protection offered.

Treatment must be completed prior to or within reasonable time after placement into a CAMU. For determining whether treatment standards have been met, a subset of analytical surrogates may be used based on the degree of difficulty of treatment and analysis of constituents with similar treatment properties.

The closure requirements for a CAMU are such that there should be no unacceptable risks to humans or the environment resulting from exposure to hazardous waste or hazardous constituents. Compliance for a CAMU closure must be met as specified in the 40 CFR §264.552(e)(5) requirements for leaving waste in place.

A2.0 CHEMICAL-SPECIFIC ARARs

Chemical-specific ARARs are generally health- or risk-based numerical values or methodologies applied to site-specific conditions that result in the establishment of a cleanup level. Many potential ARARs associated with particular response alternatives (such as closure or discharge) can be characterized as action-specific but include numerical values or methodologies to establish them so they fit in both categories (chemical- and action-specific). This section presents ARARs determination conclusions addressing numerical values for soil, air, and groundwater pertinent to the OU 4 sites. Section A2.1 presents summaries of the ARARs conclusions for each media. A detailed discussion of the ARARs for each media follows in Section A2.2. Potential federal and state chemical-specific ARARs are summarized in Tables A-1 and A-2 of this appendix, respectively.

A2.1 Summary of ARARS Conclusions by Medium

Soil, groundwater, surface water, and air are the environmental media potentially affected by the OU 4 response actions. The conclusions for ARARs pertaining to these media are presented in the following sections.

A2.1.1 Groundwater ARARs Conclusions

The proposed remedial alternatives evaluated in this supplemental FS address contaminated soil only. No cleanup or discharge to groundwater is proposed in any of the remedial alternatives; therefore, no groundwater cleanup ARARs were identified for the OU 4 remedial actions. Although the 22/23 Area groundwater has been moved from OU 4 to OU 5 and groundwater remedial actions are not a part of this FS, an analysis and evaluation of groundwater ARARs is presented here to the extent that they are pertinent to determine vadose zone soil cleanup levels that are protective of groundwater quality.

A2.1.2 Surface-Water ARARs Conclusions

The proposed remedial alternatives evaluated in this supplemental FS address contaminated soil. No cleanup or discharge to surface water is proposed in any of the remedial alternatives; therefore, no surface-water ARARs were identified for the OU 4 remedial actions.

A2.1.3 Soil ARARs Conclusions

Contaminants in soil at Sites 1D, 1H, and 30 were detected at concentrations that could threaten human health and the environment. As described in Section A1.4, some contaminated soil at these sites could meet the definition of a hazardous waste.

Soil cleanup levels that are protective of human health and the environment were established for each site. Title 22 CCR 66264.94 is determined to be the controlling relevant and appropriate ARAR for setting soil cleanup levels at the OU 4 soil sites. Potential federal and state groundwater ARARs were also considered when setting cleanup goals. Site 1H was determined to be protective of groundwater, and the groundwater at Site 1H was recommended for no further action in the Group D RI report (SWDIV, 1997). The objectives of the soil remedial alternatives include protection of human health and the environment and prevention of future adverse impact to groundwater from releases of hazardous substances from site soils. The DON believes that cleanup to these soil RG concentrations will prevent releases to groundwater at concentrations that could exceed federal and state ARARs. The groundwater requirements that were used to establish soil cleanup levels are discussed in Section A2.2.1.

The Central Valley Region RWQCB designated level methodology (DLM) was used for the soil sites as TBC guidance to comply with potential groundwater ARARs. The soil cleanup goals will

be set lower than the designated level following the DLM guidance. The DON has determined that the DLM guidance is a potential TBC for complying with the groundwater requirements at Sites 1D, 1H, and 30.

A2.1.4 Air ARARs Conclusions

The alternatives involving excavation at Sites 1D, 1H, 1E-1, and 30 may result in particulate emissions. The requirements of APCD Rule 50(d)(1) are potentially applicable federal ARARs for prohibiting emissions darker than number 1 on the Ringlemann chart for more than 3 minutes in any 60-minute period. More specific information on these requirements is provided in the discussion of action-specific ARARs.

A2.2 Detailed Discussion of ARARs by Medium

The following subsections provide a detailed discussion of federal and state ARARs by medium.

A2.2.1 Groundwater ARARs

The proposed remedial alternatives evaluated in this supplemental FS address contaminated soil only. Although groundwater remedial actions are not a part of this FS, an analysis and evaluation of groundwater ARARs is presented here to the extent that they are pertinent to determine vadose zone soil cleanup levels that are protective of groundwater quality.

The substantive provisions of the following potential federal and state groundwater ARARs and TBCs were evaluated and the stringency of these requirements were compared and analyzed to determine the controlling ARARs for establishing soil cleanup levels:

- RCRA groundwater protection standards set forth in 22 CCR 66264.94(a)(1) and (3), (c), (d), and (e)
- Federal maximum contaminant levels (MCLs) for volatile organic compounds (VOCs) in drinking water as promulgated by USEPA under the Safe Drinking Water Act (SDWA) at 40 CFR § 141.62(b) for inorganics
- Federal nonzero maximum contaminant level goals (MCLGs) at 40 CFR § 141.51(b) for inorganics
- State primary and secondary MCLs at 22 CCR § 64431 for inorganic chemicals and § 64449 for secondary MCLs
- Porter-Cologne Water Quality Control Act, Cal. Water Code §§ 13241
- Comprehensive Water Quality Control Plan for the San Diego Basin (water quality objectives, beneficial uses, and waste discharge limitations) (RWQCB, 1994), referred to hereinafter as the Basin Plan
- California State Water Resources Control Board (SWRCB) Resolutions 68-16, 88-63, and 92-49.
- Title 23 CCR, Div. 3, Ch. 15, § 2550(a), 2550.4(d), (e), and (f), and 2550.5
- Title 27 CCR Div. 2, Subdiv. 1, § 20400(a), (c), and (e).

The analysis of these requirements is presented below.

A2.2.1.1 Federal

One of the significant issues in identifying groundwater ARARs under the SDWA and RCRA is whether the groundwater at the site can be classified as a source of drinking water. USEPA groundwater policy is set forth in the preamble to the NCP (55 FR 8666, 8752–8756 [1990]).

This policy uses the groundwater classification system set forth in the draft USEPA Guidelines for Groundwater Classification Under the USEPA Groundwater Protection Strategy (USEPA, 1986). Under this policy, groundwater is classified in one of three categories (Class I, II, or III), based on ecological importance, replaceability, and vulnerability considerations. Irreplaceable groundwater that is currently used by a substantial population or groundwater that supports a vital habitat is considered to be Class I. Class II consists of groundwater that is currently being used or that might be used as a source of drinking water in the future. Groundwater that cannot be used for drinking water due to insufficient quality (e.g., high salinity or widespread, naturally occurring contamination) or quantity is considered to be Class III. The USEPA guidelines define Class III groundwater as groundwater with total dissolved solids (TDS) concentrations over 10,000 mg/L and a yield of less than 150 gallons per day (gpd) (USEPA, 1986). Class III groundwater can also be classified based on economic or technological treatability tests as well as quality or quantity (both criteria are not needed, just one or the other).

The federal (USEPA) groundwater classification system is based on guidance and not promulgated requirements. Therefore, it is not a potential ARAR. However, it may be determined to be a TBC if used to set cleanup levels for groundwater. In the past, the DON has used SWRCB Res. 88-63 rather than the USEPA guidance to determine the appropriate groundwater classification. SWRCB Res. 88-63 designates all waters of the state to be suitable as sources of drinking water excluding those waters that:

- Exceed 3,000 mg/L TDS,
- Do not yield 200 gpd from a single well,
- Are a geothermal resource or in a water conveyance facility, or
- Cannot be reasonably treated for domestic use using either best management practices or best economically achievable treatment practices.

The USEPA position on use of the state versus federal groundwater classification guidance, clarified in a June 1988 letter from Tom Huetteman, USEPA, to Mr. Henry Gee, DON (DON, 1998), is that, because California does not have a USEPA-endorsed comprehensive state groundwater protection program, the federal definition of potential drinking water (10,000 parts per million [ppm] TDS or less and a yield of 150 gpd) should be used during the RI/FS rather than the state definition found in SWRCB Res. 88-63. USEPA further clarified its position in a memorandum sent to the DON in November 2000, intended to provide guidelines for applying the federal groundwater classification criteria and includes site-specific factors that can be considered in finally determining whether all or portions of the aquifer(s) should be considered a potential drinking-water source. These factors include:

- Thickness of the aquifer
- Actual groundwater yield
- Proximity to salt water and the potential for saltwater intrusion
- Quality of underlying water-bearing units and whether these units are current or potential drinking-water sources
- Existence of institutional controls on well construction or aquifer use
- Information on current or historical use of the aquifer
- Cost of cleanup to MCLs.

The USEPA position is only more stringent if the groundwater being evaluated has a TDS concentration between 3,000 and 10,000 ppm or a yield between 200 and 300 gpd. If this is the

case, the USEPA may insist on applying federal rather than state guidelines to classify the aquifer.

The aquifer underlying the OU 4 Sites is located within a basin currently used for drinking water and other beneficial uses such as agriculture and industry. The aquifer is classified as a Class II aquifer.

Safe Drinking Water Act

Federal MCLs and MCLGs developed by USEPA under the SDWA are potentially relevant and appropriate requirements for aquifers with Class II characteristics, such as the groundwater at the OU 4 sites, and therefore are potential federal ARARs. Under the SDWA, the point of compliance (POC) for MCLGs and MCLs is at the tap. Therefore, the MCLs and MCLGs are not "applicable" ARARs for DON sites. However, MCLs and MCLGs are generally considered relevant and appropriate as RGs for current or potential drinking water sources, and thus are commonly identified as potential ARARs for response actions under CERCLA.

Although MCLs are developed using cost and technical considerations, USEPA considers them to be protective of human health as well.

The NCP states that MCLGs that are set at levels above zero should be considered to be relevant and appropriate requirements for groundwaters that are potential sources of drinking water (40 CFR § 300.430(e)(2)(I)(B) and 55 FR 8666, 8750–8754 [1990]). Although the POC for MCLGs and MCLs under the SDWA is at the tap, USEPA has determined that for CERCLA remedies, nonzero MCLGs or MCLs should be attained throughout the contaminated plume or at and beyond the edge of the waste management area, when waste is left in place (55 FR 8666, 8753 [1990]).

Secondary MCLs (SMCLs) are nonenforceable federal contaminant levels intended as guidelines for the states. Because they are nonenforceable, federal SMCLs are not ARARs.

RCRA Groundwater Protection Standards

Groundwater concentration limits for RCRA-regulated units are promulgated at 22 CCR § 66264.94, which states that the concentrations of compounds must not exceed the background level of that constituent in groundwater or, if achieving background is shown to be technologically or economically infeasible, some higher concentration limit that is set as part of the corrective action program. In no event shall a concentration limit greater than background exceed MCLs established under the federal SDWA (22 CCR §§ 64431 and 64444).

The RCRA groundwater protection standards are applicable only for currently operating regulated units. These standards are not applicable for the OU 4 sites because they are not regulated unitsand are not relevant and appropriate federal requirements for the OU 4 sites because the media regulated (i.e., groundwater) is not the same as the contaminated media at the OU 4 sites . However, they must be considered when determining vadose zone soil cleanup levels that are protective of groundwater. The provisions at 22 CCR 66264.94(e) allow concentration limits above background to be used as long as contaminant concentrations do not exceed other statutes or regulations (e.g., MCLs).

A2.2.1.2 State

Issues pertinent to identified potential state ARARs for groundwater are discussed in this section. The state has identified the following ARARs for groundwater cleanup at the site:

Primary and Secondary State MCLs

Primary and secondary state MCLs for OU 4 chemicals of concern (COCs) are set forth in 22 CCR § 64431 (Maximum Contaminant Levels – Inorganic Chemicals). These requirements are incorporated into the Basin Plan (CRWQCB, 1994). The DON has determined that the

substantive provisions of the primary MCLs set forth in Section 64431 are not state ARARs for the OU 4 sites because the media regulated (i.e., groundwater) is not the same as the contaminated media at the OU 4 sites. However, they must be considered when determining vadose zone soil cleanup levels that are protective of groundwater..

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) became Division 7 of the California Water Code in 1969. The Porter-Cologne Act requires each regional board to formulate and adopt Basin Plans for all areas within the region (Cal. Water Code § 13240). It also requires each regional board to establish water quality objectives (WQOs) that will protect the beneficial uses of the water basin (Cal. Water Code § 13241) and to prescribe waste discharge requirements that would implement the Basin Plan for any discharge of waste to the waters of the state (Cal. Water Code § 13263[a]).

The DON accepts the substantive provisions of Cal. Water Code §§ 13241 of the Porter-Cologne Act as enabling legislation as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the WQCP for the San Diego Basin, SWRCB Res. 68-16 and Res. 88-63, and state primary MCLs as potential state ARARs.

Comprehensive Water Quality Control Plan for San Diego Basin (Basin Plan)

The San Diego RWQCB Basin Plan was evaluated for potential state ARAR status for the OU 4 sites. The Basin Plan was prepared and implemented by the San Diego RWQCB to protect and enhance the quality of the waters in the San Diego Basin. The Basin Plan establishes location-specific beneficial uses and WQOs for the surface water and groundwater of the region and is the basis of the San Diego RWQCB regulatory programs. The Basin Plan includes both numeric and narrative WQOs for specific groundwater subbasins. The WQOs are intended to protect the beneficial uses of the waters of the region and to prevent nuisance.

Beneficial use and reuse of water are key aspects of the Basin Plan for the San Diego Basin. The OU 4 sites at MCB Camp Pendleton are located in the Santa Margarita River basin, which has the following beneficial use designations (RWQCB, 1994):

- Municipal and domestic supply
- Agricultural supply
- Industrial service supply
- Industrial process supply.

The DON accepts the substantive provisions in Chapters 2 and 3 of the Basin Plan for the San Diego RWQCB (1994), including beneficial use, WQOs, and waste discharge requirements, as potential ARARs. The uses designated for the San Diego Basin are ARARs for this OU 4 supplemental FS.

State Water Resources Control Board Resolutions 68-16 and 92-49

SWRCB Res. 68-16 is the state's antidegradation policy. SWRCB Res. 68-16, "Statement of Policy With Respect to Maintaining High Quality of Waters in California," 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 the required 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 necessary to assure that a) pollution or a nuisance will not occur and b) the highest water quality consistent with maximum benefit to the people of the state will be maintained (SWRCB 1968).

SWRCB Res. 92-49 (as Amended on 21 April 1994 and 02 October 1996) is titled Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304. This resolution contains policies and procedures for the regional boards that apply to all investigations and cleanup and abatement activities for all types of discharges subject to Cal. Water Code § 13304. It is, therefore, not of general applicability and is not an "applicable" ARAR. However, it was evaluated as a potential "relevant and appropriate" state ARAR.

Cleanup to below background water quality conditions is not required by the SWRCB under the Porter-Cologne Act. SWRCB Res. 92-49 II.F.1 (SWRCB 1992) provides that regional boards may require cleanup and abatement to "conform to the provisions of the Resolution No. 68-16 of the State Water Board, and the Water Quality Control Plans of the State and Regional Water Quality Control Boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions."

State Water Resources Control Board Res. 88-63, Adoption of Policy Entitled "Sources of Drinking Water"

SWRCB Res. 88-63 establishes criteria to help RWQCBs identify potential sources of drinking water (SWRCB, 1988). According to this resolution, all groundwater in California is considered suitable or potentially suitable for domestic or municipal freshwater supply except for cases in which any one of the following water quality and production criteria cannot be met.

- TDS exceed 3,000 mg/L (or electrical conductivity is greater than 5,000 micromhos per centimeter [µmho/cm]) and the RWQCB does not reasonably expect the groundwater to supply a public supply system.
- Groundwater is contaminated, either by natural processes or by human activity unrelated to a specific pollution incident and cannot reasonably be treated for domestic use either by best management practices or best economically available treatment practices.
- The groundwater does not provide sufficient water to supply a single well capable of producing an average sustained yield of 200 gpd.

SWRCB Res. 88-63 has been incorporated by reference into the Basin Plan (RWQCB 1994). The DON has determined that the substantive provisions of this policy are potential state ARARs for this supplemental FS.

The DON has concluded that SWRCB Res. 88-63 is a controlling ARAR for MCB Camp Pendleton OU 4 sites for purposes of developing vadose zone soil cleanup goals, because the Basin Plan specifically identifies the Santa Margarita River Subbasin as a source of drinking water supply, Class II aquifer (RWQCB 1994).

23 CCR Div. 3, Ch. 15, §§ 2550(a); 2550.4 (d), (e), and (f); and 2550.5; and 27 CCR Div. 2, Subdiv. 1, §§ 20380(a), 20400(a), (c), (d), (e), and (g)

The requirements in 23 CCR Division 3, Chapter 15, §§ 2550(a), 2550.4(d), (e), and (f), and 2550.5 are for hazardous waste. Essentially the same requirements were identified at 27 CCR Div. 2, Subdiv. 1, §§ 20380(a), 20400(a), (c), (d), (e), and (g), and 20405 for nonhazardous waste. The DON has reviewed these requirements and has determined that the provisions in

23 CCR 2550.4 and 27 CCR 20400 are not more stringent than federal ARARs at 22 CCR 66264.94. Likewise, the provisions in 23 CCR 2550.5 are not more stringent than federal ARARs at 22 CCR 66264.95. Requirements of 23 CCR 2550 and 27 CCR 20380 are not considered potential ARARs because they do not constitute standards in and of themselves; rather, they address the general applicability of technical standards for water-quality monitoring and response in Chapter 15. These requirements are considered part of the technical standards that are considered potential state ARARs. The chemical-specific requirements at 27 CCR identified above are not more stringent than federal ARARs and are not potential ARARs for OU 4 sites.

A2.2.2 Surface-Water ARARs

The proposed remedial actions evaluated in the supplemental FS address contaminated soil. No cleanup or discharge to surface water is proposed for any of the remedial alternatives; therefore, no surface-water ARARs were identified for the OU 4 remedial action alternatives.

A2.2.3 Soil ARARs

This section presents a detailed discussion of chemical-specific ARARs for soil remedial action alternatives at Sites 1D, 1E-1, 1H, and 30. Contaminants in soil at Site 1D, 30, and 1H were detected at concentrations that could threaten human health and the environment. The key threshold questions for soil ARARs are whether the wastes located at the OU 4 soil sites would be classified as hazardous waste, and whether soil cleanup levels are protective of groundwater. The soil may be classified as a federal hazardous waste as defined by RCRA and the state-authorized program, or as non-RCRA, state-regulated hazardous waste. If the soil is determined to be hazardous waste, the appropriate requirements will apply.

A2.2.3.1 Federal

Potential chemical-specific federal ARARs pertaining to soil at the OU 4 sites are listed in Table A-1.

RCRA Hazardous Waste and Groundwater Protection Standards.

The federal RCRA requirements at 40 CFR 261 do not apply in California because the state RCRA program is authorized. The authorized state RCRA requirements are therefore considered potential federal ARARs (see Section A1.3.2). The applicability of RCRA requirements depends on whether the waste is an RCRA hazardous waste, whether the waste was initially treated, stored, or disposed of after the effective date of the particular RCRA requirement, and whether the activity at the site constitutes treatment, storage, or disposal as defined by RCRA. However, RCRA requirements may be relevant and appropriate even if they are not applicable. Examples include activities that are similar to the definition of RCRA treatment, storage, or disposal for waste that is similar to RCRA hazardous waste.

The determination of whether a waste is an RCRA hazardous waste can be made by comparing the site waste to the definition of RCRA hazardous waste. The RCRA requirements at 22 CCR § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100 are potential ARARs because they define RCRA hazardous waste. A waste can meet the definition of hazardous waste if it has the toxicity characteristic of hazardous waste. This determination is made by using the toxicity characteristic leaching procedure (TCLP). The maximum concentrations allowable for the TCLP listed in § 66261.24(a)(1)(B) are potential federal ARARs for determining whether the site has hazardous waste. If the site waste has concentrations exceeding these values, it is determined to be a characteristic RCRA hazardous waste (see Section A1.4.1).

The requirements at 22 CCR § 66264.94(a)(1), (a)(3), (c), (d), and (e) are potential federal ARARs for the vadose zone (i.e., the unsaturated zone contamination). These sections set

concentration limits for the unsaturated zone as well as for groundwater and surface water. These requirements are considered to be potential federal ARARs because they are part of the approved state RCRA program. These requirements are not potential ARARs for Site 1H since it was determined to be protective of groundwater in the Group D RI report (SWDIV, 1997c).

RCRA land disposal restrictions (LDRs) at 22 CCR § 66268.1(f) are potential federal ARARs for discharging waste to land. This section prohibits the disposal of hazardous waste to land unless (1) it is treated in accordance with the treatment standards of 22 CCR § 66268.40 and the underlying hazardous constituents meet the Universal Treatment Standards at 22 CCR § 66268.48; (2) it is treated to meet the alternative soil treatment standards of 22 CCR § 66268.49; or a treatability variance is obtained under 22 CCR § 66268.44. These are potentially applicable federal ARARs because they are part of the state-approved RCRA program. RCRA Treatment Standards for non-RCRA, state-regulated waste are not potentially applicable federal ARARs but they may be relevant and appropriate state ARARs.

Toxic Substances Control Act.

The Toxic Substances Control Act (TSCA) regulates the storage and disposal of polychlorinated biphenyls (PCBs). USEPA designed self-implementing procedures for a general, moderate-size site where there should be low residual environmental impact from remedial activities. The requirements at 40 CFR § 761.61(a) are not binding for CERCLA response actions (40 CFR § 761.61[a][1][ii]), and are therefore not applicable ARARs. Because PCBs are not COCs for OU 4 sites, the substantive requirements of these regulations are also not relevant and appropriate ARARs for soil remedial actions in this supplemental FS.

Military Munitions Rule

The Military Munitions Rule identifies when conventional and chemical military munitions become a hazardous waste under RCRA. It also provides for safe storage and transport of such waste. The requirements for military munitions have been consolidated into 40 CFR § 266 Subpart M, with appropriate references to other requirements (e.g., treatment and disposal). The substantive provisions of these requirements are not ARARs for response actions under this supplemental FS because the OU 4 site soils do not contain munitions or waste that contains munitions.

A2.2.3.2 State

RCRA Requirements

Potential chemical-specific ARARs identified by the DTSC were limited to federal provisions of the RCRA requirements included within the USEPA-authorized RCRA program for California. As such, these requirements are considered federal ARARs. When state regulations are either broader in scope or more stringent than their federal counterparts, they are considered potential state ARARs. Thus, the provisions set forth in 22 CCR 66262.24(a)(2) are broader in scope than federal RCRA requirements and are considered state requirements. For instance, the state hazardous waste testing requirements for toxicity characteristics of hazardous waste set forth in 22 CCR 66262.24(a)(2) are potential state ARARs for determining whether the waste soil is hazardous. Other state requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 FR 60848). The 22 CCR div. 4.5 requirements that are part of the state-approved RCRA program would be potential state ARARs for non-RCRA, state-regulated hazardous wastes.

The site waste characteristics need to be compared to the definition of non-RCRA, state-regulated hazardous waste. The non-RCRA, state-regulated waste definition requirements at 22 CCR § 66261.24(a)(2) are potential state ARARs for determining whether other RCRA

requirements are potential state ARARs. This section lists the TTLCs and STLCs. The site waste may be compared to these thresholds to determine whether it meets the characteristics for a non-RCRA, state-regulated hazardous waste.

State Water Resources Control Board Resolutions 92-49

An amended SWRCB Resolution No. 92-49, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304, was promulgated on 13 January 1997. The DON has identified Section III.G of that resolution as the substantive portion of the policy pertinent to soil cleanup. SWRCB Resolution No. 92-49 is not a rule of general applicability to the public. Rather, it is guidance from the SWRCB to the Regional Boards. Therefore, it is not an applicable requirement. The sole focus of Section III.G is water-quality cleanup levels rather than soils. No mention is made of soils or cleanup levels. The section specifically addresses "attainment" and "restoration" of water quality. Section III.G references Section 2550.4 of Chapter 15. Because the state requirements at Section 2550.4 of Chapter 15 are essentially the same as 22 CCR 66264.94 and are no more stringent than federal ARARs, SWRCB Resolution No. 92-49 is not an ARAR for soil cleanup at OU 4 sites. The state does not agree with the DON as to the ARAR status of SWRCB Resolution No. 92-49 but has not held up response actions when the state agrees with the technology (see Section A2.2.1.2).

23 CCR Division 3, Chapter 15

The requirements at this section define a hazardous waste that is covered by the Chapter 15 requirements. These are not more stringent than federal or state RCRA ARARs for identifying hazardous waste. However, if the site waste meets the definition of hazardous waste under 23 CCR § 2521, other Chapter 15 requirements may be ARARs for discharging waste to land including landfill requirements.

Section 2550.4 of Chapter 15 has also been identified by the state as a potential ARAR for soil cleanup levels for hazardous waste. This section is essentially the same as federal ARARs identified at 22 CCR § 66264.94(a)(1)(3), (c), (d), and (e). Therefore, Section 2550.4 is not an ARAR for soil cleanup levels at OU 4 sites.

27 CCR Division 2, Subdivision 1

Former 23 CCR Div. 3, Ch. 15 requirements that have been repealed and went into effect on 18 July 1997, the following sections define waste characteristics for discharge of waste to land. These requirements may be applicable for soil left in place that was discharged after the effective date of the requirements. They are not potentially applicable to discharges before that date but may be relevant and appropriate.

Title 27 CCR § 20230(a) defines inert waste as waste "that does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives, and does not contain significant quantities of decomposable waste." Title 27 CCR § 20230(b) states that "inert wastes do not need to be discharged at classified waste management units." Title 27 CCR § 20230(a) and (b) may be potential state ARARs for soil that meets the definition of inert waste.

Title 27 CCR §§ 20210 and 20220 are state definitions for designated waste and nonhazardous waste, respectively. These may be ARARs for soil that meets the definitions. These soil classifications determine state classification and citing requirements for discharging waste to land.

Title 27 CCR § 20400(a), (c), (d), (e), and (g) have been identified by the state as potential monitoring and cleanup concentration limit ARARs for waste soil other than hazardous waste.

This section is also not more stringent than federal ARARs at 27 CCR § 66264.94(a)(1) and (3), (c), (d), and (e). Therefore, 27 CCR § 20400 is not an ARAR for soil sites at OU 4.

California Central Valley Region RWQCB

The RWQCB Central Valley Region published the DLM in October 1986 (RWQCB 1989). The guidance document was updated in June 1989. The RWQCB San Diego has used this guidance in the past for evaluating soil contamination. The DON has decided to use this guidance as a TBC to comply with ARARs requiring cleanup of soil for protection of groundwater at Sites 1D and 30. The DLM is used only as a screening tool to indicate compliance with the discharge requirements. The DON does not otherwise accept the DLM for classifying waste. Site 1H has already been determined to be protective of groundwater and no further action was recommended for groundwater in the Group D RI report (SWDIV, 1997c); therefore, the DLM is not a TBC for Site 1H.

A2.2.4 Sediments ARARs

The proposed remedial actions evaluated in the supplemental FS address contaminated soil only. Sediments are not a medium of concern for the OU 4 supplemental FS and, therefore, no sediments ARARs were identified for the OU 4 remedial action alternatives.

A2.2.5 Air ARARs

This section presents a detailed discussion of chemical-specific ARARs for potential air emissions for the OU 4 remedial action alternatives. The potential air emissions considered for this supplemental FS include particulates from excavation and handling of soil at Sites 1D, 1H, and 30. The no action and institutional controls actions do not offer potential sources for air emissions. ARARs for air are discussed in greater detail under action-specific requirements.

A.2.2.5.1 Federal

The CAA and RCRA air emission requirements are discussed below.

Clean Air Act

The CAA establishes the National Ambient Air Quality Standards (NAAQS) in 40 CFR § 50.4–50.12. NAAQS are not enforceable in and of themselves; they are translated into source-specific emissions limitations by the state (USEPA, 1990a). Substantive requirements of the San Diego APCD rules that have been approved by USEPA as part of the State Implementation Plan (SIP) under the CAA are potential federal ARARs for air emissions (CAA Section 110). The SIP includes rules for emissions restrictions for particulates, organic compounds, and hazardous air pollutants, as well as standards of performance for new sources. The San Diego APCD rules and regulations evaluated as potential ARARs are presented in Tables A-5 and A-6. The following APCD rules and regulations were evaluated for potential ARAR status: New Source Review (NSR) Rules 20 to 20.8; Rules 50, 51, 52, 52.1, 53, 54, 61.9, 62, and 68; and Regulations X and XI.

San Diego APCD Rule 51 is considered a potential federal ARAR because it has been approved into the SIP. Rule 51 prohibits the discharge to the atmosphere of air contaminants that cause injury, detriment, nuisance, or annoyance to a considerable number of persons. The DON is concerned about the vague, subjective nature of the nuisance rule and the lack of objective standards, as well as the inclusion of subjective nonenvironmental criteria such as "annoyance, repose, and comfort," and so forth. The requirements of 40 CFR § 300.5 specify that an ARAR must be an environmental or facility sitting requirement or limitation. Rule 51 does not fall within the definition of those terms and is therefore not an ARAR. The nature, quantity, and location of identified contaminants at OU 4 sites should not be of concern. The

DON has determined that Rule 51 is not an ARAR for the alternatives proposed at the OU 4 sites.

No method is available for measuring discharge from the excavation activities under Rules 52 and 54. Therefore, Rules 52 and 54 are also not potential ARARs. APCD Rules 50(d)(1) addresses discharge of any air contaminant and is considered a potentially applicable federal ARAR for the discharge of particulate matter via fugitive dust emissions from soil excavation. Rule 50(d)(1) prohibits discharge of any air contaminant from any single source of emissions that is darker than number 1 on the Ringlemann Chart for more than 3 minutes in any 60-minute period. Other APCD rules are not pertinent to the scope of the proposed remedial alternatives.

RCRA Air Emission Requirements

RCRA air emissions standards at 22 CCR § 66264.1030–66264.1034, excluding .1030(c), .1033(j), .1034(c)(2), and .1034(d)(2), and at 22 CCR § 66264.1050–66264.1063, excluding .1050(c) and (d), .1057(g)(2), .1060, .1063(d)(3), for vents or equipment leaks pertain to equipment that contains or contacts hazardous wastes with organic concentrations of at least 10 percent by weight. The concentrations of organic contaminants in soil at the site do not exceed 10 percent by weight. Therefore, this requirement is not an ARAR.

A2.2.5.2 State

RCRA requirements for non-RCRA, state-regulated hazardous wastes and San Diego APCD rules are described below.

State RCRA requirements included within the USEPA-authorized RCRA program for California are considered to be potential federal ARARs and are discussed above. When state regulations are broader in scope than their federal counterparts, they are considered potential state ARARs. State requirements such as the non-RCRA, state-regulated hazardous waste requirements may be potential state ARARs because they are not within the scope of the federal ARARs (57 FR 32726 [1992]).

SCAQMD Rules 401 and 1401 were identified by the state as ARARs for the potential air emissions at OU 4 sites during remedial actions. These are not potential federal ARARs because they are not included in the SIP (see discussion of federal ARARs under the CAA above). APCD rules not included in the SIP are considered possible state ARARs. However, no other state requirements were determined to be pertinent to the remedial alternatives.

A3.0 LOCATION-SPECIFIC ARARs

Potential location-specific ARARs are identified and discussed in this section. The discussions are presented based on various attributes of the site location, such as whether it is within a floodplain. Additional surveys will be performed in connection with the response action design and response action to confirm location-specific ARARs where inadequate site information currently exists, or in the event of changes to planned facility locations.

Site 1D is located in 20 Area, immediately north of the intersection of Vandergrift Boulevard and Stuart Mesa Road. The site is approximately 500 feet south of the Santa Margarita River and is subject to flooding during peak rainfall events. The site is one of nine closed refuse burning grounds that served as principal trash disposal areas on the Base prior to the 1970s. The site is covered with native soil. Natural vegetation in and around the area is primarily undisturbed, with coastal scrub and riparian habitat. The site is located approximately 4,000 feet from the ocean (SWDIV, 1996b). No Base production wells are located downgradient of Site 1D.

Site 1E-1 is a former refuse burning area located in 32 Area to the northwest of MACS Road. The site is located on a plateau approximately 2,600 feet from the Santa Margarita River. The site is a previously undiscovered extension of the burn pits comprising Site 1E, which was addressed in the OU 3 ROD (IT, 1999a). Groundwater is estimated to be 200 feet below ground surface.

Site 30 is located in 31 Area, on both sides of a dirt road near the Santa Margarita River where it drains to the ocean. The site consists of red fill soil material along an unpaved road. The site is approximately 2,800 feet from the ocean and approximately 600 feet from the Santa Margarita River (SWDIV 1996b) and is subject to flooding during peak rainfall events. Extensive vegetation is growing over the fill soil areas, providing some protection from erosion. The northwestern area is adjacent to a sensitive ecological habitat. No Base production wells are located downgradient from Site 30.

Site 1H is located in 62 Area north of San Mateo Road. The site is densely vegetated, but no threatened or endangered species have been observed at the site.

A3.1 Summary of Location-Specific ARARS

The resource categories relating to location-specific requirements potentially affected by the OU 4 response actions include cultural resources, wetlands protection, floodplain management, hydrologic resources, and ecological resources. The conclusions for ARARs pertaining to these resources are presented in the following sections.

A3.1.1 Cultural Resources ARARs Conclusions

Potential federal ARARs set forth in 36 CFR 800 require federal agencies to identify historical properties that may be affected by a proposed undertaking. The substantive requirements for identification of potentially affected historical properties are applicable federal requirements for on-site actions. However, the remaining requirements apply only if potentially affected historical properties on or eligible for the National Register are identified.

Site 30 is near a cultural resource site that could be eligible for listing in the National Register (CA-SDI-13929). Substantive provisions for the identification of historical properties set forth in 36 CFR 800.3 and 800.4 are applicable federal ARARs. Substantive provisions set forth in 36 CFR 800.5 to 800.15 and 36 CFR 65 are considered ARARs for Site 30 because a historical property was identified near the site.

Reviews of existing cultural resources information from areas on and adjacent to MCB Camp Pendleton did not indicate any historical or archaeological resources in or within the immediate

vicinity of OU 4 Sites 1E-1, and 1H. Site 30 is on and near prehistoric sites and historic archeological sites. In addition, there is one area near Site 1D that contains prehistoric items. Therefore, archeological and Native American monitoring is required during any investigation and remediation activities conducted at Sites 1D and 30.

A3.1.2 Wetlands Protection and Floodplain Management Conclusions

There are no known wetlands at the OU 4 sites. The substantive provisions of 40 CFR 230 and 231 prohibiting discharge of dredged or fill material into wetlands are not potential ARARs because no discharge to wetlands is proposed for OU 4 sites. The substantive provisions of 40 CFR Part 6 requiring minimizing the destruction, loss, or degradation of wetlands are also not potential ARARs.

Sites 1D and 30 are located within areas susceptible to flooding during a statistical 100-year flood event. The substantive provisions of 22 CCR § 66264.18[b] for design, construction, operation, and maintenance of hazardous waste facilities within a 100-year floodplain to avoid washout are potentially applicable ARARs for soil remediation activities at Sites 1D and 30.

The substantive requirements of 40 CFR §§ 6(b) and 6.302 and § 6 app. to address the potential impacts on floodplain beneficial use (flood control, water quality, and habitat) that could be affected by site remediation are potentially applicable federal ARARs for actions taken within a floodplain at Sites 1D and 30.

A3.1.3 Hydrologic Resources Conclusions

The Wild and Scenic Rivers Act (16 USC §§ 1271–1287) requires the avoidance of taking action that will have a direct adverse effect on a scenic river. There are no wild, scenic, or recreational rivers located on or near the OU 4 supplemental FS sites. Therefore this requirement is not a potential ARAR for the OU 4 remedial actions.

The Fish and Wildlife Coordination Act (16 USC §§ 661–666c) was enacted to protect fish and wildlife when federal actions result in the control or structural modification of a natural stream or body of water. This requirement is not pertinent to the proposed remedial actions for OU 4 sites in this supplemental FS and therefore is not a potential ARAR.

Requirements under Section 10 of the Rivers and Harbors Act of 1899 are not pertinent to the proposed remedial actions for OU 4 sites because they do not involve creating any obstruction not authorized by Congress to the navigable capacity of any of the waters of the United States (33 USC §§ 401–413). Therefore this is not a potential ARAR.

A3.1.4 Biological Resources Conclusions

Endangered species have been observed in the vicinity of Sites 1D and 30 during several biological surveys conducted in 1996, 1997, 1998, and 2001. Species of potential concern identified at the sites include coastal California gnatcatcher (federal endangered species list), least Bell's vireo (state endangered species list), Pacific pocket mouse, and arroyo southwestern toad. Therefore, substantive requirements of the Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1543) and California Fish and Game Code § 2080 pertaining to the protection of endangered species or their habitats are considered potentially applicable ARARs because some of the proposed alternatives for these sites involve facility construction and soil excavation that would disturb the sites.

Migratory birds have been observed in the vicinity of the OU 4 soil sites. Therefore, substantive provisions of the Migratory Bird Treaty Act (16 USC §§ 703–712) are applicable federal ARARs for these sites.

A3.1.5 Coastal Resources Conclusions

Sites 1D, 1E-1, and 30 are located within the designated boundary of the coastal zone, as indicated in California Coastal Commission (CCC) maps that delineate the extent of the coastal zone maps (CCC, 1993). Therefore, the Coastal Zone Management Act (CZMA) (16 USC §§ 1451–1464) and implementing regulations at 15 CFR § 930 are potential federal ARARs for the remedial actions at Sites 1D, 1E-1, and 30. The coastal zone requirements at Cal. Pub. Res. Code §§ 30000–30900 and 14 CCR, §§ 13001–13666.4 were identified as potential state ARARs for these sites.

A3.1.6 Geologic Characteristics Conclusions

There are no active geological faults at MCB Camp Pendleton and no discharge is proposed to a salt dome formation, salt bed formation, or underground mines or caves. Therefore, the requirements at 22 CCR § 66264.18(a) and § 66264.18(c) are not potential ARARs for this response action.

A3.2 Detailed Discussion of ARARs

The following subsections provide a detailed discussion of federal and state ARARs by location-specific resources. Pertinent and substantive provisions of the potential ARARs listed and described below were reviewed to determine whether they are potential federal or state ARARs for the OU 4 sites in this supplemental FS.

Requirements that are determined to be federal and state location-specific ARARs or TBCs are identified in Tables A-3 and A-4 of this appendix, respectively. ARARs determinations are presented in the column denoted by the heading ARAR Determination. Determinations of status for location-specific ARARs were generally based on consultation of maps or lists included in the regulation or prepared by the administering agency. References to the document or agency consulted are provided in the Comments column and may be provided in footnotes to the table. Specific issues concerning some of the requirements are discussed in the following sections.

A3.2.1 Cultural Resources ARARs

The following cultural resources requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- National Historic Preservation Act of 1966, as amended (16 USC §§ 470–470x-6, 36 CFR pt. 800, 40 CFR § 6.301[b])
- Archaeological and Historic Preservation Act (16 USC § 469–469c-1, 40 CFR § 6.301[c])
- Historic Sites, Buildings, and Antiquities Act of 1935 (16 USC §§ 461–467, 40 CFR § 6.301[a]) and/or
- Archaeological Resources Protection Act of 1979, as amended (Pub. L. 96-95, 16 USC § 470aa–470mm).

A3.2.1.1 National Historic Preservation Act of 1966, as Amended

Pursuant to Sections 106 and 110(f) of the National Historic Preservation Act (NHPA) (16 USC §§ 470–470x-6, and its implementing regulations [36 CFR pt. 800]), as amended, CERCLA remedial actions are required to take into account the effects of remedial activities on any historic properties included on or eligible for inclusion on the National Register of Historic Places (National Register). The National Register is a list of districts, sites, buildings, structures, and objects that are significant in American history, architecture, archaeology, engineering, and culture. Section 110(f) of the National Historic Preservation Act of 1966, as amended, requires

that before approval of any federal undertaking that may directly and adversely affect any National Historic Landmark, the head of the responsible federal agency will, to the maximum extent possible, undertake such planning and actions as may be necessary to minimize harm to the landmark, and will afford the Advisory Council a reasonable opportunity to comment on the undertaking.

Potential federal ARARs set forth in 36 CFR 800 require federal agencies to identify historical properties that may be affected by a proposed undertaking. The substantive requirements for identification of potentially affected historical properties are applicable federal requirements for on-site actions. However, the remaining requirements apply only if potentially affected historical properties on or eligible for the National Register are identified.

Site 30 is near a cultural resource site that could be eligible for listing in the National Register (CA-SDI-13929). Substantive provisions for the identification of historical properties set forth in 36 CFR 800.3 and 800.4 are applicable federal ARARs. Substantive provisions set forth in 36 CFR 800.5 to 800.15 and 36 CFR Part 65 are considered ARARs for Site 30 because a historical property was identified near the site.

A3.2.1.2 Archaeological and Historic Preservation Act

The Archaeological and Historic Preservation Act, 16 USC § 469–469c-1, provides for the preservation of historical and archaeological data that might otherwise be lost as a result of dam construction or alterations of the terrain. If activities in connection with any federal construction project or federally approved project may cause irreparable loss to significant scientific, prehistorical, or archaeological data, the act requires the agency undertaking that project to preserve the data or request the Department of the Interior (DOI) to do so. This act differs from the NHPA in that it encompasses a broader range of resources than those listed on the National Register and mandates only the preservation of the data (including analysis and publication).

Reviews of existing cultural resources information from areas on and adjacent to MCB Camp Pendleton did not indicate any historical or archaeological resources in or within the immediate vicinity of OU 4 sites 1E-1 and 1H.

Site 30 is on and near prehistoric sites and historic archeological sites. The first site is recorded as low-density shell midden with over 100 pieces of shell. This site also contains flakes (from stone tools) (LSA, 2000). A second archeological site contains both historic (ceramic fragments, beer cans, and ration tins) and prehistoric (one core fragment, one mano, one unidentified ground stone fragment, fifteen pieces of lithic debitage, several fragments of bone, and over 300 pieces of marine shell) artifacts (LSA, 2000). A third site is located approximately 360 feet north of the site and is composed of one core fragment, four flakes, and more than 50 pieces of marine shell (LSA, 2000). Because of these sites, archeological and Native American monitoring is required during any investigation and remediation activities conducted at Site 30 (LSA, 2000).

While no cultural resources were previously recorded within Site 1D, there is one area that contains prehistoric items located north of the site (approximately 50 feet north of the railroad tracks). This site contains one mano, one hammer-stone, one hammer-scraper, at least four flakes, and pieces of marine shell (LSA, 2000). Because of this site, archeological monitoring is required during any investigation and/or remediation activities conducted at Site 1D (LSA, 2000).

A3.2.1.3 Historic Sites, Buildings, and Antiquities Act of 1935

The purpose of the Historic Sites, Buildings, and Antiquities Act (16 USC §§ 461–467) and its implementing regulations (40 CFR § 6.301[c]) is to encourage the long-term preservation of nationally significant properties that illustrate or commemorate the history and prehistory of the United States, including historic landmarks (36 CFR § 65) and natural landmarks (36 CFR § 62).

Properties designated as National Historic Landmarks in California are listed in the National Register. Natural landmarks are nationally significant examples of a full range of ecological and geological features that constitute the nation's natural heritage. In conducting an environmental review of a proposed action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR § 62.6(d) to avoid undesirable impacts on such landmarks. These requirements are not substantive and are not potential ARARs. However, if it is determined that areas to be disturbed during the response action are potentially eligible for the National Natural Historic Landmark Program, the State Historic Preservation Officer should be contacted.

A3.2.1.4 Archaeological Resources Protection Act of 1979

Public Law (Pub. L. No.) 96-95 (16 USC § 470aa–470mm) was enacted in 1979 and amended in 1988 and applies to all lands to which the fee title is held by the United States. The purpose of this statute is to provide for the protection of archaeological resources on federal and Indian lands. The act prohibits unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such activity is pursuant to a permit issued under Section 470cc.

Substantive provisions of the Archaeological Resources Protection Act of 1979, set forth in 32 CFR 229.1 et. seq., for the protection of archaeological resources on federal lands are potentially applicable federal ARARs for Sites 1D and 30. These requirements will be applicable to on-site excavation if previously unidentified archaeological resources are identified during excavation, or if excavation of Sites 1D and 30 could impact a site listed on the National Register. The excavation will need to be evaluated and consultation will be required with the State Historic Preservation Officer.

A3.2.2 Wetlands Protection and Floodplains Management ARARs

The following wetlands protection and floodplains management requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- Executive Order (Exec. Order No.) 11990, Protection of Wetlands (40 CFR § 6.302[a])
- Executive Order No. 11988, Floodplain Management (40 CFR § 6.302[b])
- Clean Water Act, §404, 33 USC § 1344 and/or
- RCRA (33 USC §§ 6901–6991[i]), 22 CCR § 66264.18[b]).

A3.2.2.1 Federal

Protection of Wetlands, Executive Order No. 11990

Executive Order No. 11990 requires that federal agencies minimize the destruction, loss, or degradation of wetlands; preserve and enhance the natural and beneficial value of wetlands; and avoid support of new construction in wetlands if a practicable alternative exists. While executive orders themselves are not ARARs, they are considered TBC guidance that should be followed in any response action. Executive Order No. 11990 is codified at 40 CFR § 6.302(a). The substantive provisions of 40 CFR § 6.302(a) are potential federal ARARs for response actions within a wetland. An area at the northwest edge of Site 30 has been identified as a wetland and may be impacted by remedial actions that involve site excavation. Therefore, these requirements are potential applicable ARARs for Site 30. There are no known wetlands at Sites 1D, 1E-1, and 1H.

Floodplain Management, Executive Order No. 11988

Under 40 CFR § 6.302(b), federal agencies are required to evaluate the potential effects of action they may take in a floodplain to avoid, to the extent possible, adverse effects associated

with direct and indirect development of a floodplain. Sites 1D and 30 are located within areas susceptible to flooding during a statistical 100-year flood event. Therefore, 40 CFR § 6.302(b) is a potential ARAR for response actions at these sites.

Clean Water Act (33 USC § 1344)

Section 404 of the Clean Water Act of 1977 governs the discharge of dredged and fill material into waters of the United States, including adjacent wetlands. Wetlands are areas that are inundated by water frequently enough to support vegetation typically adapted for life in saturated soil conditions. Wetlands include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mudflats, natural ponds, and similar areas. Both the USEPA and the U.S. Army Corps of Engineers have jurisdiction over wetlands. USEPA's Section 404 guidelines are promulgated in 40 CFR § 230, and the U.S. Army Corps of Engineer's guidelines are promulgated in 33 CFR § 320. Discharge of dredge or fill material to a wetland is not planned as part of the OU 4 remedial actions. Therefore, these requirements are not potential ARARs.

Resource Conservation and Recovery Act (33 USC §§ 6901–6991[i])

Under 22 CCR § 66264.18(b), any hazardous waste facility located in a 100-year floodplain or within the maximum high tide must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood or maximum high tide, unless the owner or operator can demonstrate that procedures are in effect that will cause the waste to be removed safely, before flood or tidewater can reach the facility.

Sites 1D and 30 are located within areas susceptible to flooding during a statistical 100-year flood event. The substantive provisions of 22 CCR § 66264.18[b] require that a hazardous waste facility within a 100-year floodplain be designed, constructed, operated, and maintained to avoid washout and subsequent releases of hazardous materials. This requirement is applicable for the construction of any new soil treatment facilities to be used as part of the remedial actions for Sites 1D and 30 because portions of contaminated soils at these sites meet the definition of hazardous waste.

A3.2.2.2 State

The state RCRA requirements for floodplains are evaluated above as potential federal ARARs.

A3.2.3 Hydrologic Resources ARARs

The following hydrologic resources requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- Wild and Scenic Rivers Act (substantive provisions of 16 USC §§ 1271–1287)
- Fish and Wildlife Coordination Act (substantive provisions of 16 USC §§ 661–666c) and/or
- Rivers and Harbors Act of 1899 (substantive provisions of 33 USC §§ 401–413).

A3.2.3.1 Wild and Scenic Rivers Act

The Wild and Scenic Rivers Act (WSRA) (16 USC §§ 1271–1287) establishes requirements applicable to water resource projects affecting wild, scenic, or recreational rivers within the National Wild and Scenic Rivers System, as well as rivers designated on the National Rivers Inventory to be studied for inclusion on the national system. In accordance with Section 7 of the act, a federal agency may not assist, through grant, loan, license, or otherwise, the construction of a water resources project that would have a direct and adverse effect on the free-flowing, scenic, and natural values for which a river on the national system or a study river on the

National Rivers Inventory was established. The act also covers indirect effects from construction of water resources projects below or above rivers or their tributaries that are in the national system or under study on the National Rivers Inventory, such as a dam on a tributary and construction or development on adjacent shorelines. Adverse impacts must be mitigated, and coordination may be required with the National Park Service and Department of Agriculture.

There are no wild, scenic, or recreational rivers located on or near the OU 4 supplemental FS sites. Therefore this requirement is not a potential ARAR for the OU 4 remedial actions.

A3.2.3.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (16 USC §§ 661–666c) was enacted to protect fish and wildlife when federal actions result in the control or structural modification of a natural stream or body of water. The statute requires federal agencies to take into consideration the effect a water-related project would have on fish and wildlife and take action to prevent loss or damage to these resources. This requirement is not pertinent to the proposed remedial actions for OU 4 sites in this supplemental FS and therefore is not a potential ARAR.

A3.2.3.3 Rivers and Harbors Act of 1899

Section 10 of the Rivers and Harbors Act of 1899 prohibits the creation of any obstruction not authorized by Congress to the navigable capacity of any of the waters of the United States (33 USC §§ 401–413). It prohibits construction of wharves, piers, booms, weirs, breakwaters, bulkheads, jetties, or other structures in a port unless the construction is approved by the U.S. Army Corps of Engineers. In addition, excavation or filling of any port, harbor, channel, lake, or any navigable water is prohibited without authorization. Section 10 permits are required for these activities. Section 10 permits cover construction, excavation, or deposition of materials in, over, or under navigable waters, or any work that would affect the course, location, condition, or capacity of those waters. This requirement is not pertinent to the proposed remedial actions for OU 4 sites in this supplemental FS and therefore is not a potential ARAR.

A3.2.4 Biological Resources ARARs

The following biological resources requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- Endangered Species Act of 1973 (substantive provisions of 16 USC §§ 1531–1543)
- Migratory Bird Treaty Act of 1972 (substantive provisions of 16 USC §§ 703–712)
- Marine Mammal Protection Act (substantive provisions of 16 USC §§ 1361–1421h)
- Magnuson-Stevens Fishery Conservation and Management Act (16 USC §§ 1801–1882)
- National Wildlife Refuge System Administration Act of 1996 (16 USC § 668dd–668ee, substantive provisions of 50 CFR § 27.11–27.97)
- Wilderness Act (16 USC §§ 1131–1136, 50 CFR § 35.1–35.14) and/or
- California Endangered Species Act (Cal. Fish & Game Code, Ch. 1.5, §§ 2050–2116).

A3.2.4.1 Federal

Endangered Species Act of 1973

The Endangered Species Act (ESA) of 1973 (16 USC §§ 1531–1543) provides a means for conserving various species of fish, wildlife, and plants that are threatened with extinction. The ESA defines an endangered species and provides for the designation of critical habitats. Substantive requirements of ESA require that federal agencies may not jeopardize the continued existence of any listed species or cause the destruction or adverse modification of

critical habitat. Under Section 7(a) of the ESA, federal agencies must carry out conservation programs for listed species. All CERCLA response actions must comply with these requirements. 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. Consultation regulations at 50 CFR § 402 are administrative in nature and are therefore not ARARs. However, they may be TBCs to comply with the substantive provisions of the ESA.

Endangered species have been observed in the vicinity of Sites 1D and 30 during several biological surveys conducted in 1996, 1997, 1998, and 2001. Species of potential concern identified at the sites include coastal California gnatcatcher (federal endangered species list), least Bell's vireo (state endangered species list), Pacific pocket mouse, and arroyo southwestern toad. Therefore, substantive requirements pertaining to the protection of endangered species or their habitats are considered applicable because some of the proposed alternatives for these sites involve facility construction and soil excavation that would disturb the sites. These requirements are discussed further under action-specific ARARs.

Migratory Bird Treaty Act of 1972

The Migratory Bird Treaty Act (16 USC §§ 703–712) prohibits at any time, using any means or manner, the pursuit, hunting, capturing, and killing or attempting to take, capture, or kill any migratory bird. This act also prohibits the possession, sale, export, and import of any migratory bird or any part of a migratory bird, as well as nests and eggs. A list of migratory birds for which this requirement applies is found at 50 CFR § 10.13. Migratory birds have been observed in the vicinity of the OU 4 sites. The substantive provisions of this requirement are applicable federal ARARs.

Marine Mammal Protection Act

The Marine Mammal Protection Act (16 USC §§ 1361–1421h) prohibits the taking of a marine mammal on the high seas or in a harbor or other place under the jurisdiction of the United States. It prohibits the possession, transport, and sale of a mammal or marine mammal product, unless authorized under law. The prohibitions that are potentially pertinent to CERCLA actions are at 16 USC § 1372(a)(2). Given the inland locations of the OU 4 sites, marine mammals are not known or suspected to be present at the OU 4 sites.

Magnuson-Stevens Fishery Conservation and Management Act of 1976, as Amended

The purpose of the Magnuson-Stevens Fishery Conservation and Management Act (16 USC §§ 1801–1882) is to conserve and manage the fishery resources found off the coasts of the United States, the anadromous species, and the continental shelf fishery resources of the United States. It establishes a fishery conservation zone within which the United States has exclusive fishery management prerogatives. This requirement is not a potential ARAR because no managed fisheries are located within the vicinity of the OU 4 sites.

National Wildlife Refuge System Administration Act of 1966

The National Wildlife Refuge System Administration Act of 1966 (16 USC § 668dd–668ee) and its implementing regulations at 50 CFR §§ 25–37 establish wildlife refuges that are maintained for the primary purpose of developing a national program of wildlife and ecological conservation and rehabilitation. These refuges are established for the restoration, preservation, development, and management of wildlife and wild land habitats; protection and preservation of endangered or threatened species and their habitats; and management of wildlife and wild lands to obtain the maximum benefit from these resources.

The National Wildlife Refuge System Administration Act contains the following substantive requirements that are potential ARARs. The act prohibits any person from disturbing, injuring,

cutting, burning, removing, destroying, or possessing any property within any area of a wildlife refuge. The act also prohibits the taking or possessing of any fish, bird, mammal or other wild vertebrate or invertebrate animals, or nest or eggs within any refuge area or otherwise occupying any such area unless such activities are performed with a permit or permitted by express provision of law. The act also regulates the use of audio equipment as well as motorized vehicles, aircraft, and boats in wildlife refuges. It prohibits construction activities, disposal of waste, and the introduction of plants and animals into any wildlife refuge. The prohibitions under the act are codified at 50 CFR § 27. This requirement is not a potential ARAR because the areas affected by the OU 4 remedial actions are not designated as part of the National Wildlife Refuge System.

Wilderness Act

The Wilderness Act (16 USC § 1131) and its accompanying implementing regulations (50 CFR § 35.1–35.14) create the National Wilderness Preservation System. The intent of the law is to administer and manage units of this system (i.e., wilderness areas) in order to preserve their wilderness character and to leave them unimpaired for future use as wilderness. This requirement is not a potential ARAR because the OU 4 sites are not located in a federally owned wilderness area.

A3.2.4.2 State

California Endangered Species Act

Substantive provisions of the California Endangered Species Act, set forth in the California Fish and Game Code §§ 2050–2068, 2070, 2080, and 2090–2096, have been identified previously by the state as potential state ARARs. However, §§ 2050–2068 and 2070 were determined to be procedural and nonsubstantive, and §§ 2090–2096 are not effective after 01 January 1994. California Fish and Game Code § 2080 prohibits the take of endangered species.

Endangered species have been observed in the vicinity of Sites 1D and 30 during several biological surveys conducted in 1996, 1997, 1998, and 2001. Species of potential concern identified at the sites include coastal California gnatcatcher (federal endangered species list), least Bell's vireo (state endangered species list), Pacific pocket mouse, and arroyo southwestern toad. Therefore, the substantive provisions of California Fish and Game Code § 2080 pertaining to the protection of endangered species or their habitats are considered potentially applicable because some of the proposed alternatives for these sites involve facility construction and soil excavation that would disturb the sites. The response action will be designed to minimize potential effects on these endangered species. These requirements are discussed further under action-specific ARARs.

A3.2.5 Coastal Resources ARARs

The following coastal resources requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- Coastal Zone Management Act (substantive provisions of 16 USC §§ 1451–1464, 15 CFR § 930) and/or
- California Coastal Act of 1976 (Cal. Pub. Res. Code §§ 30000–30900; 14 CCR §§ 13001–13666.4).

A3.2.5.1 Federal

Coastal Zone Management Act

The CZMA (16 USC §§ 1451–1464) and the accompanying implementing regulations in 15 CFR § 930 require that federal agencies conducting or supporting activities directly affecting the

coastal zone conduct or support those activities in a manner that is consistent with the approved state coastal zone management programs. A state coastal zone management program (developed under state law and guided by the CZMA) sets forth objectives, policies, and standards to guide public and private uses of lands and water in the coastal zone.

Sites 1D, 1E-1, and 30 are located within the designated boundary of the coastal zone, as indicated in CCC maps that delineate the extent of the coastal zone maps (CCC, 1993). Therefore, the CZMA and implementing regulations at 15 CFR § 930 are potential federal ARARs. Activities directly affecting the coastal zone at these sites will be conducted in a manner consistent with the substantive provisions of the CZMA.

A3.2.5.2 State

California Coastal Act of 1976

The Public Resources Code (Cal. Pub. Res. Code §§ 30000–30900) and 14 CCR §§ 13001–13666.4 regulate activities associated with development to control direct significant impacts on coastal waters and to protect state and national interests in California coastal resources. The California Coastal Act policies set forth in the act constitute the standards used by the CCC in its coastal development permit decisions and for the review of local coastal programs. These policies contain the following substantive requirements: protection and expansion of public access to the shoreline and recreation opportunities (Cal. Pub. Res. Code §§ 30210–30224); protection, enhancement and restoration of environmentally sensitive habitats including intertidal and nearshore waters, wetlands, bays and estuaries, riparian habitat, grasslands, streams, lakes, and habitat for rare or endangered plants or animals (Cal. Pub. Res. Code §§ 30230–30240), protection of productive agricultural lands, commercial fisheries, and archaeological resources (Cal. Pub. Res. Code §§ 30234, 30241–30244), protection of the scenic beauty of coastal landscapes (Cal. Pub. Res. Code § 30251), and provisions for expansion, in an environmentally sound manner, of existing industrial ports and electricity-generating power plants (Cal. Pub. Res. Code § 30264).

Sites 1D, 1E-1, and 30 are located within the designated boundary of the coastal zone, as indicated in CCC maps that delineate the extent of the coastal zone maps (CCC, 1993). Therefore, the coastal zone requirements at Cal. Pub. Res. Code §§ 30000–30900) and 14 CCR §§ 13001–13666.4 were identified as potential state ARARs for the OU 4 remedial actions at Sites 1D, 1E-1, and 30.

A3.2.6 Geologic Characteristics ARARs

The following geologic characteristics requirements were evaluated for potential ARAR determination for the OU 4 remedial actions:

- RCRA (33 USC §§ 6901–6991[l]), hazardous waste facility siting criteria, 22 CCR §§ 66264.18(a) and (c)].

A3.2.6.1 Federal

Resource Conservation and Recovery Act (33 USC §§ 6901–6991[i])

Hazardous waste facilities must be sited in accordance with the following requirements:

- Seismic considerations (22 CCR § 66264.18(a) – portions of new facilities or facilities undergoing substantial modification where transfer, treatment, storage, or disposal of hazardous waste will be conducted shall not be located within 61 meters (200 feet) of a fault that has had displacement in Holocene time.
- Salt dome formations, salt bed formations, underground mines and caves (22 CCR § 66264.18[c]) – the placement of any noncontainerized or bulk liquid hazardous waste

in any salt dome formation, salt bed formation, or underground mine or cave is prohibited.

There are no active faults at MCB Camp Pendleton (Parsons 1999). Thus, none of the OU 4 sites are located within 61 meters (200 feet) of a Holocene fault. In addition, remedial actions at these sites do not involve on-site treatment, storage or disposal of hazardous waste. No discharge is proposed to a salt dome formation, salt bed formation, or underground mines or caves. Therefore, the requirements at 22 CCR § 66264.18(a) and § 66264.18(c) are not potential ARARs for this response action.

A3.2.6.2 State

The state location-specific RCRA requirements for geologic characteristics are evaluated above as potential federal ARARs.

A4.0 ACTION-SPECIFIC ARARs

This supplemental FS report evaluates remedial action alternatives for soil at Sites 1D, 1E-1, 1H, and 30 at MCB Camp Pendleton. This potential ARARs analysis evaluates the following soil alternatives for Sites 1D, 1E-1, 1H, and 30:

- Alternative 1: No Action
- Alternative 2: Institutional Controls (site access restrictions with Base Master Plan amendment, periodic site inspection/monitoring)
- Alternative 3: Capping with Engineered Soil Cover and Institutional Controls (Site 1H only)
- Alternative 4: Soil Excavation, Backfill, Ex Situ Solidification/Stabilization, and on-Base Reuse of Treated Soil (Sites 1D and 30 only)
- Alternative 5: Soil Excavation, Pretreatment, Backfill, and Off-Base Disposal (pretreatment applies to Sites 1D and 30 only)
- Alternative 6: Soil Excavation, Backfill, Pretreatment, and On-Base CAMU Disposal (pretreatment applies to Sites 1D and 30 only).

Detailed descriptions of the remedial alternatives are provided in the main text of this supplemental FS.

Tables A-5 and A-6 of this appendix present and evaluate federal and state potential action-specific ARARs for OU 4 sites, respectively. A discussion of the requirements determined to be pertinent to each alternative being evaluated for the OU 4 sites action is presented in this section. A discussion of how the alternative complies with each identified ARAR is also provided.

A4.1 Soil Alternative 1: No Action

There is no need to identify ARARs for the no action alternative because ARARs apply to "any removal or remedial action conducted entirely on site" and "no action" is not a removal or remedial action (CERCLA Section 121(e), 42 USC § 9621[e]). CERCLA § 121 (42 USC § 9621) cleanup standards for selection of a Superfund remedy, including the requirement to meet ARARs, are not triggered by the no action alternative (USEPA 1991b). Therefore, a discussion of compliance with action-specific ARARs is not appropriate for this alternative.

A4.2 Soil Alternative 2: Institutional Controls

Institutional controls are required to maintain the integrity of the contaminated soil sites by preventing excavations or increased infiltration of surface waters, preventing land use that presents unacceptable risk to human health due to residual contamination, and preserving access to the sites for the DON and the FFA signatories. Such institutional controls shall consist of land-use restrictions designed to protect the selected remedy. In March 2000, DTSC and the DON signed a memorandum of agreement (MOA) describing specific conditions under which DTSC would have the same authority as the DON to enforce environmental restrictions imposed on transferring parcels of property being remediated under CERCLA and under RCRA.

A4.2.1 Federal ARARs

Federal requirements that are potential ARARs for institutional actions are described in the following sections.

A4.2.1.1 Land Use Controls

There are no federal ARARs for land-use controls; however, USEPA and the DON have developed guidance pertaining to land-use controls.

A4.2.1.2 RCRA Facility Post-closure Requirements

The State of California has received RCRA authorization from the USEPA for its hazardous waste management program (57 FR 32726, 23 July 1992) and for several corrective action requirements under HSWA. These state requirements are considered potential federal ARARs because they are authorized under RCRA. Although these RCRA requirements are not applicable because hazardous waste operations at the OU 4 soil sites ceased before the effective date of RCRA, 19 November 1980, they are potentially relevant and appropriate for soil Sites 1D, 1H, and 30.

The substantive post-closure care requirements set forth in 22 CCR 66264.117(b) are potential relevant and appropriate ARARs for the institutional controls alternative because the contaminated soil is left in place. Post-closure care is required for "facilities at which all hazardous wastes, waste residues, contaminated materials and contaminated soils will not be removed during closure" for a period sufficient to protect human health and the environment (22 CCR 66264.117[a]). These requirements may include monitoring, maintenance, land use restrictions, and site security. Alternative 2 proposes no removal of contaminated soil.

A4.2.2 State ARARs

A4.2.2.1 Land Use Controls

State ARARs controlling land use restrictions are found in the substantive provisions of California Civil Code (Cal. Civ. Code) § 1471 and the California HSC. This requirement is not an applicable ARAR for the purpose of remedial actions under this supplemental FS because none of the OU 4 sites are being transferred from the DON to a non-federal agency, and it is highly unlikely that they will be transferred in the future given their location and training nature of the Base.

The substantive provisions of Cal. Civ. Code § 1471 are the following general narrative standard: "...To do or refrain from doing some act on his or her own land...where...: (c) each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials, as defined in section 25260 of the health and safety code." This narrative standard would be implemented through incorporation of restrictive environmental covenants in the deed at the time of a transfer. These covenants would be recorded with the environmental restriction covenant and agreement and would run with the land.

A4.2.2.2 Title 27, Division 2, Subdivision 1

Subdivision 1 regulates the siting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment, storage, or disposal. Article 1 of Subchapter 5 of Chapter 3 specifies postclosure requirements for waste management units that leave waste in place. Section 20950(a)(2)(A) and (B) states that the goal, including a final cover to be installed, is to minimize the infiltration of water into the waste, thereby minimizing the production of leachate and gas until such time as the waste in the unit no longer constitutes a potential threat to water quality. These state requirements were determined to be no more stringent than federal ARARs for postclosure maintenance at Title 22 CCR Section 66264.117(b). Therefore, Sections 20950(a)(2)(A) and (B) were determined not to be ARARs for leaving soil in place.

The DON accepts Central Valley Region RWQCB DLM (CRWQCB, 1986) guidance as a TBC for Sites 1D and 30 to indicate compliance with the federal ARARs for leaving soil in place at

levels protective of groundwater. Site 1H has been determined to be protective of groundwater and no further action for groundwater was recommended in the Group D RI report (SWDIV, 1997c). If contaminants in the soil at Sites 1D and 30 are shown to meet water quality objectives using DLM in accordance with RWQCB guidance, it may be left in place in accordance with identified clean closure requirements. Failure of the DLM screen does not indicate noncompliance; however, further evaluation may be conducted prior to clean closure of soil sites that do not pass the DLM screen.

A4.2.3 Conclusions

The federal RCRA requirements set forth in 22 CCR Section 66264.117(b) are the controlling potential ARARs for postclosure care of contaminated soil left in place at Sites 1D, 1H, and 30 under this alternative. The DON accepts California RWQCB Central Valley Region DLM as TBC guidance for leaving soil in place at Site 1D and 30 at levels protective of groundwater.

A4.3 Soil Alternative 3: Capping

Capping or covering the soil contamination is a component of Alternative 3 being evaluated for Site 1H. Federal and state requirements for landfill closure are the primary sources of ARARs for this action. Landfill capping requirements, including prescriptive landfill cap requirements, are contained in four nearly identical sets of regulations: 40 CFR § 258, and 22, 23, and 27 CCR. These regulations pertain to active landfills. Because Site 1H ceased operation prior to the effective date of any of these regulations, they are not "applicable" ARARs. However, they are potentially "relevant and appropriate" ARARs for the proposed capping action at Site 1H because it contains contaminated soil classified as hazardous waste. Because these regulations contain overlapping requirements, the most stringent requirements of these ARARs will be controlling ARARs for remedial design/remedial action.

A4.3.1 Federal ARARs

Federal requirements that are potential ARARs for capping/cover actions are described in the following sections.

A4.3.1.1 RCRA Requirements

The proposed cap for Site 1H in Alternative 1H-3 includes construction of a 1.4-acre engineered soil cover (i.e., an evapotranspiration [ET] cover) designed to provide long-term minimization of infiltration of liquids; function with minimum maintenance; promote drainage and minimize erosion or abrasion of the cover, and accommodate settling and subsidence. The substantive RCRA provisions for prescriptive landfill cap requirements set forth in 22 CCR § 66264.228(e) to (r) are relevant and appropriate ARARs for the proposed cap. A prescriptive landfill cap design consists of a foundation layer, a clay barrier layer, and a vegetative layer.

The proposed ET cover will be designed consistent with the prescriptive cap requirements and performance standards. The foundation layer will consist of a 12-inch sand layer reinforced with a geogrid covered by a 12-inch rounded cobble layer and a 12-ounce geotextile cushion layer. A clay barrier layer consisting of an 18-inch clean soil layer will be placed on top of the foundation layer in 6-inch lifts, and compacted to 95% compaction to attain a minimum permeability of 10^{-6} cm/s. A 6-inch vegetated topsoil layer (loosely compacted) and designed to support vegetation.

Under 22 CCR § 66264.310(a)(7), a variance is allowed from any of the prescriptive cap requirements as long as it is demonstrated that the prescriptive cap is not necessary to protect public health, water quality, or other environmental quality. The specific engineered alternative must be consistent with the performance goal addressed by the particular construction or prescriptive standard and must afford equivalent protection against water quality impairment.

This requirement is not a potential ARAR because it is less stringent than state requirements under 27 CCR §§ 20080(b) and (c) and 21090(a), which require that engineered alternatives equivalent to prescriptive standards be considered only if the prescriptive standards are not feasible.

Certain RCRA provisions pertaining to landfill closure may be relevant and appropriate for closure of Site 1H because some of the contaminated soil at this site may be classified as hazardous waste. The substantive postclosure care requirements set forth in 22 CCR 66264.117(b) are potential relevant and appropriate ARARs for the capping alternative because the contaminated soil would be left in place. Postclosure care is required for "facilities at which all hazardous wastes, waste residues, contaminated materials and contaminated soils will not be removed during closure" for a period sufficient to protect human health and the environment (22 CCR 66264.117[a]). These requirements may include monitoring, maintenance, land use restrictions, and site security. Soil Alternative 3 proposes no removal of contaminated soil.

Movement within a waste management unit does not constitute disposal or placement of hazardous waste under RCRA. At CERCLA sites, an area of contamination can be considered comparable to a RCRA unit. Thus, the grading required to construct the engineered cover proposed for Site 1H in Alternative 3 does not constitute placement or disposal under RCRA and, therefore, RCRA waste generator requirements and land disposal restrictions contained in 22 CCR § 66262.10(a) and 66262.111 are not triggered.

A4.3.1.2 Criteria for Municipal Waste Landfills, 40 CFR § 258

Landfill closure requirements for municipal waste landfills are set forth in 40 CFR § 258, Subpart F. Because Site 1H did not receive wastes after the effective date of these requirements (9 October 1991), these requirements would not be applicable. However, the substantive portions of these requirements may be potentially relevant and appropriate because Site 1H received domestic wastes from MCB Camp Pendleton similar or identical to wastes managed in municipal solid waste landfills.

Provisions in 40 CFR § 258.60(a) and (b) require that the final cover system be designed to minimize infiltration and erosion. This section provides specific technical standards for cover design but allows for alternative cover designs if it is demonstrated that the alternative designs will achieve the same level of performance. However, these requirements are not potential ARARs because they are less stringent than state requirements under 27 CCR §§ 20080(b) and (c) and 21090(a).

Section 258.61 requires postclosure maintenance for 30 years unless it can be demonstrated that a shorter or longer period of maintenance is required. These requirements are not potential ARARs because they are less stringent than state requirements under 27 CCR §§ 20950(a) and 21180(a), which require that the postclosure maintenance period shall be not less than 30 years and shall extend as long as the wastes pose a threat to water quality.

A4.3.1.3 Clean Air Act

Grading activities associated with placement of the cap may generate fugitive dust, which must be controlled to comply with SCAQMD requirements. Substantive portions of SCAQMD Rules 401, 403, and 1150 are action-specific ARARs for remedial action at Site 1H. Rules 401 and 403 require that fugitive dust emissions be controlled during grading, excavation, and earth-moving activities. SCAQMD Rule 1150 requires that an excavation management plan be developed prior to excavation of landfill materials. Although the plan itself is considered administrative in nature, the DON will address substantive provisions of this regulation during the remedial design/remedial action phase.

A4.3.2 State ARARs

State requirements that are potential ARARs for capping/cover actions are described in the following sections. Substantive state requirements identified by the state that are more stringent than federal ARARs are potential ARARs for Site 1H capping.

A4.3.2.1 Solid Waste (27 CCR Div. 2)

Under 27 CCR § 20080(b) and 23 CCR § 2510(b), engineered alternatives to the prescriptive landfill cover are allowed when the discharger can demonstrate that the construction or prescriptive standard is not feasible and there is a specific engineered alternative. To demonstrate that compliance with prescriptive standards is not feasible, the discharger shall demonstrate that compliance with a prescriptive standard either: (1) is unreasonably and unnecessarily burdensome and will cost substantially more than engineered alternatives; or (2) is impractical and will not promote attainment of applicable performance standards considering all relevant technical and economic factors. These factors include present and projected costs of compliance, potential costs for response action if waste or leachate is released to the environment, and the extent to which groundwater resources could be affected.

Pertinent state provisions under 27 CCR § 20080(b) and (c), § 21090, § 20320(c) and (d), § 20324(g)(1), § 20950(a), and § 21180(a), that are more stringent than federal provisions under 22 CCR § 66264.310(a)(7), are potential relevant and appropriate ARARs for Site 1H where waste is already covered (Site 1H is currently covered by approximately 2 to 3 feet of soil over the buried materials), and for constructing new covers or adding to existing covers when alternative designs are proposed.

A4.3.2.2 SCAQMD Requirements

SCAQMD rules for emissions were identified in Section A2.2.5, and it is assumed at this time that all these rules have been approved by USEPA in the SIP and are therefore federal ARARS. Therefore, no state ARARs from the SCAQMD rules have been identified at this time.

A4.3.3 Conclusions

The substantive RCRA provisions for prescriptive landfill cap requirements set forth in 22 CCR § 66264.228(e) to (r) are relevant and appropriate ARARs for design of the proposed cap. However, pertinent state provisions under 27 CCR § 20080(b) and (c), § 21090, § 20320(c) and (d), § 20324(g)(1), § 20950(a), and § 21180(a), which allow for an alternative engineered cover design if it is demonstrated that the prescriptive design is not feasible, are more stringent than federal provisions under 22 CCR § 66264.310(a)(7), and are potential relevant and appropriate state ARARs for Site 1H.

The substantive provisions for municipal waste landfill closure requirements set forth in 40 CFR § 258, Subpart F, may be potentially relevant and appropriate because Site 1H received domestic wastes from MCB Camp Pendleton similar or identical to wastes managed in municipal solid waste landfills.

State requirements under 27 CCR §§ 20950(a) and 21180(a), which require that the postclosure maintenance period shall be not less than 30 years and shall extend as long as the wastes pose a threat to water quality are relevant and appropriate federal requirements for the capping alternative.

Substantive portions of SCAQMD Rules 401, 403, and 1150 are action-specific ARARs for remedial action at Site 1H. The federal RCRA requirements set forth in 22 CCR §66264.117(b) are the controlling potential relevant and appropriate requirements for postclosure care of contaminated soil left in place at Site 1H under this alternative.

A4.4 Alternatives 4, 5 and 6: Excavation

Alternatives 4, 5 and 6 involve excavation of contaminated soil at Sites 1D, 1H, and 30. These alternatives are intended to meet the requirements for protection of human health and the environment and clean closure requirements. ARARs for excavation are typically state-promulgated regulations pertaining to fugitive emissions, temporary storage (of wastes for treatment or disposal) or protection of species and habitat during remedial construction activities.

A4.4.1 Federal ARARs

This section discusses federal requirements that may be potential ARARs for soil excavation. See Section A4.3.1.3 for potential federal ARARs for air discharge from excavation activities.

Sites 1D and 30 are within the floodplain of the Santa Margarita River. Substantive provisions pertaining to the protection of floodplains and wetlands at 40 CFR Part 6 Appendix A, excluding Section 6(a)(2), (4), and (6) are potentially relevant and appropriate for Sites 1D and 30 excavation. The excavation activities will avoid to the extent possible adverse impacts to floodplains. If there is no practicable alternative to affecting the floodplains, the potential harm will be minimized, and restoration and preservation of the natural and beneficial values of the floodplains included in the remedial alternatives.

The historical and cultural resource identification and protection requirements at 36 CFR 800.3 and 800.4 and at 32 CFR 229.1 were determined to be potentially applicable for sites where there may be unidentified resources. Sites 1D and 30 are known or suspected areas of historical or archaeological resources. Therefore, excavation activities will be monitored at Sites 1D and 30 where unknown resources could be identified during excavation.

The substantive provisions of 22 CCR 66264.111(a) and (b) are potential relevant and appropriate federal ARARs for clean closure of the above sites proposed in alternatives 4 and 5. These provisions require elimination of the need for further maintenance and control of the site and elimination of postclosure escape of hazardous waste to the extent necessary to protect human health and the environment. Section 66264.111(c) is not a potential ARAR in and of itself because it merely references other requirements, which are evaluated separately. Postclosure requirements at Section 66264.117(b) are not potential ARARs for these alternatives because all hazardous wastes and contaminated soils will be removed.

Based on the hazardous waste determination described under federal chemical-specific ARARs discussion, some contaminated soils at Sites 1D, 1H, and 30 have been determined to be hazardous. Substantive requirements of 22 CCR § 66262.34 (pertaining to hazardous waste accumulation) are applicable ARARs. These requirements are also relevant and appropriate for contaminated soil classified as non-RCRA or California designated waste that is similar to RCRA-hazardous waste.

Alternatives 4, 5, and 6 involve stockpiling of excavated materials while waste characterization or on-site treatment is performed. The substantive requirements of 22 CCR §§ 66264.251, 66264.258(a) and (b), 66264.111, and 66264.114 (pertaining to the control of run-on and runoff and closure of waste piles) are relevant and appropriate requirements for the temporary storage of stockpiled materials. Storage of hazardous waste in stockpiles during a response action may be subject to stringent RCRA and/or state requirements. Substantive requirements in 22 CCR § 66262.34 (accumulation time), § 66264.553 (temporary units), and § 66264.251 and § 264.554 (waste piles) may be potential relevant and appropriate ARARs. Also, under the clean closure alternative, after contaminated soil has been excavated and stockpiled, the stockpiled material will be sampled and characterized for disposal. In addition, substantive requirements of 49 CFR §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and

172.504 (pertaining to the Department of Transportation requirements for transport of hazardous materials) are relevant and appropriate for transport of materials on site.

A4.4.2 State ARARs

The state requirements for floodplains are included in the approved RCRA program and are discussed as federal ARARs in Section A4.4.1.

Title 27, Division 2, Subdivision 1 regulates the siting, design, construction, operation, closure, and monitoring of waste discharges to land for treatment, storage, or disposal. Article 1 of Subchapter 5 of Chapter 3 specifies clean closure requirements for waste management units. Section 20950(a)(2)(b) states that the goal for clean closure is to physically remove all waste and contaminated materials from the unit and from its underlying and surrounding environs, such that the waste in the unit no longer poses a threat to water quality. Successful completion of clean closure eliminates the need for any postclosure maintenance. The closure requirements in 27 CCR 20950 are no more stringent than the RCRA requirements set forth in 22 CCR 66264.111 and 66264.94, which have been determined to be potential federal ARARs. Therefore, requirements for clean closure set forth in 27 CCR 20950 are not ARARs.

If the excavated soil is determined to be neither RCRA- nor non-RCRA-hazardous waste, a designated waste determination must be made prior to disposal in accordance with the substantive provisions of 27 CCR § 20200. In addition, the substantive requirements of San Diego RWQCB Res. 95-96 (a regional requirement that conditionally waives adoption of waste discharge requirements for temporary discharge of contaminated soils to waste piles) may be a TBC for compliance with the potential state ARARs.

Fugitive dust may be generated during the excavation and handling of the contaminated soil. The pertinent substantive provisions of the San Diego APCD Regulation IV are considered potential ARARs for these activities. San Diego APCD Regulation IV requires that reasonably available control measures be applied to prevent fugitive dust emissions.

Under 27 CCR § 20080(b) and 23 CCR § 2510(b), engineered alternatives to prescriptive waste pile design requirements are allowed when the discharger can demonstrate that the construction or prescriptive standard is not feasible and there is a specific engineered alternative. To demonstrate that compliance with prescriptive standards is not feasible, the discharger shall demonstrate that compliance with a prescriptive standard either: (1) is unreasonably and unnecessarily burdensome and will cost substantially more than engineered alternatives; or (2) is impractical and will not promote attainment of applicable performance standards considering all relevant technical and economic factors. These factors include present and projected costs of compliance, potential costs for response action in the event that waste or leachate is released to the environment, and the extent to which groundwater resources could be affected.

Pertinent state provisions under 27 CCR § 20080(b) and 23 CCR § 2510(b), that are more stringent than federal provisions under 22 CCR § 66264.310(a)(7), are potential relevant and appropriate ARARs for soil excavation actions at soil Sites 1D, 1H, and 30.

A4.4.3 Conclusions

Substantive provisions pertaining to the protection of floodplains and wetlands at 40 CFR Part 6 Appendix A, excluding Section 6(a)(2), (4), and (6) are potentially relevant and appropriate for Sites 1D and 30 excavation. The historical and cultural resource identification and protection requirements at 36 CFR 800.3 and 800.4 and at 32 CFR 229.1 were determined to be potentially applicable for sites where there may be unidentified resources. The substantive

provisions of 22 CCR 66264.111(a) and (b) are potential relevant and appropriate federal ARARs for clean closure of soil sites 1D, 1H, and 30.

Substantive requirements of 22 CCR § 66262.34 (pertaining to hazardous waste accumulation) are applicable ARARs. These requirements are also relevant and appropriate for contaminated soil classified as non-RCRA or California designated waste that is similar to RCRA hazardous waste. The substantive requirements of 22 CCR §§ 66264.251, 66264.258(a) and (b), 66264.111, and 66264.114 (pertaining to the control of run-on and runoff and closure of waste piles) are relevant and appropriate requirements for the temporary storage of stockpiled materials. Substantive requirements in 22 CCR § 66262.34 (accumulation time), § 66264.553 (temporary units), and § 66264.251 and § 264.554 (waste piles) may be potential relevant and appropriate ARARs. In addition, substantive requirements of 49 CFR §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and 172.504 (pertaining to the Department of Transportation requirements for transport of hazardous materials) are relevant and appropriate for transport of materials on site.

Substantive provisions in 27 CCR § 20200 are potential state ARARs for classification of California designated waste determined to be neither RCRA- nor non-RCRA-hazardous waste. In addition, the substantive requirement of San Diego RWQCB Res. 95-96 may be a TBC for compliance with the potential state ARARs. Finally, the pertinent substantive provisions of the San Diego APCD Regulation IV are considered potential ARARs for control of fugitive dust that may be generated during the excavation and handling of contaminated soil.

A4.5 Alternative 4: On-Site Solidification/Stabilization

Under Alternative 4, excavated soil from Sites 1D and 30 will involve excavation of the impacted soil followed by on-site ex situ treatment via incorporation in cold-mix asphalt product, a form of solidification/stabilization (S/S), followed by on-Base use in road building, road maintenance, or other construction projects. Untreated, excavated soil (which has been stockpiled) would be loaded, screened, and conveyed to a pug mill where it would be mixed with a stabilizing reagent(s), aggregate, and organic emulsion in the appropriate ratio to form a cold-mix asphalt product.

A4.5.1 Federal ARARs

Because the process results in a commercially viable product, soil treated in Alternative 4 may meet the definition of a "recyclable material" under federal laws and regulations (40 CFR 261.2 and 261.6(c)), and be exempted from certain hazardous waste management requirements.

In general, when hazardous waste is treated to produce end products that are applied to or placed upon the ground, the products are regarded as having been "used in a manner constituting disposal" and are subject to a variety of hazardous waste management requirements under Subpart C of 40 CFR Part 266. However, Subpart C also allows exemptions for products that have undergone a permanent chemical reaction so as to become inseparable. Recycled products that are so exempted are nevertheless required to meet applicable LDR treatment standards and related record keeping and documentary requirements (40 CFR 268.7). Before the stabilized soil (asphalt) is transported from the site for on-Base use, post-treatment leachability testing will be necessary to confirm that the process has effectively immobilized the metal remedial chemicals of concern (RCOCs) and demonstrate that land disposal treatment standards have been met.

Substantive requirements of 22 CCR § 66262.34 (pertaining to hazardous waste accumulation) are applicable ARARs. These requirements are also relevant and appropriate for stockpiled contaminated soil classified as non-RCRA or California-designated waste that is similar to RCRA-hazardous waste.

The substantive requirements of 22 CCR §§ 66264.251, 66264.258(a) and (b), 66264.111, and 66264.114 (pertaining to the control of run-on and runoff and closure of waste piles) are relevant and appropriate requirements for the temporary storage of stockpiled soil at Sites 1D and 30. Storage of hazardous waste in stockpiles during a response action may be subject to stringent RCRA and/or state requirements. Substantive requirements in 22 CCR § 66262.34 (accumulation time), § 66264.553 (temporary units), and § 66264.251 and § 264.554 (waste piles) may be potential relevant and appropriate ARARs.

A4.5.2 State ARARs

Although recycling exemptions are also embodied in state laws and regulations (CA HSC Sec. 25143.2, and 22 CCR §§ 66266.20), in many instances the exemptions may not apply to RCRA-hazardous waste (refer to CA HSC Sec. 25143.2 (e)(1)).

Based on previous correspondence from DTSC's Resource Recovery Section, the equipment used during soil stabilization via asphalt incorporation (i.e., pug mill, hoppers, conveyors, etc.) may have to be permitted as a transportable treatment unit (TTU) under permit-by-rule, which would govern the recycling/asphalt incorporation process. Temporary on-site storage of soil awaiting stabilization, which in its untreated state may be construed as RCRA-hazardous waste, could require compliance with substantive requirements. Current state law prohibits land disposal of waste containing greater than 350 mg/kg lead at a facility other than a Class I hazardous waste disposal facility.

Stabilized soil containing lead at concentrations greater than 350 mg/kg in cold-mix asphalt might have to provide a determination that the resultant asphalt is a recycled "product" and not a regulated waste (HSC Section 25143 et seq.), or a DTSC land disposal variance, or RWQCB-approved amendments to the facility (installation) waste discharge requirements. Assuming that the aforementioned regulatory and permitting requirements for the recycled product are satisfied, Alternative 4 would comply with RCRA closure with no post-closure care requirements.

A4.6 Alternative 5: Off-Site Disposal

Alternative 5 addresses remediation of contaminated soils exceeding the RGs through excavation, chemical stabilization of all excavated soil, and transportation of the excavated soil to an appropriate off-Base disposal facility. This ARARs evaluation is for activities conducted on site and does not address off-site requirements. However, off-site disposal will be required to comply with all applicable regulations. In addition, substantive requirements of 49 CFR §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and 172.504 (pertaining to the Department of Transportation requirements for transport of hazardous materials) would be relevant and appropriate for transport of materials off site.

A4.7 Alternative 6: On-Base CAMU Disposal

Alternative 6 addresses remediation of contaminated soils exceeding the RGs through excavation, chemical stabilization of a portion of the excavated soil, and transportation of the excavated soil to an on-Base CAMU disposal facility. This ARARs evaluation is for activities conducted on site and does not address the on-Base CAMU requirements. The technical feasibility of constructing and permitting the on-Base CAMU facility is a separate issue that will be handled outside of the OU 4 FS. From the standpoint of this FS, the on-Base CAMU disposal facility will be required to comply with all applicable regulations and requirements, much in the same manner as an off-Base disposal facility. The substantive requirements of 49 CFR §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and 172.504 (pertaining to the

Department of Transportation requirements for transport of hazardous materials) would be relevant and appropriate for transport of materials to the on-Base CAMU facility.

A5.0 SUMMARY

The proposed remedial action alternatives evaluated in the OU 4 supplemental FS address contaminated soil at Sites 1D, 1E-1, 1H, and 30. Soil, air, groundwater and surface water are the environmental media potentially affected by the OU 4 remedial actions. Controlling ARARs have been identified in the text and tables of this appendix for each medium, location, and proposed response action.

Some soil contaminant concentrations at Sites 1D and 30 meet the definition of RCRA hazardous waste. Also, portions of contaminated soil at Site 1H were classified as California-hazardous waste. Therefore, RCRA requirements were considered for potential ARAR status. Substantive federal provisions at Title 22 CCR Section 66264.94 were identified as controlling relevant and appropriate chemical-specific ARARs for determining soil cleanup levels at Sites 1D, 1H, and 30. The RWQCB Central Valley Region DLM was used as TBC guidance to set cleanup goals that are protective of groundwater at Sites 1D and 30. The DON believes that cleanup to these soil RG concentrations will prevent releases to groundwater at concentrations that could exceed groundwater thresholds. Site 1H was determined to be protective of groundwater and the groundwater at Site 1H was recommended for no further action in the Group D RI report (SWDIV 1997).

It is noted that state requirements at 27 CCR Section 20400 and SWRCB Resolution No. 92-49 are potentially applicable requirements for soil cleanup levels. However, they are no more stringent than federal ARARs and are not potential ARARs for the remedial action at OU 4 sites. Cleanup to federal cleanup levels will also comply with these state requirements although they are not ARARs.

Site 30 is near a cultural resource site that could be eligible for listing in the National Register (CA-SDI-13929). Substantive provisions for the identification of historical properties set forth in 36 CFR 800.3 and 800.4 are applicable federal ARARs. Site 30 is also on and near prehistoric sites and historic archeological sites. In addition, there is one area near Site 1D that contains prehistoric items. Substantive provisions set forth in 36 CFR 800.5 to 800.15 and 36 CFR 65 are considered ARARs for Sites 30 and 1D. Archeological and Native American monitoring is required during any investigation and remediation activities conducted at these sites.

Sites 1D and 30 are located within areas susceptible to flooding during a statistical 100-year flood event. The substantive provisions of 22 CCR § 66264.18[b] for design, construction, operation, and maintenance of hazardous waste facilities within a 100-year floodplain to avoid washout are potentially applicable ARARs for soil remediation activities at Sites 1D and 30. The substantive requirements of 40 CFR §§ 6(b) and 6.302 and § 6 app. to address the potential impacts on floodplain beneficial use that could be affected by site remediation are potentially applicable federal ARARs for actions taken within a floodplain at Sites 1D and 30, including any site grading, excavation, and construction of treatment facilities.

Endangered species of potential concern identified at the OU 4 sites include coastal California gnatcatcher (federal endangered species list), least Bell's vireo (state endangered species list), Pacific pocket mouse, and arroyo southwestern toad. Substantive requirements of the ESA of 1973 (16 USC §§ 1531–1543) and California Fish and Game Code § 2080 pertaining to the protection of endangered species or their habitats are considered potentially applicable requirements because some of the proposed alternatives for these sites involve facility construction and soil excavation that would disturb the sites.

Migratory birds have been observed in the vicinity of the OU 4 sites. Therefore, substantive provisions of the Migratory Bird Treaty Act (16 USC §§ 703–712) were identified as applicable

federal ARARs for prohibiting a take at Sites 1D, 1H, and 30 where excavation may affect observed birds on site.

Sites 1D, 1E-1, and 30 are located within the designated boundary of the coastal zone. The CZMA (16 USC §§ 1451–1464) and implementing regulations at 15 CFR § 930 are potential federal ARARs for the remedial actions at these sites. The coastal zone requirements at Cal. Pub. Res. Code §§ 30000–30900 and 14 CCR §§ 13001–13666.4 were also identified as potential state ARARs for these sites.

Substantive requirements of 22 CCR § 66262.34 (pertaining to hazardous waste accumulation) are applicable requirements. These requirements are also relevant and appropriate for contaminated soil classified as non-RCRA or California-designated waste that is similar to RCRA-hazardous waste. The substantive requirements of 22 CCR §§ 66264.251, 66264.258(a) and (b), 66264.111, and 66264.114 (pertaining to the control of run-on and runoff and closure of waste piles) are relevant and appropriate requirements for the temporary storage of stockpiled materials. Substantive requirements in 22 CCR § 66262.34 (accumulation time), § 66264.553 (temporary units), and § 66264.251 and § 264.554 (waste piles) may be potential relevant and appropriate ARARs. In addition, substantive requirements of 49 CFR §§ 171.2(f), 172.300, 172.302, 172.303, 172.304, 172.400, and 172.504 (pertaining to the Department of Transportation requirements for transport of hazardous materials) are relevant and appropriate for transport of materials on site.

The substantive RCRA provisions for prescriptive landfill cap requirements set forth in 22 CCR § 66264.228(e) to (r) are relevant and appropriate action-specific ARARs for design of the proposed cap at Site 1H. Substantive state provisions under 27 CCR § 20080(b) and (c), § 21090, § 20320(c) and (d), § 20324(g)(1), § 20950(a), and § 21180(a), which allow for an alternative engineered cover design if it is demonstrated that the prescriptive design is not feasible, are controlling potential relevant and appropriate state ARARs for Site 1H. The substantive provisions for municipal waste landfill closure requirements set forth in 40 CFR § 258, Subpart F, may be potentially relevant and appropriate because Site 1H received domestic wastes from MCB Camp Pendleton similar or identical to wastes managed in municipal solid waste landfills. State requirements under 27 CCR §§ 20950(a) and 21180(a), which require that the post-closure maintenance period shall be not less than 30 years and shall extend as long as the wastes pose a threat to water quality are controlling relevant and appropriate federal ARARs for the capping alternative.

Substantive provisions in 27 CCR § 20200 are potential state ARARs for classification of California-designated waste determined to be neither RCRA- nor non-RCRA-hazardous waste. In addition, the substantive requirement of San Diego RWQCB Res. 95-96 may be a TBC for compliance with the potential state ARARs. Finally, the pertinent substantive provisions of the San Diego APCD Regulation IV are considered potential ARARs for control of fugitive dust that may be generated during the excavation and handling of contaminated soil.

The federal RCRA requirements set forth in 22 CCR § 66264.117(b) are the controlling potential ARARs for post-closure care of contaminated soil left in place at Sites 1D, 1H, and 30. The substantive provisions of 22 CCR § 66264.111(a) and (b) are potential relevant and appropriate federal ARARs for clean closure of the OU 4 soil sites.

A6.0 REFERENCES

Air Quality Management District (AQMD), (South Coast). 1988. Policy on Implementation of Rule 1303.

California Coastal Commission (CCC). 1998. Maps indicating coastal zone designations for County of San Diego. June.

Department of Defense (DOD), (United States). 1998. Military Munitions Rule Implementation Policy. 01 July 1998.

DOD. 1999. *Range Rule Risk Methodology: Tools, Models, and Protocols (R3M)*. August.

Department of the Navy (DON) 1998. Letter from Tom Huetteman Region IX to Henry Gee, Department of the Navy, regarding groundwater classification as a potential drinking water source. 30 June 1998.

DON. 2000. Memorandum of Agreement Between the United States Department of the Navy and the California [Environmental Protection Agency] Department of Toxic Substances Control. Signed 10 March 2000.

IT. 1998a. Marine Corps Base Camp Pendleton, California, Record of Decision Operable Unit 3. 31 August.

IT. 1998c. Draft Final Marine Corps Base Camp Pendleton, California, Remedial Investigation and Feasibility Study for Operable Unit 3. 01 May.

Parsons, 1999. Draft Remedial Investigation and Feasibility Study, Operable Unit 4, Marine Corps Base Camp Pendleton, California. 29 April.

PRC. 1998. Development of Toxicity Reference Values for Conducting Ecological Risk Assessments at Naval Facilities in California. Interim final Technical Memorandum. September. CTO-027, contract number N62474-94-D-7609.

Regional Water Quality Control Board (RWQCB). 1989. Staff Report: The Designated Level Methodology for Waste Classification and Cleanup Level Determination: RWQCB Central Valley Region. June.

RWQCB 1994, Water Quality Control Plan for the San Diego Basin (9), California Regional Water Quality Control Board (San Diego region), September 8.

Southwest Division Naval Facilities Engineering Command (SWDIV), 1995. Draft Final Engineering Evaluation/Cost Analysis (EE/CA) for Group A Site 3, Pest Control Wash Rack, and Site 6, DPDO (DRMO) Scrap Yard. September.

SWDIV, 1996b. Draft Final RI Report for Group C Sites, Remedial Investigation/Feasibility Study, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 12 November.

SWDIV, 1997. Draft Final Remedial Investigation Report for Group D Sites, Remedial Investigation/Feasibility Study, Marine Corps Base Camp Pendleton, California, prepared by Jacobs Engineering Group Inc., 16 July.

State Water Resources Control Board (SWRCB), (California). 1968. Resolution No. 68-16. Statement of Policy With Respect to Maintaining High Quality Waters in California.

SWRCB, 1988. Resolution No. 88-63. Sources of Drinking Water.

SWRCB 1992. Resolution No. 92-49 (as amended on 21 April 1994 and 02 October 1996): Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304.

SWRCB. 1997. Resolution No. 97-026. California Ocean Plan. 23 July.

SWRCB. 2000. Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Phase 1 of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan).

United States Environmental Protection Agency, (USEPA). 1986. *Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy*.

USEPA. 1988a. *CERCLA Compliance With Other Laws Manual,* Draft Guidance. EPA/540/G-89/006, Office of Emergency and Remedial Response, Washington, DC. August.

USEPA. 1988b. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*. OSWER Directive 9355.3-01, -02. EPA/540/G-89/004. October.

USEPA. 1989d. *CERCLA Compliance With Other Laws Manual: Part II – Clean Air Act and Other Environmental Statutes and State Requirements,* EPA/540/G-89/009, OSWER Directive 9234.1-02, Office of Solid Waste and Emergency Response, Washington, DC. August.

USEPA. 1989e. Memorandum, Subject: Land Disposal Restrictions as Relevant and Appropriate Requirements for CERCLA Contaminated Soil and Debris, OSWER Directive No. 9347.2-01, Office of Solid Waste and Emergency Response. June.

USEPA. 1989f. Determining When Land Disposal Restrictions Are Applicable to Response Actions. OSWER Directive 9347.3-05FS. July.

USEPA. 1990a. National Ambient Air Quality Standards (NAAQS).

USEPA. 1991b. ARARs Q's and A's: General Policy, RCRA, CWA, SDWA, Post-ROD Information, and Contingent Waivers. OSWER Directive No. 9234.2-01/FS-A, Washington, DC. June.

USEPA. 1991c. Management of Investigation-Derived Wastes During Site Inspections. EPA/540/G-91/009. May.

USEPA. 1994. Resolution No. 94-16. Approval of Revised Water Quality Control Plan for the San Diego Region, "Basin Plan."

USEPA. 1996. Resolution No. 96-86. Amendment to San Diego Basin Plan.

USEPA. 1997d. ERA Guidance for Superfund: Process for Designing and Conducting ERAs. Interim Final. Washington, DC. EPA/540/R-97/006.

USEPA. 1997e. Resolution No. 97-084. Amendment to San Diego Basin Plan.

USEPA. 1998b. *Guidelines for Ecological Risk Assessment*. EPA/630/R-95/002F. Washington, DC.

USEPA. 1998d. *Current Drinking Water Standards, National Primary Drinking Water Regulations* Office of Water, Washington DC. July.

USEPA. 1998e. *Preliminary Remediation Goals*, Region IX. Noncancer Endpoints. August.

USEPA. 1999c. *National Recommended Water Quality Criteria* – Correction. Office of Water, EPA 822-Z-99-001. April.

USEPA. 2000j. Interim Policy on Land Use Controls Associated With Environmental Restoration Activities. Memorandum. 31 August.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

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 C.F.R. § 141.61 (a) and (c).	Relevant and Appropriate	The NCP defines MCLs as relevant and appropriate for groundwater determined to be a current or potential source of drinking water in cases where MCLGs are not ARARs. MCLs may be relevant and appropriate for Class I and Class II aquifers. The San Diego RWQCB has designated groundwater in the vicinity of the OU 4 Sites for municipal/ domestic use (potential drinking water) (RWQCB, 1994), which is a Class II aquifer as defined by US EPA. Relevant and appropriate for determining vadose zone soil cleanup levels that are protective of groundwater.
MCLGs pertain to known or anticipated adverse health effects (also known as recommended MCLs).	Public water system.	40 C.F.R. § 141.50 and 141.51	Relevant and Appropriate	MCLGs that have nonzero values may be relevant and appropriate for groundwater determined to be a current or potential source of drinking water (40 C.F.R. § 300.430[e][2][i][B]–[D]). The San Diego RWQCB has designated groundwater in the vicinity of the OU 4 Sites for municipal/domestic use (potential drinking water) (RWQCB, 1994). Relevant and appropriate for determining vadose zone soil cleanup levels that are protective of groundwater.
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system.	40 C.F.R. § 143.3	Not an ARAR	SMCLs are federal contaminant levels intended as guidelines for the states. Because they are not enforceable, federal SMCLs are not ARARs.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste.	Waste.	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Not an ARAR	Pertinent for determining whether waste is hazardous. Not an ARAR because groundwater is not a medium of concern for the OU 4 Sites.
TCLP regulatory levels. A solid waste is characterized as toxic based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste.	Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B)	Not an ARAR.	Pertinent for determining whether waste is hazardous. Not an ARAR because groundwater is not a medium of concern for the OU 4 Sites.
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.	Cal. Code Regs. tit. 22, § 66264.94, except 66264.94(a)(2) and 66264.94(b)	Potentially Relevant and Appropriate.	Potentially applicable for groundwater at a site that meets the prerequisites. If the site is not a regulated unit, potentially relevant and appropriate for waste that is similar in composition to listed waste or when waste constituents have released or have the potential to release to groundwater. These concentration limits may be relevant and appropriate for determining soil excavation cleanup levels at Sites 1D, 1H and 30. This regulation is further evaluated under action-specific ARARs
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 of disposal.	Cal. Code Regs. tit. 22, § 66264.95	Not an ARAR	Not applicable to OU 4 FS sites. Groundwater not a medium of concern.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C., ch. 103, §§ 9601–9675)[c]				
Alternate Concentration Limits (ACLs) using a point of exposure beyond the facility boundary.	Known or projected points of entry from groundwater to surface water.	CERCLA § 121(d)(2)(B)(ii) 42 U.S.C., ch. 103, § 9621	Not an ARAR	Groundwater not a medium of concern for OU 4 Sites.
Clean Water Act of 1977, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
Federal ambient water quality criteria.	Discharges to waters of the United States and groundwater.	33 U.S.C. § 1314(a) and 42 U.S.C. § 9621(d)(2) 64 Fed. Reg. 19781 (22 April 1999)	Not an ARAR	Groundwater not a medium of concern for OU 4 Sites.
Federal water quality standards.	Discharges to waters of the United States.	40 C.F.R. § 131.36(b) and 131.38	Not an ARAR	Not applicable to OU 4 FS sites. Groundwater not a medium of concern.
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 C.F.R. § 141.11–141.13, excluding § 141.11(d)(3), 141.15, 141.16, 141.61(a) and (c), and 141.62(b)	Not an ARAR	The NCP defines MCLs as relevant and appropriate for surface water determined to be a current or potential source of drinking water in cases where MCLGs are not ARARs. Not applicable for OU 4 -sites
Ensure safety of public water systems; remedial actions must meet cleanup standards; MCLGs pertain to known or anticipated health effects (also known as recommended MCLs).	Public water system; remedial activities impacting groundwater; groundwater that is a potential source of drinking water.	40 C.F.R. § 141.50–141.51	Not an ARAR	Not applicable to OU 4 FS sites. Groundwater not a medium of concern.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Safe Drinking Water Act (42 U.S.C., ch. 6A, § 300[f]–300[j]-26)[c]				
National secondary drinking water regulations are standards for the aesthetic qualities of public water systems (SMCLs).	Public water system.	40 C.F.R. § 143.3	Not an ARAR	SMCLs are federal contaminant levels intended as guidelines for the states. Because they are not enforceable, federal SMCLs are not ARARs.
Clean Water Act, as Amended (33 U.S.C., ch. 26, §§ 1251–1387)[c]				
Effluent limitations that meet technology-based requirements, including BCPCT and BAT economically achievable.	Discharges to waters of the United States.	33 U.S.C., ch. 26, § 1311(b)(2)	Not an ARAR	Not applicable to OU 4 FS sites. Surface or groundwater not a medium of concern.
Water quality criteria.	Discharges to waters of the United States and groundwater.	33 U.S.C., ch. 26, § 1314(a) and 42 U.S.C., ch. 103, § 9621(d)(2) 64 Fed. Reg. 19781 (22 April 1999)	Not an ARAR	Not applicable to OU 4 FS sites. Surface or groundwater not a medium of concern.
Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C., 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 U.S.C., ch. 103, § 9621	Not an ARAR	Not applicable to OU 4 FS sites. Surface or groundwater not a medium of concern.
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Definition of RCRA hazardous waste.	Waste.	Cal. Code Regs. tit. 22, § 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100	Applicable	Applicable for determining whether soil or groundwater is hazardous. Substantive provisions of these sections are applicable to characterize excavated soils at sites 1D, 1E-1, 1H and 30.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
SOIL				
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
A solid waste is characterized as toxic, based on the TCLP, if the waste exceeds the TCLP maximum concentrations.	Waste.	40 C.F.R. pt. 261.24(a) Cal. Code Regs. tit. 22, § 66261.24(a)(1)(B)	Applicable	Applicable for determining whether excavated soil is hazardous. Substantive provisions of these sections are applicable to characterize excavated soils at sites 1D, 1E-1, 1H and 30.
LDRs prohibit disposal of hazardous waste unless treatment standards are met.	Hazardous waste land disposal.	Cal. Code Regs. tit. 22, § 66268.1(f)	Applicable	Applicable for soil classified as hazardous waste; potentially relevant and appropriate for site-specific circumstances, such as when the source of the waste is unknown but the waste is similar in composition to a listed waste and/or when RCRA treatment, storage, or disposal activities or similar activities are performed.
Groundwater Protection Standards: requirements to ensure that hazardous constituents entering the groundwater from a regulated unit do not exceed the concentration limits for contaminants of concern 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.	Cal. Code Regs. tit. 22, § 66264.94(a)(1) and (3), (c), (d), and (e)	Potentially Relevant and Appropriate for soil response actions at sites 1D, 1E-1, 1H and 30	Potentially applicable for soil at a site that meets the prerequisites. If the site is not a regulated unit, potentially relevant and appropriate for vadose zone (soil) when the waste is similar in composition to listed waste or when waste constituents have released or have the potential to release and may pose a threat to human health or the environment. Concentration limits may be relevant and appropriate for soil cleanup or monitoring actions. The regulation refers to the "unsaturated zone," which, for purposes of the ARARs evaluation, is the same as soil.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
Resource Conservation and Recovery Act (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Treatment standards including technology requirements before hazardous waste can be disposed to land.	Hazardous waste land disposal.	Cal. Code Regs. tit. 22, § 66268.40	Applicable	Applicable for soil classified as hazardous waste; potentially relevant and appropriate for site-specific circumstances, such as when the source of the waste is unknown but the waste is similar in composition to a listed waste and/or when RCRA treatment, storage, or disposal activities or similar activities are performed.
Universal Treatment Standards used to comply with treatment standards.	Hazardous waste land disposal.	Cal. Code Regs. tit. 22, § 66268.48	Applicable	Applicable for hazardous waste; potentially relevant and appropriate for site-specific circumstances, such as when the source of the waste is unknown but the waste is similar in composition to a listed waste and/or when RCRA treatment, storage, or disposal activities or similar activities are performed.
Toxic Substances Control Act (15 U.S.C., ch. 53, §§ 2601–2692)[c]				
Regulates storage and disposal of PCBs.	Soils, debris, sludge, or dredged materials contaminated with PCBs at concentrations greater than 50 ppm.	40 C.F.R. § 761.61(a)(4)	Not an ARAR	Applicable for wastes contaminated at greater than 50 ppm PCBs. May be relevant and appropriate for wastes with lower levels of PCB contamination. Not pertinent to OU 4 sites.
Military Munitions Rule (40 C.F.R. pt. 266 subpt. M)[c]				
Identification of hazardous waste munitions and treatment and storage requirements for hazardous waste munitions.	Storage of military munitions.	40 C.F.R. pt. 266, subpt. M	Not an ARAR	Military munitions must be managed in accordance with 40 C.F.R. pt. 266 subpt. M requirements unless the waste meets the criteria set forth in 40 C.F.R. § 266.205(a)(1)(i)–(vii). Potentially applicable for sites containing military munitions. Not pertinent to OU 4 sites
Guidance for range UXO.	Applies to inactive, closed, or transferring ranges.	Range Rule Risk Methodology: Tools, Models, and Protocols (R3M)	Not an ARAR	Potentially TBC guidance for complying with RCRA requirements in subpart M discussed above. Not pertinent to OU 4 sites.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
		AIR		
Clean Air Act (42 U.S.C., ch. 85, §§ 7401–7671)[c]				
NAAQS: Primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Contamination of air affecting public health and welfare.	40 C.F.R. § 50.4–50.12	Not an ARAR	Not enforceable and therefore not an ARAR.
Provisions of SIP approved by U.S. EPA under Section 110 of CAA.	Major sources of air pollutants.	42 U.S.C. § 7401; portions of 40 C.F.R. § 52.220 applicable to San Diego County Air Pollution Control District (APCD)	Not an ARAR. Potentially applicable for response actions.	Not an ARAR in itself but pertinent provisions of the SIP may be ARARs. Emissions of air pollutants regulated under the SIP are not suspected at OU 4 sites under current conditions. However, soil excavation alternatives at sites 1D, 1H and 30 may potentially have air emissions regulated under the SIP.
Resource Conservation and Recovery Act Air Emissions Requirements (42 U.S.C., ch. 82, §§ 6901–6991[i])[c]				
Air emission standards for process vents or equipment leaks.	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations that manage hazardous wastes with organic concentrations of at least 10 ppm_w.	Cal. Code Regs. tit. 22, § 66264.1030–66264.1034, excluding .1030(c), .1033(j), .1034(c)(2), .1034(d)(2) Cal. Code Regs. tit. 22, § 66264.1050–66264.1063, excluding .1050(c), (d), .1057(g)(2), .1060, .1063(d)(3)	Not an ARAR	Not applicable for OU 4 FS sites. No soil contains more than 10 percent by weight volatile organic compounds.

Table A-1
Potential Federal Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H, and 30

Notes: [a] many potential 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 potential ARARs
[c] statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:

ACL – alternative concentration limit
APCD – Air Pollution Control District
ARAR – applicable or relevant and appropriate requirement
BAT – best available technology
BCPCT – best conventional pollution control technology
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
ch. – chapter
COC – chemical of concern
DoD – Department of Defense
DON – Department of the Navy
Fed. Reg. – Federal Register
LDR – land disposal restriction
MCL – maximum contaminant level
MCLG – maximum contaminant level goal
NAAQS – National Ambient Air Quality Standards (primary and secondary)
NCP – National Oil and Hazardous Substances Pollution Contingency Plan
NPDES – National Pollutant Discharge Elimination System
OU – operable unit
PCB – polychlorinated biphenyl
POC – point of compliance
ppm – parts per million
ppm_w – parts per million by weight
pt. – part
RCRA – Resource Conservation and Recovery Act
RWQCB – (California) Regional Water Quality Control Board, SanDiego Region
§ – section
SIP – State Implementation Plan
SMCL – secondary maximum contaminant level
subpt. – subpart
TBC – to be considered
TCLP – toxicity characteristic leaching procedure
tit. – title
TSD – treatment, storage, and disposal
U.S.C. – *United States Code*
U.S. EPA – United States Environmental Protection Agency
UXO – unexploded ordnance
VOC – volatile organic compound

Table A-2
Potential State Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
SOIL, GROUNDWATER, AND AIR				
Cal-EPA Department of Toxic Substances Control[c]				
Definition of "non-RCRA hazardous waste." Persistent and bioaccumulative toxic substances TTLCs and STLCs	Waste.	Cal. Code Regs. tit. 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.	Applicable for determining whether a waste is a State-regulated, non-RCRA hazardous waste.
State MCL list.	Source of drinking water.	Cal. Code Regs. tit. 22, §§ 64431 and 64444	Relevant and appropriate.	For determining vadose zone soil cleanup levels that are protective of groundwater.
State secondary MCL list.	Source of drinking water.	Cal. Code Regs. tit. 22, § 64449(a)	Not an ARAR	Secondary MCLS are not applicable or relevant and appropriate.
State and Regional Water Quality Control Boards[c]				
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.		Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act)	Applicable	The DON accepts the substantive provisions of §§ 13241, 13243, 13263(a), 13269, and 13360 of the Porter-Cologne Act enabling legislation, as implemented through the beneficial uses, WQOs, waste discharge requirements, promulgated policies of the Basin Plan for the San Diego region as potential ARARs.
		Cal. Water Code, div. 7, § 13304	Not an ARAR	Section 13304 does not constitute an ARAR because it does not itself establish or contain substantive environmental "standards, requirements, criteria or limitations" (CERCLA 121) and is not in itself directive in intent. In addition, Section 13304 is not more stringent than the substantive requirements of the potential state and federal ARARs identified herein.

Table A-2
Potential State Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
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.		Statement of Policy With Respect to Maintaining High Quality of Waters in California, SWRCB Res. 68-16	Not an ARAR	Groundwater not a medium of concern for OU 4 Sites.
Describes the water basins in the San Diego County region, 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.		Comprehensive Water Quality Control Plan for the San Diego County region (Basin Plan) (Cal. Water Code § 13240)	Applicable	Substantive requirements pertaining to beneficial uses, WQOs, and certain statewide water quality control plans are potential state ARARs for determining vadose zone soil cleanup levels that are protective of water quality.

Table A-2
Potential State Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H and 30

Requirement	Prerequisite	Citation[b]	ARAR Determination	Comments
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.		Policies and procedures for investigation and cleanup and abatement of discharges under Cal. Water Code § 13304. SWRCB Res. 92-49	Not an ARAR	Groundwater not a medium of concern for OU 4 Sites.
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.		SWRCB Res. 88-63 (Sources of Drinking Water Policy)	Applicable	Policy used to support or refute drinking-water use determinations. Substantive provisions are ARARs. Groundwater at the OU 4 Sites does not meet the exclusion criteria provided in the resolution, and it is considered to be a potential source of drinking water for the purpose of state regulatory requirements.
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.		Cal. Code Regs. tit. 27, §§ 20380(a); 20400(a), (c), (d), (e), and (g);	Not an ARAR	Not more stringent than federal regulations at Cal. Code Regs. tit. 22, § 66264.94 and 66264.95.

Table A-2
Potential State Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H and 30

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.		Cal. Code Regs. tit. 23, §§ 2550(a); 2550.4(d), (e), and (f); and 2550.5	Not an ARAR	Cal. Code Regs. tit. 23, § 2550(a) addresses the general applicability of other standards in Chapter 15 and does not contain standards itself. Cal. Code Regs. tit. 23, §§ 2550.4(d), (e), and (f) and 2550.5 are not more stringent than federal ARARs at Cal. Code Regs. tit. 22, § 66264.94 and 66264.95.
Establishes beneficial uses of ocean waters, numerical and narrative WQOs, effluent quality objectives including toxic material limitations, and discharge prohibitions.		California Ocean Plan, Water Quality Control Plan for Ocean Waters of California, SWRCB Res. 97-026 (Cal. Water Code § 13170.2)	Not an ARAR	Potentially applicable for groundwater migrating to the ocean or other discharges to the ocean.
Requires analysis for each priority pollutant to determine if water-quality-based effluent limitation is required. Provides effluent limitation development methodology.	Discharges of toxic priority pollutants into inland surface waters, bays, or estuaries.	Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Inland Surface Waters Plan) (SWRCB 2000), §§ 1.3 and 1.4	Not an ARAR	Groundwater not a medium of concern for OU 4 Sites.
Definitions of designated waste, nonhazardous waste, and inert waste.		Cal. Code Regs. tit. 27, §§ 20210, 20220, and 20230	Applicable	Potential ARARs for classifying waste and determining ARAR status of other requirements.
Designated Level Methodology for Waste Classification and Cleanup Level Determination		California RWQCB, Central Valley Region	To be Considered	Guidance for setting soil cleanup goals. Not an ARAR for OU 4 sites where soil is not a concern or where the site gas already been determined to be protective of groundwater.

Table A-2
Potential State Chemical-Specific[a] ARARs by Medium
OU 4 Sites 1D, 1E-1, 1H and 30

Notes:

[a] many potential 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 potential ARARs

[c] statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs are addressed in the table below each general heading; only pertinent substantive requirements of specific citations are considered potential ARARs

Acronyms/Abbreviations:

ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
Cal-EPA – California Environmental Protection Agency
Cal. Water Code – California Water Code
CERCLA – 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

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
National Historic Preservation Act of 1966, as Amended (16 U.S.C. § 470–470x-6)[b]					
Geographic area within which a Federal undertaking may affect historic properties	Identify potentially affected historic properties	Proposed Federal project, activity, or program constituting an undertaking that may change the character or use of historic properties.	36 CFR 800.4 (a), (b), (c), and (e)	Potentially Applicable to Site 1H	Soil excavation at Site 30 would constitute a Federal undertaking.
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 U.S.C. § 470–470x-6 36 C.F.R. pt. 800 40 C.F.R. § 6.301(b)	Not an ARAR	Site 30 is located near a suspected resource site CA-SDI-13929. There are no other known or suspected cultural resources elegible for inclusion in the National 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 U.S.C. § 469–469c-1 40 C.F.R. § 6.301(c)	Potentially applicable	Substantive provisions are potential ARARs for response actions in areas where archaeological and historical resources may be found. OU 4 sites are not in areas of known or suspected historical or archaeological resources. Site 30 is located near a suspected resource site CA-SDI-13929. An archaeologist will monitor any excavation activities at the site for unidentified resources.

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Historic Sites, Buildings, and Antiquities Act of 1935 (16 U.S.C. §§ 461–467)[b]					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites.	16 U.S.C. §§ 461–467 40 C.F.R. § 6.301(a)	Not an ARAR	No designated historic sites are located on or adjacent to the OU 4 sites.
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 U.S.C. § 470aa–470mm	Potentially applicable	Substantive provisions are potential ARARs for response actions in sites containing archaeological resources. OU 4 sites are not in areas of known or suspected archaeological resources. Site 30 is located near a suspected resource site CA-SDI-13929. An archaeologist will monitor any excavation activities at the site for unidentified resources.
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 C.F.R. § 6.302(a)	Potentially relevant and appropriate for response actions at Site 30	An area at the northwest edge of Site 30 has been identified as a wetland. No other wetlands have been identified at or near the other OU 4 sites.
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 C.F.R. § 6.302(b) 40 C.F.R. pt. 6, Appendix A	Applicable	Sites 1D and 30 are located within a 100-year floodplain. Substantive provisions may be potentially relevant and appropriate for response actions within a 100-year floodplain.

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
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 U.S.C. § 1344	Potentially applicable for response actions	Not pertinent to proposed alternatives. An area at the northwest edge of Site 30 has been identified as a wetland.
Resource Conservation and Recovery Act (33 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.	Cal. Code Regs. tit. 22, § 66264.18(b)	Relevant and appropriate for Site 1D and 30	Site 1D and 30 are located within a 100-year floodplain. Substantive provisions are potential ARARs for response actions within a 100-year floodplain.
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 river.	Activities that affect or may affect any of the rivers specified in 16 U.S.C. §1276(a).	16 U.S.C. §§ 1271–1287	Not an ARAR	No designated wild, scenic or recreational rivers are located on or in the vicinity of OU 4 sites
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 U.S.C. § 662	Not an ARAR	Not pertinent to proposed alternatives
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 U.S.C. § 403 33 C.F.R. § 322	Not an ARAR	The OU 4 remedial alternatives are not expected to affect navigable waters.

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
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 U.S.C. § 1536(a), (h)(1)(B)	Potentially applicable to response actions	Listed threatened species have been observed at Sites 1D and 30. Substantive provisions are potential ARARs for response actions at or near threatened or endangered species habitats. If endangered species are present, the ecological assessment should evaluate potential effects of the contamination present and the planned response action.
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 U.S.C. § 703	Applicable to soil excavation response actions at Sites 1D, 1H, and 30	Migratory birds have been observed in the vicinity of Sites 1D, 1H, and 30.
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 U.S.C. § 1372(a)(2)	Not an ARAR	Given the inland locations, marine mammals are not known or suspected to be present at the OU 4 sites.

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
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 U.S.C. §§ 1801–1882	Not an ARAR	No managed fisheries are located within the vicinity of the OU 4 sites.
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 U.S.C § 668dd–668ee Substantive provisions of 50 C.F.R. § 27.11–27.97	Not an ARAR	The OU 4 sites are not designated as part of the National Wildlife Refuge System.
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 U.S.C. §§ 1131–1136 50 C.F.R. §§ 35.1–35.14	Not an ARAR	The OU 4 sites are not located in a federally owned wilderness area.
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 U.S.C. § 1456(c) 15 C.F.R. § 930	Not Applicable	OU 4 Sites are not located within the coastal zone.

Table A-3
Potential Federal Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H, and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
Resource Conservation and Recovery Act (33 U.S.C. §§ 6901–6991[i])[b]					
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.	Cal. Code Regs. tit. 22, § 66264.18(a)	Not an ARAR	Proposed removal actions at OU 4 sites do not include on-site treatment, storage or disposal.
Within salt dome formation, underground mine, or cave	Placement of noncontainerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste; placement.	Cal. Code Regs. tit. 22, § 66264.18(c)	Not an ARAR	OU 4 remedial action sites do not contain any salt dimes, mines or caves.

Note:
[a] only the substantive provisions of the requirements cited in this table are potential ARARs
[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:
ARAR – applicable or relevant and appropriate requirement
CCC – California Coastal Commission
Cal. Code Regs. – *California Code of Regulations*
C.F.R. – *Code of Federal Regulations*
DON – Department of the Navy
Exec. Order No. – executive order number
FEMA – Federal Emergency Management Agency
Pub. L. No. – public law number
RCRA – Resource Conservation and Recovery Act
§ – section
U.S. – United States
U.S.C. – *United States Code*

Table A-4
Potential State Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Endangered Species Act (Cal. Fish & Game Code §§ 2050–2116)[b]					
Endangered species habitat	Department policy and legislative findings and definitions for significant natural areas.	Activity taking place in an endangered species habitat and significant natural area.	Cal. Fish & Game Code §§ 2050–2068	Not an ARAR	Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
Endangered species habitat	Procedures for listing endangered species.	Threatened or endangered species determination.	Cal. Fish & Game Code § 2070	Not an ARAR	Procedural; not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
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	Applicable for response actions at Sites 1D and 30	A State-listed endangered species (least Bell vireo) has been identified in the vicinity of Site 30. An endangered species (California gnatcatcher) has also been identified at Sites 1D, and 30.
Endangered species habitat	Ensures that action taken will not jeopardize the survival and reproduction of any threatened or endangered species.	Threatened or endangered species determination or a candidate species with proper notification.	Cal. Fish & Game Code §§ 2090–2096	Not an ARAR	Not effective after 01 January 1994.

Table A-4
Potential State Location-Specific ARARs
OU 4 Sites 1D, 1E-1, 1H and 30

Location	Requirement	Prerequisite	Citation[a]	ARAR Determination	Comments
California Coastal Act of 1976[b]					
Coast	Regulates activities associated with development to control direct significant impacts on coastal waters and to protect state and national interests in California coastal resources.	Any activity which could impact coastal waters and resources.	Cal. Pub. Res. Code §§ 30000–30900; Cal. Code Regs. tit. 14, §§ 13001–13666.4	Potentially applicable Sites 1D and 30	Sites 1D and 30 are located within the designated boundary of the coastal zone on California Coastal Commission maps (CCC 1993)

Note:
[a] only the substantive provisions of the requirements cited in this table are potential ARARs
[b] statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs follow each general heading; only substantive requirements of the specific citations are considered potential ARARs

Acronyms/Abbreviations:
ARAR – applicable or relevant and appropriate requirement
Cal. Code Regs. – *California Code of Regulations*
Cal. Fish & Game Code – California Fish and Game Code
Cal. Gov't Code – California Government Code
Cal. Pub. Res. Code – California Public Resources Code
CCC – California Coastal Commission
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
DON – Department of the Navy
§ – section

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Resource Conservation and Recovery Act (42 U.S.C. §§ 6901–6991[i])*							
On-site waste generation	Person who generates waste shall determine if that waste is a hazardous waste.	Generator of waste.	Cal. Code Regs. tit. 22, § 66262.10(a), 66262.11	3,4,5,6			Applicable for any operation where hazardous waste is generated. There is a potential for excavated soil from Sites 1D, 1H and 30, to be classified as RCRA hazardous waste due to high contaminant concentrations. This determination will be made at the time the wastes are generated.
	Requirements for analyzing waste for determining whether waste is hazardous.	Generator of waste.	Cal. Code Regs. tit. 22, § 66264.13(a) and (b)	3,4,5,6			Applicable to analysis of excavated soils generated during a response action.
Hazardous waste accumulation	On-site hazardous waste accumulation is allowed for up to 90 days as long as the waste is stored in containers or tanks, on drip pads, inside buildings, is labeled and dated, etc.	Accumulate hazardous waste.	Cal. Code Regs. tit. 22, § 66262.34	3,4,5,6			Potentially applicable to on-site storage of contaminated soil. This determination will be made at the time the wastes are generated.
Closure with no postclosure care (e.g., clean closure)	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.	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.111(a) and (b)		4,5,6		Relevant and appropriate for soil excavation actions at Sites 1D, 1H and 30.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Postclosure Care	Conduct postclosure monitoring and continue maintenance, land use restrictions and site security, for a period sufficient to protect human health and the environment	Facilities at which hazardous waste or contaminated soils will not be removed during closure	Cal. Code Regs. tit. 22, § 66264.117(b), (c) and (d)		2,3		Relevant and appropriate for contaminated soil at Sites 1D, 1H and 30.
Pretransport requirements	Hazardous waste must be packaged in accordance with DOT regulations prior to transporting.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.30	3,4,5,6			Applicable for any operation where hazardous waste is generated and transported. Potentially applicable to excavated soil. This determination will be made at the time the wastes are generated.
	Hazardous waste must be labeled in accordance with DOT regulations prior to transporting.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.31	3,4,5,6			Applicable for any operation where hazardous waste is generated and transported. Potentially applicable to excavated soil. This determination will be made at the time the wastes are generated.
	Provides requirements for marking hazardous waste prior to transporting.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.32	3,4,5,6			Applicable for any operation where hazardous waste is generated and transported. Potentially applicable to excavated soil. This determination will be made at the time the wastes are generated.
	A generator must ensure that the transport vehicle is correctly placarded prior to transport of hazardous waste.	Any operation where hazardous waste is generated.	Cal. Code Regs. tit. 22, § 66262.33	3,4,5,6			Applicable for any operation where hazardous waste is generated and transported. Potentially applicable to excavated soil. This determination will be made at the time the wastes are generated.
Clean closure	During the partial and final closure periods, all contaminated equipment, structures and soils shall be properly disposed or decontaminated by removing all hazardous waste and residues.	Hazardous waste management facility	Cal. Code Regs. tit. 22, § 66264.114		3,4,5,6		Relevant and Appropriate. Alternatives 3, 4, 5 and 6 may involve stockpiling excavated soil while waste characterization is performed.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Container storage	Containers of RCRA hazardous waste must be: • 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 held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere, in a container.	Cal. Code Regs. tit. 22, § 66264.171, .172, .173				Not an ARAR. Container storage requirements are applicable only if hazardous wastes are generated during remedial activities and are stored on-site for longer than 90 days. The DON does not intend to store hazardous wastes longer than 90 days.
	Inspect container storage areas weekly for deterioration.		Cal. Code Regs. tit. 22, § 66264.174				Not an ARAR. The DON does not intend to store hazardous wastes longer than 90 days.
	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide containment system with a capacity of 10 percent of the volume of containers of free liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.	Storage in a container of RCRA hazardous waste not meeting small-quantity generator criteria held for a temporary period greater than 90 days before treatment, disposal, or storage elsewhere.	Cal. Code Regs. tit. 22, § 66264.175(a) and (b)				Not an ARAR. The DON does not intend to store hazardous wastes longer than 90 days.
	Keep containers of ignitable or reactive waste at least 50 feet from the facility property line.	Ignitable or reactive waste.	Cal. Code Regs. tit. 22, § 66264.176				Not an ARAR. The DON does not intend to store hazardous wastes longer than 90 days.
	Keep incompatible materials separate. Separate incompatible materials stored near each other by a dike or other barrier.		Cal. Code Regs. tit. 22, § 66264.177				Not an ARAR. The DON does not intend to store hazardous wastes longer than 90 days.
	At closure, remove all hazardous waste and residues from the containment system, and decontaminate or remove all containers and liners.		Cal. Code Regs. tit. 22, § 66264.178				Not an ARAR. The DON does not plan to store hazardous wastes longer than 90 days.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Use of tanks or piping	Requirements for secondary containment of tank systems.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.193(b), (c), (d), and (e)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.
	Requirements for secondary containment of ancillary equipment.	Tank systems for transferring, storing or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.193(f)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.
Use of tank systems	Requirements for operation of tank systems including spill prevention and prohibitions of material that could cause failure.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.194(a) and (b)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.
	Requirements for inspection of tank systems including inspection of overflow protection, corrosion, release, detection equipment, and cathodic protection.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.195(a), (b), and (c)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.
	Requirements for response to leaks and spills from tank systems including removal of system from use if appropriate, containment, cleanup, emergency procedures, etc.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.196(b) except (b)(5) and (b)(7)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.
	Requirements for closure and postclosure care of tank systems decontamination, clean closure and leaving waste in place at closure.	Tank systems for transferring, storing, or treating hazardous waste.	Cal. Code Regs. tit. 22, § 66264.197(a) and (b)		3,4,5,6		May be relevant and appropriate for storage of decontamination water generated during response actions.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Placement of waste in land disposal units	Movement of excavated materials to new location and placement in or on land will trigger LDRs for the excavated waste or closure requirements for the unit in which the waste is being placed.	Materials containing RCRA hazardous wastes subject to LDRs are placed in another unit.	Cal. Code Regs. tit. 22, § 66268.40	4			Potentially applicable to use of treated excavated soil as road base material. Resulting mix is commercially viable product that may meet federal definition of recyclable material. However, it must meet LDR treatment standards.
	Treatment of waste subject to ban on land disposal must attain levels achievable by BDAT for each hazardous constituent in each listed waste, if residual is to be land disposed.	Placement of RCRA hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, or underground mine or cave.	Cal. Code Regs. tit. 22, § 66268.42	4			Potentially applicable to treatment of excavated soil for use as road base material.
	BDAT standards for spent solvent wastes and dioxin-containing wastes are based on one of four technologies or combinations: for wastewaters, (1) steam stripping, (2) biological treatment, or (3) carbon absorption; and for all other wastes, (4) incineration. Any technology may be used, however, if it will achieve the concentration levels specified.	Solvent or dioxin-containing wastes.	Cal. Code Regs. tit. 22, § 66268.30, § 66268.31				Not an ARAR. None of the proposed alternatives involves placement of spent-solvent or dioxin-containing waste in land disposal units.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
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. If waste is left on site, closure and postclosure care requirements are necessary.	Surface impoundments, container or tank liners, and hazardous waste residues or contaminated soil (including soil from dredging or soil disturbed in the course of drilling or excavation) returned to land. Not applicable to material treated, stored, or disposed only before the effective date of the requirements, or if treated *in situ* or consolidated within the area of contamination.	Cal. Code Regs. tit. 22, § 66264.228(a), (b), (e)–(k), (m), (o)–(q) except as it cross-references procedural requirements such as closure plans and annual reports.				Not an ARAR. No more stringent than federal clean closure requirements set forth in 22, § 66264.111.
Waste pile	Use a single liner and leachate collection system. Waste put into waste pile is subject to land ban regulations.	RCRA hazardous waste, noncontainerized accumulation of solid, nonflammable hazardous waste that is used for treatment or storage.	Cal. Code Regs. tit. 22, § 66264.251 (except 251[j], 251[e][11])		3,4,5,6		Substantive requirements pertaining to the control of run-on and runoff and closure of a temporary waste pile may be relevant and appropriate for storage of stockpiled contaminated soil.
	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.		Cal. Code Regs. tit. 22, § 66264.553(b) and (d)		3,4,5,6		Substantive provisions may be relevant and appropriate for temporary storage of stockpiled contaminated soil from response actions.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Waste pile (continued)	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 § 66264.554		3,4,5,6		Substantive provisions may be relevant and appropriate for temporary storage of stockpiled contaminated soil from response actions.
	Prevent run-on and control and collect runoff from a 24-hour 25-year storm (waste piles, land treatment facilities, landfills). Prevent overtopping of surface impoundments.	RCRA hazardous waste treated, stored, or disposed after the effective date of the requirements.	Cal. Code Regs. tit. 22, § 66264.221(c), (e), (h); § 66264.251(c), (d), (f), (g), (h), (k); § 66264.273(c), (d), (j)(1); § 66264.301(c), (d), (f), (g)		3,4,5,6		Substantive provisions may be relevant and appropriate for temporary storage of stockpiled contaminated soil from response actions.
Closure of waste pile	At closure, owner shall remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, and structures and equipment contaminated with waste and leachate, and manage them as hazardous waste. If waste is left on-site, perform postclosure care in accordance with the closure and postclosure care requirements that apply to landfills.	Waste pile used to store hazardous waste.	Cal. Code Regs. tit. 22, § 66264.258(a) and (b) except references to procedural requirements		3,4,5,6		Substantive provisions may be relevant and appropriate for temporary storage of stockpiled contaminated soil from response actions.
CAMU	An area at an RCRA facility may be designated as a CAMU. Placement of remediation wastes into or within a CAMU does not constitute land disposal of hazardous wastes nor creation of a unit subject to minimum technology requirements or LDRs.	RCRA CAMU.	Cal. Code Regs. tit. 22, § 66264.552(c) and (e)				Not an ARAR. Remedial actions will not involve creation of a CAMU. Requirements for the new CAMU in Alternative 6 will be addressed separate from this FS.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Incineration	Waste analysis, pretreatment, operating, and monitoring requirements and performance standards for hazardous waste incinerators.	Facility that incinerates hazardous wastes.	Cal. Code Regs. tit. 22, § 66264.341, 66264.342, 66264.343, 66264.345, and 66264.347				Not an ARAR. Remedial actions will not involve incineration of contaminated soil.
	Owner or operator shall remove all hazardous waste and waste residues from the incinerator site and manage residues as hazardous waste unless they are demonstrated not to be hazardous waste.	Facility that incinerates hazardous waste.	Cal. Code Regs. tit. 22, § 66264.351				Not an ARAR. Remedial actions will not involve incineration of contaminated soil.
Thermal treatment	Establishes requirements for owners and operators of interim status facilities that thermally treat hazardous waste in devices other than those that use flame combustion.	RCRA hazardous waste treatment.	Cal. Code Regs. tit. 22, § 66265.370–66265.383				Not an ARAR. Remedial actions will not involve treatment of contaminated soil by thermal desorption.
Use of equipment that contacts hazardous waste with organic concentrations greater than 10 percent by weight	Air emission standards for process vents or equipment leaks.	Equipment that contains or contacts hazardous waste with organic concentrations of at least 10 percent by weight or process vents associated with specified operations that manage hazardous wastes with organic concentrations of at least 10 ppm_w.	Cal. Code Regs. tit. 22, § 66264.1030–1034 (excluding 1030[c], 1033[j], 1034[c][2], 1034[d][2]); 66264.1050–1063 (excluding 1050[c], 1050[d], 1057[g][2], 1061[d], 1063[d][3])				Not an ARAR. No hazardous wastes are present with organic concentrations greater than 10 percent.
Treatment in a miscellaneous unit	Design and operating standards for unit in which hazardous waste is treated.	Treatment of hazardous waste in a unit.	Cal. Code Regs. tit. 22, § 66264.601		4,5,6		May be an ARAR for on-site treatment (solidification/stabilization) alternative for sites 1D and 30 contaminated soil.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Discharge to groundwater from regulated unit	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.	Cal. Code Regs. tit. 22, § 66264.91(a) and (c), except as it cross-references permit requirements				Not an ARAR. No alternatives involve discharge to groundwater from a regulated unit
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.	Cal. Code Regs. tit. 22, § 66264.95				Not an ARAR. Groundwater not a medium of concern for the OU 4 soil sites.
Monitoring	Requirements for monitoring groundwater, surface water, and the vadose zone.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.97		2,3,6		May be relevant and appropriate for remedial alternatives that leave contaminated soil in place.
	Requirements for a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.98		2,3,6		May be relevant and appropriate for remedial alternatives that leave contaminated soil in place.
	Requirements for an evaluation monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.99		2,3,6		May be relevant and appropriate for remedial alternatives that leave contaminated soil in place.
Corrective action	The owner or operator required to take corrective action under Cal. Code Regs. tit. 22, § 66264.91 shall take corrective action to remediate releases from the regulated unit and to ensure that the regulated unit achieves compliance with the water quality protection standard.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.100(a) and (b)		3,4,5,6		Potentially relevant and appropriate ARAR for a response action.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Corrective action (continued)	The owner or operator shall implement corrective action measures that ensure that constituents of concern achieve their respective concentration limits at all monitoring points and throughout the zone affected by the release, including any portions of the affected zone that extend beyond the facility boundary, by removing the waste constituents or treating them in place. The owner or operator shall take other action to prevent noncompliance due to a continued or subsequent release including, but not limited to, source control.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.100(c)		3,4,5,6		Potentially relevant and appropriate ARAR for a response action.
Monitoring	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.	Cal. Code Regs. tit. 22, § 66264.100(d)		2,3,4, 5,6		May be potentially relevant and appropriate ARAR for monitoring during the response action.
Completion of response action	Completion of the corrective action program must be demonstrated to be in compliance with the water quality protection standard based on the results of sampling and analysis for all constituents of concern for a period of 1 year and establish a detection monitoring program.	Hazardous waste treatment, storage, or disposal facility.	Cal. Code Regs. tit. 22, § 66264.100(g)(1) and (3)		2,3,4, 5,6		May be an ARAR for demonstrated completion of a response action.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Military Munitions Rule (40 CFR pt. 266 subpt. M)*							
Military munitions	Standards for transportation and storage of solid waste military munitions and treatment and disposal of waste military munitions.	Management of military munitions.	40 CFR § 266.203, 266.205, and 266.206				Not an ARAR. Alternatives do not involve management of military munitions.
Safe Drinking Water Act (42 U.S.C. § 300[f]–300[j]-26)*							
	The UIC program regulates construction of new Class IV wells and operation and maintenance of existing wells.	Class IV wells are used to inject hazardous or radioactive waste into or above a formation that contains a USDW within 0.25 mile of the well.	40 CFR § 144.13				Not an ARAR. Groundwater is not a medium of concern for OU 4 Sites.
Injection	The UIC program prohibits injection activities that allow movement of contaminants into underground sources of drinking water that may result in violations of MCLs or adversely affect health.	An approved UIC program is required in states listed under SDWA Section 1422. Class I wells and Class IV wells are the relevant classifications for CERCLA sites. Class I wells are used to inject hazardous waste beneath the lowermost formation that contains a USDW within 0.25 mile of the well.	40 CFR § 144.12, excluding the reporting requirements in § 144.12(b) and 144.12(c)(1)				Not an ARAR. Groundwater is not a medium of concern for OU 4 Sites.
	Class IV wells are banned except for reinjection of treated groundwater into the same formation from which it was withdrawn, as part of a CERCLA cleanup or RCRA corrective action.		40 CFR § 144.13(c)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Injection (continued)	The director of the UIC program in a state may lessen the stringency of 40 CFR § 144.52 construction, operation, and manifesting requirements for a well if injection does not occur into, through, or above a USDW or if the radius of endangering influence is less than or equal to the radius of the well.		40 CFR § 144.16				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Prepare, maintain, and comply with plugging and abandonment plan.	Class I wells.	40 CFR § 144.28(c), § 144.51(e)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Monitor Class I wells by: • frequent analysis of injection fluid; • continuous monitoring of injection pressure, flow rate, and volume; and • installation and monitoring of groundwater monitoring wells.	Class I wells are used to inject hazardous waste beneath the lowermost formation that contains a USDW within 0.25 mile of the well.	40 CFR § 144.28(g)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Applicants for Class I permits must: • identify all injection wells within the area of review; and • take action as necessary to ensure that such wells are properly sealed, completed, or abandoned to prevent contamination of a USDW.		40 CFR § 144.55 (§ 144.55[b][4] is applicable only for Class III wells)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Criteria for determining whether an aquifer may be determined to be an exempted aquifer include current and future use, yield, and water quality characteristics.		40 CFR § 146.4				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Injection (continued)	Case and cement all Class I wells to prevent movement of fluids into USDW, taking into consideration well depth, injection pressure, hole size, composition of injected waste, and other factors.		40 CFR § 144.28(e)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Conduct appropriate geologic drilling logs and other tests during construction.		40 CFR § 146.12(d), excluding the reporting requirements				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Injection pressure may not exceed a maximum level designed to ensure that injection does not initiate new fractures or propagate existing ones and cause the movement of fluids into a USDW. Continuously monitor injection pressure, flow rate, and volume, and annual pressure, if required. Demonstration of mechanical integrity is required every 5 years. Groundwater monitoring may also be required.		40 CFR § 146.13(a), (b), (d)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Comply with state underground injection requirements.		40 CFR § 147				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
	Wastes that no longer exhibit a hazardous characteristic are not prohibited if the wastes are disposed into a nonhazardous or hazardous injection well as defined under 40 CFR § 146.6(a).	Characteristically hazardous wastewaters.	40 CFR § 148.1(d)				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Injection (continued)	Hazardous waste to be injected is subject to land ban regulations. Treated groundwater that meets the definition of hazardous waste and is to be injected also is subject to land ban regulations.		40 CFR § 268.2				Not an ARAR. Groundwater not a medium of concern for OU 4 Sites.
Toxic Substances Control Act (15 U.S.C. §§ 2601–2692)*							
Marking of PCBs	The following must be marked as designated in 40 CFR § 761.45: PCB containers containing greater than 50 ppm PCBs, PCB articles (see 40 CFR § 761.45), PCB article containers, storage areas used to store PCBs, and PCB items for disposal. All marks must be on the exterior of PCB container and must be clearly visible.	PCB article described in 40 CFR § 761.45.	40 CFR § 761.40				Not an ARAR. PCBs are not chemicals of concern at these sites.
Disposal of PCBs	Provides expanded decontamination procedures and disposal options for PCBs. Ensures consistency with RCRA land disposal restriction.	Remedial actions involving PCBs.	40 CFR § 761.50				Not an ARAR. PCBs are not chemicals of concern at these sites.
	Nonliquid PCBs at concentrations of 50 ppm or greater in the form of contaminated soil, rags, or other debris shall be disposed in a TSCA-approved incinerator or in a TSCA-approved chemical waste landfill or by a TSCA-approved alternative disposal method.		40 CFR § 761.60(e)				Not an ARAR. PCBs are not chemicals of concern at these sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Disposal of PCBs (continued)	All PCB articles or containers must be removed and disposed within 1 year of storage.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(a)				Not an ARAR. PCBs are not chemicals of concern at these sites.
PCB storage on-site prior to disposal	Storage facilities must be constructed with adequate roof and walls; with a floor and curb of impervious materials; without drain valves, floor drains, expansion joints, sewer lines, or other openings; and above the 100-year floodwater level.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR 761.65(b)				Not an ARAR. PCBs are not chemicals of concern at these sites.
	Temporary storage (30 days or less) need not comply with above storage regulations for the following items: PCB articles and equipment that are nonleaking; leaking articles and equipment placed in nonleaking containers; PCB containers containing nonliquid PCBs, such as soil, rags, and debris; or liquid PCBs between 50 to 500 ppm if covered by spill prevention, control, and countermeasure plan.	Temporary storage of PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(c), except § 761.65(c)(9)				Not an ARAR. PCBs are not chemicals of concern at these sites.
	All storage areas must be properly marked.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(c)(3)				Not an ARAR. PCBs are not chemicals of concern at these sites.
	No item of movable equipment used to handle PCBs that comes in contact with PCBs shall be moved from the storage area unless it has been decontaminated as specified in 40 CFR § 761.79.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(c)(4)				Not an ARAR. PCBs are not chemicals of concern at these sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
PCB storage on-site prior to disposal (continued)	All stored articles must be checked for leaks every 30 days.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(c)(7)				Not an ARAR. PCBs are not chemicals of concern at these sites.
	Containers must be dated when they are placed in storage.	PCB concentrations of 50 ppm or greater and PCB items with PCB concentrations of 50 ppm or greater.	40 CFR § 761.65(c)(8)				Not an ARAR. PCBs are not chemicals of concern at these sites.
Cleanup of PCB spills	Cleanup of PCBs to different levels depending upon spill location, potential exposure to residual PCBs after cleanup, concentrations originally spilled, and the nature and size of the population potentially exposed.	Spills of PCBs that occur after 04 May 1987 and result from release of materials containing PCBs at concentrations of 50 ppm or greater.	40 CFR § 761.120; 761.123; 761.125 except 125(a)(1), 125(b)(3), and record-keeping requirements in 125(c) such as 125(c)(1)(iii), 125(c)(5); 761.130; 761.135				Not an ARAR. PCBs are not chemicals of concern at these sites.
	Additional cleanup may be required to prevent unreasonable risk to human health and the environment.	Spills at sites warranting additional cleanup due to human-health risk, shallow groundwater, or other factors.	40 CFR § 761.120(b)				Not an ARAR. PCBs are not chemicals of concern at these sites.
	For low-concentration spills (less than 500 ppm PCBs), solid surfaces should be double-washed/rinsed and all soil within the spill area, plus a 1-foot buffer, should be excavated, and the ground restored to its original configuration by backfilling with clean soil (containing less than 1 ppm PCBs).	Low-concentration spill that involves less than 1 pound PCBs by weight.	40 CFR § 761.125(b)(1)				Not an ARAR. PCBs are not chemicals of concern at these sites.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Clean Air Act (42 U.S.C. §§ 7401–7671)*							
Discharge to air	Provisions of SIP approved by U.S. EPA under Section 110 of CAA.	Major sources of air pollutants.	40 U.S.C § 7410; portions of 40 CFR § 52.220	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.
	NAAQS – primary and secondary standards for ambient air quality to protect public health and welfare (including standards for particulate matter and lead).	Contamination of air affecting public health and welfare.	40 CFR § 50.4–50.12				Not an ARAR. Federal NAAQS are nonenforceable standards.
	Requires distribution of a public notice to each address within a 0.25-mile radius of the project for any significant project.	Definition of significant projects.	SCAQMD Rule 212	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.
	Analysis of impairment to visibility, soils, and vegetation using U.S. EPA methods required. Must provide analysis of ambient air quality if located in attainment or unclassifiable area and other information required for analysis.	Source requires authority to construct under Rule 10, and the daily emissions increase, calculated using Rule 20.1(c)(4), is at or greater than listed amounts for pollutants in designated attainment or unclassified area.	SDAPCD Rule 20.3(c) and (e)(1) and (2), excluding references to procedural or permit requirements	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.
	Must not exceed or contribute to an exceeded NAAQS.	New major source of organic compounds or any air contaminant.	SDAPCD Rule 20.4(a)(1), excluding references to procedural or permit requirements	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Discharge to air (continued)	Applicant must certify that all major stationary sources owned or operated by such person in the state are in compliance, carry out the SIP for applicable pollutant, make the new source comply with LAER, conduct air quality analysis in accordance with Rule 20.3, and show that these sources do not interfere with attainment of NAAQS.	Any source for which an NAAQS is exceeded.	SDAPCD Rule 20.4(b)(1), (2), (3), and (4), excluding references to procedural or permit requirements	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.
	Applicant must submit alternative site analysis to demonstrate that benefits outweigh environmental and social costs.	New stationary source may emit carbon gases, nitrogen oxides, or carbon monoxide.	SDAPCD Rule 20.4(b)(7)				Not an ARAR. Response actions do not involve new stationary source that may emit carbon gases, nitrogen oxides or carbon monoxide.
Discharge of any nonattainment air contaminant or any halogenated hydrocarbons	All new sources of air pollution that may result in a net emission increase of any nonattainment air contaminant or any halogenated hydrocarbons are to employ BACT.	Net emissions increase of any nonattainment air contaminant or any halogenated hydrocarbons.	SCAQMD Rule 1303	3,4,5,6			Potentially applicable ARAR for response actions involving soil excavation or on-site treatment.
Federal Hazardous Materials Transportation Law (49 U.S.C. §§ 5101–5127)*							
Transportation of hazardous material	No person shall represent that a container or package is safe unless it meets the requirements of 49 U.S.C. §§ 5101–5127.	Interstate carriers transporting hazardous waste and substances by motor vehicle. Transportation of hazardous material under contract with any department of the executive branch of the federal government.	49 CFR § 171.2(f)		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Transportation of hazardous material (continued)	No person shall unlawfully alter or deface labels, placards or descriptions, packages, containers, or motor vehicles used for transportation of hazardous materials.		49 CFR § 171.2(g)		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
Hazardous materials marking, labeling, and placarding	Each person who offers hazardous material for transportation or each carrier that transports it shall mark each package, container, and vehicle in the manner required.	Person who offers hazardous material for transportation; carries hazardous material; or packages, labels, or placards hazardous material.	49 CFR § 172.300		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	Each person offering nonbulk hazardous materials for transportation shall mark the proper shipping name and identification number (technical name) and consignee's name and address.		49 CFR § 172.301		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	Hazardous materials for transportation in bulk packages must be labeled with proper ID number, specified in 49 CFR § 172.101 table, with required size of print. Packages must remain marked until cleaned or refilled with material requiring other marking.		49 CFR § 172.302		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	No package marked with a proper shipping name or ID number may be offered for transport or transported unless the package contains the identified hazardous material or its residue.		49 CFR § 172.303		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Hazardous materials marking, labeling, and placarding (continued)	The markings must be durable, in English, in contrasting colors, unobscured, and away from other markings.		49 CFR § 172.304		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	Nonbulk combination packages containing liquid hazardous materials must be packed with closures upward, and marked with arrows pointing upward.		49 CFR § 172.312		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	Labeling of hazardous material packages shall be as specified in the list.		49 CFR § 172.400		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.
	Each bulk packaging or transport vehicle containing any quantity of hazardous material must be placarded on each side and each end with the type of placards listed in Tables 1 and 2 of 49 CFR § 172.504.	Each person who offers for transport or transports any hazardous materials shall comply with these placarding requirements.	49 CFR § 172.504		3,4,5,6		May be relevant and appropriate for transporting hazardous materials on-site.

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal , 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	RA	TBC	Comments
Solid waste disposal facility	A facility or practice shall not: contaminate an underground drinking water source beyond the solid waste boundary or a court- or state-established alternative; cause a discharge of pollutants into waters of the United States that is in violation of the substantive requirements of the NPDES under CWA Section 402, as amended; cause a discharge of dredged material or fill material to waters of the United States that is in violation of the substantive requirements of CWA Section 404; or cause nonpoint source pollution of waters of the United States that violates applicable legal substantive requirements implementing an areawide or statewide water quality management plan approved by the Administrator under CWA Section 208, as amended.	Solid waste disposal facility and practices except agricultural wastes, overburden resulting from mining operations, land application of domestic sewage, location and operations of septic tanks, solid or dissolved materials in irrigation return flows, industrial discharges that are point sources subject to permits under CWA, source special nuclear or by-product material as defined by the Atomic Energy Act, hazardous waste disposal facilities that are subject to regulation under RCRA subtitle C, disposal of solid waste by underground well injection, and municipal solid waste landfill units.	40 CFR § 257.3–257.4 and Appendix I				Not an ARAR. None of the proposed response actions involve on-site land disposal or using excavated soil as on-site replacement fill.

Note:
* statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of specific citations are considered potential ARARs

Table A-5
Potential Federal Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Acronyms/Abbreviations:

A – applicable
AQMD – Air Quality Management District
ARAR – applicable or relevant and appropriate requirement
BACT – best available control technology
BDAT – best demonstrated available technology
CAA – Clean Air Act
Cal. Code Regs. – *California Code of Regulations*
CAMU – corrective action management unit
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CFR – *Code of Federal Regulations*
CWA – Clean Water Act
DON – Department of the Navy
DOT – Department of Transportation
EE/CA – Engineering Evaluation/Cost Analysis
FS – feasibility study
IR – Installation Restoration (Program)
LAER – lowest achievable emission rate
LDR – land disposal restriction
MCAS – Marine Corps Air Station
MCL – maximum contaminant level
NAAQS – National Ambient Air Quality Standards (primary and secondary)
NPDES – National Pollutant Discharge Elimination System
OU – operable unit
PCB – polychlorinated biphenyl
POC – point of compliance
ppm – parts per million
ppm_w – parts per million by weight
RA – relevant and appropriate
RAO – remedial action objective
RCRA – Resource Conservation and Recovery Act
RI – remedial investigation
§ – section
SCAQMD – South Coast Air Quality Management District
SDAPCD – San Diego Air Pollution Control District
SDWA – Safe Drinking Water Act
SIP – State Implementation Plan
subpt. – subpart
TBC – to be considered
TCE – trichloroethene
tit. – title
TSCA – Toxic Substances Control Act
UIC – underground injection control
U.S.C. – *United States Code*
USDW – underground source of drinking water
U.S. EPA – United States Environmental Protection Agency
VOC – volatile organic compound

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination A	ARAR Determination RA	ARAR Determination TBC	Comments
State Water Resources Control Board and Regional Water Quality Control Board*							
Actions affecting water quality	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 water or groundwater that could affect water quality, including NPDES permits, and to take enforcement action to protect water quality.		Cal. Water Code, div. 7, §§ 13241, 13243, 13263(a), 13269, and 13360 (Porter-Cologne Water Quality Control Act); other provisions are not ARARs	2,3,4,5,6			Substantive provisions as implemented through the beneficial uses, water quality objectives, and waste discharge requirements of the Water Quality Control Plan for the San Diego basin are potentially applicable ARARs for soil sites. This includes substantive requirements contained in permits, but not the permits themselves.
	Describes the water basins in the San Diego, establishes beneficial uses of surface water and groundwater, establishes water quality objectives, including narrative and numerical standards, establishes implementation plans to meet water quality objectives and protect beneficial uses, and incorporates statewide water quality control plans and policies.		Comprehensive Water Quality Control Plan for the San Diego Basin. (Water Code § 13240)	2,3,4,5,6			Substantive provisions in of the San Diego Basin Plan are potential ARARs for setting soil cleanup levels that are protective of groundwater at Sites 1D, 1E-1, 1H, and 30.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Discharges to high-quality waters	Incorporated into all Regional Board Basin Plans. Requires that quality of waters of the state that is better than needed to protect all beneficial uses be maintained unless certain findings are made. Discharges to high quality waters must be treated using best practicable treatment or control necessary to prevent pollution or nuisance and to maintain the highest quality water. Requires cleanup to background water quality or to lowest concentrations technically and economically feasible to achieve. Beneficial uses must, at least, be protected.		SWRCB Res. 68-16 (Policy With Respect to Maintaining High Quality of Waters in California) (Cal. Water Code § 13140, CWA regulations 40 C.F.R. § 131.12)	2,3,4,5,6			Substantive provisions are a potential ARAR for new discharges.
Actions affecting water quality	Provides water quality criteria for classifying the beneficial use of groundwater as municipal/domestic. Criteria outlined as follows: total dissolved solids ≤ 3,000 mg/L or yielding 200 gallons per day or serving as a public water system.	Applies in determining beneficial uses for waters that may be affected by discharges of waste.	SWRCB Res. 88-63 ("Sources of Drinking Water Policy") (as contained in the Basin Plans)	2,3,4,5,6			Substantive provisions are a potential ARAR for determining potential drinking water sources.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Actions affecting water quality (continued)	Establishes policies and procedures for the oversight of investigations and cleanup and abatement activities resulting from discharges of waste which affect or threaten water quality. Requires cleanup of all waste discharged and restoration of affected water to background conditions. Requires actions for cleanup and abatement to conform to Res. 68-16 and applicable provisions of Cal. Code Regs. tit. 23, div. 3, ch. 15 as feasible.	Cleanup and discharge of groundwater to groundwater or surface water and establishment of containment zones.	SWRCB Res. 92-49 (Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Cal. Water Code § 13304) (Cal. Water Code § 13307) (02 October 1996)				Not an ARAR. No more stringent than Cal. Code Regs. tit. 22, § 66264.94, which was determined to be a federal ARAR.
Discharge to inland surface waters	Establishes concentration levels for volatile organic constituents and TPH for discharge to inland surface waters designated for municipal supply and complies with the Basin Plan and RWQCB Res. 68-16.		San Diego RWQCB Order No. 91-10				Not an ARAR. Regional requirement; not part of state plan. May be TBC for complying with other ARARs in San Diego region.
Closure of waste management unit	Prior to closure, inactive waste management units must comply with the substantive requirements for eliminating most nonstormwater discharges, developing and implementing a stormwater pollution prevention plan, and performing monitoring of stormwater discharges.		SWRCB Order No. 91-13-DWQ, as amended by Order No. 92-12-DWQ (General Industrial Storm Water Permit)				Not a potential ARAR; permits are not required under CERCLA. However, substantive requirements may be considered TBC guidance for complying with ARARs (such as BPT/BAT and WQOs) and beneficial uses.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Closure of waste management unit (continued)	Waste management units that are going through final closure, with 5 acres of disturbance or more, must comply with the substantive requirements for eliminating most nonstormwater discharges, developing and implementing a stormwater pollution prevention plan, and performing monitoring to stormwater discharges.		SWRCB Order No. 92-08-DWQ (General Construction Activity Storm Water Permit)				Not a potential ARAR; permits are not required under CERCLA. However, substantive requirements may be considered TBC guidance for complying with ARARs (such as BPT/BAT and WQOs) and beneficial uses.
Waste piles	Resolution conditionally waiving adoption of waste discharge requirements for temporary discharge of contaminated soils to waste piles. Provision for 90-day waiver for stockpiling of nonhazardous soil.	Nonhazardous waste stockpiling.	San Diego RWQCB Res. 95-96				Not an ARAR. Regional requirement; not part of state plan. May be TBC for complying with other ARARs in San Diego region.
Landfill closure	Establishes general waste discharge requirements for postclosure maintenance of inactive nonhazardous waste landfills within the San Diego Region.	Nonhazardous waste landfills within the San Diego Region.	San Diego RWQCB Order No. 97-11 (general waste discharge requirements for inactive landfills)				Not an ARAR. Regional requirement; not part of state plan. May be TBC for complying with other ARARs in San Diego region.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Discharge to surface waters	Establishes numerical water quality objectives for the protection of human health and freshwater aquatic life for a large number of toxic pollutants. It also establishes narrative objectives and toxicity objectives. It provides a program of implementation and specifies proposals to adopt numerical standards for water bodies that are dominated by reclaimed water and agricultural drainage.	Discharge to surface waters, enclosed bays, and estuaries.	Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California. (Phase I of the Inland Surface Waters Plan and the Enclosed Bays and Estuaries Plan)				Not an ARAR for soil sites. No discharges to surface waters are proposed as part of remedial alternatives for soil sites.
	Establishes prohibitions on discharges to cold interstate waters and maximum temperature changes to other waters to protect natural receiving water temperatures; includes site-specific temperature objectives for certain water bodies.	Discharge to surface waters, enclosed bays, and estuaries.	Cal. Water Code §§ 13140, 13142.5 (Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California)				Not an ARAR for soil sites. No discharges to surface waters are proposed as part of remedial alternatives for soil sites.
Discharge to drinking water source	Prohibits discharge of known human carcinogens or reproductive toxins to source of drinking water or on land where it could pass into a source of drinking water. Chemicals and applicable regulatory levels are listed in Cal. Code Regs. tit. 22, § 12000–14000	Discharge of known human carcinogens or reproductive toxins	Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop. 65), Cal. Health & Safety Code, div. 20, § 25249.5–.13				Not an ARAR for soil sites. No discharges to drinking water source are proposed as part of remedial alternatives for soil sites.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Safe Drinking Water and Toxic Enforcement Act of 1986 (Prop. 65)*							
California Environmental Quality Act*							
Actions by state	Requires analysis of environmental impacts of response actions, comparison of alternative actions, and implementation of appropriate mitigation measures. No hazardous substances may remain on-site unless further mitigation is not feasible.	State actions	CEQA, California Pub. Res. Code §§ 21100–21178, 15000, and 15002				Not an ARAR. Requirements of CEQA are applicable to state actions and not those of the federal government. The CERCLA process fulfills these requirements.
California Underground Storage Tank Program*							
Corrective action for underground tanks	Regulates permitting and testing of underground tanks and specifies requirements for corrective action of discharges from tanks.	Underground tank	Cal. Code Regs. tit. 23, div. 3, ch. 16 (underground tank regulations)				Not an ARAR. No UST sources of CERCLA hazardous substances, or contaminants or pollutants are associated with the site.
Corrective action for aboveground tanks	Regulates use and discharges from aboveground petroleum tanks, including testing and corrective action requirements.	Aboveground petroleum tank	Cal. Health & Safety Code, div. 20, ch. 6.6.7, § 25270–25270.13 (Aboveground Petroleum Storage Act)				Not an ARAR. No actions related to aboveground storage tanks are planned as part of this action.
Action at solid waste disposal site	Authorizes the RWQCB to implement the SWAT program with respect to water quality. The purpose of the SWAT program is to identify solid waste disposal sites that may be leaking hazardous wastes and threatening water quality.	Solid waste disposal site	Cal. Water Code § 13273 (SWAT program)				Substantive provisions may be potential ARARs. CERCLA RI/FS process complies with these requirements.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Toxic Pits Cleanup Act*							
Action at surface impoundment	Authorizes the RWQCB to regulate surface impoundments containing hazardous waste, as defined in Cal. Code Regs. tit. 22. Prohibits discharges to such surface impoundments unless they meet specified siting and design requirements. Requires compliance with specific investigation, remediation, and reporting requirements.	Surface impoundment	Cal. Health & Safety Code § 25208 (Toxic Pits Cleanup Act)				Not an ARAR. Remedial actions will not involve discharges to or cleanup of surface impoundment.
State Water Resources Control Board*							
Landfill capping	Alternatives to construction or prescriptive standards.	Cal. Code Regs. tit. 27 requirements are only applicable for waste discharged after 18 July 1997 unless otherwise noted.	Cal. Code Regs. tit. 27, §§ 20080 (b) and (c) and 21090	3			Potentially applicable to Site 1H. Substantive requirements pertaining to criteria for justifying alternative means of meeting prescriptive standards are relevant and appropriate. The selected alternative meets the requirements as an engineered alternative to the prescriptive standard because the selected alternative is as effective as the prescriptive cap in reducing infiltration into the landfill materials.
	General construction criteria and general criteria for containment structures.	Waste discharged after 18 July 1997.	Cal. Code Regs. tit. 27, §§ 20310 and 20320		3		Substantive requirements pertaining to general criteria for cap construction are relevant and appropriate for Site 1H.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Monitoring	Persons responsible for discharges at units that were closed, abandoned, or inactive on or before 27 November 1984 may be required to develop and implement a monitoring program in accordance with subdiv. 1, subch. 3, art. 1, (Cal. Code Regs. tit 27, §§ 20380–20435).	Closed, inactive, or abandoned waste management unit before 27 November 1984.	Cal. Code Regs. tit. 27, § 20080(g)	2,3			Potentially applicable to establishment of a detection groundwater monitoring program at soil sites.
Disposal of waste	Requires that designated waste as defined at Cal. Water Code § 13173 be discharged to Class I or Class II waste management units.	Discharges of designated waste after 18 July 1997 (nonhazardous waste that could cause degradation of surface or ground waters) to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20210	4,5,6			Potentially applicable for waste that meets the definition of "designated waste." Waste characterization is necessary for ARAR determination.
	Requires that nonhazardous solid waste as defined at § 20220(a) be discharged to a classified waste management unit.	Discharge of nonhazardous solid waste after 18 July 1997 to land for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20220(b), (c), and (d)	4,5,6			Potentially applicable for waste that meets the definition of "nonhazardous waste." Waste characterization is necessary for ARAR determination.
	Inert waste as defined at § 20230(a) need not be discharged at a classified unit.	Applies to discharges of inert waste to land after 18 July 1997 for treatment, storage, or disposal.	Cal. Code Regs. tit. 27, § 20230(b)	4,5,6			Potentially applicable for waste that meets the definition of "inert waste." If the waste is inert, it may be disposed more easily or used as fill because it does not need to be discharged to a classified unit.
Closure of a waste management unit	General closure and postclosure maintenance standards	Waste discharged after 18 July 1997.	Cal. Code Regs. tit. 27, § 20950(a), (d), and (e)		2,3		Substantive requirements may be potential relevant and appropriate ARARs for closure and postclosure maintenance of soil sites.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Landfill closure	Classified waste management units shall be closed in accordance with an approved closure and postclosure maintenance plan, which provides for continued compliance with the applicable standards for waste containment and precipitation and drainage controls and monitoring requirements.	Waste discharged after 18 July 1997.	Cal. Code Regs. tit. 27, § 21769	2,3			Substantive requirements may be potential ARARs for postclosure maintenance of soil sites. Preparation of closure and postclosure maintenance plans are procedural requirements. However, the design documents for the remedial response will document how the substantive requirements will be met.
Monitoring	Requires detection monitoring. Once a significant release has occurred, evaluation or corrective action monitoring is required.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20385(a)(1) and (a)(2)		2,3		Substantive detection monitoring requirements may be potential appropriate ARARs for closure and postclosure maintenance of soil sites. Evaluation monitoring not an ARAR because there is no measurable evidence of a groundwater release from the soil sites. Not an ARAR if equivalent federal requirements at Cal. Code Regs. tit. 22, § 66264.91 are determined to be ARARs.
Groundwater cleanup	Requires identification of the point of compliance, hydraulically downgradient from the area where waste was discharged to land.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20405				Not an ARAR. Groundwater is not a medium of concern for these sites.
Monitoring	Requires monitoring for compliance with remedial action objectives for 3 years from the date of achieving cleanup levels.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20410				Not an ARAR. Groundwater is not a medium of concern for these sites.
	Requires general soil, surface water, and groundwater monitoring.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20415				Not an ARAR. Potentially applicable Federal requirements at Cal. Code Regs. tit. 22, § 66264.97 are more stringent.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Groundwater monitoring	Provides minimum requirements for a groundwater detection monitoring program.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20420				Not an ARAR. Potentially applicable Federal requirements at Cal. Code Regs. tit. 22, § 66264.98 are more stringent.
	Requires evaluation monitoring once a significant release is detected.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20425				Not an ARAR. Potentially applicable Federal requirements at Cal. Code Regs. tit. 22, § 66264.98 are more stringent.
Corrective action	Requires implementation of corrective action measures that ensure that cleanup levels are achieved throughout the zone affected by the release by removing the waste constituents or treating them in place. Source control may be required. Also requires monitoring to determine the effectiveness of the corrective actions.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20430 except § 20430(g)(2)		2,3,4,5,6		Relevant and appropriate in the event that detection and evaluation monitoring shows evidence that a new release has occurred.
	Requires demonstration of completion of the corrective action to include eight evenly distributed sampling events throughout the year.	Discharge of waste to land after 18 July 1997.	Cal. Code Regs. tit. 27, § 20430(g)(2)				Potential ARAR for corrective action completion demonstration. More stringent than federal requirements at Cal. Code Regs. tit. 22, § 66264.100(g).

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Clean closure	When the discharger has successfully completed clean closure, the landfill shall no longer be subject to the SWRCB-promulgated requirements of this title; otherwise, the discharger shall close the landfill and carry out postclosure maintenance as though the discharger had not attempted clean closure. For the purpose of this paragraph, the discharger shall have successfully clean-closed a landfill only if all waste materials, contaminated components of the containment system, and affected geologic materials—including soils and rock beneath and surrounding the unit and groundwater polluted by a release from the unit—are either removed and discharged to an appropriate unit or treated to the extent that they no longer pose a threat to water quality; and all remaining containment features are inspected for contamination and, if contaminated, discharged in accordance with para. (f)(1).		Cal. Code Regs. tit. 27, § 21090(f)	4,5,6			Potentially applicable ARAR for response actions that propose clean closure.
Monitoring	Detection monitoring program may be required at CAI sites before the effective date of these requirements.	CAI site before 27 November 1984.	Cal. Code Regs. tit. 23, § 2510(g)		2,3		Potentially relevant and appropriate if more stringent than federal ARARs. May limit the requirements to monitoring for CAI sites.
Detection monitoring	Detection monitoring program.	Cal. Code Regs. tit. 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs. tit. 23, § 2550.8				Not an ARAR because is essentially the same (not more stringent) as federal requirements at Cal. Code Regs. tit. 22, § 66264.98.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Evaluation monitoring	Evaluation monitoring program.	Cal. Code Regs. tit. 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs. tit. 23, § 2550.9				Not an ARAR because is essentially the same (not more stringent) as federal requirements at Cal. Code Regs. tit. 22, § 66264.99.
Monitoring	Corrective action monitoring.	Cal. Code Regs. tit. 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs. tit. 23, § 2550.10				Not an ARAR because is essentially the same (not more stringent) as federal requirements at Cal. Code Regs. tit. 22, § 66264.100.
Groundwater cleanup	Point of compliance.	Cal. Code Regs. tit. 23 requirements are only applicable to waste discharges to land after 27 November 1984.	Cal. Code Regs. tit. 23, § 2550.5				Not an ARAR. Groundwater is not a medium of concern for soil sites.
Cal-EPA Department of Toxic Substances Control*							
CAMU	Media impacted by RCRA hazardous waste must be considered for corrective action regardless of the date of original impact.	Consolidated hazardous waste.	Cal. Code Regs. tit. 22, § 66264.101(a)				Not an ARAR. Remedial actions will not involve creation of a CAMU.
	Corrective action, where appropriate, must be performed not only at the facility, but also beyond the facility boundary.	Consolidated hazardous waste.	Cal. Code Regs. tit. 22, § 66264.101(c)				Not an ARAR. Remedial actions will not involve creation of a CAMU.
Disposal of non-RCRA waste	Land disposal restrictions for non-RCRA, California-regulated hazardous waste.	Non-RCRA, California-regulated hazardous waste disposal.	Cal. Code Regs. tit. 22, § 66268.105		4,5,6		May be potential ARARs for disposal if more stringent than federal ARARs.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
California Civil Code*							
Land-use controls	Provides conditions under which land-use restrictions will apply to successive owners of land.	Transfer property from the DON to a nonfederal agency.	Cal. Civ. Code § 1471	2,3			Potential ARAR where the DON is transferring property to a nonfederal agency. Substantive provisions are the following general narrative standard: "to do or refrain from doing some act on his or her own land . . . where (c) Each such act relates to the use of land and each such act is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence of hazardous materials, as defined in Section 25260 of the California Health and Safety Code." This narrative standard would be implemented through incorporation of restrictive covenants in the deed at the time of transfer.
California Health and Safety Code*							
	Allows DTSC to enter into an agreement with the owner of a hazardous waste facility to restrict present and future land uses.	Transfer property from the DON to a nonfederal agency.	Cal. Health & Safety Code § 25202.5	2,3			Potential ARAR where the DON is transferring property to a nonfederal agency. Substantive provisions are the general narrative standards to restrict "present and future uses of all or part of the land on which the … facility … is located . . ."

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Land-use controls (continued)	Provides a streamlined process to be used to enter into an agreement to restrict specific use of property in order to implement the substantive use restrictions of Cal. Health & Safety Code § 25232(b)(1)(A)–(E).	Transfer property from the DON to a nonfederal agency.	Cal. Health & Safety Code § 25222.1	2,3			Potential ARAR where the DON is transferring property to a nonfederal agency. Cal. Health & Safety Code § 25222.1 provides the authority for the state to enter into voluntary agreements to establish land-use covenants with the owner of the property. Substantive provision is the general narrative standard: "restricting specified uses of the property."
	Prohibits certain uses of land containing hazardous waste without a specific variance.	Hazardous waste property.	Cal. Health & Safety Code § 25232(b)(1)(A)–(E)	2,3			Potential ARAR for sites containing hazardous waste. Land-use restrictions will be used to prohibit the following activities at soil sites containing hazardous waste: residential use of the sites, construction of hospitals for humans, schools for persons under 21 years of age, day care centers for children, or any permanently occupied human habitation on the sites.
	Provides a process for obtaining a written variance from a land-use restriction.	Transfer property from the DON to a nonfederal agency.	Cal. Health & Safety Code § 25233(c)	2,3			Potential ARAR for institutional controls where the DON is transferring property to a nonfederal agency. Cal. Health & Safety Code § 25233(c) sets forth substantive criteria for granting variances from the uses prohibited in subpara. 25232(b)(1) (A)–(E) based on specified environmental and health criteria.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emissions	No person shall discharge from any source whatsoever such quantities of air contaminants or other material that causes injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or that endangers the comfort, repose, health, or safety of any such persons or the public, or that causes, or has a natural tendency to cause, injury or damage to business or property.	Air emissions.	Cal. Health & Safety Code § 41700				Not an ARAR. See Section _____for the DON's position on similar regulations of nuisance air emissions.
	No person shall discharge into the atmosphere from any source whatsoever any air contaminant, other than uncombined water vapor, for a period or periods aggregating more than 3 minutes in any 1 hour that is as dark or darker in shade as that designated as No. 2 on the Ringelmann Chart, as published by the United States Bureau of Mines, or of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke.	Air emissions.	Cal. Health & Safety Code § 41701	4,5,6			Potential ARAR for response actions involving soil excavation or on-site treatment. Normally implemented through local air district regulations, for example, San Diego APCD Rule 20.1(c)(4).
Waste disposal	Wastes that contain total lead in excess of 350 ppm, copper in excess of 2,500 ppm, or nickel in excess of 200 ppm must be disposed in a Class I landfill.	Waste containing total lead, copper, or nickel in excess of specified levels.	Cal. Health & Safety Code § 25157.8	5,6			Potentially applicable for disposal of excavated contaminated soil from remedial actions. May be more restrictive than federal ARARs. Further evaluation is necessary for wastes that meet the criteria.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
California Fish and Game Code*							
Actions involving wildlife	Designation of the Department of Fish and Game as trustee for State Fish and Wildlife Resources.		Cal. Fish & Game Code § 711.7				Not an ARAR. Not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
Taking of plants or animals	Permits to take or possess plant or animal life for scientific, educational, or propagation purposes.		Cal. Fish & Game Code §§ 1000, 1001, and 1002				Not an ARAR. Not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
Species conservation and enhancement	Conservation objectives and policy.		Cal. Fish & Game Code §§ 1600, 1700, 1750, 1801, and 2014; Cal. Water Code § 1243				Not an ARAR. Not a "cleanup standard, standard of control," or "other substantive requirement, criteria, or limitation."
Actions affecting wildlife resource	Requires streambed alterations to not substantially adversely affect an existing fish or wildlife resource.	Waters of the state.	Cal. Fish & Game Code §§ 1601 and 1603				Not an ARAR. Not pertinent for proposed alternatives for soil sites.
Actions impacting endangered species	Projects within the state shall not jeopardize the existence of any endangered or threatened species or result in the destruction or adverse modification of habitat essential to the continued existence of those species, if there are reasonable and prudent alternatives available consistent with preserving the species or its habitat that would prevent jeopardy.	Endangered or threatened species.	Cal. Fish & Game Code §§ 1900, 1908, 2053, and 2080	2,3,4,5,6			Listed threatened species have been observed at Sites 1D, 1E-1, and 30. Substantive provisions are potential ARARs for response actions at or near threatened or endangered species habitats.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Actions impacting birds or mammals	Prohibits the taking of birds and mammals, including the taking by poison.	Birds and mammals.	Cal. Fish & Game Code § 3005(a)	2,3,4,5,6			Migratory birds have been observed in the vicinity of Sites 1D, 1H, and 30. Procedural aspects are not ARARs; certain substantive provisions pertaining to take of birds or mammals with a poisonous substance are applicable. The selected remedy will prevent "take" of birds and mammals by removing contaminated soils, or by containing them and severing the exposure pathways.
Discharge to waters of the state	Prohibits the passage of enumerated substances or materials into waters of the state deleterious to fish, plant life, or birds.		Cal. Fish & Game Code §§ 5650(a) and (f); 5651	2,3			Substantive provisions may be ARARs for response actions where the potential exists for contaminants to pass into water.
San Diego Air Pollution Control District (APCD)*							
Air emission	Visible emissions standard that states a person shall not discharge any air contaminant into the atmosphere from any single source of emission for a period or periods aggregating more than 3 minutes in a 60-minute period, which is (a) as dark or darker in shade as that designated No. 1 on the Ringelmann Chart, or (b) of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in (a).		APCD Rule 50(d)(1).	3,4,5,6			Grading and excavation activities proposed for soil sites have the potential to produce visible emissions due to fugitive dust. Substantive requirements pertaining to visible emissions, such as wetting the soil or waste, may be required to minimize fugitive dust.
	Requires person excavating a landfill to identify mitigation measures to ensure that a public nuisance condition does not occur.		SCAQMD Rule 1150	4,5,6			Substantive provisions are relevant and appropriate for on-site consolidation that exposes buried waste to the atmosphere.

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Alternatives as listed under ARAR Determination column: 1 – No action, 2 – Institutional Controls, 3 – Capping, 4 – Soil Excavation, On-Site Stabilization/ Solidification, and Reuse as Road Base, 5 – Soil Excavation and Off-Site Disposal, 6 – Soil Excavation and On-Base Disposal (CAMU).

Action	Requirement	Prerequisites	Citation	ARAR Determination			Comments
				A	RA	TBC	
Air emission (continued)	Shall not cause or allow the emissions of fugitive dust such that the presence of such dust remains visible in the atmosphere beyond the property line of the emission source and shall not cause or allow PM_{10} levels to exceed 50 micrograms per cubic meter when determined, by simultaneous sampling, as the difference between upwind and downwind samples.		SCAQMD Rule 403	3,4,5,6			Fugitive dust can be generated from any grading and earth-moving activities including placement of various cover layers and consolidation of wastes. Substantive requirements pertaining to fugitive dust emission control will be applicable.

Note:
* statutes and policies, and their citations, are provided as headings to identify general categories of potential 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 potential ARARs; specific potential ARARs are addressed in the table below each general heading; only substantive requirements of the specific actions are considered potential ARARs.

Acronyms/Abbreviations:
A – applicable
APCD – Air Pollution Control District
AQMD – Air Quality Management District
ARAR – applicable or relevant and appropriate requirement
BACT – best available control technology
BAT – best available technology
BPT – best practicable treatment
CAI – closed, abandoned, or inactive
Cal. Code Regs. – *California Code of Regulations*
Cal-EPA – California Environmental Protection Agency
Cal. Water Code – California Water Code
CAMU – correction action management unit
CEQA – California Environmental Quality Act
CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R. – *Code of Federal Regulations*
CWA – Clean Water Act
DON – Department of the Navy
DTSC – (Cal-EPA) Department of Toxic Substances Control

Table A-6
Potential State Action-Specific ARARs – Soil
OU 4 Soil Sites: 1D, 1E-1, 1H and 30

Acronyms/Abbreviations (continued)

EE/CA – engineering evaluation/cost analysis
FAWQC – Federal Ambient Water Quality Control
FS – feasibility study
LDR – land disposal restriction
mg/L – micrograms per liter
NPDES – National Pollutant Discharge Elimination System
PM_{10} – particulate matter, less than 10 micrometers in diameter
ppm – parts per million
Prop. – proposition
RA – relevant and appropriate
RAO – removal action objective
RCRA – Resource and Recovery Act
Res. – resolution
RI – remedial investigation
RWQCB – Regional Water Quality Control Board (San Diego)
§ – section
SCAQMD – South Coast Air Quality Management District
SIP – State Implementation Plan
SWAT – Solid Waste Assessment Test
SWRCB – (California) State Water Resources Control Board
T-BACT – best available control technology for toxics
TBC – to be considered
tit. – title
TPH – total petroleum hydrocarbons
U.S.C. – *United States Code*
UST – underground storage tank
VOC – volatile organic compound
WQO – water quality objective

APPENDIX B
BIOLOGICAL SURVEY REPORT

VARANUS BIOLOGICAL SERVICES, INC.

August 28, 2001

Steve Griswold
Parsons Infrastructure & Technology Group
100 W. Walnut Street
Pasadena, CA 91124

Subject: Biological survey results for Sites 30, 1D, 1E-1 and 1H on Marine Corps Base Camp Pendleton, San Diego County, California

Dear Steve,

At the request of Parsons Infrastructure & Technology Group (Parsons), Wildlife Biologists Kylie Fischer, Ingri Quon and William Haas of Varanus Biological Services, Inc. (Varanus) conducted surveys at Marine Corps Base Camp Pendleton (Base), Oceanside, San Diego County, California. The focus of our surveys was to determine 1) if any California gnatcatchers have active nests within the drilling footprints at Sites 30, 1D, 1E-1, and 1H, 2) determine if the habitat is appropriate for the clapper rail and assess the likelihood of breeding pairs within the drilling footprint at Site 30, and 3) assess the potential for pacific pocket mouse within the drilling footprints at Sites 30, 1D, and 1E-1.

Kylie Fischer and Ingri Quon conducted surveys for the California gnatcatcher (*Polioptila californica*) at Sites 30, 1D, 1E-1 and 1H on 1 August 2001. Kylie Fischer conducted gnatcatcher surveys at Sites 30, 1D, 1E-1 on 6 August. Kylie and Varanus Principal Biologist William Haas visited Sites 30, 1D, 1E-1 on 9 August 2001. On 9 August William Haas also conducted a habitat assessment for the potential occurrence of light-footed clapper rail (*Rallus longirostris levipes*) at Site 30 and pacific pocket mouse (*Perognathus longimembris pacificus*) at Sites 30, 1D, and 1E-1.

Site Descriptions:

Site 30

Site 30 is approximately 1,300 feet west of the intersection of Stuart Mesa Road and MACS Road in the Santa Margarita River Basin. Habitat types include diegan coastal sage scrub, coastal freshwater marsh, and coastal brackish marsh. California sagebrush (*Artemisia californica*),

• ENDANGERED SPECIES RESEARCH • BIOLOGICAL ASSESSMENT •
• CONSTRUCTION MONITORING •
7920 SILVERTON AVE., SUITE D • SAN DIEGO, CA 92126
PH: 858-536-8762 FAX: 858-536-8781 E-MAIL: thevaranids@earthlink.net

coyote brush (*Baccharis pillularis*), cholla (*Opuntia prolifera*) and coastal prickly-pear (*Opuntia littoralis*) dominate the diegan coastal sage scrub. The coastal freshwater marsh is dominated by catttails (*Typha sp*) and bulrush (*Scirpus sp*) and is confined to the western portion of the drilling footprint. The coastal brackish marsh is dominated by willow species (*Salix sp.*), mulefat (*Baccharis salicifolia*), tree tobacco (*Nicotiana glauca*) and pickleweed (*Salicornia sp.*)

Site 1D

Site 1D is located north of the intersection of Stuart Mesa Road and Vandegrift Boulevard within the floodplain of the Santa Margarita River. Most of the habitat has been cleared within the drilling footprint and is considered disturbed. Diegan coastal sage scrub and southern willow scrub are present around the border of the drilling footprint. Plant species present within the diegan coastal sage scrub include California sagebrush, coyote brush, black sage (*Salvia mellifera*) and California buckwheat (*Eriogonum fasciculatum*). Willows and mulefat dominate the southern willow scrub.

Site 1E-1

Site 1E-1 is located along the northern side of MACS Road. The drilling footprint has previously been cleared of vegetation. The habitats surrounding the area consist of non-native grassland, coyote brush scrub and diegan coastal sage scrub dominated by California sagebrush and herbaceous species typical of recovering post-disturbance sage scrub.

Site 1H

Site 1H is located near the northwestern corner of the Base, north of San Mateo Road. Habitat types include coyote brush scrub and disturbed habitat. A dense stand of coyote brush scrub is located in the middle of the drilling footprint with disturbed habitat surrounding it.

Results of the Biological Surveys

We recorded survey conditions (Table 1) and documented all vertebrate species incidentally observed (Tables 2, 3, 4, 5) at each of the study sites. At Site 30, we recorded 1 reptile species, 37 bird species and 4 mammal species (Table 2). At Site 1D, we recorded 10 bird species and 1

mammal species (Table 3). At Site 1E-1, we recorded 1 reptile species, 13 bird species and 1 mammal species (Table 4). At Site 1H, we recorded 7 bird species (Table 5).

An important distinction regarding breeding status of birds is as follows: A fledgling is a hatch year bird that is still dependent on the adults for food, a juvenile is a hatch year bird that can forage and survive independent of the adults. Juveniles may still forage with the adults

Site 30 (Figure 1)

California Gnatcatcher

Within the drilling footprint, there resides at least one pair of California gnatcatchers. On 9 August, Ms. Fischer and Mr. Haas found an adult female with an (independent) juvenile In addition, Ms. Fischer saw at least four juveniles on 6 August. Observed behaviors indicated that some of the juveniles were offspring of the pair although the adult female was not seen feeding any of the juveniles. No other breeding activity or active nests were found at the site.

Clapper Rail

The freshwater marsh adjacent to and within the sampling area is definitely suitable and probably occupied clapper rail habitat. We did not hear or see any clapper rails, however we did not conduct tape-playback surveys and our visit was conducted well beyond the period when this species is most vocal (although they vocalize spontaneously to varying degrees throughout the year). We did not conduct nest searches, however it is our understanding that your sampling will not occur within the marsh vegetation or, at most, along the edge of the marsh. If there is a need to sample within the potential clapper rail habitat (and from our discussions we are sure that the sampling would be done by hand without entry by a motorized vehicle), we suggest the following:

1. The marsh portion of the site be addressed at the end of the Site 30 sampling period (to maximally exceed the normal breeding period), and
2. Have the sampling be done with the escort of an avian biologist knowledgeable of the biology and habits of the clapper rail.

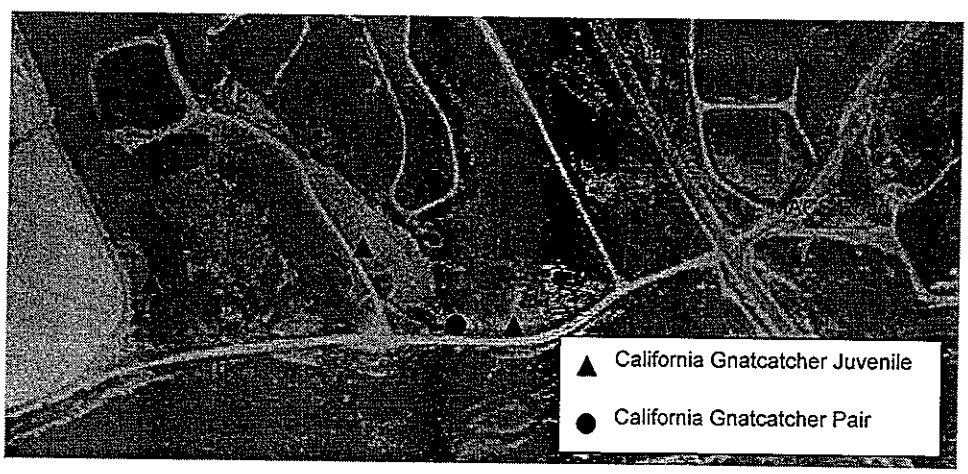
Pacific Pocket Mouse

Site 30 has probably hosted pacific pocket mouse historically however we did not detect any active burrows or current signs within the site vicinity. Interestingly there was a tremendous amount of evidence of other small mammal activity (probably deer mice (*Peromyscus* sp.) and/or harvest mice (*Reithrodontomys megalotis*)).

Least Bell's Vireo

Varanus did not perform this fieldwork. According to the biologist who did perform the work (Mike McEntee of Griffith Wildlife Biology), two juvenile least Bell's vireos (*Vireo bellii pusillus*) were seen foraging at the southern edge of the site. He assumed that the pair was probably across the river and not within the drilling footprint. No adult least Bell's vireos were found at Site 30.

Figure 1
Species Locations at Site 30



Additional Sensitive Species

At Site 30, two additional listed or sensitive species were seen. One California least tern, a federal and state-listed endangered species, was seen circling in the river on 9 August. One white-tailed kite (*Elanus leucurus*), a state-listed fully protected species, was seen foraging at the site on 1 August.

Site 1D (Figure 2)

California Gnatcatcher

One pair of California gnatcatchers resides at Site 1D. The pair was seen actively feeding four fledglings on 6 August. The adults would forage in the plants that are growing in the disturbed area while the fledglings stayed in the Diegan coastal sage scrub at the western edge of the site. The fledglings appeared to be at least 24 days old (ten days removed from the nest) when seen on 6 August.

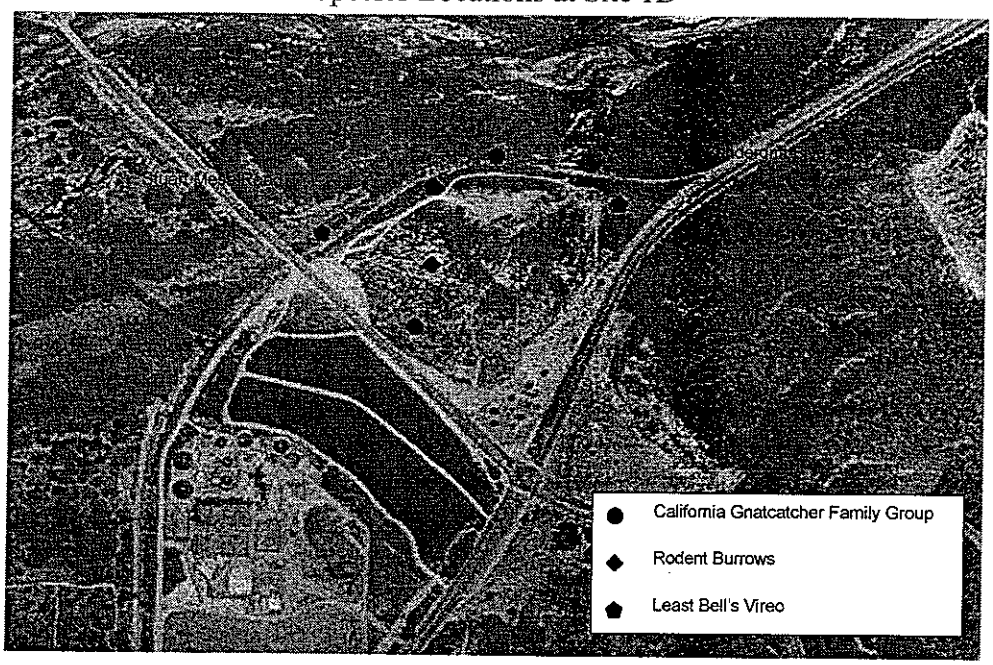
Pacific Pocket Mouse

There is relatively high potential for pacific pocket mouse to occur at Site 1D. We found numerous burrows in the NW corner of the site in suitable pacific pocket mouse habitat. However by visual inspection we could not determine if they were recent or occupied, or the identity of the species responsible for their construction. We strongly recommend that prior to initiation of work that a protocol pacific pocket mouse trapping regime be conducted and that the trapping be concentrated in the northwest corner of the site where sandy berms have been left from previous vegetation clearance activity. These berms give evidence of small mammal activity and although there was no specific evidence of pacific pocket mouse, the habitat and distance from known occupied pacific pocket mouse areas, warrant extreme caution at this site. Sampling in the indicated area should be adequate to determine the overall potential for pacific pocket mouse to occur at (the relatively large) Site 1D. During the time traps are deployed, however, the consulting biologist should conduct a thorough examination of the remainder of the site.

Least Bell's Vireo

Varanus did not perform this fieldwork. There were four singing male least Bell's vireos around the perimeter of the drilling footprint. Three of the males were heard deep in the vegetation. The fourth male was found at the edge of the vegetation along the old access road at the northern boundary of the drilling footprint. According to Mike McEntee, no breeding activity or active nests were found.

Figure 2
Species Locations at Site 1D



Additional Sensitive Species

At Site 1D, one state-listed species of special concern was heard on 6 August, the yellow warbler (*Dendroica petechia*).

Site 1E-1 (Figure 3)

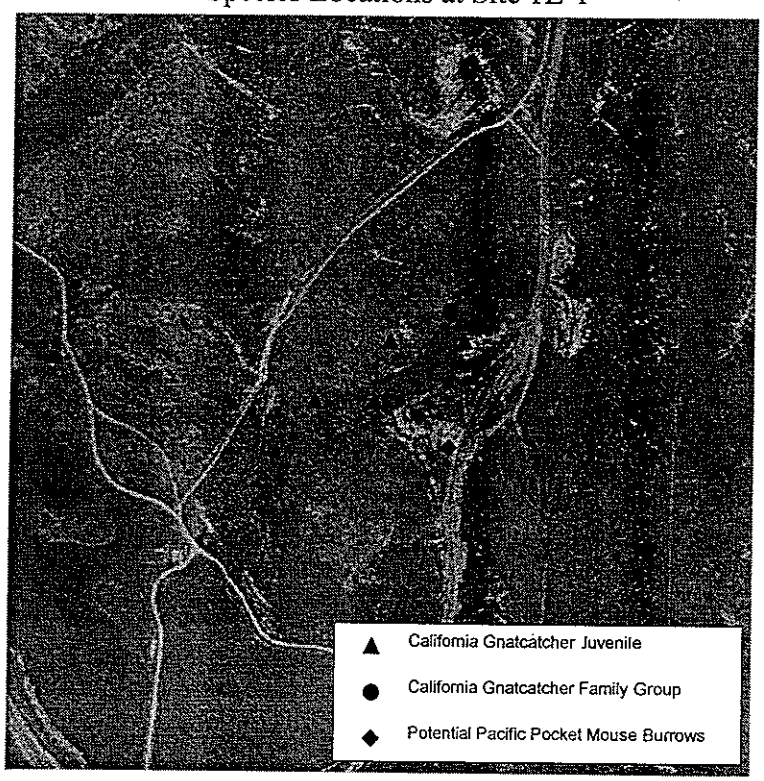
California Gnatcatcher

Within the larger area called 1E, Ms. Fischer found one pair of California gnatcatchers feeding three fledglings (family group) and from three to five juveniles. The juveniles were old enough to have been from an earlier clutch from the aforementioned family group or possibly dispersing juveniles from one or more nearby adult pairs. Only one of these birds was seen in the area specifically referred to as 1E-1 and this was one of the dispersing or independent juveniles. The family group stayed in the vegetation to the north of 1E-1. The fledglings appeared to be approximately 21 days old (out of the nest approximately seven days) when found on August 6. Ms. Fischer determined the age from a combination of tail length, "freshness" of plumage, and overall activity level (they were more sedentary than older juveniles were).

Pacific Pocket Mouse

Site 1E-1 is surrounded by known occupied pacific pocket mouse habitat. We found at least one recently active burrow and associated fecal pellets that have a strong potential to have been made by pacific pocket mouse individual(s). We did not conduct a trapping program and therefore could not determine the identity of the animal that excavated/used these burrows, or whether the burrows were still occupied. We found additional burrows along the edge of MACS Road and along the access road that lies along the western edge of the site. However the level of occupation or identity of inhabitants could not be identified simply by visual inspection.

Figure 3
Species Locations at Site 1E-1



Additional Sensitive Species

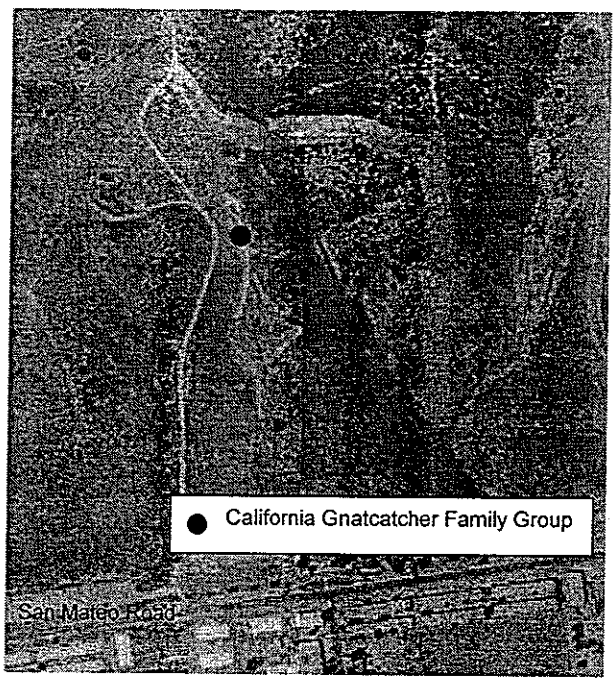
No additional sensitive species were detected during the surveys of 1E-1.

Site 1H (Figure 4)

California Gnatcatcher

Site 1H supports one pair of California gnatcatchers with at least two fledglings. The fledglings appeared to be at least 21-24 days old (seven to ten days out of the nest) when seen on 1 August. They were still actively begging for food from the adults directly in the drilling footprint.

Figure 4
Species Locations at Site 1H



Additional Sensitive Species

One ashy rufous-crowned sparrow (*Aimophila ruficeps canescens*), a state-listed species of special concern, was heard calling in the area on 1 August.

Recommendations and Conclusions:

We recommend that the sites be sampled in the following manner and order.

Under current biological conditions, we believe that Site 30 is ready to be surveyed and sampled. No additional work is required from Varanus at this site. We recommend the presence of a monitor if sampling will occur within the freshwater marsh north of the dirt access road.

Site 1E-1 can be sampled as long as the area is accessed from the north and east through the disturbed portion of Site 1E. The direction of approach should be ascertained with an on-site biologist knowledgeable of pacific pocket mouse and of the aforementioned burrow locations. If the truck stays within the area that has already been disturbed and sample sites are appropriately chosen, there should be no disturbance to pacific pocket mouse. One of the sample sites at the northwestern edge of the sampling area is extremely close to the active/recently active burrow herein described. If possible we feel that is necessary for a biological monitor be on-site to indicate areas to be avoided, assist with sample site locations, and overall to eliminate any disturbance to the pacific pocket mouse. Varanus can provide the biological monitor for this site.

Portions of Site 1D are ready to be surveyed and sampled. We recommend that Parsons personnel gain access to the site from Vandegrift Blvd. rather than Stuart Mesa Road. This will ensure no unnecessary harassment of the California gnatcatchers present at the site. We also recommend more investigation into the origin of the rodent burrows that were seen in the northwestern portion of the site. Trapping for the pacific pocket may be possible while the first two sites are being sampled. We feel that this should be done in consultation with the U.S. Fish and Wildlife Service in order to ensure that trapping need not be repeated next year if negative results from this year are not acceptable - a possible outcome due to the current time of year, low population levels, and overall depressed activity levels at other nearby sites. If trapping is acceptable and no individuals are found, then surveying and sampling can commence across the entire site. Varanus can perform the trapping and biological monitoring, if necessary.

We recommend Site 1H as one of the last sites surveyed and sampled. This recommendation is based on the fact that the California gnatcatcher family group was foraging within the drilling footprint. Surveying and sampling can commence after September 5 for this site. No additional work is required by Varanus at this site

Please do not hesitate to contact us if you have any further questions or comments.

Sincerely,

William E. Haas
Principal Biologist

TABLE 1
BIOLOGICAL SURVEY CONDITIONS
CAMP PENDLETON , SAN DIEGO COUNTY, CALIFORNIA

DATE 2001	1August	6 August	9 August
START TIME	0840	0600	0755
END TIME	1345	1000	1115
TEMPERATURE	70°F	59-69°F	71-75°F
WIND SPEED	0-10 mph	0 mph	0-3 mph
SKY CONDITION	100% cover	100% cover	100-25%
SURVEY BY	K. Fischer (TE-039321) I. Quon (TE-812740)	K. Fischer (TE-039321)	K. Fischer (TE-039321) W. E. Haas (TE-779910)

TABLE 2
VERTEBRATE SPECIES DETECTED IN 2001
SITE 30, CAMP PENDLETON, SAN DIEGO COUNTY, CALIFORNIA

Common Name	Scientific Name
Reptiles and Amphibians	
Red coachwhip	*Masticophis flagellum piceus*
Birds	
Anna's hummingbird	*Calypte anna*
Ash-throated flycatcher	*Myiarchus cinerascens*
Belted kingfisher	*Ceryle alcyon*
Bewick's wren	*Thryomanes bewickii*
Black-bellied plover	*Pluvialis squatarola*
Black-necked stilt	*Himantopus mexicanus*
Black phoebe	*Sayornis nigricans*
Bushtit	*Psaltriparus minimus*
California gnatcatcher – FE, SSC	*Polioptila californica*
California least tern – FE, SE	*Sterna antillarum browni*
Californa quail	*Callipepla californica*
California towhee	*Pipilo crissalis*
Caspian tern	*Sterna caspia*
Cliff swallow	*Petrochelidon pyrrhonota*
Common raven	*Corvus corax*
Common yellowthroat	*Geothlypis trichas*
Great blue heron	*Ardea herodias*
Greater yellowlegs	*Tringa melanoleuca*
Green heron	*Butoroides virescens*
House finch	*Carpodacus mexicanus*
Killdeer	*Charidrius vociferus*
Least Bell's vireo – FE, SE	*Vireo bellii pusillus*
Lesser goldfinch	*Carduelis psaltria*
Mallard	*Anas platyrhynchos*
Marsh wren	*Cistothorus palustris*
Mourning dove	*Zenaida macroura*
Nuttall's woodpecker	*Picoides nuttallii*
Pied-billed grebe	*Podilymbus podiceps*
Solitary sandpiper	*Tringa solitaria*
Song sparrow	*Melospiza melodia*
Red-shouldered hawk	*Buteo lineatus*
Red-tailed hawk	*Buteo jamaicenis*
Red-winged blackbird	*Agelaius phoeniceus*
Turkey vulture (overhead)	*Cathartes aura*
Western kingbird	*Tyrranus verticalis*
White-tailed kite – SFP	*Elanus leucurus*

Table 2 Continued	
Common Name	**Scientific Name**
Wrentit	*Chamaea fasciata*
Mammals	
California ground squirrel (burrows)	*Spermophilus beecheyi nudipes*
Desert cottontail	*Sylvilagus auduboni*
Mouse species (burrows and tracks)	*Peromyscus sp./Reithrodontomys sp.*
Southern mule deer	*Odocoileus hemionus fulignata*

TABLE 3
VERTEBRATE SPECIES DETECTED IN 2001
SITE 1D, CAMP PENDLETON, SAN DIEGO COUNTY, CALIFORNIA

Common Name	Scientific Name
Birds	
Anna's hummingbird	*Calypte anna*
Bushtit	*Psaltriparus minimus*
California gnatcatcher	*Polioptila californica*
California towhee	*Pipilo crissalis*
Least Bell's vireo	*Vireo bellii pusillus*
Lesser goldfinch	*Carduelis psaltria*
Mourning dove	*Zenaida macroura*
Song sparrow	*Melospiza melodia*
Wrentit	*Chamaea fasciata*
Yellow warbler	*Dendroica petechia*
Mammals	
Coyote (burrow)	*Canis latrans*

TABLE 4
VERTEBRATE SPECIES DETECTED IN 2001
SITE 1E-1, CAMP PENDLETON, SAN DIEGO COUNTY, CALIFORNIA

Common Name	Scientific Name
Reptiles and Amphibians	
San Joaquin fence lizard	*Sceloporus occidentalis biseriatus*
Birds	
Anna's hummingbird	*Calypte anna*
Black phoebe	*Sayornis nigricans*
Bushtit	*Psaltriparus minimus*
California gnatcatcher	*Polioptila californica*
California towhee	*Pipilo crissalis*
Cliff swallow	*Petrochelidon pyrrhonota*
Common raven	*Corvus corax*
Lesser goldfinch	*Carduelis psaltria*
Mourning dove	*Zenaida macroura*
Red-tailed hawk (overhead)	*Buteo jamaicenis*
Turkey vulture (overhead)	*Cathartes aura*
Western kingbird	*Tyrranus verticalis*
Wrentit	*Chamaea fasciata*
Mammals	
Possible pacific pocket mouse (burrows)	*Perognathus longimembris pacificus*

TABLE 5 VERTEBRATE SPECIES DETECTED IN 2001 SITE 1H, CAMP PENDLETON, SAN DIEGO COUNTY, CALIFORNIA	
Common Name	**Scientific Name**
Birds	
Bushtit	*Psaltriparus minimus*
California gnatcatcher	*Polioptila californica*
California towhee	*Pipilo crissalis*
Cliff swallow	*Petrochelidon pyrrhonota*
Lesser goldfinch	*Carduelis psaltria*
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*
Wrentit	*Chamaea fasciata*

APPENDIX C
RELEVANT SITE-SPECIFIC INFORMATION COLLECTED BY OTHERS

TABLE P-3
Surface Soil[a] and Subsurface Soil Background Concentrations for Metals

Metal	Soil - 0 to 5 Feet (mg/kg)				Soil - 0 to 10 Feet (mg/kg)	
	Las Flores Basin 95th Percentile[b]	Marine Terrace Deposits 95th Percentile[b]	Santa Margarita Basin 95th Percentile[c]	San Luis Rey Basin 95th Percentile	Santa Margarita Basin 95th Percentile[c]	San Luis Rey Basin 95th Percentile[c]
Aluminum	40,000	20,200	20,999	16,398	21,733	15,156
Antimony	8.76[e]	8.76[e]	8.76	8.76[e]	8.38	8.38[e]
Arsenic	4.26[f]	2.67	4.61	17.2	4.25	16.0
Barium	435	217	262	133[d]	261.2	385
Beryllium	1.2	1.52[e]	1.52	1.52[e]	1.42	1.42[e]
Cadmium	1.58[e]	1.6	1.58	1.58[e]	1.52	1.52[e]
Chromium	34.6	77.9	33.0	15.5	32.6	13.2
Cobalt	9.85	20.3	13.3	13.3[e]	12.8	12.8[e]
Copper	27.9	78.4	26.8	6.5	26.0	4.8
Cyanide	0.24[e]	0.24[e]	0.24	0.24[e]	0.37	0.37[e]
Iron	37,000	31,400	26,459	20,200[d]	28,553	19,883
Lead	15.1	23.7	29.1	11.7	21.7	10.2
Magnesium	11,300	7,200	10,601	6,103	10,672	6,150
Manganese	549	1,170	688	199[d]	655	199[d]
Mercury	0.08[e]	0.05	0.08	0.05[d]	0.10	0.05[d]
Molybdenum	7.36[e]	7.36[e]	7.36	7.36[e]	5.98	7.36[e]
Nickel	15.9	41.4	22.5	4.8	20.2	4.1
Selenium	0.78[e]	0.78[e]	0.78	0.78[e]	0.80	0.80[e]
Silver	1.36[e]	2.34	1.36	1.36[e]	1.36	1.36[e]
Thallium	1.35[e]	1.71	1.35	1.35[e]	1.33	1.33[e]
Vanadium	102	85.1	69.4	39.7	73.8	36.0
Zinc	91.0	67.4	111	56.0	104	59.7[d]

[a]Surface soils 0 to 5 feet.
[b]From the Group B RI report (SWDIV, 1995); soil background is limited to 0- to 5-foot interval.
[c]From the Group C RI report (SWDIV, 1996).
[d]95th percentile is higher than the maximum detected value, the concentration used for background is defaulted to the aximum value.
[e]The background data set was nondetect for this chemical, so the background concentration calculated for the Santa Margarita basin was used as a substitute.
[f]The highest detected value is used because the detection limits for nondetects were more than four times the highest detected value.

mg/kg - Milligrams per kilogram; equivalent to parts per million.
RI - Remedial investigation.
SWDIV - Southwest Division Naval Facilities Engineering Command.

APPENDIX C1
SITE 1D

TABLE 3-1
Site 1D Contaminants of Concern in Soil and Associated Proposed Remediation Goals
MCB Camp Pendleton
(Sheet 1 of 2)

	Human Health Concern				Ecological Concern					
Contaminant of Concern[a]	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PRG (mg/kg)	Background[d] Concentration (mg/kg)	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PLE[e] (mg/kg)	Background[d] Concentration (mg/kg)	Proposed Remediation Goal (mg/kg) 0-5 feet	Proposed Remediation Goal (mg/kg) 5-10 feet
Metals										
Antimony	35.3	0.5	31	8.38	35.3	0.5, 1.0, 1.5, 6.0	1.3(CM)	8.76	8.8	31
Arsenic	7.3	0.5, 1, 1.5	0.38	4.25	--	--	--	--	4.3	4.3
Chromium	40.8	0.5, 1, 2	0.2	32.6	--	--	--	--	33	33
Copper	--	--	--	--	739	0.5, 1, 1.5	13(CM)	26	26	--
Iron	--	--	--	--	30,100	0.5	186(CG)	26,459	26,459	--
Lead	1,100	0.5	130	21.7	1,100	0.5, 1.0, 2.0	13(CM)	29.1	29	130
Zinc	--	--	--		2,880	0.5, 1.0, 1.5	80(CG)	111	111	--

The list of contaminants of concern is based on the chemical list included in Table 2-2 of the EE/CA report (Kleinfelder, 1997).
The listed values are the maximum concentrations reported in the depth intervals of human health or ecological concern.
The listed sampling depths are where concentrations of contaminants of concern were reported exceeding the PRGs and background values for chemicals of human health concern and the PLEs and background values for chemicals of ecological concern.

TABLE 3-2
Remedial Action Objectives and Goals for Site 1D Soil
MCB Camp Pendleton

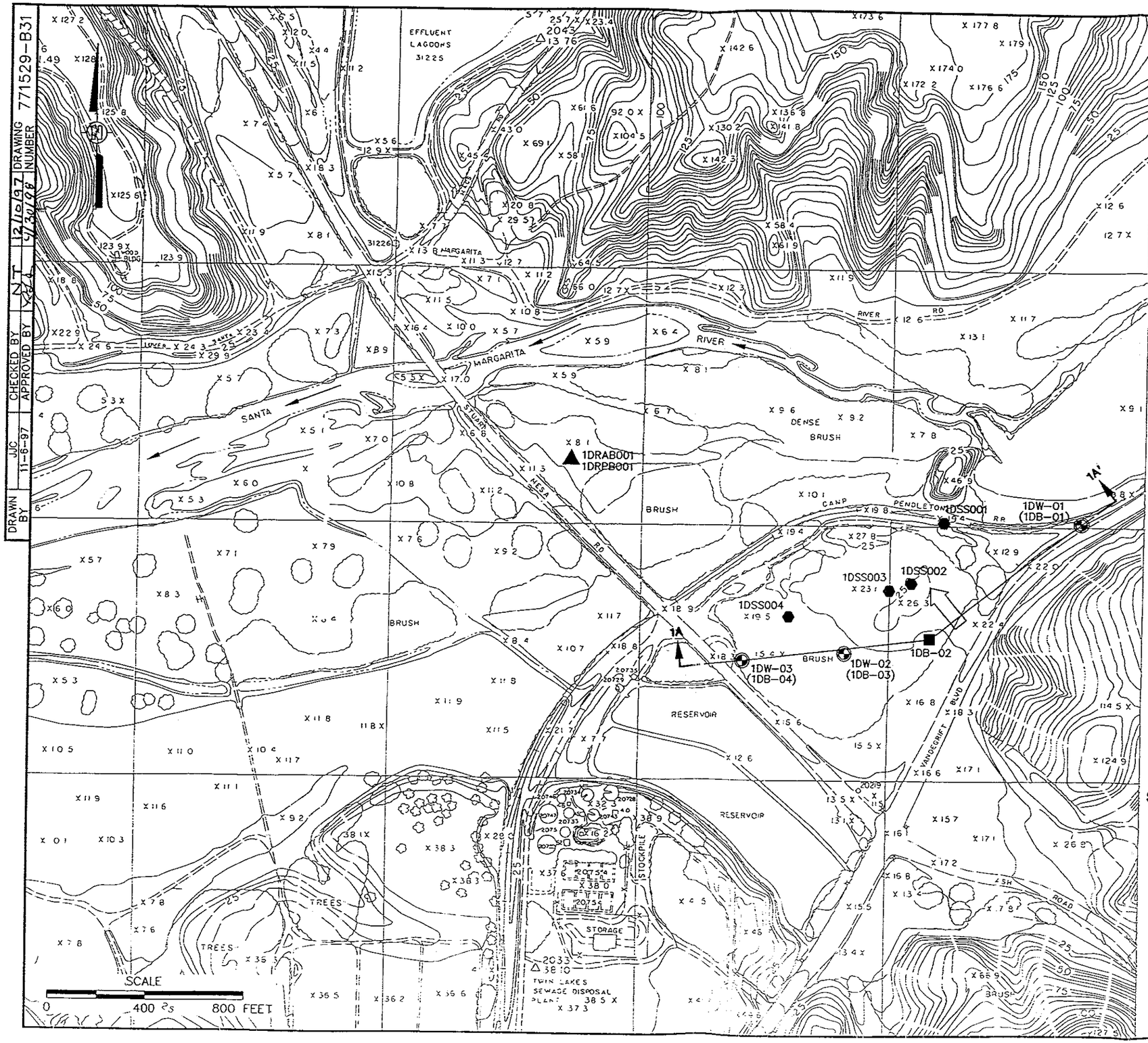
Objective: Minimize exposure to chemicals in soil at concentrations exceeding background concentrations, preliminary remediation goals for humans, levels protective of groundwater, and preliminary limits of exposure for plants, invertebrates, birds, and mammals.

Goals:

Contaminant of Concern	Maximum Concentration (mg/kg)	Proposed Remediation Goal (mg/kg) (0-3 feet)
Antimony	35	8.8[a]
Arsenic	6.4	4.3[a]
Chromium	37	33[a]
Copper	739	26[a]
Iron	30,100	26,459[a]
Lead	1,100	29[a]
Zinc	2,880	111[a]

[a]Proposed remediation goal was set at background.

mg/kg - Milligrams per kilogram.



LEGEND

1DRAB001 ▲	ECOLOGIC RISK ASSESSMENT REFERENCE SAMPLING LOCATION
1DSS001 ⬢	SURFACE SOIL SAMPLE
1DB-02 ■	BOREHOLE LOCATION
1DW-03 (1DB-04)	MONITORING WELL LOCATION WITH SOIL BORING NUMBER IN PARENTHESES
→	SURFACE-WATER FLOW DIRECTION
⇦	APPROXIMATE GROUNDWATER FLOW DIRECTION (FROM POTENTIOMETRIC SURFACE CONTOUR MAPS, APPENDIX B)
1A 1A'	GEOLOGIC CROSS-SECTION LOCATION

TOPOGRAPHIC REFERENCE:

MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAP 6A. DATE: DECEMBER 1987

FIGURE 3-1

SITE 1D - REFUSE BURNING GROUND IN 20 AREA SAMPLE AND GEOLOGIC CROSS-SECTION LOCATIONS

MCB CAMP PENDLETON, CALIFORNIA

PREPARED FOR

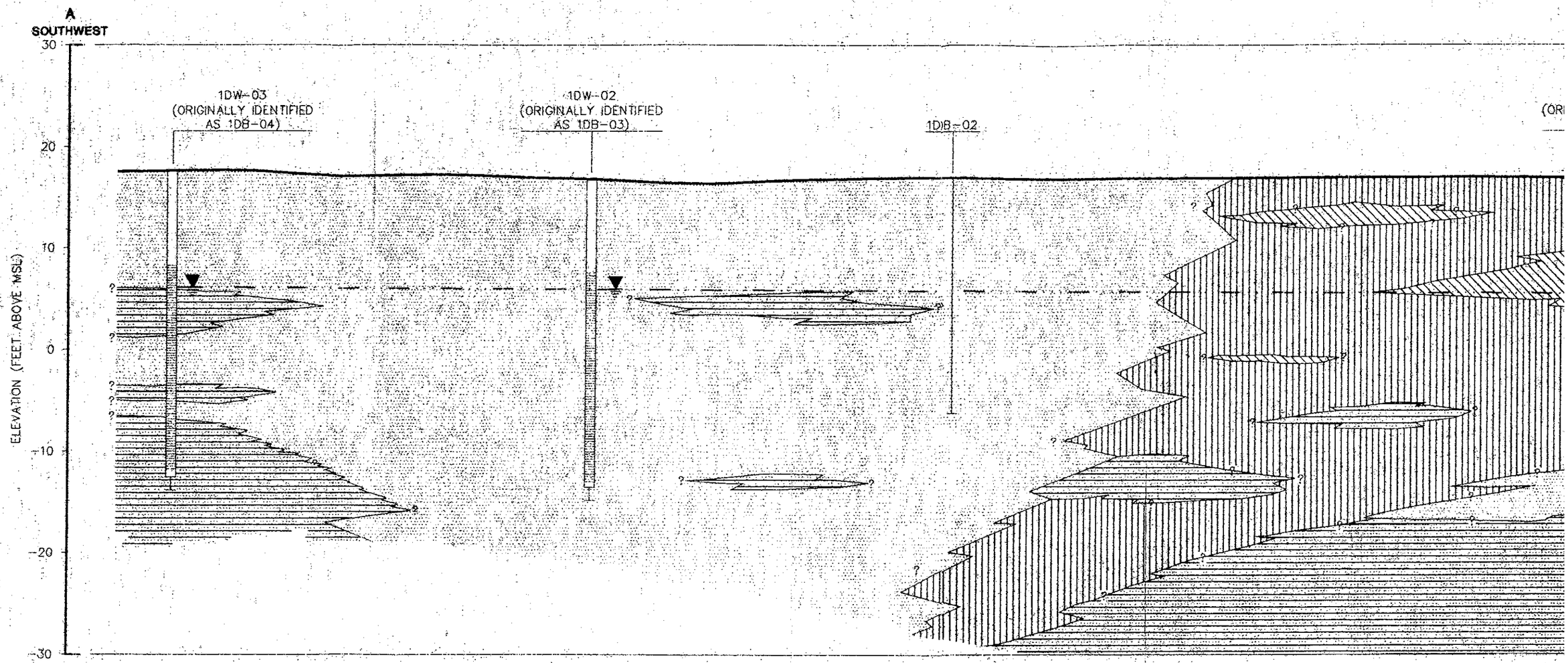
NAVAL FACILITIES ENGINEERING SERVICE CENTER

CONTRACT NO. N47408-92-D-3056
DELIVERY ORDER No. 0014
771529-ITNPR-0003

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWING NUMBER 771529-B31
DRAWN BY JJC 11-6-97
CHECKED BY NT 12/10/97
APPROVED BY 12/30/97

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
JJC 11-11-97	NT 12/10/97		771529-B53



LEGEND:

- PREDOMINANTLY SILT
- PREDOMINANTLY SAND
- SILTY SAND OR SAND WITH SILT
- PREDOMINANTLY CLAY
- CLAYEY SAND OR SAND WITH CLAY
- ARTIFICIAL FILL

1DW-02 — GROUNDWATER MONITORING WELL
- BLANK CASING
- WELL SCREEN
- TOTAL DEPTH OF BORING

LITHOLOGIC CONTACT

STATIC WATER ELEVATION (MEASURED 10/26/94)

1DB-02
- SOIL BORING
- TOTAL DEPTH OF BORING

MSL MEAN SEA LEVEL

HORIZONTAL SCALE
0 100 200 FEET

VERTICAL SCALE
0 10 20 FEET

EXAGGERATION = 10X VERTICAL

NOTES:

1) CROSS-SECTION LOCATION SHOWN IN FIGURE 2-2.
2) LITHOLOGIC CONTACTS ARE INFERRED BASED ON BORING LOGS.
3) STRATIGRAPHY AND CONTACTS ARE INTERPRETED BASED ON SOILS OBSERVED IN BORINGS.

REFUS
GEO
MC

NAV

C

APPENDIX C2
SITE 1E-1

TABLE 4-1
Site 1E Contaminants of Concern in Soil and Associated Proposed Remediation Goals MCB Camp Pendleton
(Sheet 1 of 2)

Contaminant of Concern[a]	Human Health Concern				Ecological Concern				Proposed Remediation Goal (mg/kg) 0-5 feet	Proposed Remediation Goal (mg/kg) 5-10 feet
	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PRG (mg/kg)	Background Concentration[d] (mg/kg)	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PLE[e] (mg/kg)	Background Concentration[d] (mg/kg)		
Metals										
Aluminum	--	--	--	--	47,200	1	891(PM)	20,999	20,999	--
Antimony	140	0.5, 15	31	8.38	140	0.5, 1.5, 2, 15	1.2(PM)	8.76	8.8	31
Arsenic	10.7	0.5, 2	0.38	4.25	--	--	--	--	4.3	4.3
Cadmium	9.3	2, 23	9	1.52	--	--	--	--	9	9
Chromium	104	0.5, 2, 7, 18, 23	0.2	32.6	--	--	--	--	33	33
Cobalt	--	--	--	--	24.5	1, 1.5, 2, 7,	3(PM)	13.3	13	--
Copper	--	--	--	--	1,660	0.5	11(PM)	26	26	--
Iron	--	--	--	--	61,500	0.5	437(PM)	26,459	26,459	--
Lead	1,610	0.5	130	21.7	1,610	0.5, 1, 1.5	16(PM)	29.1	29	130
Zinc	--	--	--	--	5,930	0.5, 1.5, 2, 7, 10, 15	960(PM)	111	960	--

TABLE 4-1
Site 1E Contaminants of Concern in Soil and Associated Proposed Remediation Goals MCB Camp Pendleton
(Sheet 2 of 2)

[a]The list of contaminants of concern is based on the chemical list included in Table 2-3 of the EE/CA report (Kleinfelder, 1997).
[b]The listed values are the maximum concentrations reported in the depth intervals of human health or ecological concern.
[c]The listed sampling depths are where concentrations of contaminants of concern were reported exceeding the PRGs and background values for chemicals of human health concern and exceeding the PLEs and background values for chemicals of ecological concern.
[d]The background concentrations were calculated differently for human health and ecological risk evaluations (SWDIV, 1996a).
[e]The listed PLEs are the lowest among those PLEs listed for the site-specific representative species in the Group C RI report (SWDIV, 1996a), with the exception of mammals and/or birds for which the PLEs were derived from a single toxicity value. For these species, the highest PLE were selected. Species designations are as follows:

Invertebrate - I
Pacific pocket mouse - PM
Plant - P
California gnatcatcher - CG
California quail - CQ

-- Indicates that the chemical is not a contaminant of concern for the category (i.e., human health concern or ecological concern).
EE/CA - Engineering evaluation/cost analysis.
mg/kg - Milligrams per kilogram.
N/A - Not available.
PLE - Preliminary limits of exposure.
PRG - Preliminary remediation goal using a residential land use scenario.

TABLE 4-2
Remedial Action Objectives and Goals for Site 1E Soil
MCB Camp Pendleton

Objective: Minimize exposure to chemicals in soil at concentrations exceeding background concentrations, preliminary remediation goals for humans, levels protective of groundwater, and preliminary limits of exposure for plants, invertebrates, birds, and mammals.

Goals:

Contaminant of Concern	Maximum Concentration (mg/kg)	Proposed Remediation Goal (mg/kg) (0-5 feet)	Proposed Remediation Goal (mg/kg) (5-10 feet)
Aluminum	47,200	20,999[a]	--
Antimony	140	8.8[a]	31[a]
Arsenic	10.7	4.3[a]	4.3[a]
Cadmium	9.3	9[b]	9[b]
Chromium	104	33[a]	33[a]
Cobalt	25	13[a]	--
Copper	1,660	26[a]	--
Iron	61,500	26,459[a]	--
Lead	1,610	29[a]	130[b]
Zinc	5,930	960[c]	--

[a]Proposed remediation goal was set at background.

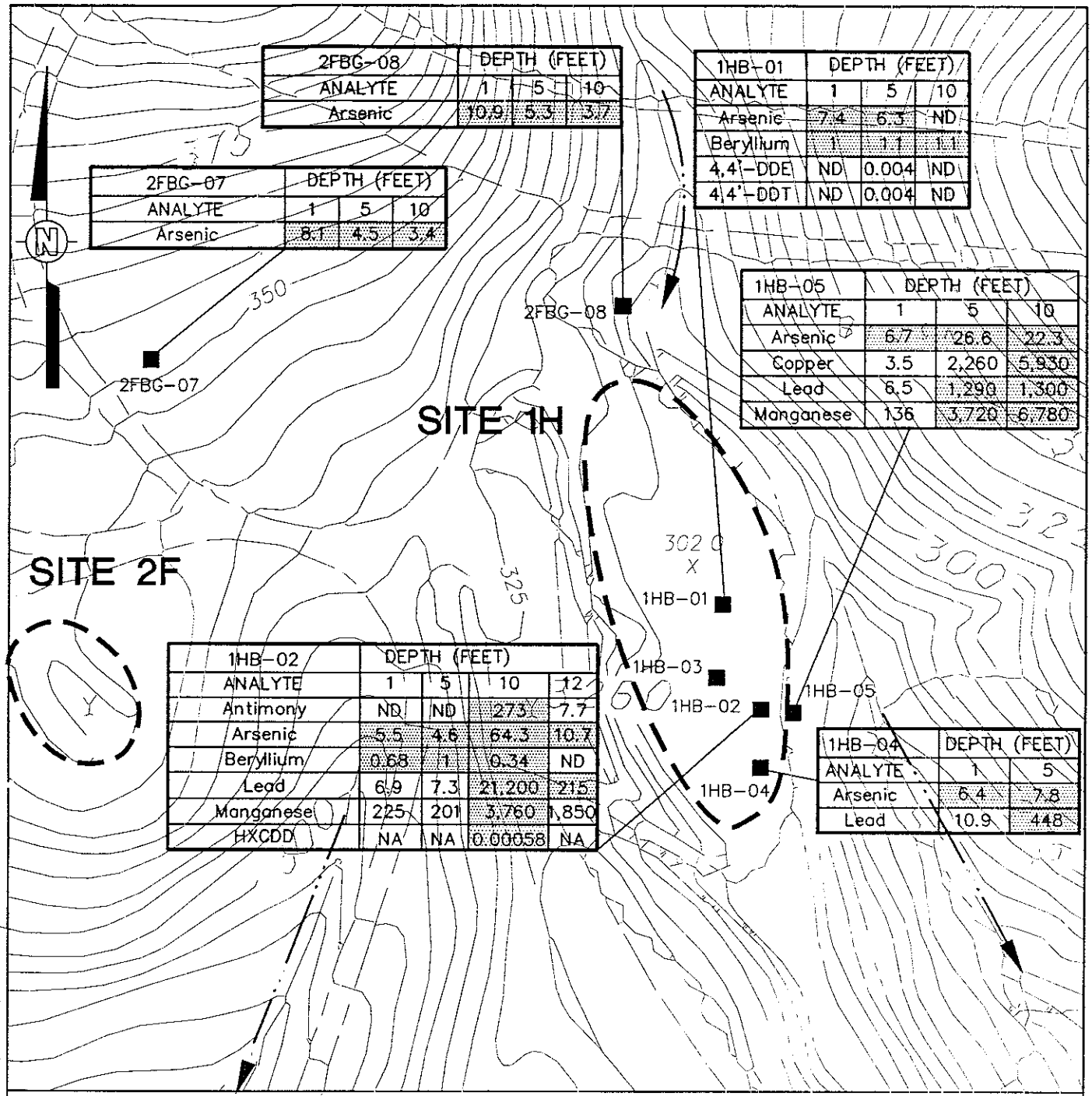
[b]Proposed remediation goal was set at the risk-based PRG.

[c]Proposed remediation goal was set at the most stringent PLE for the species of concern.

mg/kg - Milligrams per kilogram.

-- Denotes that the contaminant is not of concern at that depth range.

APPENDIX C3
SITE 1H



2FBG-08	DEPTH (FEET)		
ANALYTE	1	5	10
Arsenic	10.9	5.3	3.7

2FBG-07	DEPTH (FEET)		
ANALYTE	1	5	10
Arsenic	8.1	4.5	3.4

1HB-01	DEPTH (FEET)		
ANALYTE	1	5	10
Arsenic	7.4	6.3	ND
Beryllium	1	1.1	1.1
4,4'-DDE	ND	0.004	ND
4,4'-DDT	ND	0.004	ND

1HB-05	DEPTH (FEET)		
ANALYTE	1	5	10
Arsenic	6.7	26.6	22.3
Copper	3.5	2,260	5,930
Lead	6.5	1,290	1,300
Manganese	136	3,720	6,780

1HB-02	DEPTH (FEET)			
ANALYTE	1	5	10	12
Antimony	ND	ND	273	7.7
Arsenic	5.5	4.6	64.3	10.7
Beryllium	0.68	1	0.34	ND
Lead	6.9	7.3	21,200	215
Manganese	225	201	3,760	1,850
HXCDD	NA	NA	0.00058	NA

1HB-04	DEPTH (FEET)	
ANALYTE	1	5
Arsenic	6.4	7.8
Lead	10.9	448

LEGEND

1HB-01 ■ SOIL BORING LOCATION

SURFACE-WATER FLOW DIRECTION

APPROXIMATE BOUNDARY OF REFUSE BURNING GROUND AS ESTIMATED PRIOR TO SAMPLING

ND NOT DETECTED
NA NOT ANALYZED

ANALYTE (mg/kg)	PRG	BACKGROUND
ANTIMONY	31	8.38
ARSENIC	0.38	10.9
BERYLLIUM	0.14	1.42
COPPER	2,800	26
LEAD	130	21.7
MANGANESE	3,200	655
HXCDD	0.00007	NA

NOTES:

1. CONCENTRATIONS GIVEN IN MILLIGRAMS PER KILOGRAM (mg/kg)
2. CONCENTRATIONS ABOVE PRGs ARE SHADED
3. ONLY DETECTIONS EXCEEDING PRGs ARE SHOWN
4. DEPTH INTERVALS WITH NO ORGANIC DETECTIONS OR NO INORGANIC CONCENTRATIONS ABOVE PRGs ARE NOT SHOWN

SCALE
0 100 200 FEET

TOPOGRAPHIC REFERENCE:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAPS 57D, 58C, 67A AND 66B DATE: DECEMBER 1987

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

DRAWN BY	DATE
MBMILLER	03-15-99
CHECKED BY	DATE
APPROVED BY	DATE
PROJECT MANAGER	DATE

SITE 1H-REFUSE BURNING GROUND IN 62 AREA
SUMMARY OF SOIL ANALYTICAL RESULTS
MCB CAMP PENDLETON, CALIFORNIA

CONTRACT NAME	AUTOCAD FILE No.	PLOT SCALE	SHEET	OF	SCALE	DOCUMENT CONTROL No.	OHM PROJECT No.	FIGURE No.	REVISION
SWDIV	19739098.DWG	1=100	1	1	1"=100'		919739	FIG 8-1	0

R0 0:u:32:50 3/16/99 16:32:54 19739098.DWG

APPENDIX C4
SITE 30

TABLE 7-1
Site 30 Contaminants of Concern in Soil and Associated Proposed Remediation Goals MCB Camp Pendleton
(Sheet 1 of 2)

Contaminant of Concern[a]	Human Health Concern				Ecological Concern				Proposed Remediation Goal (mg/kg) 0 - 5 Feet	Proposed Remediation Goal (mg/kg) 5 - 10 feet
	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PRG (mg/kg)	Background Concentration[d] (mg/kg)	Maximum Concentration[b] (mg/kg)	Sampling Depths of Concern[c] (feet)	PLE[e] (mg/kg)	Background Concentration[d] (mg/kg)		
Metals										
Antimony	1,080	0.5, 0.6	31	8.38	1,080	0.5, 0.6, 2, 3.5, 5, 5.5	0.8(SS)	8.76	8.8	31
Arsenic	16	0.6, 5.0, 5.5, 20.5, 40	0.38	4.25	16	0.5, 0.6, 1, 5, 5.5, 48	1.1(SS)	4.61	4.3	4.3
Chromium	59.3	0.5, 0.6	0.2	32.6	52.1	0.5, 5	3.2(SS)	32.6	33	33
Cobalt	--	--	--	--	18.1	0.5, 0.6, 2, 5	0.3(SS)	13.3	13	--
Copper	--	--	--	--	3,530	0.5, 0.6, 2, 3.5	13(CM)	26	26	--
Lead	109,000	0.5, 0.6, 5.0	130	21.7	109,000	0.5, 0.6, 1.5, 2, 3.5, 5, 5.5	13(CM)	29.1	29	130
Manganese	5,140	0.5, 5	3,200	655	--	--	--	--	3,200	3,200

TABLE 7-2
Remedial Action Objectives and Goals for Site 30 Soil
MCB Camp Pendleton

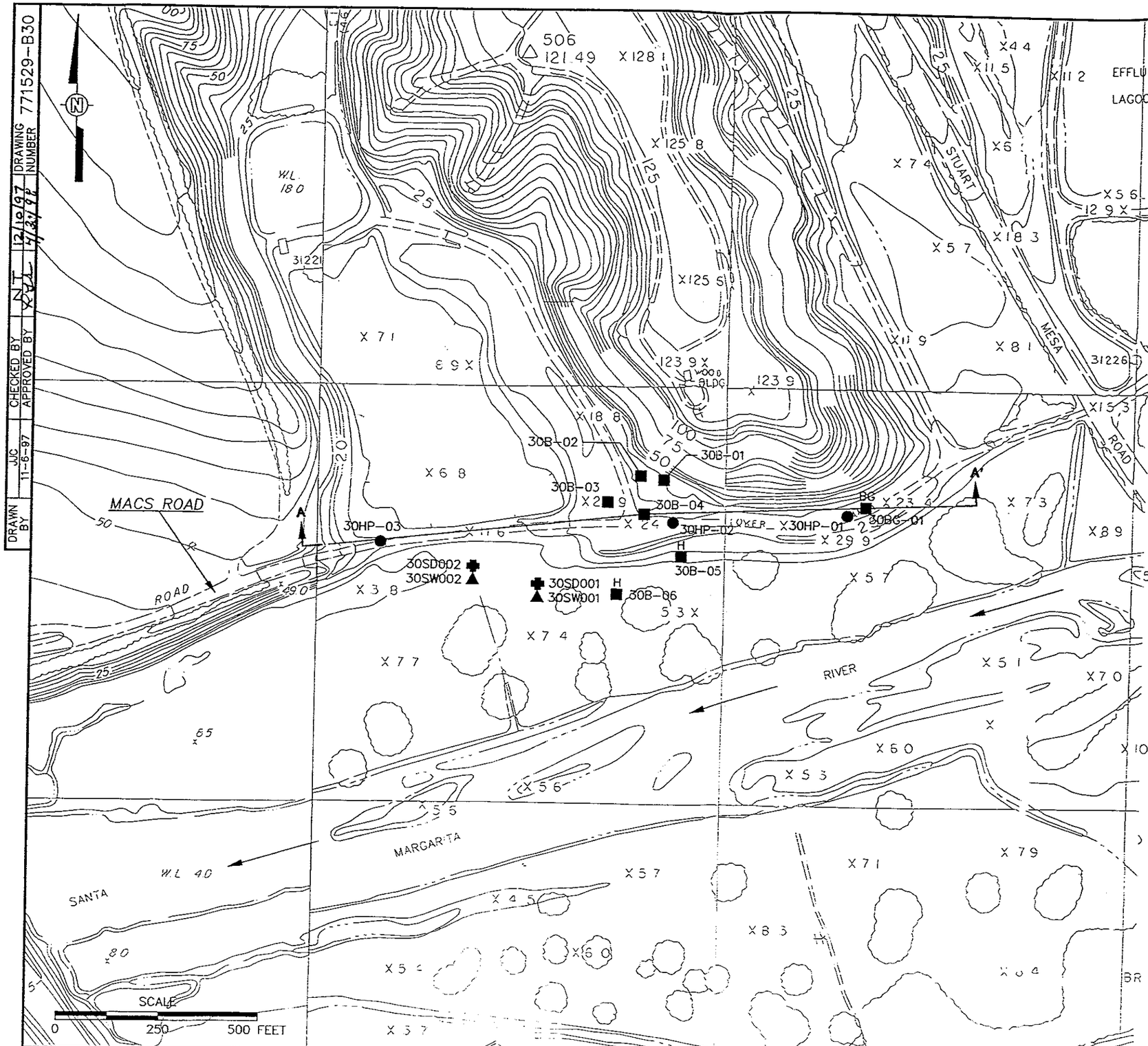
Objective: Minimize exposure to chemicals in soil at concentrations exceeding background concentrations, preliminary remediation goals for humans, levels protective of groundwater, and preliminary limits of exposure for plants, invertebrates, birds, and mammals.

Goals:

Contaminant of Concern	Maximum Concentration (mg/kg)	Proposed Remediation Goal (mg/kg) (0-5 feet)	Proposed Remediation Goal (mg/kg) (5-10 feet)
Antimony	1,080	8.8[a]	31[b]
Arsenic	16	4.3[a]	4.3[a]
Chromium	59	33[a]	33[a]
Cobalt	18	13[a]	--
Copper	543	26[a]	--
Lead	109,000	29[a]	130[b]
Manganese	5,140	3,200[b]	3,200[b]

[a]Proposed remediation goal was set at background.
[b]Proposed remediation goal was set at the risk-based PRG.

mg/kg - Milligrams per kilogram.
PRG - Preliminary remediation goal.
-- Denotes that the contaminant is not of concern at that depth range.



LEGEND

30B-06 H ■	HAND-AUGER BOREHOLE LOCATION
30B-04 ■	BOREHOLE LOCATION
30BG-01 BG ■	BACKGROUND SOIL BORING LOCATION
30SD002 ✚	SEDIMENT SAMPLE
30SW001 ▲	SURFACE-WATER SAMPLE LOCATION: SAMPLES COLLECTED DURING MARCH 1994, NOV. 1994, AND FEB. 1995.
30HP-01 ●	HYDROPUNCH SAMPLE LOCATION
→	SURFACE-WATER FLOW DIRECTION (EPHEMERAL)
A A'	GEOLOGIC CROSS-SECTION LOCATION

TOPOGRAPHIC REFERENCES:
MARINE CORPS BASE CAMP PENDLETON GENERAL DEVELOPMENT MAPS 5B/6A. DATE: DECEMBER 1987

FIGURE 7-1

SITE 30 - FIRING RANGE SOIL FILL IN 31 AREA SAMPLE AND GEOLOGIC CROSS-SECTION LOCATIONS

MCB CAMP PENDLETON, CALIFORNIA

PREPARED FOR

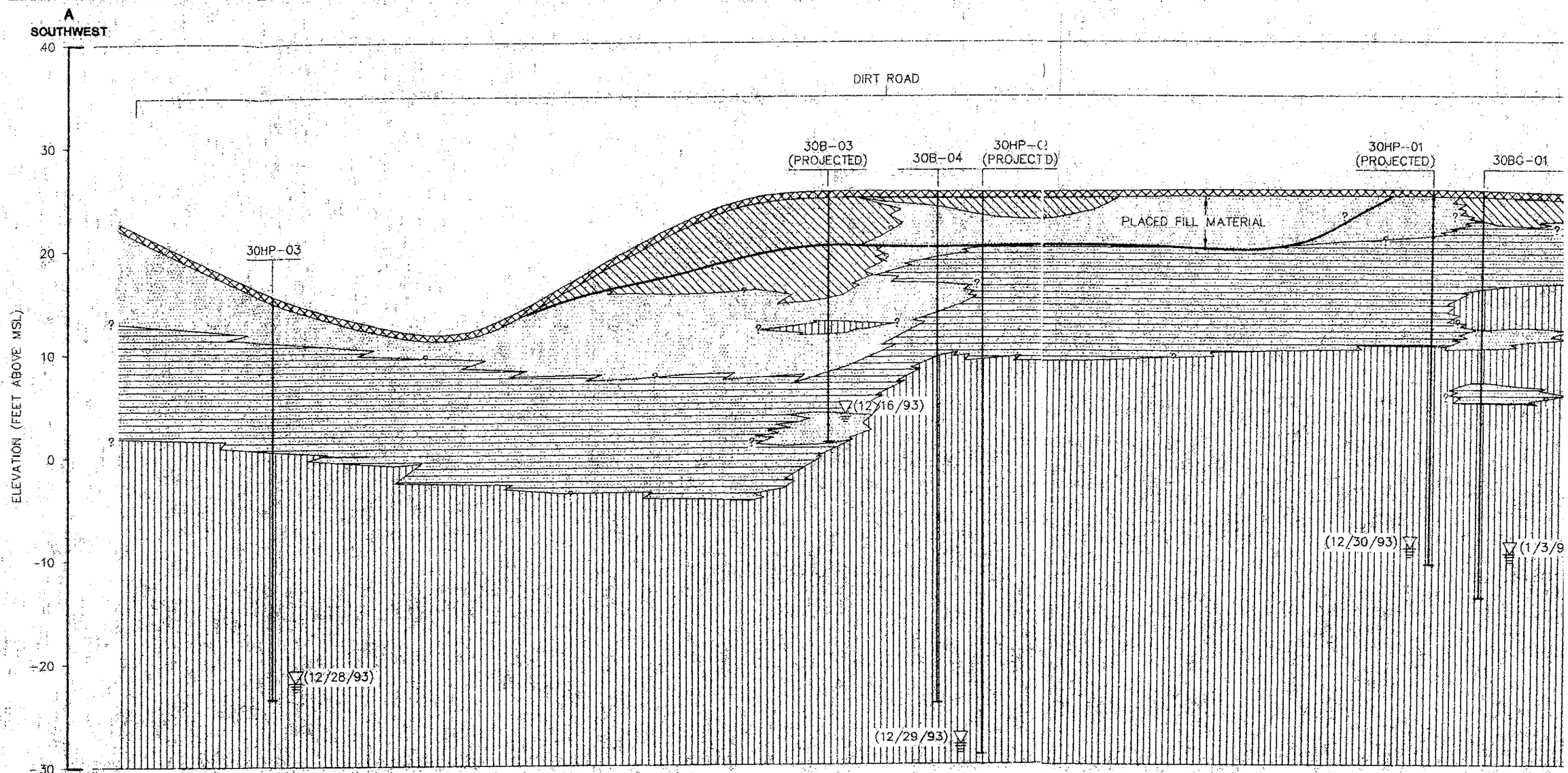
NAVAL FACILITIES ENGINEERING SERVICE CENTER

CONTRACT NO. N47408-92-D-3056
DELIVERY ORDER No. 0014
771529-ITNPR-0003

INTERNATIONAL TECHNOLOGY CORPORATION

DRAWN BY	CHECKED BY	DRAWING NUMBER
JJC 11-6-97	NT 12/10/97	771529-B30
	APPROVED BY	

DRAWN BY	JJC	11-11-97	CHECKED BY	NT	4/30/98	DRAWING NUMBER	771529-B52
			APPROVED BY				



LEGEND:

- PREDOMINANTLY SILT
- PREDOMINANTLY SAND
- SILTY SAND OR SAND WITH SILT
- PREDOMINANTLY CLAY
- CLAYEY SAND OR SAND WITH CLAY
- ARTIFICIAL FILL

30B-03 — SOIL BORING

TOTAL DEPTH OF BORING

LITHOLOGIC CONTACT

PLACED FILL MATERIAL CONTACT

STATIC WATER ELEVATION FIRST ENCOUNTERED (DATE IN PARENTHESES)

MSL — MEAN SEA LEVEL

NOTES:

1) CROSS-SECTION LOCATION SHOWN IN FIGURE 2-10.
2) LITHOLOGIC CONTACTS ARE INFERRED BASED ON BORING LOGS.
3) STRATIGRAPHY AND CONTACTS ARE INTERPRETED BASED ON SOILS OBSERVED IN BORINGS.
4) PLACED FILL MATERIAL IS APPROXIMATELY 10 FEET THIC AND WAS LOGGED USING THE USCS CLASSIFICATION SYSTEM.

HORIZONTAL SCALE
0 100 200 FEET

VERTICAL SCALE
0 10 20 FEET

EXAGGERATION = 10X VERTICAL

FIG
S
FIRING RANGE S
GEOLOGIC CR
MCB CAMP PEN
PREP
NAVAL FACIL
SERVIC
CONTRACT NO.
DELIVERY
771529-
IT

APPENDIX G2
SITE 1E-1

SITE 1E-1 ANALYTICAL REPORTS

Applied Physics & Chemistry Laboratory – Chino, California

01-6040
01-6041
01-6090

Triangle Laboratories – Durham, North Carolina

55583A
55583B
56607
56607A
56607B

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: CINDY ZEKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to:

Project Name/Code: MCB CAMP PENDLETON Job # 740012.11000 P.O. #

Project Address: SITE 1E-1 \ OU4 APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: RANDALL BRAND

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	VOCs (8260B)	8260A	SVOCs (8270C)	6010B/7000	8081A	8082	8151A	8015 Mod (GtD)	SPLP	TCLP	Remarks
1E1B-05A		9/26/01	0945	SOIL	NONE	1 SLEEVE		X									6040
1E1B-05A		9/26/01	0945			2 SLEEVE			X	X	X	X	X	X			
1E1B-05B			10:00			3 ENCORE	X										
1E1B-05B			10:00			1 SLEEVE		X									
1E1B-05B			10:00			2 SLEEVE			X	X	X	X	X	X			
1E1B-05C			10:15			3 ENCORE	X										
1E1B-05C			10:15			1 SLEEVE		X									
1E1B-05C			10:15			2 SLEEVE			X	X	X	X	X	X			
1E1B-01A			10:34			1 SLEEVE		X									
1E1B-01A			10:34			2 SLEEVE			X	X	X	X	X	X			
1E1B-01B			11:00			3 ENCORE	X										
1E1B-01B-MS			11:00			3 ENCORE	X										
1E1B-01B-MSD			11:00			3 ENCORE	X										
1E1B-01B			11:00			1 SLEEVE		X									
1E1B-01B-MS			11:00			1 SLEEVE		X									

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/26/01 / 1630 Received by [signature] Date/Time 9-26-01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # / Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Root-file:[CUST.DATA.LAB]CHAIN-ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: CINDY ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to:

Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11000

Project Address SITE 1E-1 APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: RANDALL BRAND

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs (8260B)	8280A	SVOCs (8270C)	GC/MS/7000	8081A	8082	8151A	8015 Mod (GRO)	SPLP	TCLP			Remarks
1E1B-01B-	MSD	9/26/01	11:00	SOIL	NONE	1 SLEEVE		X											
1E1B-01B-			11:00			2 SLEEVE			X	X	X	X	X	X					
1E1B-01B-	MS		11:00			1 SLEEVE			X	X	X	X	X	X					
1E1B-01B-	MSD		11:00			1 SLEEVE			X	X	X	X	X	X					
1E1B-06A			12:35			2 ~~1 SLEEVE~~ (LRST) ~~ENCORE~~		X											
1E1B-06A			12:35			2 SLEEVE			X	X	X	X	X	X					
1E1B-06B			12:35			3 ENCORE	X												
1E1B-06B			12:35			1 SLEEVE		X											
1E1B-06B			12:35			1 SLEEVE			X	X	X	X	X	X					
1E1B-06C			12:35			3 ENCORE	X												
1E1B-06C			12:35			1 SLEEVE		X											
1E1B-06C			12:35			2 SLEEVE			X	X	X	X	X	X					
1E1B-02A			1315 ~~1322~~	(LRST)		1 SLEEVE		X											
1E1B-02A			1312 ~~1332~~	(LRST)		2 SLEEVE			X	X	X	X	X	X					
1E1B-06D			1250			1 SLEEVE		X											

6040

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Randall Brand Date/Time 9/26/01 / 1630 Received by [signature] Date/Time 9-26-01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients und[illegible]nd that all terms described in the proposals, quotations for this project, and/or th[illegible]eral terms provided in the current APCL price schedules will be followed. APCL [illegible]es the right to terminat[illegible]ervice or withhold delivery of any reports, if in APCL's sole discretion the terms [illegible] project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino CA 91710
Tel (909) 590-1828 Fax (909) 590-1498

Sample Receiving Checklist

APCL ServiceID C040 Client Name/Project: Parsons (Camp)

1. Sample Arrival

Date/Time Received 9/26/01 1630 Date/Time Opened 9/27/01 0900 By (name): HSM

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☑ Signed, dated? By: Denise
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 4.3°C 4.2°C 4.6°C ____ ____ ____

(Cooler temperature measured from temp-blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☑ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____

Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☑ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 Days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: HSM Date: 26 Sep 2001 Time: 8:00 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: {acal.texfiles}smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: CINDY ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W. WALNUT City: PASADENA State: CA Zip code: 91124

Bill to: SAME

Project Name/Code CAMP PENDLETON OUA Job # 740012 P.O. # 11000

Project Address SITE 1E-1 APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R. BRAND

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs (8260B)	8280A	SVOCs (8270C)	6010B / 7000	8081A	8082	8151A	8015 Mod (GRO)	SPLP	TCLP			Remarks
1E1B-06D		9/26/01	1250	SOIL	NONE	1 SLEEVE			X	X	X	X	X	X					
1E1B-02B			1332			3 ENCORE	X												
1E1B-02B			1332			1 SLEEVE		X											
1E1B-02B			1332			2 SLEEVE			X	X	X	X	X	X					
1E1B-02C			1332			3 ENCORE	X												
1E1B-02C			1332			1 SLEEVE		X											
1E1B-02C			1332			2 SLEEVE			X	X	X	X	X	X					
1E1B-07A			1420			1 SLEEVE		X											
1E1B-07AMS			1420			1 SLEEVE		X											
1E1B-07AMSD (1E1B-07AMSD)			1420			1 SLEEVE		X											
1E1B-07A			1420			2 SLEEVE			X	X	X	X	X	X					
1E1B-07AMS	SPLIT		1423			2 SLEEVE			X	X	X	X	X	X					split Sample
1E1B-07A-MSD	SAMPLE @		Laboratory			~~2 SLEEVE~~ (USE)			~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~		(USE)			for MS + MSD
1E1B-07B			1430			3 ENCORE	X												
1E1B-07B			1430			1 SLEEVE		X											

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/26/01 1630 Received by [signature] Date/Time 9-26-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service #

Clients understand that all terms described in the proposals, quotations for this project, and/or the standard terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: CINDY ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to: SAME

Project Name/Code CAMP PENDLETON OUT Job # 740012 P.O. # 11000

Project Address SITE 1E-1 APCL Quotation #

Due Date: ☒ regular ☐ rush ___ days ___ hours Sampled by: R. BRAND

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs (8260B)	8280A	SVOCs (8270C)	6010B/7000	8081A	8082	8151A	8015Mod (GRO)	SPLP	TCLP		Temperature	Remarks
1E1B-07B		9/26/01	1430	SOIL	NONE	2 SLEEVE			X	X	X	X	X	X					
1E1B-07C		↓	1440	↓	↓	3 ENCORE	X												
1E1B-07C			1440			1 SLEEVE		X											
1E1B-07C			1440			2 SLEEVE			X	X	X	X	X	X					
~~1E1 TB~~	~~TRIP BLANK~~		—	~~Water~~	~~HCl~~	~~3~~ 9	X												
TEMP BLANK			—	Water	NONE	3												X	
1E1-TB1			—	"	HCl	3	X												
1E1-TB2			—	"	HCl	3	X												
1E1-TB3		↓	—	"	HCl	3	X												

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/26/01 1630 Received by [signature] Date/Time 9-26-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Cl Laboratory
13760 Magnolia Ave Chino CA 91710
Tel: (909) 590-1828 Fax (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 6041 Client Name/Project: Parsons (Camp)

1. Sample Arrival

Date/Time Received 9/26/01 1630 Date/Time Opened 9/27/01 0900 By (name): HSM

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☑ Signed, dated? By: Denise
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: __ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 4.3°C 4.2°C 4.6°C ____ ____ ____

(Cooler temperature measured from temp-blank if present, otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☑ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____

Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☑ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 Days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: HSM Date: 26 Sep 2001 Time: 8:00 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: C. ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to: SAME

Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11000

Project Address ~~SIE~~ SITE 1E-1 APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: R. BRAND

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	VOC (8260B)	8280 A	SVOCs 8270C	6010B/7000	8081A	8151A	8082	8015 Modified DRO		SPLP (1312)	TCLP (1311)		Remarks
1E1B-03A		9/27/01	0808	SOIL	ICE	1		X											
" -03A			0808			2			X	X	X	X	X	X					
1E1B-03B			0825			3	X												
" -03B			0825			1		X											
" -03B			0825			2			X	X	X	X	X	X		X	X		
1E1B-03C			0840			3	X												
" -03C			0840			1		X											
" -03C			0840			2			X	X	X	X	X	X					
1E1B-03D			0830			3	X												
" -03D			0830			1		X											
" -03D			0830			2			X	X	X	X	X	X					
1E1B-04A			1215			1		X											
04A			1215			2			X	X	X	X	X	X					
1E1-TB4			—	H_2O	HCL	3	X												
TB5			—	H_2O	HCL	3	X												

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None . Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/27/01 1622 Received by [signature] Date/Time 9-27-01 1622

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: C. ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to: SAME

Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11000

Project Address SITE 1E1 APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: R. BRAND

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs 8260B	8280A	SVOCs 8270C	6010B/7000	8081A	8082	8151A	8015 (Mod DRO)					Remarks
1E1B-04B		9/27/01	1227	SOIL	ICE	3	X												
" -04B			1227			1		X											
" -04B			1227			2			X	X	X	X	X	X					
1E1B-04C			1237			3	X												
" -04C			1237			1		X											
" -04C			1237			2			X	X	X	X	X	X					
1E1B-08A			1010					X											
" -08A			1010						X	X	X	X	X	X					
1E1B-08B			1025			3	X												
" -08B			1025			1		X											
" -08B			1025			2			X	X	X	X	X	X					
1E1B-08C			1050			3	X												
-08C			1050			1		X											
-08C			1050			2			X	X	X	X	X	X					
1E1B-08D			1025			3	X												

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 1415 9/27/01 Received by [signature] Date/Time 9.27.01 1622

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Date:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: PARSONS Contact: C. ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200

Address: 100 W WALNUT City: PASADENA State: CA Zip code: 91124

Bill to: SAME

Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11000

Project Address SITE 1E-1 APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	VOCs 8260B	8280A	SVOCs 8270C	6010B/7000	8081A	8082	8015 (mod 8260)	8151A				TEMP.	Remarks
1E1B-08D		9/27/01	1025	SOIL	ICE	1		X											
" -08D		"	1025	"	"	2			X	X	X	X	X	X					
TEMP BLANK		"	—	H_2O	"	2												X	

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/27/01 / 1415 Received by [signature] Date/Time 9-27-01/622

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 6090 Client Name/Project: Parsons

1. Sample Arrival

Date/Time Received 9/27/01 1622 Date/Time Opened 9/28/01 0830 By (name): [illegible]

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☑ Signed, dated? By: Denise
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☐ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☑ Cooler Used? # of 2 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 4.3°C 4.2°C _____ _____ _____ _____

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: _____

Type: ☑ plastic ☐ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☑ Date/Time ☑ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 Days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☑ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☑ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: [illegible] Date: 27 Sep 2001 Time: 7:38 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal texfiles]smprcl.tex

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page ____ of ____

TO: TRIANGLE LABS
Address
Contact HELEN
Tel: ( )
Fax: ( )
APCL Project Title/Code Camp Pendleton OU4
City DURHAM
State
Zip code
Bill to (if different from above)
Sampler
Sample disposition: Date ☐client; ☐APCL
Due date ☐regular ☐rush
Quotation #
Client signature
P.O.#
Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
GEO-EB1	9/20/01	0807	W			8280 full with full package		
HA-EB1	9/20/01	1100	↓					
IEIB-05A	9/26/01	0945	S					
IEIB-05B	↓	1000						
IEIB-05C		1015	↓					
IEIB-01A		1034						
IEIB-01B (MS/MSD)		1100						
IEIB-06A		1235						
IEIB-06B		1235						
IEIB-06C		1235						
IEIB-02A	↓	1315						
IEIB-06D		1250	↓					
IEIB-02B		1332						
IEIB-02C		1332						
IEIB-07A (MS/MSD)		1420						
IEIB-07B	↓	1430						
IEIB-07C		1440	↓					

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by APCL Date/Time
Received by Bill Dunn Date/Time 10-16-01 11:45AM

Relinquished by Date/Time
Received by Date/Time

Relinquished by Date/Time
Received by Date/Time

Relinquished by Date/Time
Received by Date/Time

* APCL must be notified if unit price is incorrect.

18

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page ____ of ____

TO: TRIANGLE

Address | Contact Helen | Tel: ( ) | Fax: ( )

APCL Project Title/Code Camp Pendleton ovy | City | State | Zip code

Bill to (if different from above) | Sampler

Due date ☐regular ☐rush | Quotation # | Sample disposition: Date ☐client; ☐APCL

Client signature | P.O.#

Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis Items	Unit Price*	APCL Lab-ID
1EIB-03A	9/27/01	0808	S			full 8280 w/		
1EIB-03B		0825				full package (EDD)		
1EIB-03C		0840						
1EIB-03D		0830						
1EIB-04A		1215						
1EIB-04B		1227						
1EIB-04C		1237						
1EIB-08A		100						
1EIB08B		1025						
1EIB-08C		1050						
1EIB-08D		1025						

Sample Conditions: Seal ☐ Intact ☒ Broken ☐ None; Temperature ☐ Cold ☐ Room; Other

Relinquished by [signature] Date/Time | Received by [signature] Date/Time 10-2-01 11:15

Relinquished by Date/Time | Received by Date/Time

Relinquished by Date/Time | Received by Date/Time

* APCL must be notified if unit price is undefined.

Date/Time

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 55583
Client: APC03 - Applied P & CH Laboratory

Book 307

Date Received 10/16/01 By [illegible]

Page 50

Carrier and Number AirBorne/

Ice Chest ICE PACKS Temp 4.0 C

TLI Number.. ...Client Sample ID..... .....Matrix mR/H:CPM. .....Client COC ID.....* Location.....			To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
307-50-1	GEO-EB1 GEO-EB1	WATER CO2	[illegible] 10/19/01	Used							
307-50-2	HA-EB1 HA-EB1	WATER CO2	[illegible] 10/19/01	Used							
307-50-3	1E1B-05A 1E1B-05A	SOIL CO2	[illegible] 10/19/01	[illegible] 10/19/01							
307-50-4	1E1B-05B 1E1B-05B	SOIL CO2									
307-50-5	1E1B-05C 1E1B-05C	SOIL CO2									
307-50-6	1E1B-01A 1E1B-01A	SOIL CO2									
307-50-7	1E1B-01B(MS/MSD) 1E1B-01B(MS/MSD)	SOIL CO2									
307-50-8	1E1B-06A 1E1B-06A	SOIL CO2									
307-50-9	1E1B-06B 1E1B-06B	SOIL CO2									
307-50-10	1E1B-06C 1E1B-06C	SOIL CO2									
307-50-11	1E1B-02A 1E1B-02A	SOIL CO2									
307-50-12	1E1B-06D 1E1B-06D	SOIL CO2									
307-50-13	1E1B-02B 1E1B-02B	SOIL CO2									
307-50-14	1E1B-02C 1E1B-02C	SOIL CO2									

Receiving Remarks: Sample 0002-2303 is a replacement for TLI#55505B. BH 10/16/01.

Archive Remarks:

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 55583
Client: APC03 - Applied P & CH Laboratory

Book 307

Date Received 10/16/01 By [illegible]

Page 50

Carrier and Number AirBorne/

Ice Chest ICE PACKS Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID..... Client COC ID.....*	Matrix Location.....	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
307-50-15	1E1B-07A(MS/MSD) 1E1B-07A(MS/MSD)	SOIL CO2	10/19/01	10/19/01							
307-50-16	1E1B-07B 1E1B-07B	SOIL CO2									
307-50-17	1E1B-07C 1E1B-07C	SOIL CO2									
307-50-18	1E1B-03A 1E1B-03A	SOIL CO2									
307-50-19	1E1B-03B 1E1B-03B	SOIL CO2									
307-50-20	1E1B-03C 1E1B-03C	SOIL CO2									
307-50-21	1E1B-03D 1E1B-03D	SOIL CO2			10/20/01	10/20/01					
307-50-22	1E1B-04A 1E1B-04A	SOIL CO2									
307-50-23	1E1B-04B 1E1B-04B	SOIL CO2									
307-50-24	1E1B-04C 1E1B-04C	SOIL CO2									
307-50-25	1E1B-08A 1E1B-08A	SOIL CO2									
307-50-26	1E1B-08B 1E1B-08B	SOIL CO2									
307-50-27	1E1B-08C 1E1B-08C	SOIL CO2									
307-50-28	1E1B-08D 1E1B-08D	SOIL CO2									

Receiving Remarks: Sample 0002-2303 is a replacement for TLI#55505B. BH 10/16/01.

Archive Remarks:

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 55583
Client: APCO3 - Applied P & CH Laboratory

Book 307

Date Received 10/16/01 By

Page 50

Carrier and Number AirBorne/

Ice Chest ICE PACKS Temp 4.0 C

TLI Number.. .....Client Sample ID..... .....Matrix mR/H:CPM. .....Client COC ID.....* Location.....	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
307-50-29 0002-2303 WATER NOT LISTED ON C.O.C. * CO2	E 10/17/01	[illegible]							

Receiving Remarks: Sample 0002-2303 is a replacement for TLI#55505B. BH 10/16/01.

Archive Remarks:

Form Revised 05/27/1997 -- Page 3 OF 3

22

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

18+MS/MSD AC 10-19-01

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 55583-A	Samples: ~~20+MS/MSD~~	TurnAround : 21 Day(s)
Prod Code: D66012	Matrix : SOIL	Hold Time : 30 Day(s)
DetectLim: 1 ppb	Type : B	Start Date : 10/18/01
	Recvd : 10/16/01	Ship By : 11/06/01
		DWL Due Dt : 10/25/01

Analyte List : Tetra - Octa

Method : Method 8280A:T-O
Client Proj : Camp Pendleton 004
Client : Applied P & CH Laboratory (APC03)
P.O. No. :
Contact : Eric Wendland
Proj. Mgr : Helen Smpardos

Collect Dt/Tm: 09/26/01
Phone : 909-590-1828
Fax : 909-590-1498
Sample Origin: CA

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF: E89
EDD: A128

Prespike Standard: n/a
Extraction Exp : 10/26/01

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AC / [signature] DATE: 10-18-01

Reviewed by: H Smpardos [signature] DATE: 10/18/01 (PMGT0197)

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 55583-B	Samples: 68 AC 10-19-01	TurnAround.: 21 Day(s)
Prod Code: D66012	Matrix : SOIL	Hold Time...: 30 Day(s)
DetectLim: 1 ppb	Type....: B	Start Date.: 10/18/01
	Recvd...: 10/16/01	Ship By....: 11/06/01
		DWL Due Dt.: 10/25/01

Analyte List.: Tetra - Octa

Method.....: Method 8280A:T-O
Client Proj..: Camp Pendleton 004
Client.....: Applied P & CH Laboratory (APC03)

P O. No .....:		Collect Dt/Tm: 09/27/01
Contact ...:	Eric Wendland	Phone.....: 909-590-1828
Proj. Mgr....:	Helen Smpardos	Fax.....: 909-590-1498
		Sample Origin: CA

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF: E89
EDD: A128

Prespike Standard: n/a
Extraction Exp....: 10/27/01

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AC / [signature] DATE: 10-18-01

Reviewed by: HSmpardos [signature] DATE: 10/18/01 (PMGT0197)

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 55583-C	Samples: 2	TurnAround.: 21 Day(s)
Prod Code: D66002	Matrix.: WATER	Hold Time..: 30 Day(s)
DetectLim: 10 ppt	Type...: B	Start Date.: 10/18/01
	Recvd..: 10/16/01	Ship By....: 11/06/01
		DWL Due Dt.: 10/25/01

Analyte List.: Tetra - Octa

Method.....: Method 8280A, Tetra-Octa CDD/CDF
Client Proj..: Camp Pendleton 004
Client.....: Applied P & CH Laboratory (APC03)
P.O. No.....:
Contact.....: Eric Wendland
Proj. Mgr....: Helen Smpardos

Collect Dt/Tm: 09/20/01
Phone.....: 909-590-1828
Fax.....: 909-590-1498
Sample Origin: CA

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF: E89
EDD: A128

Prespike Standard: n/a
Extraction Exp...: 10/20/01

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AG DATE: 10-18-01
Reviewed by: H Smpardos DATE: 10/18/01 (PMGT0197)

APCL

Applied P & Ch Laborator
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Cus dy

COPY

Please Print in pen
Page ____ of ____

TO: TRIANGLE LABS | Contact Mary McDonald | Tel: ( ) | Fax: ( )
Address | City | State | Zip code
APCL Project Title/Code | Sampler | Sample disposition: Date ☐client; ☐APCL
Bill to (if different from above) Parsons E.S. | Quotation # | P.O.#
Due date ☐regular ☐rush | Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
E1B-03A	9/27/01	0808	S	N	N	8290 + full package		
E1B-07A	9/26/01	1420				& EDD (NEDTS format)		
E1B-07C	9/26/01	1440						
E1B-01A	9/26/01	1034				Hold pending later		
E1B-01B	9/26/01	1100				instructions		
E1B-02A	9/26/01	1315						
E1B-02C	9/26/01	1332						
~~E1B-03A~~	~~9/27/01~~	~~0808~~		GW 2/7/02				
E1B-02B	9/26/01	1332						
E1B-03B	9/27/01	0825						
E1B-03C	9/27/01	0840						
E1B-03D	9/27/01	0830						
E1B-04A	9/27/01	1215						
E1B-04B	9/27/01	1227						
E1B-04C	9/27/01	1237						
E1B-05A	9/26/01	0946						
E1B-05B	9/26/01	1002						

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by	Date/Time	Received by	Date/Time
		[illegible]	2/9/02 11:30

* APCL must be notified if unit price is incorrect.

Applied P & Ch Laboratory — Subcontract Chain of Custody

13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

COPY

Please Print in pen

Page ____ of ____

TO: | Contact | Tel: ( ) | Fax: ( )

Address | City | State | Zip code

APCL Project Title/Code | Sampler | Sample disposition: Date ☐client; ☐APCL

Bill to (if different from above) | Quotation # | P.O.#

Due date ☐regular ☐rush | Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Fr Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
EIB-05C	9/26/01	1015	S	N	N	Hold		
EIB-06A	9/26/01	1223						
EIB-06B	9/26/01	1235						
EIB-06C	9/26/01	1250						
EIB-06D	9/26/01	1250						
~~EIB-07A~~	~~9/26/01~~	~~1420~~						
EIB-07B	9/26/01	1430						
~~EIB-07C & EIB-07D~~	~~9/26/01~~	~~1440~~						
EIB-08A	9/27/01	1010						
EIB-08B	9/27/01	1025						
EIB-08C	9/27/01	1050						
EIB-08D	9/27/01	1025						

2/7/02

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; ☐other

Relinquished by	Date/Time	Received by	Date/Time 2/9/02 11:30
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

APCL must be notified if unit price is incorrect.

14

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 56607
Client: PAR12 Parsons Engineering & Science, Inc.

Date Received 02/09/02 By

Carrier and Number FED EX

Book 317

Page 82

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID..... Client COC ID.....*	Matrix Location.....	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-1	E1B-03A E1B-03A	SOIL CO2	BKH 2-11-02	BKH 2-11-02	SPW 2-12-02	SPW 2-12-02					
317-82-2	E1B-07A E1B-07A	SOIL CO2									
317-82-3	E1B-07C E1B-07C	SOIL CO2	BKH 2-11-02	BKH 2-11-02							
317-82-4	E1B-01A E1B-01A	SOIL CO2									
317-82-5	E1B-01B-MS E1B-01B *	SOIL CO2									
317-82-6	E1B-02A E1B-02A	SOIL CO2									
317-82-7	E1B-02C E1B-02C	SOIL CO2									
317-82-8	E1B-02B E1B-02B	SOIL CO2									
317-82-9	E1B-03B E1B-03B	SOIL CO2									
317-82-10	E1B-03C E1B-03C	SOIL CO2									
317-82-11	E1B-03D E1B-03D	SOIL CO2									
317-82-12	E1B-04A E1B-04A	SOIL CO2									
317-82-13	E1B-04B E1B-04B	SOIL CO2									
317-82-14	E1B-04C E1B-04C	SOIL CO2									

Receiving Remarks:

Archive Remarks:

15

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 56607
Client: PAR12 Parsons Engineering & Science, Inc.

Book 317

Date Received 02/09/02 By

Page 82

Carrier and Number FED EX

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID..... Client COO ID.....*	Location.....	Matrix	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-15	E1B-05A E1B-05A	CO2	SOIL	SPW 2-12-02	SPW 2-12-02							
317-82-16	E1B-05B E1B-05B	CO2	SOIL									
317-82-17	E1B-05C E1B-05C	CO2	SOIL									
317-82-18	E1B-06A E1B-06A	CO2	SOIL									
317-82-19	E1B-06B E1B-06B	CO2	SOIL									
317-82-20	E1B-06C E1B-06C	CO2	SOIL									
317-82-21	E1B-06D E1B-06D	CO2	SOIL									
317-82-22	E1B-07B E1B-07B	CO2	SOIL									
317-82-23	E1B-08A E1B-08A	CO2	SOIL									
317-82-24	E1B-08B E1B-08B	CO2	SOIL									
317-82-25	E1B-08C E1B-08C	CO2	SOIL									
317-82-26	E1B-08D E1B-08D	CO2	SOIL									

Receiving Remarks:

Archive Remarks:

Form Revised 05/27/1997 -- Page 2 OF 2

6

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 56607-	Samples: 3	TurnAround : 18 Day(s)
Prod Code: D01012	Matrix..: Soil	Hold Time. : 30 Day(s)
DetectLim: 1 ppt	Type....: NA	Start Date : 02/11/02
	Recvd...: 02/09/02	Ship By... : 02/27/02
		DWL Due Dt.: 02/15/02

Analyte List.: METHOD 8290 T-O

Method.....: Method 8290: Tetra-Octa
Client Proj..: APCL Samples
Client.....: Parsons Engineering & Science, Inc. (PAR12)
P.O. No.....: Collect Dt/Tm: 09/27/01 08:08
Contact.....: Cindy Zicker Phone.....: 626-440-6156
Proj. Mgr....: Mary McDonald Fax.....: 626-440-6200
Sample Origin:

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF.....: EPA Prespike Standard: N/A
EDD: A128

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: _____ DATE: 2/9/02
Reviewed by: _____ DATE: 2/19/02 (PMGT0197

Triangle Laboratories, Inc.®
2445 S. Alston Ave. • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 13:10 02/09/2002

APCL

Applied P & Ch Laboratory

13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

COPY

Contract Chain of Custody

Please Print in pen

Page _____ of _____

TO: TRIANGLE LABS | Contact Mary McDonald | Tel: ( ) | Fax: ( )

Address | City | State | Zip code

APCL Project Title/Code | Sampler | Sample disposition: Date ☐client; ☐APCL

Bill to (if different from above) PERSONAL | Quotation # | P.O.#

Due date ☐regular ☐rush | Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
E1B-03A	9/27/01	0808	S	N	N	8290 + full package		
E1B-07A	9/26/01	1420				+ EDD (NEDTS format)		
E1B-07C	9/26/01	1440						
E1B-01A	9/26/01	1034				Hold pending later		
E1B-01B	9/26/01	1100				instructions		
E1B-02A	9/26/01	1315						
E1B-02C	9/26/01	1332						
~~E1B-03A~~	~~9/27/01~~	~~0808~~						
E1B-02B	9/26/01	1332						
E1B-03B	9/27/01	0825						
E1B-03C	9/27/01	0840						
E1B-03D	9/27/01	0830						
E1B-04A	9/27/01	1215						
E1B-04B	9/27/01	1227						
E1B-04C	9/27/01	1237						
E1B-05A	9/26/01	0945						
E1B-05B	9/26/01	1002						

GW 2/7/02

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by	Date/Time	Received by [signature]	Date/Time 2/9/02 11:30
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

* APCL must be notified if unit price is incorrect.

COPY

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page _____ of _____

TO:
Contact
Tel: ( )
Fax: ( )
Address
City
State
Zip code
APCL Project Title/Code
Sampler
Sample disposition: Date ☐client; ☐APCL
Bill to (if different from above)
Quotation #
P.O.#
Due date ☐regular ☐rush
Client signature
Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
EIB-05C	9/26/01	1015	S	N	N	Hold		
EIB-06A	9/26/01	1223						
EIB-06B	9/26/01	1235						
EIB-06C	9/26/01	1250						
EIB-06D	9/26/01	1250						
~~EIB-07A~~	~~9/26/01~~	~~1420~~						
EIB-07B	9/26/01	1430						
~~EIB-07C~~ ~~EIB-07C~~	~~9/26/01~~	~~1440~~						
EIB-08A	9/27/01	1010						
EIB-08B	9/27/01	1025						
EIB-08C	9/27/01	1050						
EIB-08D	9/27/01	1025						

SW 2/7/02

SW 2/7/01

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; ☐Other

Relinquished by	Date/Time	Received by	Date/Time 2/9/02 1130
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

* APCL must be notified if unit price is incorrect

14

COPY

Eric W

From: George & Cindy Zicker [gzicker@socal.rr.com]
Sent: Friday, February 08, 2002 12:36 PM
To: Eric W
Cc: Steve Griswold
Subject: 1E1 Samples to ship for Dioxin
Importance: High

i Eric!

he three samples we want to have analyzed by 8290 (right away) are
E1B-03A
E1B-07A
E1B-07C

ve already contacted Triangle and asked them to bill me direct so they are expecting the samples Please clearly indicate the ree samples to be analyzed by 8290 and mark the rest as "hold"

lease ship all of the following samples:
E1B-01A
E1B-01B
E1B-02A
E1B-02B
E1B-02C
E1B-03A
E1B-03B
E1B-03C
E1B-03D
E1B-04A
E1B-04B
E1B-04C
E1B-05A
E1B-05B
E1B-05C
E1B-06A
E1B-06B
E1B-06C
E1B-06D
E1B-07A
E1B-07B
E1B-07C
E1B-08A
E1B-08B
E1B-08C and
E1B-08D

lease send these samples today (Friday) for overnight delivery and make sure samples are packaged to maintain 4 degrees C reservation.

lso, if at all possible could you please e-mail me information regarding how long samples have been stored at the warehouse and pproximate temperature in the warehouse Just in case down the line we have to explain this in a data quality assessment.

hanks a bunch,
indy

15

TRIANGLE LABORATORIES, INC. LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 56607
Client: PAR12 - Parsons Engineering & Science, Inc.

Date Received 02/09/02 By

Carrier and Number FED EX

Book 317

Page 82

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID / Client COC ID	Matrix / Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-1	E1B-03A E1B-03A	SOIL CO2	BKH 2-11-02	BKH 2-11-02	SPW 2-12-02	SPW 2-12-02			SPW 2-21-02	SPW 2-21-02	
317-82-2	E1B-07A E1B-07A	SOIL CO2									
317-82-3	E1B-07C E1B-07C	SOIL CO2	BKH 2-11-02	BKH 2-11-02							
317-82-4	E1B-01A E1B-01A	SOIL CO2									
317-82-5	E1B-01B-MS E1B-01B *	SOIL CO2									
317-82-6	E1B-02A E1B-02A	SOIL CO2					2-20-02 CDR	2-20-02 CDR			
317-82-7	E1B-02C E1B-02C	SOIL CO2									
317-82-8	E1B-02B E1B-02B	SOIL CO2									
317-82-9	E1B-03B E1B-03B	SOIL CO2					2-20-02 CDR	2-20-02 CDR			
317-82-10	E1B-03C E1B-03C	SOIL CO2									
317-82-11	E1B-03D E1B-03D	SOIL CO2									
317-82-12	E1B-04A E1B-04A	SOIL CO2					2-20-02 CDR	2-20-02 CDR			
317-82-13	E1B-04B E1B-04B	SOIL CO2									
317-82-14	E1B-04C E1B-04C	SOIL CO2									

Receiving Remarks:

Archive Remarks:

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container...: Intact

TLI Project Number 56607
Client: PAR12 - Parsons Engineering & Science, Inc.

Book 317

Date Received 02/09/02 By

Carrier and Number FED EX

Page 82

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID..... Client COC ID.....*	Location.....	Matrix	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-15	E1B-05A E1B-05A	CO2	SOIL	SPW 2-12-02	SPW 2-12-02			SPW 2-21-02	SPW 2-21-02			
317-82-16	E1B-05B E1B-05B	CO2	SOIL									
317-82-17	E1B-05C E1B-05C	CO2	SOIL									
317-82-18	E1B-06A E1B-06A	CO2	SOIL									
317-82-19	E1B-06B E1B-06B	CO2	SOIL									
317-82-20	E1B-06C E1B-06C	CO2	SOIL									
317-82-21	E1B-06D E1B-06D	CO2	SOIL									
317-82-22	E1B-07B E1B-07B	CO2	SOIL			2-20-02 VDR	2-20-02 VDR					
317-82-23	E1B-08A E1B-08A	CO2	SOIL			2-20-02 VDR	2-20-02 VDR					
317-82-24	E1B-08B E1B-08B	CO2	SOIL									
317-82-25	E1B-08C E1B-08C	CO2	SOIL									
317-82-26	E1B-08D E1B-08D	CO2	SOIL									

Receiving Remarks:

Archive Remarks:

Form Revised 05/27/1997 -- Page 2 OF 2

17

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 56607-A	Samples: 2	TurnAround : 18 Day(s)
Prod Code: D01012	Matrix..: Soil	Hold Time...: 30 Day(s)
DetectLim: 1 ppt	Type....: NA	Start Date..: 02/20/02
	Recvd...: 02/09/02	Ship By.....: 03/08/02
		DWL Due Dt..: 02/26/02

Analyte List..: 8290 T-O

Method.....: Method 8290: Tetra-Octa
Client Proj...: APCL Samples
Client.....: Parsons Engineering & Science, Inc (PAR12)
P.O. No.....: Collect Dt/Tm: 09/27/01 08:08
Contact.....: Cindy Zicker Phone.....: 626-440-6156
Proj. Mgr....: Mary McDonald Fax.....: 626-440-6200
Sample Origin:

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF.....: EPA Prespike Standard: N/A
EDD(s).....: A128

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AG / [signature] DATE: 02-20-02
Reviewed by: MEM / [signature] DATE: 02-20-02 (PMGT0197

Triangle Laboratories, Inc.®
2445 S. Alston Ave. • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 09:20 02/20/2002

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

COPY

Subcontract Chain of Custody

Please Print in pen
Page ____ of ____

TO: TRIANGLE LABS | Contact Mary McDonald | Tel: ( ) | Fax: ( )
Address | City | State | Zip code
APCL Project Title/Code | Sampler | Sample disposition: Date ☐client; ☐APCL
Bill to (if different from above) Parsons E.S. | Quotation # | P.O.#
Due date ☐regular ☐rush | Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
E1B-03A	9/27/01	0808	S	N	N	8290 + full Package		
E1B-07A	9/26/01	1420				+ EDD (NEDTS format)		
E1B-07C	9/26/01	1440				↓		
E1B-01A	9/26/01	1034				Hold pending later instructions		
E1B-01B	9/26/01	1100						
E1B-02A	9/26/01	1315						
E1B-02C	9/26/01	1332						
~~E1B-03A~~	~~9/27/01~~	~~0808~~		on 2/7/02				
E1B-02B	9/26/01	1332						
E1B-03B	9/27/01	0825						
E1B-03C	9/27/01	0840						
E1B-03D	9/27/01	0830						
E1B-04A	9/27/01	1215						
E1B-04B	9/27/01	1227						
E1B-04C	9/27/01	1237						
E1B-05A	9/26/01	0945						
E1B-05B	9/26/01	1002	↓	↓	↓	↓		

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by	Date/Time	Received by [signature]	Date/Time 2/9/02 11:30
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

* APCL must be notified if unit price is incorrect.

COPY

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page _____ of _____

TO: | Contact | Tel: ( ) | Fax: ( )

Address | City | State | Zip code

APCL Project Title/Code | Sampler | Sample disposition: Date ☐client; ☐APCL

Bill to (if different from above) | Quotation-# | P.O.#

Due date ☐regular ☐rush | Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
EIB-05C	9/26/01	1015	S	N	N	Hold.		
EIB-06A	9/26/01	1223						
EIB-06B	9/26/01	1235						
EIB-06C	9/26/01	1250						
EIB-06D	9/26/01	1250						
~~EIB-07A~~	~~9/26/01~~	~~1420~~						
EIB-07B	9/26/01	1430						
~~EIB-07C~~ EIB-07C	~~9/26/01~~	~~1440~~						
EIB-08A	9/27/01	1010						
EIB-08B	9/27/01	1025						
EIB-08C	9/27/01	1050						
EIB-08D	9/27/01	1025						

2/7/02

2/7/01

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by	Date/Time	Received by	Date/Time 2/9/02 11:30
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

* APCL must be notified if unit price is incorrect.

COPY

Eric W

From: George & Cindy Zicker [gzicker@socal.rr.com]
Sent: Friday, February 08, 2002 12:36 PM
To: Eric W
Cc: Steve Griswold
Subject: 1E1 Samples to ship for Dioxin
Importance: High

i Eric!

he three samples we want to have analyzed by 8290 (right away) are
E1B-03A
E1B-07A
E1B-07C

ve already contacted Triangle and asked them to bill me direct so they are expecting the samples. Please clearly indicate the ree samples to be analyzed by 8290 and mark the rest as "hold".

lease ship all of the following samples:
E1B-01A
E1B-01B
E1B-02A
E1B-02B
E1B-02C
E1B-03A
E1B-03B
E1B-03C
E1B-03D
E1B-04A
E1B-04B
E1B-04C
E1B-05A
E1B-05B
E1B-05C
E1B-06A
E1B-06B
E1B-06C
E1B-06D
E1B-07A
E1B-07B
E1B-07C
E1B-08A
E1B-08B
E1B-08C and
E1B-08D

lease send these samples today (Friday) for overnight delivery and make sure samples are packaged to maintain 4 degrees,C reservation.

lso, if at all possible could you please e-mail me information regarding how long samples have been stored at the warehouse and pproximate temperature in the warehouse. Just in case down the line we have to explain this in a data quality assessment.

hanks a bunch,
indy

TRIANGLE LABORATORIES, INC. LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container....: Intact

TLI Project Number 56607
Client: PAR12 - Parsons Engineering & Science, Inc.

Date Received 02/09/02 By [illegible]

Carrier and Number FED EX

Book 317

Page 82

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID..... Client COC ID.....*	Matrix Location.....	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-1	E1B-03A E1B-03A	SOIL CO2	BKH 2-11-02	BKH 2-11-02	SPW 2-12-02	SPW 2-12-02			SPW 2-21-02	SPW 2-21-02	
317-82-2	E1B-07A E1B-07A	SOIL CO2									
317-82-3	E1B-07C E1B-07C	SOIL CO2	BKH 2-11-02	BKH 2-11-02							
317-82-4	E1B-01A E1B-01A	SOIL CO2									
317-82-5	E1B-01B-MS E1B-01B	SOIL CO2									
317-82-6	E1B-02A E1B-02A	SOIL CO2					2-20-02 [illegible]	2-20-02 [illegible]			
317-82-7	E1B-02C E1B-02C	SOIL CO2									
317-82-8	E1B-02B E1B-02B	SOIL CO2									
317-82-9	E1B-03B E1B-03B	SOIL CO2					2-20-02 [illegible]	2-20-02 [illegible]			
317-82-10	E1B-03C E1B-03C	SOIL CO2									
317-82-11	E1B-03D E1B-03D	SOIL CO2									
317-82-12	E1B-04A E1B-04A	SOIL CO2					2-20-02 [illegible]	2-20-02 [illegible]			
317-82-13	E1B-04B E1B-04B	SOIL CO2									
317-82-14	E1B-04C E1B-04C	SOIL CO2									

Receiving Remarks:

Archive Remarks:

2

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container....: Intact

TLI Project Number 56607
Client: PAR12 - Parsons Engineering & Science, Inc.

Book 317

Date Received 02/09/02 BY

Carrier and Number FED EX

Page 82

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID Client COC ID	Matrix Location	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
317-82-15	E1B-05A E1B-05A	SOIL CO2	SRW 2-12-02	SRW 2-17-02			SRW 2-21-02	SRW 2-21-02			
317-82-16	E1B-05B E1B-05B	SOIL CO2									
317-82-17	E1B-05C E1B-05C	SOIL CO2									
317-82-18	E1B-06A E1B-06A	SOIL CO2									
317-82-19	E1B-06B E1B-06B	SOIL CO2									
317-82-20	E1B-06C E1B-06C	SOIL CO2									
317-82-21	E1B-06D E1B-06D	SOIL CO2									
317-82-22	E1B-07B E1B-07B	SOIL CO2			2-20-02 VDR	2-20-02 VDR					
317-82-23	E1B-08A E1B-08A	SOIL CO2			2-20-02 VDR	2-20-02 VDR					
317-82-24	E1B-08B E1B-08B	SOIL CO2									
317-82-25	E1B-08C E1B-08C	SOIL CO2									
317-82-26	E1B-08D E1B-08D	SOIL CO2									

Receiving Remarks:

Archive Remarks:

Form Revised 05/27/1997 -- Page 2 OF 2

22

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 56607-B	Samples: 3	TurnAround.: 18 Day(s)
Prod Code: D01012	Matrix.: Soil	Hold Time..: 30 Day(s)
DetectLim: 1 ppt	Type....: NA	Start Date.: 02/20/02
	Recvd...: 02/09/02	Ship By....: 03/08/02
		DWL Due Dt.: 02/26/02

Analyte List.: 8290 T-O

Method.....: Method 8290: Tetra-Octa
Client Proj..: APCL Samples
Client.....: Parsons Engineering & Science, Inc. (PAR12)
P.O. No.....:
Contact.....: Cindy Zicker
Proj. Mgr....: Mary McDonald

Collect Dt/Tm: 09/27/01 08:08
Phone.....: 626-440-6156
Fax.....: 626-440-6200
Sample Origin:

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF.....: EPA

Prespike Standard: N/A
EDD(s).....: A128

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AC / [signature] DATE: 02-20-02

Reviewed by: MCM / [signature] DATE: 02-20-02 (PMGT0197

Triangle Laboratories, Inc.®
2445 S. Alston Ave. • Durham, North Carolina 27713
Phone: (919) 544-5729 • Fax: (919) 544-5491

Printed: 09:44 02/20/2002

APPENDIX G3
SITE 1H

SITE 1H ANALYTICAL REPORTS

Applied Physics & Chemistry Laboratory – Chino, California

01-6344
01-6448

Triangle Laboratories – Durham, North Carolina

56389A

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Cust dy

Please Print in pen Page 1 of ____

Client: PARSONS Contact: C. ZICKER Tel #: 626 440 6156 Fax #: 626 440 6200
Address: 100 W. Walnut St. City: Pasadena State: CA Zip code: 91124
Bill to: SAME
Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11000
Project Address SITE 1H APCL Quotation #
Due Date: [X] regular [ ] rush ___ days ___ hours Sampled by: K. BRAND

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	6010B/7000	Cr6+ (7196A)	Hg (7471A)	8330									Remarks
1HSB-03A		10/11/01	1050	SOIL	ICE	2	X	X	X	X									
-03B			1108			2	X	X	X	X									
~~-03C~~						~~2~~													
1HSB-04A			1130			2	X	X	X	X									
-04B			1144			2	X	X	X	X									
~~-04C~~						~~2~~													
-04D			1130			2	X	X	X	X									
TEMP		10/11/01	—	H_2O		2 VOA													

6344

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 10/11/01 / 1515 Received by [signature] Date/Time 10/11/01 / 1520
Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 6344 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 10/11/01 1520 Date/Time Opened 10/11/01 1520 By (name): Paul
Custody Transfer: ☑ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☐ APCL Empl: _____

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☑ Cooler Used? # of 1 Cooled by: ☐ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.3 _____ _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☐ glass ☑ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____
Received/Checked by: Paul Date: 11 Oct 2001 Time: 8:18 a.m

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal texfiles]smprcl.tex

039902

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zicker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste A2 City: Pasadena State: CA Zip code: 91124

Bill to: same

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # ~~11000~~ 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JL

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8280A	6010B/7000	Cr6+ (7196A)	Hg (7471A)	8330	SPLP (1312)	TCLP (1311)						Remarks
1HSB-01A		10/8/01	0910	Soil	Ice	1		X	X	X	X								* Extra volume
1HSB-01B			0920					X	X	X	X								collected for
1HSB-01C			0925					X	X	X	X	X	X						MS/MSD
1HSB-01D			0945				X	X	X	X	X								analyses
1HSB-01E			0955					X	X	X	X								
1HSB-01F			0900					X	X	X	X								
1HSB-02A*			1335			3		X	X	X	X								
1HSB-02B			1340			1		X	X	X	X								
1HSB-02C			1345				X	X	X	X	X								
1HSB-02D			1358				X	X	X	X	X	X	X						
1HSB-02E			1405					X	X	X	X								
1HSB-02F			1200					X	X	X	X								
1HSB-03A			1305					X	X	X	X								
1HSB-03B			1312					X	X	X	X								
1HSB-03C			1318					X	X	X	X								

6448

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 10/16/01 / 11:13 Received by [signature] Date/Time 10/16/01 / 11:13

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zirker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste A2 City: Pasadena State: CA Zip code: 91124

Bill to:

Project Name/Code Camp Pendleton OUY Job # 74012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JL

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	8280A	6010B/7000	Cr6+ (7196A)	Hg (7471A)	8330	SPLP (1312)	TCLP (1311)	VOCs (8260B)	Gasoline (8015M)	6010B/7000 24 hr, 7471A	8250A	SVOCs, PCBs, TPH Diesel, 8141 Pesticides	Remarks
1HSB-06A		10/15/01	1130	Soil	Ice	1		X	X	X	X								
1HSB-06B			1140					X	X	X	X								
1HSB-06C			1146					X	X	X	X								
1HSB-07A			1055					X	X	X	X								
1HSB-07B			1105					X	X	X	X								
1HSB-07C			1110					X	X	X	X								
1HSB-08A			1515					X	X	X	X								
1HSB-08B			1525					X	X	X	X								
1HSB-08C			1530					X	X	X	X								
HSA-EB1		10/15/01	1550	Water	HCl	3-40mL VOAs								X					
					None	3-40mL VOAs									X				
					HNO3	2-Polys										X			
					None	2-1L Ambers											X		
					None	7-1L Ambers												X	

6448

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 10/16/01 / 1113 Received by Roy Aguilar Date/Time 10-16-01 / 11:13

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Date:

Clients unde[illegible] that all terms described in the proposals, quotations for this project, and/or th[illegible]eral terms provided in the current APCL price schedules will be followed. APCL [illegible]ves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 6448 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 10/16/01 1113 Date/Time Opened 10/16/01 1200 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Raj

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ___ ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. Shipping Container/Cooler

☑ Cooler Used? # of 2 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.9 4.3
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☑ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: Paul Date: 16 Oct 2001 Time: 10:00 a m

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

>cumentFile [ocal texfiles]smprcl tex

040202

COPY

APCL

Applied P & Ch Laboratory
13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page 1 of 1

TO: Triangle
Contact Helen Smpardos Tel: (919) 544-5729 Fax: (919) 574-5491
Address 801 Capitola Drive
City Durham State N.C. Zip code 27713
APCL Project Title/Code CAMP Pendleton
Sampler
Sample disposition: Date ☐client; ☐APCL
Bill to (if different from above)
Quotation #
P.O.#
Due date ☑regular ☐rush
Client signature Joseph A. Saldana
Date 1-10-02

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
1AIB-07A	12/13/01	1120	S			Dioxins & Furans		01-7795-1
6A-B02-C	11/30/01	1220	S			8280A Full list		01-7436-1
HA-EB1-1201	12/13/01	1030	W			level 4 with EDD		01-7694-1
1HSB-01D	10/15/01	0945	S			NEDTS format		01-6450-1
1HSB-02 C		1345	S					01-6450-2
1HSB-02D		1358	S					01-6450-3
HSA-EB1		1550	W					01-6450-4
1111SB-09	12/03/01		S					02-1043-3
1111SB-09	12/03/01		S					02-1043-4
1111SB-9A-A	12/11/01		S					02-1043-1
1111SB-9A-B	12/11/01		S					02-1043-2
1111SB-19B	12/03/01		S					02-1043-5
1111SB-27A	12/03/01		S					02-1043-6

Sample Conditions: Seal ☐ Intact ☐ Broken ☑ None; Temperature ☑ Cold ☐ Room; Other

Relinquished by Joseph A. Saldana	Date/Time 1-10-02 1242	Received by Stacy White	Date/Time 1-12-02 8:50
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time
Relinquished by	Date/Time	Received by	Date/Time

* APCL must be notified if unit price is incorrect.

[illegible] Laboratory
13[illegible] Magnolia Ave. Chino CA 91710
Tel. (000) 000-1838 Fax: (000) 000-1408

Subcontract Information

Subcontractor Name Triangle

Subcontractor Contact Helen Sampardos

APCL Subcontract ID (from Subcontract Logbook) 0251003

APCL Purchase Order # :

Service ID	Client Name and QC Level	Test Method Code and Description	APCL Quo-#	Unit Price	# of Smpl	Sub's Quo-#	Unit Price	Subtotal Amount
02-1043	Parsons / NEESA C	8280A Dioxins						
01-6450								
01-7694								
01-7436								
01-7795								
							Total Amount	

Prepared by Joseph A. Sullivan (Service Dept.) Date 1/18/02

Reviewed by _____ (Marketing Dept.) Date / /

Reviewed by _____ (Financial Dept.) Date / /

Approved by _____ (Service Dept.) Date / /

Shipped out by _____ Date / /

Expected Report Date / / Actual Report Date / /

Please keep this form, together with the COC to the subcontractor, in Subcontract Record at Rm 104 in sequence of subcontract ID.

TRIANGLE LABORATORIES, INC. -- LOG IN RECORD/CHAIN OF CUSTODY

Custody Seal : Absent
Chain of Custody : Present
Sample Tags : Absent
Sample Tag Numbers: Not Listed on Chain of Custody
SMO Forms : N/A

Sample Seals: Absent
Container.... Intact

TLI Project Number 56389
Client: APC03 Applied P & CH Laboratory

Date Received 01/12/02 BY
Carrier and Number AIRBORNE

Book 315
Page 62

Ice Chest ICE Temp 4.0 C

TLI Number.. mR/H:CPM.	Client Sample ID / Client COC ID	Location	Matrix	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	To LAB Date/Init	To STORAGE Date/Init	DISPOSED Date/Init
315-62-1	1A1B-07A 1A1B-07A	CO2	SOIL									
315-62-2	6A-B02-C 6A-B02-C	CO2	SOIL									
315-62-3	HA-EB1-1201 HA-EB1-1201	CO2	WATER	SPW 1-15-02	Used							
315-62-4	1HSB-01D 1HSB-01D	CO2	SOIL									
315-62-5	1HSB-02C 1HSB-02C	CO2	SOIL									
315-62-6	1HSB-02D 1HSB-02D	CO2	SOIL									
315-62-7	HSA-EB1 HSA-EB1	CO2	WATER	SPW 1-15-02	Used							
315-62-8	1111SB-09B 1111SB-09 *	CO2	SOIL									
315-62-9	1111SB-09C 1111SB-09 *	CO2	SOIL									
315-62-10	1111SB-9A-A 1111SB-9A-A	CO2	SOIL									
315-62-11	1111SB-9A-B 1111SB-9A-B	CO2	SOIL									
315-62-12	1111SB-19B 1111SB-19B	CO2	SOIL									
315-62-13	1111SB-27A 1111SB-27A	CO2	SOIL									

Receiving Remarks: COC LIST SAMPLE ID 1111SB-09 TWICE.TWO SAMPLES ARRIVED 1111SB-09B & 1111SB-09C HOWEVER THEY ARE NOT LISTED ON COC. RAW 1/12/02

Archive Remarks:

TRIANGLE LABORATORIES, INC.
SAMPLE TRACKING AND PROJECT MANAGEMENT FORM

----------ADMINISTRATIVE INFORMATION----------

TLI Proj#: 56389-B
Prod Code: D66002
DetectLim: 10 ppt

Samples: 2
Matrix..: WATER
Type....: B
Recvd...: 01/12/02

TurnAround..: 21 Day(s)
Hold Time...: 30 Day(s)
Start Date..: 01/14/02
Ship By.....: 02/02/02
DWL Due Dt..: 01/21/02

Analyte List : Tetra - Octa

Method.....: Method 8280A, Tetra-Octa CDD/CDF
Client Proj...: Camp Pendleton
Client.....: Applied P & CH Laboratory (APC03)
P.O. No.....:
Contact.....: Joseph Seldome
Proj. Mgr....: Helen Smpardos

Collect Dt/Tm: SeeCOC
Phone.....: 909-590-1828
Fax.....: 909-590-1498
Sample Origin: CA

----------SPECIAL INSTRUCTIONS / QA REQUIREMENTS----------

TEF.....: E89

Prespike Standard: n/a
EDD(s).....: A128

----------REPORTING REQUIREMENTS----------

Reporting Format: Report Option III

See MILES for Instructions/Communications.

Completed by: AC / [illegible] DATE: 01-14-02

Reviewed by: H Smpardos [illegible] DATE: 01/14/02 (PMGT0197)

APPENDIX G4
SITE 30

SITE 30 ANALYTICAL REPORTS

Applied Physics & Chemistry Laboratory – Chino, California

01-5723
01-5724
01-5746
01-5747
01-5772
01-5798
01-5799
01-5823
01-5824
01-5840
01-5841
01-5858
01-5868
01-5870
01-5899
01-5901
01-5931
01-5932
01-5933
01-5961
01-5975
01-5976
01-6047
01-6461
01-7323

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: Cindy Ficker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut St. City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	8330	8332	6010 B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-E11-A1	30-E11-A	9-10-01	1140	SO12	ICE ~~NONE~~	1								TBD- hold samples for further analysis pending initial results;
30-E11-A2			1150				X				TBD			
30-E11-A3			1208											
30-E11-B1	30-E11-B		1143											
30-E11-B2			1155				X				TBD			
30-E11-B3			1210											
30-E11-C1	30-E11-C		1148											
30-E11-C2			1200				X				TBD			
30-E11-C3			1213											Please composite complete sample as indicated
30-E10-A1	30-E10-A		1335											
30-E10-A2			1350				X				TBD			
30-E10-A3			1407											
30-E10-B1	30-E10-B		1340											
30-E10-B2			1356				X				TBD			
30-E10-B3			1415											

5723

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken; Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 / 1800 Received by [signature] Date/Time 9-10-01 / 1800

Relinquished by Date/Time / Received by Date/Time

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 West Walnut St.
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B	SPLP(1312)	TCLP(1311)	Remarks
30-E10-C1	30-E10-C	9/10/01	~~1340~~ 1345	SOIL	~~None~~ ICE	1								Please composite complete sample as indicated; TBD- hold composited sample for further analysis pending initial results.
30-E10-C2			~~1350~~ 1352				X				TBD			
30-E10-C3			~~1525~~ 1417											
30-E12-A1	30-E12-A		~~1442~~ 1440											
30-E12-A2			~~1514~~ 1510				X				TBD			
30-E12-A3			1525											
30-E12-B1	30-E12-B		1442											
30-E12-B2			1514				X				TBD			
30-E12-B3			1530											
30-E12-C1	30-E12-C		1445											
30-E12-C2			1520				X				TBD			
30-E12-C3			1533											
30-E14-A1	30-E14-A		1545											
30-E14-A2			1600				X				TBD			
30-E14-A3			1619											

5723

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 1800 Received by [signature] Date/Time 9-10-01 1800

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut St.
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012
P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Analysis Items: Pb (7421)	8270C	8330	8332	6010B	SPLP (1312)	TCLP (1311)	Remarks
30-E14-B1	30-E14-B	9/10/01	1550	SOIL	~~[illegible]~~	1								Please composite
30-E14-B2			1606				X				TBD			complete sample
30-E14-B3			1622											as indicated;
30-E14-C1	30-E14-C		1554											TBD-hold
30-E14-C2			1610				X				TBD			composited sample
30-E14-C3			1625											for further
30-E14-D1	30-E14-D		1558											analysis pending
30-E14-D2			1613				X				TBD			initial results
30-E14-D3			1627											
30-E08-A1	30-E08-A		1132											
30-E08-A2			1200				X				TBD			
30-E08-A3			1212											
30-E08-B1	30-E08-B		1149											
30-E08-B2			1205				X				TBD			
30-E08-B3			1217											

5723

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☒ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 / 1802 Received by [signature] ~~Date/Time~~ 9/10/01 / 1802

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5723 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/10/01 1800 Date/Time Opened 9/11/01 0832 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Reuse

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.0 4.2 4.7 _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____
Received/Checked by: Paul Date: 10 Sep 2001 Time: 8:14 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal texfiles]amprcl.tex

029902

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zicker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste 42 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 74001 2 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8330	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-E08-C1	30-E08-C	9/10/01	~~1351~~ 1450	Soil	Ice	1	X				TBD			Please composite complete sample as indicated, TBD - hold composited sample for further analysis pending initial results
30-E08-C2			~~1415~~ 1289											
30-E08-C3			1219											
30-E09-A1	30-E09-A		1345				X				TBD			
30-E09-A2			1406											
30-E09-A3			1426											
30-E09-B1	30-E09-B		1348				X				TBD			
30-E09-B2			1409											
30-E09-B3			1429											
30-E09-C1	30-E09-C		1351				X				TBD			
30-E09-C2			1415											
30-E09-C3			1413											
30-E09-D1	30-E09-D		1400				X				TBD			
30-E09-D2			1420											
30-E09-D3			1435											

5724

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 / 1800 Received by [signature] Date/Time 9/10/01 1800

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zicker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste. A2 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: VG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-E13-A1		9/10/01	1442	Soil	Ice	1													
30-E13-A2	30-E13-A		1523				X					TBD							
30-E13-A3			1540																
30-E13-B1			1445																
30-E13-B2	30-E13-B		1524				X					TBD							
30-E13-B3			1545																
30-E13-C1			1511																
30-E13-C2	30-E13-C		1533				X					TBD							
30-E13-C3			1548																
30-E15-A1			1601																
30-E15-A2	30-E15-A		1618				X					TBD							
30-E15-A3			1635																
30-E15-B1			1605																
30-E15-B2	30-E15-B		1622				X					TBD							
30-E15-B3			1640																

5724

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken; Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 / 1800 Received by [signature] Date/Time 9/10/01 / 1800

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C Zeller Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste A2 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☑ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)				Remarks
30-E15-C1	30-E15-C	9/10/01	1209	Soil	Ice	1	X					TBD						
30-E15-C2		1	1225	1	1	1												
30-E15-C3		1	1243	1	1	1												

White – With report
Yellow – Lab copy
Pink – Originator

9/10/01

5724

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/10/01 1800 Received by [signature] Date/Time 9-10-01 1800

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5724 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/10/01 1800 Date/Time Opened 9/11/01 0830 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.0 4.2 4.7 _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: Paul Date: 10 Sep 2001 Time: 8:14 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal texfiles]smprcl.tex

030502

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 West Walnut St. City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-G07-A1	30-G07-A	9/11/01	0815	SOIL	ICE	1	X					TBD							Please composite complete sample as indicated; TBD- hold composited sample for further analysis pending initial results; ★ additional sample volume provided for MS/MSD.
30-G07-A2			0830																
30-G07-A3			0845																
30-G07-B1	30-G07-B		0820				X					TBD							
30-G07-B2			0835																
30-G07-B3			0850																
30-G07-C1★	30-G07-C		0825				X					TBD							
30-G07-C2★			0840																
30-G07-C3★			0855																
30-C18-A1	30-C18-A		0920				X					TBD							
30-C18-A2			1005																
30-C18-A3			0950																
30-C18-B1	30-C18-B		0925				X					TBD							
30-C18-B2			1010																
30-C18-B3			0955																

5746

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 / 1830 Received by [signature] Date/Time 9-11-01 / 1830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: Cindy Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 West Walnut St City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton 0114 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-C18-C1		9/11/01	0931	SOIL	ICE	1													
30-C18-C2	30-C18-C		1013				X					TBD							
30-C18-C3			1000																
30-D16-A1			1145																
30-D16-A2	30-D16-A		1153				X					TBD							
30-D16-A3			1202																
30-D16-B1			1147																
30-D16-B2	30-D16-B		1155				X					TBD							
30-D16-B3			1206																
30-D16-C1			1149																
30-D16-C2	30-D16-C		1158				X					TBD							
30-D16-C3			1210																
30-D16-D1			1151																
30-D16-D2	30-D16-D		1200				X					TBD							
30-D16-D3			1215																

5746

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 1830 Received by [signature] Date/Time 9-11-01 1830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: Cindy Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 West Walnut St City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code CAMP PENDLETON OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-E16-A1	30-E16-A	9/11/01	0838	SOIL	ICE	1	X					TBD							
30-E16-A2			0903																
30-E16-A3			0919																
30-E16-B1	30-E16-B		0849				X					TBD							
30-E16-B2			0909																
30-E16-B3			0925																
30-E16-C1	30-E16-C		0856				X					TBD							
30-E16-C2			0912																
30-E16-C3			0930																
30-G04-A1	30-G04-A		1145				X					TBD							
30-G04-A2			1201																
30-G04-A3			1220																
30-G04-B1	30-G04-B		1150				X					TBD							
30-G04-B2			1208																
30-G04-B3			1222																

5746

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 1830 Received by [signature] Date/Time 9-11-01 1830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5716 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/11/01 1830. Date/Time Opened 9/12/01 0800. By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. **Shipping Container/Cooler**

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.6 4.1 3.5

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: ____

Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT 5 Day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 11 Sep 2001 Time: 9:08 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal.texfiles]smpcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: Cindy Zicker
Tel #: 626-440-6156
Fax #: 626-440-6200
Address: 100 West Walnut St
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: CAMP PENDLETON 044
Job # 740012
P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush ____ days ____ hours
Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-G04-C1	30-G04-C	9/11/01	1153	SOIL	ICE	1								
30-G04-C2			1214				X							
30-G04-C3			1226											
30-G04-D1	30-G04-D		1159											
30-G04-D2			1217				X							
30-G04-D3			1230											
30-D17-A1	30-D17-A		1330											
30-D17-A2			1345				X							
30-D17-A3			1400											
30-D17-B1	30-D17-B		1335											
30-D17-B2			1360				X							
30-D17-B3			1410											
30-D17-C1	30-D17-C		1340											
30-D17-C2			1355				X							
30-D17-C3			1420											

5747

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ____ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 1830 Received by [signature] Date/Time 9-11-01 1830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: Cindy Bicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 West Walnut St City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation # JG/AR

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)				Remarks
30-G03-A1 *	30-G03-A	9/11/01	1430	SOIL	ICE	2											* additional
30-G03-A2 *			1445			2	X				TBD						sample
30-G03-A3 *			1500			2											provided
30-G03-B1	30-G03-B		1435			1											for MS/MSD
30-G03-B2			1450				X				TBD						
30G03-B3			1505														
30-G03-C1	30-G03-C		1440														
30-G03-C2			1455				X				TBD						
30-G03-C3			1510														
30-G05-A1	30-G05-A																
30-G05-A2							X				TBD						
30-G05-A3																	
30-G05-B1	30-G05-B																
30-G05-B2							X				TBD						
30-G05-B3																	

5747

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 / 1830 Received by [signature] Date/Time 9-11-01 / 830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Ficker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 West Walnut St.
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb(7421)	8270 C	8330	8332		6010 B/7000	SPLP(1312)	TCLP(1311)					Remarks
30-G05-C1	30-G05-C	9/11/01	1525	SO12	ICE	1													
30-G05-C2		1	1437	1	1	1	X					TBD							
30-G05-C3		1	1549																

5747

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/11/01 / 1830 Received by [signature] Date/Time 9-11-01 / 1830

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5747 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/11/01 1830 Date/Time Opened 9/12/01 0800 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: M. Denis

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.6 4.1 3.5 ____ ____ ____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by: Paul Date: 11 Sep 2001 Time: 9:08 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile [acal texfiles]smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 West Walnut St.
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton 014
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-D05-A1	30-D05-A	1115	9/12/01	SOIL	ICE	1													Please composite
30-D05-A2		1543	9/11/01				X					TBD							complete sample
30-D05-A3		1530	9/11/01																as indicated;
30-D05-B1	30-D05-B	1120	9/12/01																TBD-hold
30-D05-B2		1546	9/11/01				X					TBD							composited sample
30-D05-B3		1535	9/11/01																for further
30-D05-C1	30-D05-C	1125	9/12/01																analysis pending
30-D05-C2		1548	9/11/01				X					TBD							initial results;
30-D05-C3		1540	9/11/01																*additional
30-D05-D1	30-D05-D	1130	9/12/01																sample provided
30-D05-D2		1550	9/11/01				X					TBD							for MS/MSD
30-D05-D3		1542	9/11/01																
30-E05-A1	30-E05-A	1530	9/11/01																
30-E05-A2		1055	9/12/01				X					TBD							
30-E05-A3		1115	9/12/01																

5772

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/12/01 11610 Received by Paul [signature] Date/Time 9-12-01 1160

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen Page 2 of 4

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100
Project Address APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: SG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	8330	8332		6010B/7060	SPLP (1312)	TCLP (1311)					Remarks
30-E05-B1	30-E05-B	9/11/01	1535	SOIL	ICE	1													* additional
30-E05-B2		9/12/01	1100				X					TBD							sample provided
30-E05-B3		9/12/01	1120																for MS/MSD
30-E05-C1	30-E05-C	9/11/01	1540																
30-E05-C2		9/12/01	1105				X					TBD							
30-E05-C3		9/12/01	1125																
30-E05-D1	30-E05-D	9/11/01	1545																
30-E05-D2		9/12/01	1110				X					TBD							
30-E05-D3			1130																
30-A06-A1*	30-A06-A		1300			2													
30-A06-A2*			1320			2	X					TBD							
30-A06-A3*			1335			2													
30-A06-B1	30-A06-B		1305			1													
30-A06-B2			1325			1	X					TBD							
30-A06-B3			1340																

5772

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/12/01 / 1610 Received by Roy Aguilera Date/Time 9-12-01 / 1610

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut St.
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-A06-C1	30-A06-C	9/12/01	1310	SO12	ICE	1													
30-A06-C2			1330				X					TBD							
30-A06-C3			1343																
30-A07-A1	30-A07-A		1346																
30-A07-A2			1357				X					TBD							
30-A07-A3			1410																
30-A07-B1	30-A07-B		1349																
30-A07-B2			1359				X					TBD							
30-A07-B3			1412																
30-A07-C1	30-A07-C		1351																
30-A07-C2			1402				X					TBD							
30-A07-C3			1415																
30-A07-D1	30-A07-D		1355																
30-A07-D2			1405				X					TBD							
30-A07-D3			1417																

5772

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/12/01 1610 Received by [signature] Date/Time 9-12-01 1610

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut St. City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-B07-A1	30-B07-A	9/12/01	1420	SOIL	ICE	1								
30-B07-A2			1438				X				TBD			
30-B07-A3			1500											
30-B07-B1	30-B07-B		1424											
30-B07-B2			1444				X				TBD			
30-B07-B3			1505											
30-B07-C1	30-B07-C		1429											
30-B07-C2			1449				X				TBD			
30-B07-C3			1510											
30-B07-D1	30-B07-D		1433											
30-B07-D2			1455				X				TBD			
30-B07-D3			1515											
		9/12/01												

5772

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/12/01 1610 Received by Roy Aguilar Date/Time 9-12-01 1610

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service #

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5772 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/12/01 1610 Date/Time Opened 9/13/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Roy

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.7 3.2 3.6

(Cooler temperature measured from temp blank if present otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 12 Sep 2001 Time: 8:01 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal.texfiles]amprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: G. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut St. Ste. A2 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OH4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-D08-A1	30-D08-A	9/13/01	1400	SOIL	ICE	1								please composite
30-D08-A2			1414				X				TBD			complete sample
30-D08-A3			1426											as indicated;
30-D08-B1*	30-D08-B		1403			2								TBD-hold
30-D08-B2*			1418				X				TBD			composited sample
30-D08-B3*			1428											for further
30-D08-C1	30-D08-C		1408			1								analysis pending
30-D08-C2			1421				X				TBD			initial results;
30-D08-C3			1431											*additional
30-D08-D1	30-D08-D		1412											sample provided
30-D08-D2			1424				X				TBD			for MS/MSD
30-D08-D3			1435											
30-D08-A2	30-D09-A		1436											
30-D09-A2			1443				X				TBD			
30-D09-A3			1448											

5798

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9-13-01 / 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients under... that all terms described in the proposals, quotations for this project, and/or the ... terms provided in the current APCL price schedules will be followed. APCL rese... the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zicker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste A2 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] Regular [ ] rush ___ days ___ hours Sampled by: JEG/AR

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010/7000	STLC (1312)	TCLP (1311)	Remarks
30-D09-B1	30-D09-B	9/13/01	1439	Soil	Ice	1								Please composite complete sample as indicated; TBD - hold composited sample for further analysis pending initial results
30-D09-B2			1445				X				TBD			
30-D09-B3			1449											
30-D09-C1	30-D09-C		1441											
30-D09-C2			1447				X				TBD			
30-D09-C3			1450											
30-H04-A1	30-H04-A		1453											
30-H04-A2			1502				X				TBD			
30-H04-A3			1514											
30-H04-B1	30-H04-B		1455											
30-H04-B2			1508				X				TBD			
30-H04-B3			1518											
30-H04-C1	30-H04-C		1458											
30-H04-C2			1511				X				TBD			
30-H04-C3			1524											

5798

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9-13-01 / 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons ES Contact: C. Zicker Tel #: (626) 440-6156 Fax #: (626) 440-6200

Address: 100 W. Walnut St. Ste A2 City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-C07-A1	30-C07-A	9/13/01	0740	Soil	Ice	1													
30-C07-A2			0751				X					TBD							
30-C07-A3			0802																
30-C07-B1	30-C07-B		0743																
30-C07-B2			0753				X					TBD							
30-C07-B3			0804																
30-C07-C1	30-C07-C		0747																
30-C07-C2			0756				X					TBD							
30-C07-C3			0806																
30-C07-D1	30-C07-D		0750																
30-C07-D2			0759				X					TBD							
30-C07-D3			0810																
30-C06-A1	30-C06-A		0810																
30-C06-A2			0821				X					TBD							
30-C06-A3			0835																

5798

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 1700 Received by [signature] Date/Time 9-13-01 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons | Contact: C. Zicker | Tel #: 626-440-6156 | Fax #: 626-440-6200

Address: 100 West Walnut | City: Pasadena | State: CA | Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 | Job # 740012 | P.O. # 11100

Project Address | APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours | Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Analysis Items: Pb (7421)	8270 C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-C06-B1	30-C06-B	9/13/01	0813	SOIL	ICE	1								
30-C06-B2			0824				X				TBD			
30-C06-B3			0841											
30-C06-C1	30-C06-C		0816											
30-C06-C2			0827				X				TBD			
30-C06-C3			0849											
30-D06-A1	30-D06-A		0905											
30-D06-A2			0920				X				TBD			
30-D06-A3			0935											
30-D06-B1	30-D06-B		0910											
30-D06-B2			0925				X				TBD			
30-D06-B3			0940											
30-D06-C1	30-D06-C		0915											
30-D06-C2			0930				X				TBD			
30-D06-C3			0945											

5798

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken; Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9/13/01 / 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5798 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/13/01 1700 Date/Time Opened 9/14/01 0800 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold # Received
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☐ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.2 3.9 4.4 4.0
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12
If Not, pH = Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number:
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other:
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:)Date/Time:
Received/Checked by: Paul Date: 13 Sep 2001 Time: 8:02 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal.texfiles]smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 West Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-E06-A1	30-E06-A	9/12/01	0946	SOIL	ICE	1													
30-E06-A2			0959				X					TBD							
30-E06-A3			1018																
30-E06-B1	30-E06-B		0949																
30-E06-B2			1005				X					TBD							
30-E06-B3			1022																
30-E06-C1	30-E06-C		0954																
30-E06-C2			1010				X					TBD							
30-E06-C3			1027																
30-B06-A1	30-B06-A		1041																
30-B06-A2			1052				X					TBD							
30-B06-A3			1103																
30-B06-B1	30-B06-B		1044																
30-B06-B2			1056				X					TBD							
30-B06-B3			1107																

5799

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9-13-01 / 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zickes Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 West Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-B06-C1	30-B06-C	9/13/01	1049	SOIL	ICE	1													
30-B06-C2			1059				X					TBD							
30-B06-C3			1110																
30-F06-A1	30-F06-A		1115																
30-F06-A2			1125				X					TBD							
30-F06-A3			1131																
30-F06-B1	30-F06-B		1119																
30-F06-B2			1127				X					TBD							
30-F06-B3			1133																
30-F06-C1	30-F06-C		1122																
30-F06-C2			1129				X					TBD							
30-F06-C3			1135																
30-E07-A1	30-E07-A		1137																
30-E07-A2			1151				X					TBD							
30-E07-A3			1201																

5799

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9-13-01 / 1700

Relinquished by / Date/Time / Received by / Date/Time /

APCL USE ONLY Service # N

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Ficker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JB/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-E07-B1	30-E07-B	7/3/01		SOIL	ICE	1												
30-E07-B2							X				TBD							
30-E07-B3																		
30-E07-C1	30-E07-C																	
30-E07-C2							X				TBD							
30-E07-C3																		
30-D07-A1	30-D07-A																	
30-D07-A2							X				TBD							
30-D07-A3																		
30-D07-B1	30-D07-B																	
30-D07-B2							X				TBD							
30-D07-B3																		
30-D07-C1	30-D07-C																	
30-D07-C2							X				TBD							
30-D07-C3																		

5799

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 / 1700 Received by [signature] Date/Time 9/13/01 / 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicko Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100
Project Address APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JO/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010 B/7000	SPLP(1312)	TCLP(1311)	Remarks
30-C08-A1	30-C08-A	9/13/01	1336	SOIL	ICE	1								
30-C08-A2			1346			1	X				TBD			
30-C08-A3			1358			1								
30-C08-B1	30-C08-B		1339			2								
30-C08-B2			1349			2	X				TBD			
30-C08-B3			1359			2								
30-C08-C1	30-C08-C		1341			1								
30-C08-C2			1353			1	X				TBD			
30-C08-C3			1400			1								

5799

9/13/01

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/13/01 1700 Received by [signature] Date/Time 9/13/01 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service #

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible]al terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5799 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/13/01 1700 Date/Time Opened 9/14/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.2	3.9	4.4	4.0		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 13 Sep 2001 Time: 8:02 a.m

*HI: Samples must be analyzed for results to reflect total concentrations Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [aeal texfiles]smprcl.tex

033103

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	PB(7421)	8270C	8330	8332	6010B/7000	SPLP(1312)	TCLP(1311)	Remarks
30-H05-A1*	30-H05-A	9/14/01	0750	SOIL	ICE	2								Please composite complete sample as indicated; TBD-hold composited sample for further analysis pending initial results; * additional sample provided for MS/MSD
30-H05-A2*			0804			2	X				TBD			
30-H05-A3*			0819			2								
30-H05-B1	30-H05-B		0753			1								
30-H05-B2			0809				X				TBD			
30-H05-B3			0822											
30-H05-C1	30-H05-C		0758											
30-H05-C2			0813				X				TBD			
30-H05-C3			0827											
30-H05-D1	30-H05-D		0802											
30-H05-D2			0816				X				TBD			
30-H05-D3			0829											
30-H06-A1	30-H06-A		0833											
30-H06-A2			0843				X				TBD			
30-H06-A3			0857											

5823

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 1630 Received by [signature] Date/Time 9-14-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service #

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100
Project Address APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP/1312	TCLP (1311)	Remarks
30-H06-B1	30-H06-B	9/14/01	0837	SOIL	ICE	1								
30-H06-B2			0847				X				TBD			
30-H06-B3			0904											
30-H06-C1	30-H06-C		0841											
30-H06-C2			0853				X				TBD			
30-H06-C3			0912											
30-H07-A1	30-H07-A		0920											
30-H07-A2			0940				X				TBD			
30-H07-A3			1001											
30-H07-B1	30-H07-B		0927											
30-H07-B2			0948				X				TBD			
30-H07-B3			1014											
30-H07-C1	30-H07-C		0933											
30-H07-C2			0953				X				TBD			
30-H07-C3			1021											

5823

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 / 1630 Received by [signature] Date/Time 9-14-01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		4010B/7000	SPLP (312)	TCLP (311)				Remarks
30-I07-A1	30-I07-A	9/14/01	1057	SOIL	ICE	1												
30-I07-A2			1041				X					TBD						
30-I07-A3			1109															
30-I07-B1	30-I07-B		1100															
30-I07-B2			1048				X					TBD						
30-I07-B3			1115															
30-I07-C1	30-I07-C		1104															
30-I07-C2			1152				X					TBD						
30-I07-C3			1119															
30-I06-A1	30-I06-A		1126															
30-I06-A2			1138				X					TBD						
30-I06-A3			1150															
30-I06-B1	30-I06-B		1130															
30-I06-B2			1142				X					TBD						
30-I06-B3			1155															

5823

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 1630 Received by [signature] Date/Time 9-14-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients und[illegible]d that all terms described in the proposals, quotations for this project, and/or th[illegible]al terms provided in the current APCL price schedules will be followed. APCL re[illegible] the right to terminate [illegible] service or withhold delivery of any reports, if in APCL's sole discretion the terms of [illegible] project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5823 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/14/01 1632 Date/Time Opened 9/15/01 1000 By (name): Eric/Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Parsons

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.2 3.7 4.0
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☑ Documented? Number: ____
Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT 5day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by Paul Date: 14 Sep 2001 Time: 8:12 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [local texfiles]emprcl.tex

033302

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-I06-C1	30-I06-C	9/14/01	1135	SOIL	ICE	1								
30-I06-C2			1147				X				TBD			
30-I06-C3			1159											
30-J07-A1	30-J07-A													
30-J07-A2							X				TBD			
30-J07-A3														
30-J07-B1	30-J07-B													
30-J07-B2							X				TBD			5824
30-J07-B3														
30-J07-C1	30-J07-C													
30-J07-C2							X				TBD			
30-J07-C3														
30-J07-D1	30-J07-D													
30-J07-D2							X				TBD			
30-J07-D3														

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 1630 Received by [signature] Date/Time 9-14-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under that all terms described in the proposals, quotations for this project, and/or the g terms provided in the current APCL price schedules will be followed. APCL rese the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156
Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012
P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)				Remarks
30-H08-A1	30-H08-A	9/14/01	1320	SOIL	ICE	1												
30-H08-A2			1333				X					TBD						
30-H08-A3			1348															
30-H08-B1	30-H08-B		1324															
30-H08-B2			1335				X					TBD						
30-H08-B3			1349															
30-H08-C1	30-H08-C		1328															
30-H08-C2			1339				X					TBD						
30-H08-C3			1352															
30-H08-D1	30-H08-D		1336															
30-H08-D2			1342				X					TBD						
30-H08-D3			1355															
		9/14/01																

5824

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 / 1630 Received by [signature] Date/Time 9/14/01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5824 **Client Name/Project:** Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/14/01 1630 Date/Time Opened 9/15/01 1000 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.2	3.7	4.2			

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT 5 days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by Paul Date: 14 Sep 2001 Time: 8:12 a.m.

*HI: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal.texfiles]smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons | Contact: C. Zicker | Tel #: 626-440-6156 | Fax #: 626-440-6200

Address: 100 W. Walnut | City: Pasadena | State: CA | Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 | Job # 740012 | P.O. # 11100

Project Address | APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours | Sampled by: JS/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-J08-A1	30-J08-A	9/17/01	0731	SOIL	ICE	1	X				TBD			Please composite complete sample as indicated; TBD - hold composited sample for further analysis pending initial results; ~~P~~ additional sample provided for MS/MSD
30-J08-A2			0742											
30-J08-A3			0751											
30-J08-B1	30-J08-B		0734				X				TBD			
30-J08-B2			0746											
30-J08-B3			0754											
30-J08-C1	30-J08-C		0739				X				TBD			
30-J08-C2			0749											
30-J08-C3			0758											
30-J08-A1	30-J08-A		0805				X				TBD			
30-J08-A2			0814											
30-J08-A3			0822											
30-J08-B1	30-J08-B		0810				X				TBD			
30-J08-B2			0817											
30-J08-B3			0825											

5840

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken; Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 1635 Received by [signature] Date/Time 9-17-01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626/440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100
Project Address APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-J08-C1	30-J08-C	9/17/01	0812	SOIL	ICE	1								
30-J08-C2			0821				X				TBD			
30-J08-C3			0829											
30-J09-A1	30-J09-A		0847											
30-J09-A2			0901				X				TBD			
30-J09-A3			0918											
30-J09-B1	30-J09-B		0852											
30-J09-B2			0905				X				TBD			
30-J09-B3			0921											
30-J09-C1	30-J09-C		0855											
30-J09-C2			0909				X				TBD			
30-J09-C3			0925											
30-J09-D1	30-J09-D		0859											
30-J09-D2			0915				X				TBD			
30-J09-D3			0929											

5840

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 1635 Received by [signature] Date/Time 9-17-01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the g[illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	~~Date~~ Time Collected	~~Time~~ Date Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	8330	8332		8010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-I09-A1	30-I09-A	0847	9/17/01	SOIL	ICE	1													
30-I09-A2		0901					X					TBD							
30-I09-A3		0918																	
30-I09-B1	30-I09-B	0852																	
30-I09-B2		0905					X					TBD							
30-I09-B3		0921																	
30-I09-C1	30-I09-C	0855																	
30-I09-C2		0909					X					TBD							
30-I09-C3		0925																	
30-I09-D1	30-I09-D	0859																	
30-I09-D2		0915					X					TBD							
30-I09-D3		0929																	
30-H09-A1	30-H09-A	0947																	
30-H09-A2		0956					X					TBD							
30-H09-A3		1028																	

5840

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 1635 Received by [signature] Date/Time 9-17-01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5840 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/17/01 1635 Date/Time Opened 9/18/01 0800 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: __ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.9 4.1 4.5 3.7 ____ ____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by: Paul Date: 17 Sep 2001 Time: 7:55 a.m

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal texfiles]smprcl.tex

031603

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11180
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-I10-A1	30-I10-A	9/17/01	1050	SOIL	ICE	1													
30-I10-A2			1115			1	X					TBD							
30-I10-A3			1130			1													
30-I10-B1	30-I10-B		1057			2													
30-I10-B2			1120			2	X					TBD							
30-I10-B3			1135			2													
30-I10-C1	30-I10-C		1105			1													
30-I10-C2			1125			1	X					TBD							
30-I10-C3			1145			1													
30-H10-A1	30-H10-A		1238			1													
30-H10-A2			1258			1	X					TBD							
30-H10-A3			1311			1													
30-H10-B1	30-H10-B		1242			1													
30-H10-B2			1303			1	X					TBD							
30-H10-B3			1315			1													

5841

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 / 1635 Received by [signature] Date/Time 9-17-01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Analysis Items: PH (7471)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-H10-C1	30-H10-C	9/17/01	1250	SOIL	ICE	1								
30-H10-C2			1308				X				TBD			
30-H10-C3			1322											
30-I11-A1	30-I11-A		1335											
30-I11-A2			1344				X				TBD			
30-I11-A3			1358											
30-I11-B1	30-I11-B		1338											
30-I11-B2			1347				X				TBD			
30-I11-B3			1401											
30-I11-C1	30-I11-C		1341											
30-I11-C2			1350				X				TBD			
30-I11-C3			1404											
30-I11-D1	30-I11-D		1342											
30-I11-D2			1353				X				TBD			
30-I11-D3			1412											

5841

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 / 635 Received by [signature] Date/Time 9-17-01 / 635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients unde[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible]l terms provided in the current APCL price schedules will be followed. APCL res[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Ficker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: X regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-H11-A1	30-H11-A	9/17/01	1415	SO12	ICE	1								
30-H11-A2			1427				X				TBD			
30-H11-A3			1440											
30-H11-B1	30-H-11-B		1417											
30-H11-B2			1432				X				TBD			
30-H11-B3			1445											
30-H11-C1	30-H11-C		1421											
30-H11-C2			1436				X				TBD			
30-H11-C3			1453											
30-H12-A1	30-H12-A		1505											
30-H12-A2			1523				X				TBD			
30-H12-A3			1541											
30-H12-B1	30-H12-B		1510											
30-H12-B2			1528				X				TBD			
30-H12-B3			1543											

5841

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/17/01 1635 Received by [signature] Date/Time 9-17-01 1635

Relinquished by Date/Time Received by Date/Time

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Ficker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012
P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ Regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	8010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-H12-C1	30-H12-C	9/17/01	1514	SOIL	ICE	1								
30-H12-C2			1533				X				TBD			
30-H12-C3			1547											
30-H12-D1	30-H12-D		1579											
30-H12-D2			1514				X				TBD			
30-H12-D3			1550											

5841

9/17/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (____ °C).

Relinquished by [signature] Date/Time 9/17/01 1631 Received by [signature] Date/Time 9/17/01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible]ne right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994.

Applied P & Ch Laboratory
13760 Magnolia Ave Chino CA 91710
Tel: (909) 590-1828 Fax (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5841 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/17/01 1635 Date/Time Opened 9/18/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.9	4.1	4.5	3.7		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by Paul Date: 17 Sep 2001 Time: 7:55 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal texfiles]smprcl.tex

031302

Eric W

From: Cindy Zicker [Cindy.Zicker@parsons.com]
Sent: Tuesday, September 18, 2001 11:09 AM
To: Eric Wendland (E-mail)
Cc: Lauri Roche
Subject: OU4 additional analyses

Hi Eric!

Based on the analytical results received yesterday, I would like to add SW6010B/7000 metals* and SPLP and TCLP metals** to the following samples:

1D-D05-B (Service ID 01-05676),
1D-C03-A (Service ID 01-05650),
1D-C04-A (Service ID 01-05650),
1D-I08-B (Service ID 01-05631),
1D-F11-A (Service ID 01-05560), and
1D-D06-D (Service ID 01-05676)

Also, please add 8270C, 8330 and 8332 to the following samples:

30-E07-A (Service ID 01-05799),
30-E06-B (Service ID 01-05799),
30-D07-C (Service ID 01-05799),
30-D08-C (Service ID 01-05798),
30-E09-B (Service ID 01-05724), and
30-D09-A (Service ID 01-05798).

5858

Thanks,
Cindy

*SW6010B/7000 includes ICP and GFAA metals. ICP metals include aluminum, barium, beryllium, calcium, chromium (total), cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, potassium, silver, sodium, vanadium, and zinc. GFAA metals are antimony (SW7841), arsenic (SW7060A), cadmium (SW7131A), lead (SW7421), selenium (SW7740), and thallium (SW7840/41).

**SPLP and TCLP includes aluminum, antimony, arsenic, beryllium, cadmium, chromium, and cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP(1312)	TCLP(1311)					Remarks
30-G02-A1	30-G02-A	9/18/01	0735	SOIL	ICE	1													Please composite
30-G02-A2			0752				X					TBD							complete sample
30-G02-A3			0805																as indicated;
30-G02-B1	30-G02-B		0741																TBD - hold
30-G02-B2			0756				X					TBD							composited sample
30-G02-B3			0809																for further
30-G02-C1	30-G02-C		0748																analysis pending
30-G02-C2			0800				X					TBD							initial results;
30-G02-C3			0813																*additional
30-G06-A1	30-G06-A		0821																sample provided
30-G06-A2			0832				X					TBD							for MS/MSD
30-G06-A3			0842																
30-G06-B1	30-G06-B		0825																
30-G06-B2			0835				X					TBD							
30-G06-B3			0846																

5868

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9-18-01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-G06-C1	30-G06-C	9/18/01	0829	SOIL	ICE	1								
30-G06-C2			0838				X				TBD			
30-G06-C3			0841											
30-G08-A1	30-G08-A		0851											
30-G08-A2			0900				X				TBD			
30-G08-A3			0906											
30-G08-B1	30-G08-B		0856											
30-G08-B2			0901				X				TBD			
30-G08-B3			0908											
30-G08-C1	30-G08-C		0850											
30-G08-C2			0903				X				TBD			
30-G08-C3			0910											
30-G07-A1	30-G07-A		0912											
30-G07-A2			0920				X				TBD			
30-G07-A3			0926											

5868

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1877 Received by [signature] Date/Time 9/18/01 1817

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible]l terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101. Ver. 4.0. Dec. 20. 1994.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # P.O. #

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JS/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-G07-B1	30-G07-B	9/18/01	0915	SOIL	ICE	1								
30-G07-B2			0922			1	X				TBD			
30-G07-B3			0928			1								
30-G07-C1*	30-G07-C		0918			2								
30-G07-C2*			0924			2	X				TBD			
30-G07-C3*			0930			2								
30-G09-A1	30-G09-A		0935			1								
30-G09-A2			0952			1	X				TBD			
30-G09-A3			1006			1								
30-G09-B1	30-G09-B		0939		5868	1								
30-G09-B2			0955			1	X				TBD			
30-G09-B3			1009			1								
30-G09-C1	30-G09-C		0941			1								
30-G09-C2			0958			1	X				TBD			
30-G09-C3			1011			1								

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9-18-01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5868 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/18/01 1617 Date/Time Opened 9/19/01 0830 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.4 4.0 4.7 3.9 ____ ____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by: Paul Date: 18 Sep 2001 Time: 8:41 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal.texfiles]smprcl.tex

036702

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6200 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton 014 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		8010B/7000	SPLP/1312	TCLP/1311					Remarks
30-G14-C1	30-G14-C	9/18/01	1448	SOIL	ICE	1													
30-G14-C2			1500				X					TBD							
30-G14-C3			1515																

White – With report
Yellow – Lab copy
Pink – Originator

5870

9/18/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9/18/01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP(1312)	TCLP(1311)	Remarks
30-G13-A1	30-G13-A	9/18/01	1405	SOIL	ICE	1								
30-G13-A2			1417				X				TBD			
30-G13-A3			1427											
30-G13-B1	30-G13-B		1409											
30-G13-B2			1422				X				TBD			
30-G13-B3			1429											
30-G13-C1	30-G13-C		1413											
30-G13-C2			1425				X				TBD			
30-G13-C3			1435											
30-G14-A1	30-G14-A		1440											
30-G14-A2			1450				X				TBD			
30-G14-A3			1505											
30-G14-B1	30-G14-B		1443											
30-G14-B2			1455				X				TBD			
30-G14-B3			1510											

5870

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9-18-01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible]al terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Ficter Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4 Job #: 740012 P.O. #: 11100
Project Address APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	6330	8332	6010B/7000	SPLP(1312)	TCLP(1311)	Remarks
30-G09-D1	30-G09-D	9/18/01	0947	SOIL	ICE	1								
30-G09-D2			1000				X				TBD			
30-G09-D3			1015											
30-G10-A1	30-G10-A		1020											
30-G10-A2			1034				X				TBD			
30-G10-A3			1048											
30-G10-B1	30-G10-B		1024											
30-G10-B2			1040				X				TBD			
30-G10-B3			1054											
30-G10-C1	30-G10-C		1029											
30-G10-C2			1044				X				TBD			
30-G10-C3			1059											
30-G11-A1	30-G11-A		1115											
30-G11-A2			1130				X				TBD			
30-G11-A3			1245											

White – With report
Yellow – Lab copy
Pink – Originator

5870

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☒ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9/18/01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by:

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	P330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-G11-B1	30-G11-B	9/18/01	1120	SOIL	ICE	1													
30-G11-B2			1135				X					TBD							
30-G11-B3			1255																
30-G11-C1	30-G11-C		1125																
30-G11-C2			1145				X					TBD							
30-G11-C3			1305																
30-G12-A1	30-G12-A		1321																
30-G12-A2			1334				X					TBD							
30-G12-A3			1348																
30-G12-B1	30-G12-B		1325																
30-G12-B2			1338				X					TBD							
30-G12-B3			1352																
30-G12-C1	30-G12-C		1329																
30-G12-C2			1343				X					TBD							
30-G12-C3			1356																

5870

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/18/01 1617 Received by [signature] Date/Time 9/18/01 1617

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5870 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/18/01 1617 Date/Time Opened 9/19/01 0830 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 4.4 4.6 4.7 3.9
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ **pH <2** ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☑ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by: Paul Date: 18 Sep 2001 Time: 8:41 a.m.

*HI: Samples must be analyzed for results to reflect total concentrations Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [ncal.texfiles]smprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-F16-A1	30-F16-A	9/19/01	0950	SOIL	ICE	1								
30-F16-A2			1005				X				TBD			
30-F16-A3			1020											
30-F16-B1	30-F16-B		0955											
30-F16-B2			1010				X				TBD			
30-F16-B3			1025											
30-F16-C1	30-F16-C		1000											
30-F16-C2			1015				X				TBD			
30-F16-C3			1030											
30-F17-A1	30-F17-A		1036											
30-F17-A2			1048				X				TBD			
30-F17-A3			1100											
30-F17-B1	30-F17-B		1040											
30-F17-B2			1053				X				TBD			
30-F17-B3			1102											

5899

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 1630 Received by [signature] Date/Time 9-19-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the g[illegible] terms provided in the current APCL price schedules will be followed. APCL reser[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-G16-C1	30-G16-C	9/19/01	0840	SOIL	ICE	1												
30-G16-C2			0847				X				TBD							
30-G16-C3			0857															
30-G16-D1	30-G16-D		0842															
30-G16-D2			0850				X				TBD							
30-G16-D3			0900															
30-F15-A1	30-F15-A		0911															
30-F15-A2			0917				X				TBD							
30-F15-A3			0924															
30-F15-B1	30-F15-B		0913															
30-F15-B2			0920				X				TBD							
30-F15-B3			0926															
30-F15-C1*	30-F15-C*		0915			2												
30-F15-C2*			0922			2	X				TBD							
30-F15-C3*			0929			2												

5899

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 1630 Received by [signature] Date/Time 9/19/01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 710012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JO/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-G15-A1	30-G15-A	9/19/01	0735	SOIL	ICE	2													Please composite
30-G15-A2			0801			2	X					TBD							complete sample
30-G15-A3			0816			2													as indicated;
30-G15-B1	30-G15-B		0740			1													TBD hold
30-G15-B2			0806				X					TBD							composited sample
30-G15-B3			0821																for further
30-G15-C1	30-G15-C		0749																analysis pending
30-G15-C2			0810				X					TBD							initial results;
30-G15-C3			0829																☆ additional
30-G16-A1	30-G16-A		0837																sample provided
30-G16-A2			0843				X					TBD							for MS/MSD
30-G16-A3			0852																
30-G16-B1	30-G16-B		0838																
30-G16-B2			0845				X					TBD							
30-G16-B3			0855																

5899

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [✓] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 1630 Received by [signature] Date/Time 9-19-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5899 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/19/01 1630 Date/Time Opened 9/20/01 0830 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Renee

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed dated? By:
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☐ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.2	3.6	4.1	3.9		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 19 Sep 2001 Time: 9:27 a.m

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal.texfiles]smprcl.tex

031902

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours Sampled by: JG/AK

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Analysis Items: DB (742)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-F17-C1	30-F17-C	9/19/01	1044	SOIL	ICE	1													
30-F17-C2			1057				X					TBD							
30-F17-C3			1104																
30-E17-A1	30-E17-A		1110																
30-E17-A2			1128				X					TBD							
30-E17-A3			1143																
30-E17-B1	30-E17-B		1115																
30-E17-B2			1134				X					TBD							
30-E17-B3			1152																
30-E17-C1	30-E17-C		1121																
30-E17-C2			1139				X					TBD							
30-E17-C3			1159																
30-E18-A1	30-E18-A		1300																
30-E18-A2			1312				X					TBD							
30-E18-A3			1325																

5901

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 / 1630 Received by [signature] Date/Time 9-19-01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # N

Clients under[illegible] that all terms described in the proposals, quotations for this project, and/or the [illegible] terms provided in the current APCL price schedules will be followed. APCL rese[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	P330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-E18-B1	30-E18-B	9/19/01	1305	SOIL	ICE	1													
30-E18-B2			1316				X					TBD							
30-E18-B3			1329																
30-E18-C1	30-E18-C		1308																
30-E18-C2			1321				X					TBD							
30-E18-C3			1333																
30-D18-A1	30-D18-A		1340																
30-D18-A2			1348				X					TBD							
30-D18-A3			1354																
30-D18-B1	30-D18-B		1342																
30-D18-B2			1350				X					TBD							
30-D18-B3			1356																
30-D18-C1	30-D18-C		1344																
30-D18-C2			1352				X					TBD							
30-D18-C3			1358																

5901

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 1630 Received by [signature] Date/Time 9-19-01 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6256 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☐regular ☐rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb(7421)	8270C	8330	8332	8081/7000	SPLP(1311)	TCLP(1311)	Remarks
30-D18-D1	30-D18-D	9/18/01	1346	SOIL	ICE	1								
30-D18-D2			1353				X				TBD			
30-D18-D3			1400											
30-C17-A1	30-C17-A		1405											
30-C17-A2			1418				X				TBD			
30-C17-A3			1430											
30-C17-B1	30-C17-B		1409											
30-C17-B2			1421				X				TBD			
30-C17-B3			1431											
30-C17-C1	30-C17-C		1413											
30-C17-C2			1425				X				TBD			
30-C17-C3			1433											
30-C17-D1	30-C17-D		1415											
30-C17-D2			1429				X				TBD			
30-C17-D3			1435											

5901

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: ☐Regular; ☐QA/QC Report; ☐WIP; ☐Raw Data; ☐Extended Raw Data ☐CLP; ☐ACE ☐AFCEE ☒NEESA ___(E, C or D); ☐Other _____(Please specify)

Sample Disposal: ☐Return ☒Disposal by APCL ☐Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐Intact; ☐Broken. Cooler Seal: ☐Intact; ☐Broken; ☐ None . Tag # _____ Temperature: ☐ Room ☐Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 / 1630 Received by [signature] Date/Time 9-19-01 / 1630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients under[illegible]d that all terms described in the proposals, quotations for this project, and/or the [illegible]al terms provided in the current APCL price schedules will be followed. APCL re[illegible] the right to terminate [illegible]rvice or withhold delivery of any reports, if in APCL's sole discretion the terms of [illegible]roject have been broken.

APCL Form 4-104, Ver. 4.0, Dec. 20, 1994.

Root-file:[CUST.DATA.LAB]CHAIN-ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zickes
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-G01-A1	30-G01-A	9/19/01	1440	SOIL	ICE	1													
30-G01-A2			1456				X					TBD							
30-G01-A3			1509																
30-G01-B1	30-G01-B		1445																
30-G01-B2			1459				X					TBD							
30-G01-B3			1511																
30-G01-C1	30-G01-C		1449																
30-G01-C2			1502				X					TBD							
30-G01-C3			1514																
30-G01-D1	30-G01-D		1452																
30-G01-D2			1507				X					TBD							
30-G01-D3			1575																

5901

9/19/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/19/01 / 1630 Received by [signature] Date/Time 9-19-01/630

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5901 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/19/01 1630 Date/Time Opened 9/20/01 0830 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. Shipping Container/Cooler

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.2	3.6	4.1	3.9		

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5 Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number:
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other:
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 19 Sep 2001 Time: 9:27 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]smprcl.tex

032103

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-656 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR/[illegible]

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb(7421)	8270C	8330	8332	6010B/7000	SPLP(1312)	TCLP(1311)	Remarks
30-F01-A1		9/20/01	0901	SO12	ICE	1	X				TBD			~~Please composite~~
30-F01-B1			0909				X				TBD			~~complete sample~~
30-F01-C1			0913				X				TBD			~~as indicated~~; no composites today
30-F02-A1			0916				X				TBD			TBD-hold
30-F02-B1			0920				X				TBD			composited sample
30-F02-C1			0926				X				TBD			for further
30-F03-A1*			0934			2	X				TBD			analysis pending
30-F03-B1			0942			1	X				TBD			initial results;
30-F03-C1			0944				X				TBD			* additional
30-F04-A1			0948				X				TBD			sample provided
30-F04-B1			0950				X				TBD			for MS/MSD
30-F04-C1			0954				X				TBD			
30-F04-D1			0958				X				TBD			
30-F05-A1			1008				X				TBD			
30-F05-B1			1011				X				TBD			

5931

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☒ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/20/01 / 17:35 Received by [signature] Date/Time 9-20-01 / 17:35

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5931 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/20/01 1735 Date/Time Opened 9/21/01 0802 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Ray

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C	3.6	4.4	4.8			

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☐ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☐ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: Paul Date: 20 Sep 2001 Time: 9:38 a.m.

*HI: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal.texfiles]smprcl.tex

034502

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job #: 740012 P.O. #: 11100

Project Address APCL Quotation #: 8

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JG/AR/JL

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)				Remarks
30-F05-C1		9/20/01	1020	SO12	ICE	1	X				TBD						
30-F07-A1			1028				X				TBD						
30-F07-B1			1032				X				TBD						
30-F07-C1			1037				X				TBD						
30-F08-A1			1050				X				TBD						
30-F08-B1			1053				X				TBD						
30-F08-C1			1057			2	X				TBD						
30-F08-D1			1100			1	X				TBD						
30-F09-A1			1105				X				TBD						
30-F09-B1			1109				X				TBD						
30-F09-C1			1114				X				TBD						
30-F11-A1			1120				X				TBD						
30-F11-B1			1135				X				TBD						
30-F11-C1			1155				X				TBD						
30-D05-A4			1245				X				TBD						

5932

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Date/Time / Received by [signature] Date/Time 9-20-01 11:35

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994. Root-file:[CUST.DATA.LAB]CHAIN_ROOT.TEX File:[CUST.DATA.LAB]CHAIN4.TEX

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5932 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/20/01 1935 Date/Time Opened 9/21/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Ray

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. Shipping Container/Cooler

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.6 4.4 4.8

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____

Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☐ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Paul Date: 20 Sep 2001 Time: 9:38 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal texfiles]smprcl.tex

041002

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156
Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012
P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR/JL

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-F12-A1		9/20/01	1525	SOIL	ICE	1	X				TBD							
30-F12-B1			1530				X				TBD							
30-F12-C1			1535				X				TBD							
30-F10-A1			1538				X				TBD							
30-F10-B1			1547				X				TBD							
30-F10-C1			1550				X				TBD							
30-F13-A1			1605				X				TBD							
30-F13-B1			1610			2	X				TBD							
30-F13-C1			1615			1	X				TBD							
30-F13-D1			1620				X				TBD							
30-F14-A1			1621				X				TBD							
30-F14-B1			1628				X				TBD							
30-F14-C1			1631				X				TBD							

5933

9/20/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/20/01 Received by [signature] Date/Time 9-20-01 17:35

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5933 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/20/01 1785 Date/Time Opened 9/21/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Ray

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☐ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.6 4.4 4.8 _____ _____ _____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: _____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: Paul Date: 20 Sep 2001 Time: 9:38 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal.texfiles]smprcl.tex

034302

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	8270/9270	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-E04-A1		9/21/01	0800	SOIL	ICE	1	X			TBD			TBD-hold
30-E04-B1			0810				X			TBD			composited
30-D04-A1			0835				X			TBD			sample for
30-D04-B1			0840				X			TBD			further analysis
30-E01-A1*			0905			2	X			TBD			pending initial
30-E01-B1			0915			1	X			TBD			results;
30-E02-A1			0926				X			TBD			*additional
30-E02-B1			0931				X			TBD			sample provided
30-E02-D1			0938				X			TBD			for ms/msD
30-E03-A1			0950				X			TBD			
30-E03-B1			1000				X			TBD			
30-I05-A1			1015				X			TBD			
30-I05-B1			1030				X			TBD			

5961

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/21/01 1635 Received by [signature] Date/Time 9/21/01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave, Chino CA 91710
Tel: (909) 590-1828 Fax (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 5961 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/21/01 1635 Date/Time Opened 9/22/01 1200 By (name): Kenny
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: __ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☐ Cooler Used? # of 1 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.8 ____ ____ ____ ____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT 5 to 0 ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by Pam Date: 21 Sep 2001 Time: 8:01 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous

DocumentFile: [neal text files]smprcl tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Cust dy

Please Print in pen

Client: Parsons | Contact: C. Zicker | Tel #: 626-440-6156 | Fax #: 626-440-6200

Address: 100 W. Walnut | City: Pasadena | State: CA | Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton 044 | Job # 740012 | P.O. # 11100

Project Address | APCL Quotation #

Due Date: [X] regular [ ] rush: ___ days ___ hours | Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	SW6010B/7000	SW8330	SW8332	SW8270C	SW8260A	Grain Size Dist	Pb (7421)	Remarks
HA-EB1	Equipment Blank	9/21/01	1100	Water	HNO_3	1	X							Please Send bulk
HA-EB1	⊥		1100	⊥	NONE	6		X	X	X	X			samples (1 gal/ziploc)
30-G08-Bulk B1			1120	SOIL	ICE	1 gal/ziploc						X		to PTS, where they
30-G08-Bulk B1 (4-10)			⊥										X	will collect soil
30-G08-Bulk B1 (10-200)													X	passing through
30-G08-Bulk B1 (>200)													X	the #4, #10, and #200
30-C07-Bulk B1			1100			1 gal/ziploc						X		sieves; then
30-C07-Bulk B1 (4-10)													X	these samples
30-C07-Bulk B1 (10-200)													X	(labeled as
30-C07-Bulk B1 (>200)													X	indicated) will
														be resubmitted
														to APCL for
														Pb analysis.

White – With report
Yellow – Lab copy
Pink – Originator

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/21/01/1635 Received by [signature] Date/Time 9-21-01/1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID 5976 Client Name/Project: Parsons

1. Sample Arrival
Date/Time Received 9/20/01 1735 Date/Time Opened 9/21/01 800 By (name): Roy
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Roy

2. Chain-of-Custody (CoC)
☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By:
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ☑ #Samples OK?
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs):

3. Shipping Container/Cooler
☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.6 4.4 4.8
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation
☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party

5. Holding-time Requirements
☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition
☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time
☑ RUSH TAT: 5 days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix
☐ Drinking H_2O ☑ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?
☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by: Roy Date: 20 Sep 2001 Time: 9:38 a.m

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [ncal texfiles]amprcl.tex

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200

Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124

Bill to: Parsons

Project Name/Code: Camp Pendleton OU4 Job # 740012 P.O. # 11100

Project Address APCL Quotation #

Due Date: ☒ regular ☐ rush: ___ days ___ hours Sampled by: JL, RB, AR, JG

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	SW6010B	SW7000	SW8330	SW8332	SW8270C	SW8260A		SW7471	Grain Size Dist.				Remarks
GEO-EB1	Geoprobe Equipment	9/20/01	~~0800~~ 0802	Water	HNO_3	1	X	X											Please send bulk
GEO-EB1	Blank		0802	Water	NONE	6			X	X	X	X							samples (1 gal ziplocs)
30-C07-Bulk A1			0930	SOIL	ICE	1 gal ziploc									X				to PTS, where they
30-C07-Bulk A1 (4-10)														X					will collect soil
30-C07-Bulk A1 (10-200)														X					passing through the
30-C07-Bulk A1 (>200)														X					#4, #10, and #200
30-G08-Bulk A1			1155			1 gal ziploc									X				sieves; then these
30-G08-Bulk A1 (4-10)														X					samples (labeled as
30-G08-Bulk A1 (10-200)														X					indicated) will be
30-G08-Bulk A1 (>200)														X					resubmitted to
																			APCL for
																			Rb analysis

Jim Yoon 9/20/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by Jim Yoon Date/Time 9/20/01 17:35 Received by Roy Aguirre Date/Time 9-20-01 17:35

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID 5975 Client Name/Project: Parsons Engineering Science

1. Sample Arrival

Date/Time Received 9/21/01 1635 Date/Time Opened 9/22/01 1200 By (name): Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 1 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.8 ____ ____ ____ ____ ____
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____
Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT 5 day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not attach docs) ☐ Client Contact? (Name:____)Date/Time:____
Received/Checked by Paul Date: 21 Sep 2001 Time: 8:01 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [neal textfiles]imprcl.tex

APCL

Applied P & Ch Laboratory

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 West Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton 044
Job #: 740012 P.O. #: 11100
Project Address
APCL Quotation #
Due Date: ☒ regular ☐ rush: ___ days ___ hours
Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time	Sample Matrix	Preservation	# of Containers	Pb (7421)	8270 C	8330	8332		6010B/7000	SPLP (1312)	TCLP (1311)					Remarks
30-C06-B1	30-C06-B	9/13/01	0813	SOIL	ICE	1													
30-C06-B2			0824				X					TBD							
30-C06-B3			0841																
30-C06-C1	30-C06-C		0816																
30-C06-C2			0827				X					TBD							
30-C06-C3			0849																
30-D06-A1	30-D06-A		0905																
30-D06-A2			0920				X					TBD							
30-D06-A3			0935																
30-D06-B1	30-D06-B		0910																
30-D06-B2			0925				X					TBD							
30-D06-B3			0940																
30-D06-C1	30-D06-C		0915																
30-D06-C2			0930				X					TBD							
30-D06-C3			0945																

5798
H-9/19/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken. Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by: [signature] Date/Time 9/13/01 1700 Received by: [signature] Date/Time 9-13-01 1700

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994.

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Client: Parsons Contact: C. Zicker Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut City: Pasadena State: CA Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton 014 Job # 740012 P.O. # 11100
Project Address APCL Quotation #
Due Date: ☒ Regular ☐ rush: ___ days ___ hours Sampled by: JG/AR

White – With report
Yellow – Lab copy
Pink – Originator

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	Pb (7471)	8270C	8330	8332	6010B/7000	SPLP (1312)	TCLP (1311)	Remarks
30-H05-A1*	30-H05-A	9/14/01	0750	SOIL	ICE	2								Please Composite complete sample as indicated; TBD-hold composited sample for further analysis pending initial results; *additional sample provided for MS/MSD
30-H05-A2*			0804			2	X				TBD			
30-H05-A3*			0819			2								
30-H05-B1	30-H05-B		0753			1								
30-H05-B2			0809				X				TBD			
30-H05-B3			0822											
30-H05-C1	30-H05-C		0758											
30-H05-C2			0813				X				TBD			
30-H05-C3			0827											
30-H05-D1	30-H05-D		0802											
30-H05-D2			0816				X				TBD			
30-H05-D3			0829											
30-H06-A1	30-H06-A		0833											
30-H06-A2			0843				X				TBD			
30-H06-A3			0857											

5823 HW 9/27/01

QC Requirement: ☐ Regular; ☐ QA/QC Report; ☐ WIP; ☐ Raw Data; ☐ Extended Raw Data ☐ CLP; ☐ ACE ☐ AFCEE ☒ NEESA ___ (E, C or D); ☐ Other _____ (Please specify)

Sample Disposal: ☐ Return ☒ Disposal by APCL ☐ Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: ☐ Intact; ☐ Broken; Cooler Seal: ☐ Intact; ☐ Broken; ☐ None. Tag # _____ Temperature: ☐ Room ☐ Cold (_____ °C).

Relinquished by [signature] Date/Time 9/14/01 1630 Received by [signature] Date/Time 9-14-01 1630
Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Note:

Clients unc[illegible]d that all terms described in the proposals, quotations for this project, and/or th[illegible]ral terms provided in the current APCL price schedules will be followed. APCL re[illegible] the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101 Ver. 4.0 Dec. 20, 1994

Applied P & Ch Laboratory
13760 Magnolia Ave Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

6047

Sample Receiving Checklist

APCL ServiceID: 5798 #9/27/01 Client Name/Project: Parsons Engineering Science

1. **Sample Arrival**

Date/Time Received 9/13/01 1700 Date/Time Opened 9/14/01 0800 By (name): Paul

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Denise

2. **Chain-of-Custody (CoC)**

☑ With Samples? ☐ Faxed? ☐ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos.#: _ ☐ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. **Shipping Container/Cooler**

☐ Cooler Used? # of 4 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.2 3.9 4.4 4.0 _____ _____

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler).

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. **Sample Preservation**

☐ **pH <2** ☐ pH >12

If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. **Holding-time Requirements**

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. **Sample Container Condition**

☑ Intact? ☐ Broken? ☐ Documented? Number: _____

Type: ☐ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. **Turn Around Time**

☑ RUSH TAT: 5 day ☐ Std (7-10 days) ☐ Not Marked

8. **Sample Matrix**

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. **Pre-Login Check List Completed & OK?**

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____

Received/Checked by: Paul Date: 13 Sep 2001 Time: 8:02 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal.texfiles]smprcl.tex

040502

Applied P & Ch Laboratory
13760 Magnolia Ave., Chino, CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

6047

Sample Receiving Checklist

APCL ServiceID: 5823 Client Name/Project: Parsons Engineering Science
tr 9/27/01

1. Sample Arrival

Date/Time Received 9/14/01 1632 Date/Time Opened 9/15/01 0800 By (name): Eric / Paul
Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Ramse

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: _____
☑ Project ID? ☐ Analyses Clear? ☐ Hold Samples? #on Hold _____ # Received _____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: _ ☑ #Samples OK? _____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): _____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None
Temp °C 3.2 3.7 4.0
(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)
Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12
If Not, pH = _____ Preserved by: ☐ Client ☐ APCL ☐ Third Party _____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☑ Documented? Number: _____
Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?
Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5day ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☐ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: _____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W. Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:_____)Date/Time:_____
Received/Checked by: Paul Date: 14 Sep 2001 Time: 8:12 a.m.

*HT: Samples must be analyzed for results to reflect total concentrations. Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [ucal.texfiles]smprcl.tex

040503

01-6116

Eric W

From: Cindy Zicker [Cindy.Zicker@parsons.com]
Sent: Thursday, October 11, 2001 1:37 PM
To: Eric Wendland (E-mail)
Subject: Additional analyses requested

Hi Eric!

I would like to add SW6010B/7000 metals* and SPLP and TCLP metals** to the following samples (please separate as indicated):

Group 1
1D-A07-B (Service ID 01-06016),
1D-C13-B (Service ID 01-05985),
1D-G02-B (Service ID 01-05595),
1D-H08-C (Service ID 01-05569),
1D-I07-C (Service ID 01-05695),
1D-L06-C (Service ID 01-05650), and
1D-J05-C (Service ID 01-05622). Please assign a level IV data package for 1D-J05-C.

Group 2
30-B06-C (Service ID 01-05799), -7
30-D04-A1 (Service ID 01-~~05761~~), (or 5461) -1
30-E06-B (Service ID 01-05799), -31
30-E07-A (Service ID 01-05799), -27
30-D08-A (Service ID 01-05798), -31
30-E10-C (Service ID 01-05723), -13
30-E11-A (Service ID 01-05723), -16
30-G05-B (Service ID 01-05747), -28
30-H05-C (Service ID 01-05823), -7
30-H06-A (Service ID 01-~~05723~~), (5823) -13
J-I08-B (Service ID 01-05840), -7
30-G09-A (Service ID 01-05868), -37
30-H11-A (Service ID 01-05841), -10
30-D06-A (Service ID 01-05798), and 22
30-F17-C (Service ID 01-05901). Please assign a level IV data package to 30-G05-B. 43

6461

Thank you,
Cindy

*SW6010B/7000 includes ICP and GFAA metals. ICP metals include aluminum, barium, beryllium, calcium, chromium (total), cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, potassium, silver, sodium, vanadium, and zinc. GFAA metals are antimony (SW7841), arsenic (SW7060A), cadmium (SW7131A), lead (SW7421), selenium (SW7740), and thallium (SW7840/41).

**SPLP and TCLP includes aluminum, antimony, arsenic, beryllium, cadmium, chromium, and cobalt, copper, iron, lead, magnesium, manganese, molybdenum, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc.

043825

Applied P & Ch Laboratory

APCL

13760 Magnolia Ave. Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Chain of Custody

Please Print in pen

Page 1 of 2

Client: Parsons
Contact: C. Zicker
Tel #: 626-440-6156 Fax #: 626-440-6200
Address: 100 W. Walnut
City: Pasadena
State: CA
Zip code: 91124
Bill to: Parsons
Project Name/Code: Camp Pendleton OU4
Job # 740012 P.O. # 11100
Project Address
APCL Quotation #
Due Date: [X] regular [ ] rush: ___ days ___ hours
Sampled by: JG/AR

Analysis Items

Field Sample ID No.	Sample Description	Date Collected	Time Collected	Sample Matrix	Preservation	# of Containers	SW8010B/7000	SW8330	SW8332	SW8270C	SW8015	Grain Size Dist	Pb (7421)
HA-EB1	Equipment Blank	9/21/01	1100	Water	HNO_3	1	X						
HA-EB1	↓	↓	1100	↓	NONE	6		X	X	X	X		
30-G08-Bulk B1			1120	SOIL	ICE	1 gal. ziploc						X	
30-G08-Bulk B1 (4-10)			↓	↓	↓								X
30-G08-Bulk B1 (10-200)			↓	↓	↓								X
30-G08-Bulk B1 (>200)			↓	↓	↓								X
30-C07-Bulk B1			1100			1 gal. ziploc						X	
30-C07-Bulk B1 (4-10)			↓	↓	↓								X
30-C07-Bulk B1 (10-200)			↓	↓	↓								X
30-C07-Bulk B1 (>200)		↓	↓	↓	↓								X

Remarks: Please send bulk samples (1 gal ziploc) to PTS, where they will collect soil passing through the #4, #10, and #200 sieves; then these samples (labeled as indicated) will be resubmitted to APCL for Pb analysis.

7323

QC Requirement: [ ] Regular; [ ] QA/QC Report; [ ] WIP; [ ] Raw Data; [ ] Extended Raw Data [ ] CLP; [ ] ACE [ ] AFCEE [X] NEESA ___ (E, C or D); [ ] Other _____ (Please specify)

Sample Disposal: [ ] Return [X] Disposal by APCL [ ] Hold for _____ days after receiving date. **If not specified, samples will be discarded 45 days after samples are received.**

Sample Conditions: [ ] Intact; [ ] Broken. Cooler Seal: [ ] Intact; [ ] Broken; [ ] None. Tag # _____ Temperature: [ ] Room [ ] Cold (_____ °C).

Relinquished by [signature] Date/Time 9/21/01 1635 Received by [signature] Date/Time 9-21-01 1635

Relinquished by Date/Time / Received by Date/Time /

APCL USE ONLY Service # Notes

Clients understand that all terms described in the proposals, quotations for this project, and/or the general terms provided in the current APCL price schedules will be followed. APCL reserves the right to terminate its service or withhold delivery of any reports, if in APCL's sole discretion the terms of the project have been broken.

APCL Form 4-101, Ver. 4.0, Dec. 20, 1994.

Advanced Pollution Control Laboratory
13766 Magnolia Ave Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Sample Receiving Checklist

APCL ServiceID: 6006 7323 Client Name/Project: Parsons

1. Sample Arrival

Date/Time Received 9/20/01 1735 Date/Time Opened 9/21/01 800 By (name): Roy

Custody Transfer: ☐ Client ☐ Golden State ☐ UPS ☐ US Mail ☐ FedEx ☑ APCL Empl: Roy

2. Chain-of-Custody (CoC)

☑ With Samples? ☐ Faxed? ☑ Client has Copy? ☐ Signed, dated? By: ____
☑ Project ID? ☑ Analyses Clear? ☐ Hold Samples? #on Hold ____ # Received ____
☑ CoC/Docs Zip-Locked under lid? ☐ Compos #: ___ ☑ #Samples OK? ____
☐ Discrepancies? ☐ Client notified? ☐ Response (attach docs): ____

3. Shipping Container/Cooler

☑ Cooler Used? # of 3 Cooled by: ☑ Ice ☐ Blue Ice ☐ Dry Ice ☐ None

Temp °C 3.6 4.4 4.8 ____ ____ ____

(Cooler temperature measured from temp blank if present, otherwise measured from the cooler)

Cooler Custody Seal? ☐ Absent ☐ Intact ☐ Tampered?

4. Sample Preservation

☐ pH <2 ☐ pH >12

If Not, pH = ____ Preserved by: ☐ Client ☐ APCL ☐ Third Party ____

5. Holding-time Requirements

☐ pH 24hr ☐ BACT 6/24hr ☐ Cr^{VI} 24hr ☐ NO_3^- 48hr ☐ BOD 48hr
☐ Cl_2 ASAP ☐ Turbidity 48hr ☐ DO ASAP ☐ Fe(II) ASAP
☐ HT Expired? ☐ Client notified?

6. Sample Container Condition

☑ Intact? ☐ Broken? ☐ Documented? Number: ____

Type: ☑ plastic ☑ glass ☐ Tube: brass/SS ☐ Tedlar Bag
☑ Quantity OK? ☐ Leaking? ☐ Anomaly?
☑ Caps tight? ☐ Air Bubbles? ☐ Anomaly?

Labels: ☑ Unique ID? ☐ Date/Time ☐ Preserved?

7. Turn Around Time

☑ RUSH TAT: 5 days ☐ Std (7-10 days) ☐ Not Marked

8. Sample Matrix

☐ Drinking H_2O ☑ Other Liq ☑ Soil ☐ Wipe ☐ Polymer ☐ Air ☐ Other: ____
☐ Ground H_2O ☐ Sludge ☐ Filter ☐ Oil/Petro ☐ Paint ☐ W Water ☐ Extract ☐ Unknown

9. Pre-Login Check List Completed & OK?

☑ ALL OK? (if not, attach docs) ☐ Client Contact? (Name:____)Date/Time:____

Received/Checked by: Roy Date: 20 Sep 2001 Time: 9:38 a.m

*HT: Samples must be analyzed for results to reflect total concentrations Results generated outside required of holding times are considered minimal values and may be used to define waste as hazardous but not as non-hazardous.

DocumentFile: [acal texfiles]smprcl.tex

049002

APPENDIX D
SUPPLEMENTAL FS INVESTIGATION FIELD DATA

APPENDIX D1
SITE 1D GRID LOGS

CHARACTERIZATION UNIT SAMPLING LOG

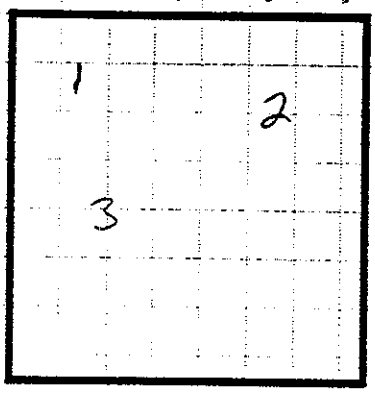
GRID NO.: A5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/27/01
Time: 1400
Date Finished: 9/27/01
Time: 1428
Drilling Contractor: Tri-County
Driller's Name: Milo Gore
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SP/silty sand, dry, fine grained, light tan	SM/sandy silt, dry, pale yellowish brown, fine grained	ML/sandy silt, dry, pale yellowish brown, fine grained
2–3	SP/silty sand, dry, fine grained, moderate yellowish brown	SM/silty sand, dry, fine grained, moderate yellowish brown	SP/silty sand, dry, fine grained, tan
4–5	SP/silty sand, dry, fine grained, tan	ML/sandy silt, dry, fine grained, pale yellowish brown	SM/silty sand, slightly moist, pale yellowish brown, fine grained
6–8			
9	A 1401	A 1413	A 1422
	B 1404	B 1418	B 1424
10	C 1409	C 1421	C 1428

CHARACTERIZATION UNIT SAMPLING LOG

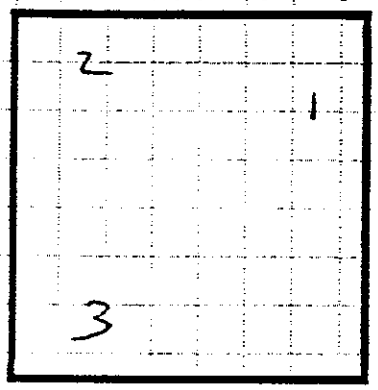
GRID NO.: A6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/27/01
Time: 1240
Date Finished: 9/27/01
Time: 1325
Drilling Contractor: Tri County
Driller's Name: Jay Pitt
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0–1	SP/silty sand, dry, moderate yellowish brown, fine-coarse grained	SP/silty sand, dry, fine grained, ~~light~~ pale brown.	SM/silty sand, dry, fine-med grained, light brown
2–4	SP/silty sand w/gravel, dry, light brown, fine-coarse grained sand, fine, angular gravel	SP/silty sand, dry, moderate yellowish brown, fine-med. grained	SP/silty sand, dry, ~~fine-coarse grained~~, light brown
5–6	SP/silty sand w/gravel, fine angular gravel, fine-coarse grained sand, light brown	SP/silty sand w/ gravel, dry, fine-coarse grained sand, fine angular gravel, light brown	SM/silty sand, dry, dark yellowish brown, fine grained
7–8			
9	A* 1241	A* 1254	A* 1313
	B 1245	B 1259	B 1319
10	C 1250	C 1306	C 1324

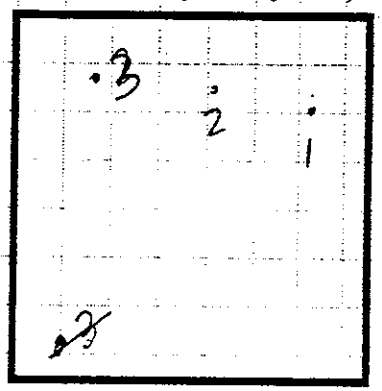
GRID NO.: H 1

Project Name: Camp Pendleton OU 4 Geologist: R. BRAND

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/25/01
Time: 1220
Date Finished: 9/25/01
Time: 1230
Drilling Contractor: TRI COUNTY
Driller's Name: —
Drilling Method: HAND Auger
Boring Diameter: —
Drill Rig: —
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes:

Sample Description

(USCS, color, %fines % sand % gravel hardness/density, moisture, other)

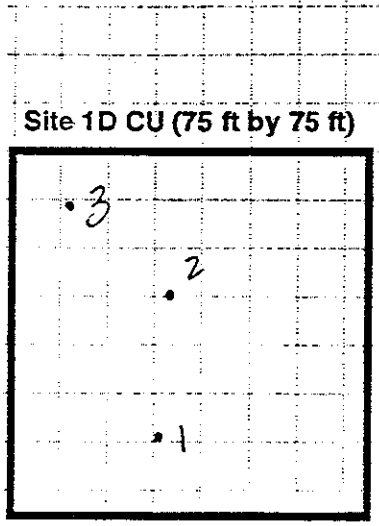
Boring 1	Boring 2	Boring 3
ML Sandy SILT brown, dry, fine gr sand <10%	SM Silty SAND v. fine to medium gr., brown-tan, <10% fines, coarse sand and gravel present, plant debris present to depth	SM Silty Sand v fine-coarse gr., tan-brown, dry, <10% fines occasional gravel and plant debris to depth
SM Silty Sand, tan, 5% fines, fine-medium gr., dry,		
occasional gravel		
A 1221	A 1222	A 1224
B 1225	B 1227	B 1228
C 1228 D 1030	C 1229 D 1030	C 1230 D 1030

GRID NO.: 40

Project Name: Camp Pendleton OU 4 Geologist: R. BRAND

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/25/01
Time: 1150
Date Finished: 9/25/01
Time: 1210
Drilling Contractor: TRI COUNTY
Driller's Name:
Drilling Method: HAND Auger
Boring Diameter:
Drill Rig: —
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description
(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0–2	SM Silty SAND brown, dry, fine to coarse poorly sorted	ML Sandy Silt brown dry fine grained sand occasional coarse sand	ML Silt brown, dry ~~wood~~ plant debris yellow brown with occasional gravel
3	refusal hard layer	~~refusal hard layer~~	refusal hard layer
9	A 1151	A 1152	A 1154
	B 1154	B 1155	B 1157
10	C 1158 X	C 1200	C 1205 X

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

CHARACTERIZATION UNIT SAMPLING LOG

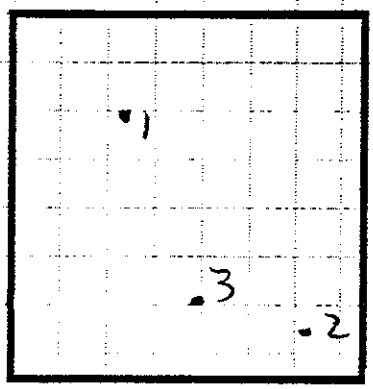
GRID NO.: B1

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/28/01
Time: 0815
Date Finished: 9/28/01
Time: 0850
Drilling Contractor: Jor Country
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0–1	SM/sandy silt, dry, fine grained, pale brown,	ML/sandy silt, dry, pale yellowish brown, fine-med. grained	ML/sandy silt, dry, pale brown fine grained
2–3	ML/sandy silt, dry, fine grained, moderate yellowish brown	ML/sandy silt, dry moderate yellowish brown, fine grained	SM/silty sand, dry, pale yellowish brown, fine grained
4–5	ML/silt w/sand, dry, fine grained, dark yellowish brown	SM/silty sand, slightly moist, fine grained, moderate yellowish brown.	SM/silty sand, dry moderate yellowish brown, fine grained
6–7			
8	A 0815	A 0824	A 0840
9	B 0817	B 0826	B 0844
	C 0820	C 0829	C 0847
10	D 0822	D 0835	D 0850

CHARACTERIZATION UNIT SAMPLING LOG

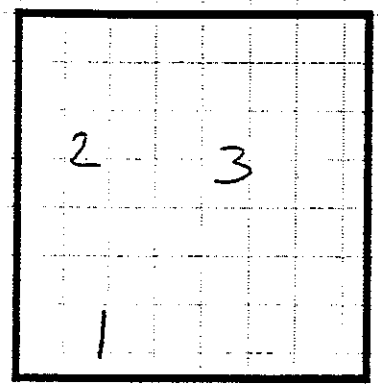
GRID NO.: B2

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/28/01
Time: 0855
Date Finished: 9/28/01
Time: 0915
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B2	Boring C3
0–1	ML/silty sand pale yellowish brown, fine grained	ML/sandy silt, dry, fine grained, pale yellowish brown	ML/silty sand pale yellowish brown, fine grained
2–3	ML/sandy silt slightly moist, fine grained, dark yellowish brown	ML/silty sand, dry, fine grained, moderate yellowish brown	ML/silty sand, slightly moist, fine grained, moderate yellowish brown
4–6	SM/silty sand slightly moist, fine grained, moderate yellowish brown	SM/sandy silt, slightly moist, fine grained, dark yellowish brown	SM/sandy silt, slightly moist, fine grained, dark yellowish brown
7–8			
9	A 0855	A 0903	A 0910
	B 0859	B 0905	B 0912
10	C 0901	C 0908	C 0915

CHARACTERIZATION UNIT SAMPLING LOG

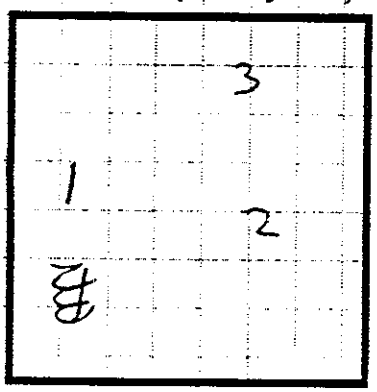
GRID NO.: B3

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/28/01
Time: 0942
Date Finished: 9/28/01
Time: ~~1020~~ 1010
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand % gravel hardness/density, moisture, other)

	Boring A1	Boring B2	Boring B3
0	ML/silty sand, dry, pale yellowish brown, fine grained	ML/silty sand, dry, moderate yellowish brown, fine grained	ML/silty sand, dry, pale yellowish brown, fine grained
1			
2	ML/silty sand, dry, fine grained, moderate yellowish brown,	ML/silty sand, dry, fine grained, moderate yellowish brown	ML/silty sand, dry, moderate yellowish brown, fine grained
3			
4	SM/silty sand, dry, fine grained, dark yellowish brown, slightly moist	ML/silty sand, dry, moderate brown, fine grained	SM/silty sand, slightly moist, dark yellowish brown
5			
6			
7			
8			
9	A 0942 B 0945 C 0948	A 0951 B 0954 C 0958	A 1001 B 1004 C 1007
10			

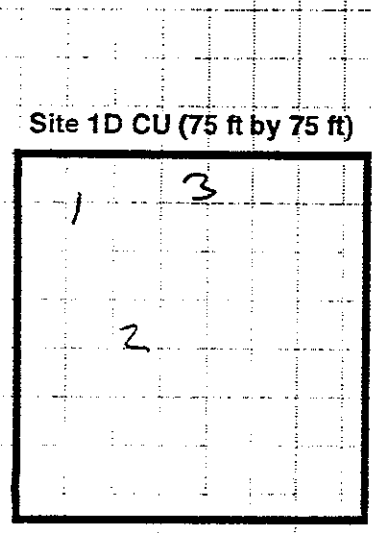
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: B4

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/28/01
Time: 1011
Date Finished: 9/28/01
Time: 1027
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 3	Boring 2
0	ML/silty sand, dry, pale brown, fine grained	ML/silty sand, dry, fine grained, pale brown	ML/silty sand, dry moderate brown, fine grained
1			
2	SM ML/silty sand, dry, fine grained, pale yellowish brown	ML/silty sand, dry, fine grained, moderate brown	ML/silty sand, dry, fine grained moderate yellowish brown
3			
4	SM ML/silty sand, dry, fine grained, pale yellowish brown	ML/silty sand & slightly moist, fine grained moderate yellowish brown	ML/silty sand, dry, slightly moist, fine grained, dark yellowish brown
5			
6			
7			
8	1	2	3
9	A* 1011 B 1013	A* 1017 B 1019	A* 1023 B 1025
10	C 1015	C 1021	C 1027

CHARACTERIZATION UNIT SAMPLING LOG

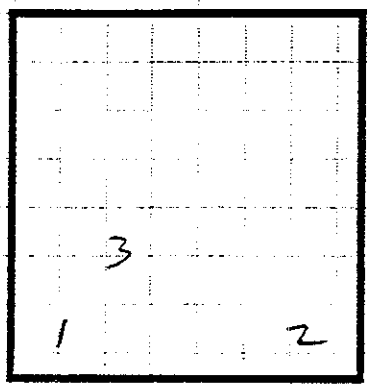
GRID NO.: B5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/27/01
Time: 1443
Date Finished: 9/27/01
Time: 1505
Drilling Contractor: Tri-County
Driller's Name: Bill & Joe
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SM/silty sand, dry, fine grained, moderate yellowish brown	ML/silty sand, dry, fine grained, dark yellowish brown	ML/silty sand, dry, fine grained, moderate yellowish brown
1			
2	SM/silty sand, dry, fine grained, moderate yellowish brown	ML/sandy silt, dry, fine grained, dark yellowish brown	ML/silty sand, dry, dark yellowish brown fine grained
3			
4	SM/silty sand, dry, fine grained, pale yellowish brown	ML/sandy silt, dry, fine grained, dark yellowish brown	ML/silty sand, dry, fine-medium grained, dark yellowish brown
5			
6			
7			
8	A 1444	A 1454	A 1501
9	B 1448	B 1456	B 1502
	C 1449	C 1459	C 1503
10	D 1453	D 1500	D 1504

CHARACTERIZATION UNIT SAMPLING LOG

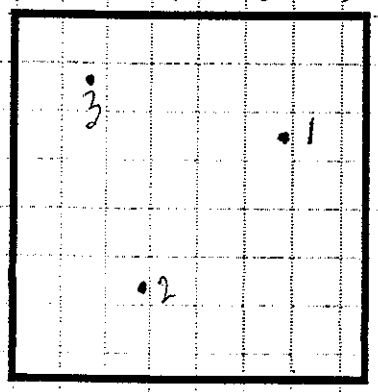
GRID NO.: B6

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9-
Time:	1050
Date Finished:	
Time:	1110
Drilling Contractor:	TRI COUNTY
Driller's Name:	
Drilling Method:	HAND AUGER
Boring Diameter:	
Drill Rig:	—
Datum: Ground Surface	
Borehole Abandonment:	Bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML SILT brown dry	ML brown, dry slight clay <2%	ML Silt brown dry
1			
2	ML Sandy SILT reddish brown, damp, very fine grained sand	ML sandy silt dark brown fine grained sand	ML Sandy Silt red-brown damp, fine grained sand
3			
4	occasional coarse sand		SM Silty SAND gray brown fine grained, damp
5			
6			
7			
8	A 1050	A 1057	A 1052
9	B 1054 C 1059	B 1055 C 1100	B 1057 C 1102
10			

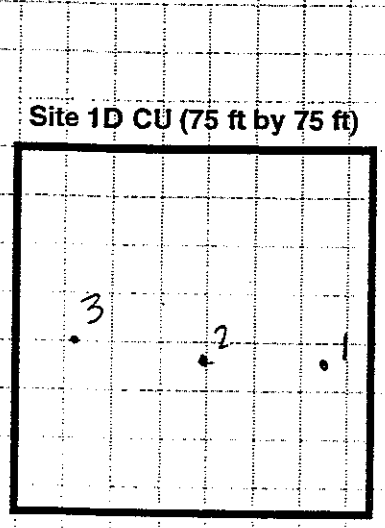
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: B7

Project Name: Camp Pendleton OU 4 | Geologist: K. BRAND

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9-25-01
Time:	1040
Date Finished:	9-25-01
Time:	10
Drilling Contractor:	
Driller's Name:	
Drilling Method:	
Boring Diameter:	
Drill Rig:	
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML dry	ML dry	ML SILT brown, dry
1			
2	ML moist	ML damp	ML Sandy Silt damp
3	Slight clay	very fine sand	V. fine sand
4		slight clay	moist
5			
6			
7			
8			
9	A 1040	A 1041	A 1042
	B 1043	B 1044	B 1045
10	C 1047	C 1048	C 1050

CHARACTERIZATION UNIT SAMPLING LOG

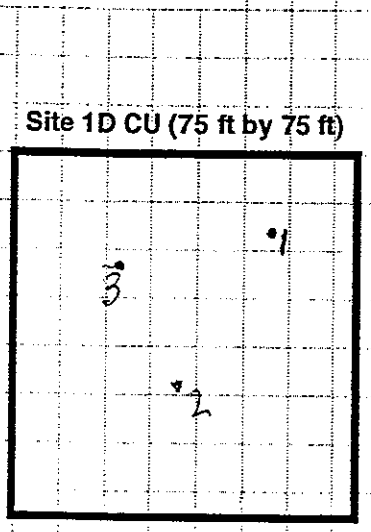
GRID NO.: 88

Project Name: Camp Pendleton OU 4 | Geologist: K BRAND

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9-25-01
Time: 1028
Date Finished: 9-25-01
Time: 1035
Drilling Contractor: TRI COUNTY
Driller's Name:
Drilling Method: HAND Auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment:
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	ML SILT brown, dry micac	ML SILT w/gravel brown dry	SP SAND medium-coarse grained sand
2–3	ML Sandy Silt brown dry, fine to coarse grained sand with trace gravel micaceous	ML Sandy SILT yellow brown, dry fine to medium sand	SM Silty SAND dark brown dry fine to coarse grained
4–5	SP Sand fine to coarse grained, gray-brown, dry	SP SAND yellow brown fine to coarse grained, dry some silt	↓
6–8			
9	A 1028	A 1029	A 1030
	B 1031	B 1032	B 1033
10	C 1034	C 1035	C 1036

CHARACTERIZATION UNIT SAMPLING LOG

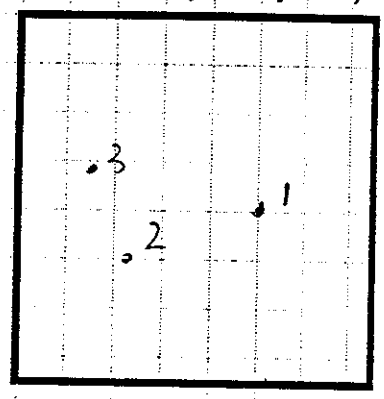
GRID NO.: B9

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9-25-01
Time: 1000
Date Finished: 9-25-01
Time: 1025
Drilling Contractor: TRI-COUNTY
Driller's Name:
Drilling Method: HAND AUGER
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring B3
0	ML Sandy SILT, brown <10% very fine grained sand; dry with some coarse grain sand and gravel, slightly plastic when wet ~~graded~~ grades	ML Sandy SILT brown dry fine to coarse grained sand <10% occasional gravel	ML SILT brown dry in thinly laminated pieces
1	To SM Silty SAND brown, dry, very fine to coarse grained, micaceous	ML Sandy SILT gray-brown, dry, V fine grained sand micaceous (beach sand)	ML Sandy SILT brown dry fine to coarse-gravel sand <10%
2	SP SAND fine to Coarse grained, brown, dry trace silt	SP SAND tan-light brown, dry, trace gravel and silt	SM Silty SAND fine to coarse grained red brown with some silt and trace gravel
3			
4			
5			
6			
7			
8			
9	A 1000	A 1005	A 1008
	B 1015	B 1010	B 1012
10	C 1020	C 1018	C 1016

CHARACTERIZATION UNIT SAMPLING LOG

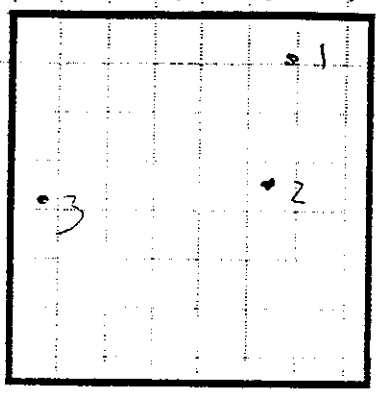
GRID NO.: B10

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	1505
Date Finished:	9/24/01
Time:	1535
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0–1	SM Silty sand, brown, v. fine to fine sand, <2% woody material, dry	ML Sandy silt, brown, v. fine to fine sand, <2% woody material, dry	SM Silty sand, brown, v. fine to fine sand, <10% woody material, dry
2–3	SP Sand, brown, v. fine to fine sand, dry, trace silt	SP Sand, brown, v. fine to medium sand, dry, trace silt	SM Silty sand, brown, v. fine to fine sand, dry
4–5	SM Silty sand, light brown, v. fine to coarse sand, subrounded, dry	SP, AA	SM, AA
6	TD @ 4.5	TD @ 4.5'	TD @ 4.5'
7			
8			
9	A - 1510	A - 1522	A - 1530
	B - 1515	B - 1524	B - 1532
10	C - 1520	C - 1526	C - 1534

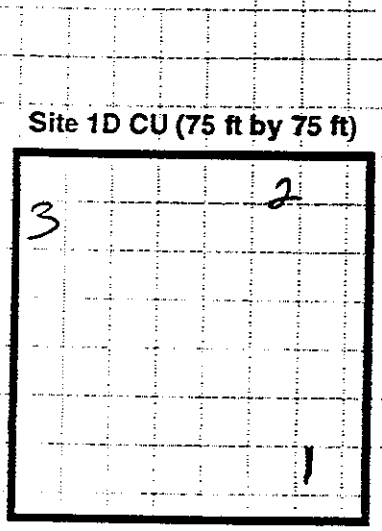
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C1

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/27/01
Time: 1150
Date Finished: 9/27/01
Time: 1235
Drilling Contractor: Tri-County
Driller's Name: Joe + Bill
Drilling Method: Hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM/silty sand, dry, fine-med. grained, light brown,	SP/silty sand, dry, fine grained, tan	ML/sandy silt, dry, pale brown fine grained
1			
2	SM/silty sand dry, fine-med grained, pale yellowish brown	ML/silt w/sand, dry, fine grained, light brown	ML/silt w/sand, dry fine grained pale brown
3			
4	SM/silty sand, dry, moderate yellowish brown, fine grained	SM/silty sand, dry, pale yellowish brown, fine grained	SP/silty sand, dry, fine grained, pale brown
5			
6			
7			
8	A 1150	A 1205	A 1222
9	B 1153	B 1209	B 1225
	C 1157	C 1213	C 1229
10	D 1201	D 1217	D 1233

CHARACTERIZATION UNIT SAMPLING LOG

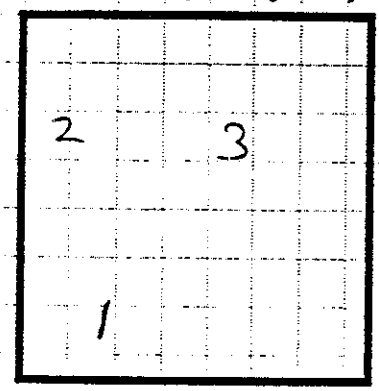
GRID NO.: C2

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/28/01
Time: 0920
Date Finished:
Time: 0940
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig:
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SM/ silty sand, dry, fine grained, pale brown	SM/ silty sand, dry fine grained, pale yellowish brown	SM/ silty sand, dry, fine grained, pale yellowish brown
1			
2	SM/ silty sand, dry, fine grained, moderate yellowish brown	SM/ silty sand, dry, fine grained, moderate yellowish brown	SM/ silty sand, dry, fine grained, pale yellowish brown
3			
4	SM/ silty sand, dry, fine grained, moderate yellowish brown	SM/ silty sand, dry, fine grained, moderate yellowish brown	SM/ silty sand, dry, light tan, fine grained
5			
6			
7			
8			
9	A 0920	A 0927	A 0934
	B 0922	B 0929	B 0937
10	C 0925	C 0932	C 0940

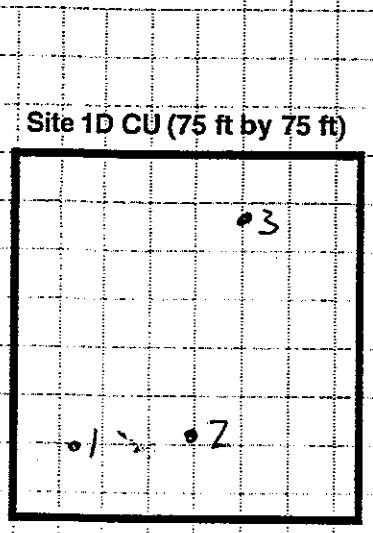
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C3

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01
Time: 0915
Date Finished: 9/5/01
Time: 1030
Drilling Contractor: Intra Phase
Driller's Name: Hilo Santiago
Drilling Method: Geoprobe
Boring Diameter: $1\frac{3}{16}$"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: PID=1.5 background breathing zone @ 0918h
Sheen @ 6-7 feet B1
" " 3 feet B2
" " 0.5 feet BB
" " 3 " B3

Sample Description Mash
(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SM/sandy silt, dry,	SM/sandy silt, dry,	SM/sandy silt, dry,
1	pale brown, fine-grained	moderate brown, fine-grained	fine-coarse grained moderate brown
2	ML/sandy silt, dry,	SM/sandy silt, dry,	SM/sandy silt, dry,
3	moderate brown, fine grained	moderate brown, fine grained	fine-grained, moderate brown
4	ML/silt w/sand, dry,	SM/~~silty, fine~~ sandy silt, dry,	ML/silt w/sand, dry,
5	moderate brown, fine-grained	moderate brown fine-grained	fine grained, light tan
6	ML/sandy silt, dry,		
7	moderate brown, fine grained		
8	ML/silt w/sand, dry,		
9	moderate brown, fine grained	A 1001	A 1018
10		B 1005	B 1021
		C 1013	C 1024
		D 1015	D 1028

A=0975
B=0933
C=0935
D=0940

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

CHARACTERIZATION UNIT SAMPLING LOG

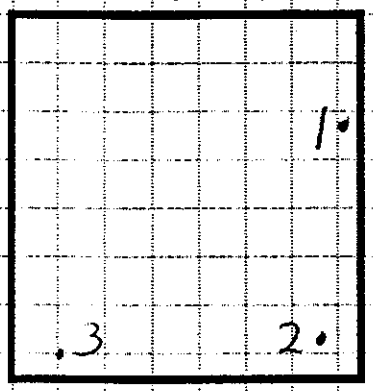
GRID NO.: C4

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01
Time: 1030
Date Finished: 9/5/01
Time: 1320
Drilling Contractor: Tetra Phase
Driller's Name: Gil + Santiago
Drilling Method: Geoprobe
Boring Diameter: 1 7/16"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: 0.0 ppm PID @ 1035 hrs
ps ash
glass @ 2.5 ft (bgs)

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SM/sandy silt w/grav. smooth, fine gravel, dry fine-coarse grained sand, pale brown	SP/silty sand, dry, fine-coarse grained, moderate brown	SM/sandy silt, dry fine-medium grain, pale brown
1			
2	SM/sandy silt, dry, fine grained moderate brown	SM/sandy silt, dry fine-medium grained moderate brown	SM/silt w/sand, dry fine grained, moderate brown
3			
4	ML/silt w/sand, dry fine grained, pale brown	SP/silty sand, dry fine-coarse grained, moderate brown	SP/sandy silt, dry fine-coarse grained moderate brown
5			
6	ML/silt w/sand, dry, fine grained, pale brown		
7			
8	ML/silt w/sand, dry, fine grained, pale brown		
9		A 1140 B 1144 C 1149	A 1310 B 1315 C 1320
10			

A 1035
B 1040
C 1045

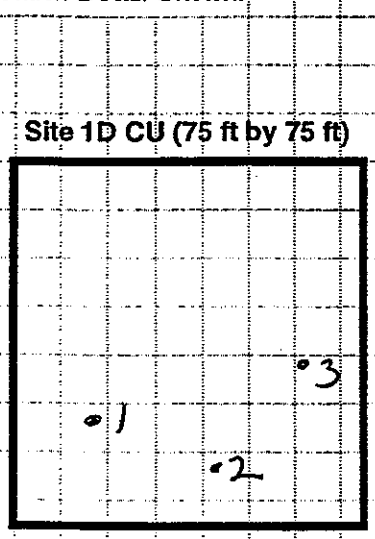
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01
Time: 1330
Date Finished: 9/5/01
Time: 1455
Drilling Contractor: Interphase
Driller's Name: Gil + Santiago
Drilling Method: Geoprobe
Boring Diameter: 1 7/16
Drill Rig: Chase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 PPM @ 1335 hrs.
no ash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SM/sandy silt, dry, fine-coarse grained, moderate brown.	SM/silty sand, ash at surface (grass fire?), dry, moderate brown, fine-medium grained	SM/sandy silt, glass, fine-medium grain moderate brown, dry
1			
2	SM/sandy silt, dry, grayish brown, glass, fine-coarse grained.	SM/sandy silt, glass, dry, moderate brown, fine grained	SM/sandy silt, glass, fine-medium grained, moderate brown, dry
3			
4	SM/sandy silt, dry, fine-grained, pale brown	SM/sandy silt, glass, dry, fine grained, moderate brown	SM/silty sand, glass, dry, fine-medium grain, moderate brown
5			
6	SM/silty sand, dry, fine-coarse grained, moderate brown		
7			
8	CL/silty clay, slightly moist, low medium plasticity, dark yellowish brown		
9		A 1422 B 1428 C 1438	A 1442 B 1448 C 1452

A 1334
B 1337 10
C 1340

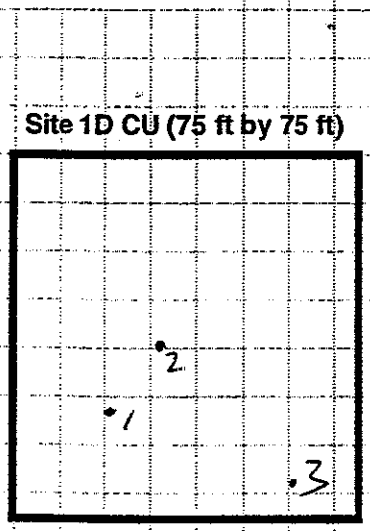
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01
Time: 1455
Date Finished: 9/6/01
Time: 0800
Drilling Contractor: Inter Phase
Driller's Name: G. & Santiago
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1506 hrs
SVOC @ C sample

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM/sandy silt, pale brn, dry, ash @ surface (grass fire?), fine-medium grained.	SM/silty sand, glass, fine-medium grained, moderate brown, dry,	SM/silty sand, glass, dry, fine medium grained, moderate brown,
1			
2	SM/silty sand, dry, glass, fine-medium grained, moderate brown.	SM/sandy silt, glass, dry, fine-medium grained, moderate brown	SM/sandy silt, glass, dry, moderate brown, fine grained
3			
4	SM/silty sand, dry, glass, fine-medium grained,	SM/sandy silt, glass, (GS) dry, fine grained, pale brown	SM/sandy silt, glass, (GS) dry, fine grained moderate brown.
5			
6	SM/silty sand, (GS) fine grained, moderate brown	SM/sandy silt, dry, glass, fine-grained, tan	SM/sandy silt, (GS) dry, moderate brown, fine grained
7			
8	SM/silty sand, glass, @8.5', fine grained, pale brown	(TD)	(TD)
	(TD)	9/5/01	9/6/01
		A 1525	0745
		B 1530	0750
		C 1540 SVOC	C 0755 SVOC

7/5/01
A 1500
B 1505
C 1515 SVOC

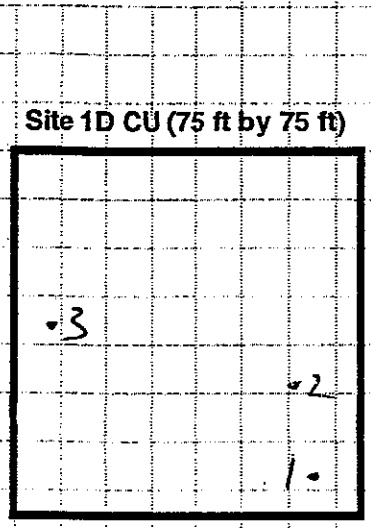
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/6/01
Time: 0800
Date Finished: 9/6/01
Time: 0900
Drilling Contractor: Tetra Phase
Driller's Name: Gil & Gman
Drilling Method: Geoprobe
Boring Diameter: 1 3/4"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.9 ppm breathing zone background 0850

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SM/silty sand w/gravel, angular, fine gravel, glass, fine-coarse grained sand, moderate brown, dry	SM/sandy silt, glass, dry, fine-coarse grain, moderate brown	SM/sandy silt, dry, glass, fine-coarse grained, mod. brown
1			
2	SM/~~silt~~ sandy silt, dry, glass, fine-coarse grained, moderate brn.	SM/sandy silt, dry, glass, fine-coarse grained, moderate brown.	SM/sandy silt, dry, glass, fine-coarse grained, moderate brown
3			
4	SM/sandy silt, pale brown, dry, fine grained, glass	SM/sandy silt, glass, pale brown, dry, fine-coarse grained	SM/sandy silt, dry, glass, moderate brown, fine-medium grained
5			
6	SM/sandy silt, dry, glass, moderate brown, fine-coarse grained		
7			
8	SP/silty sand, dry, moderate yellowish brown, fine grained		
9		A 0830	A 0845
10	TD	B 0835	B 0850
		C 0840	C 0855
		D 0845	D 0900

A 0801
B 0807
C 0815
D 0820

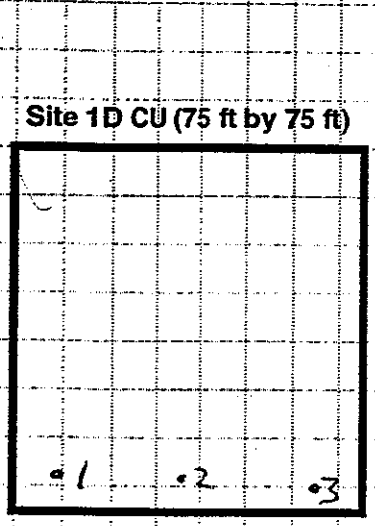
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/6/01
Time: 0905
Date Finished: 9/6/01
Time: 1040
Drilling Contractor: InterPhase
Driller's Name: Hil + Glen
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PIDs 0.2 ppm in breathing zone and background @ 0950 hrs, ash in C sample

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A2	Boring B2	Boring C3
0	SM/sandy silt, dry, glass, fine-medium grained, moderate brown	SM/silty sand, dry, glass, fine-medium grained/moderate brown	SM/sandy silt, fine-coarse grained, dry, moderate brown
1			
2	SP/sandy silt, dry, glass fine-medium grained, moderate brown	SM/sandy silt, fine-coarse grained, dry, glass, moderate brown	SM/sandy silt, fine grained, dry, moderate brown
3			
4	SM/sandy silt dry, glass, fine-medium grain, moderate brown (ash)	SP/sand w/ silt, dry, light tan, fine-medium grained, glass (ash)	SP/sand w/ silt, dry, light tan, fine-medium grained, glass
5			
6	SP/silty sand, dry, moderate yellowish brown, fine-medium grained	(TD)	(TD)
7			
8	SP/sand w/ silt, dry, light tan, fine-medium grained		
9			
10	(TD)	A 1010 B 1015 C 1020	A 1028 B 1030 C 1035

A: 0910
B: 0915
C: 0920

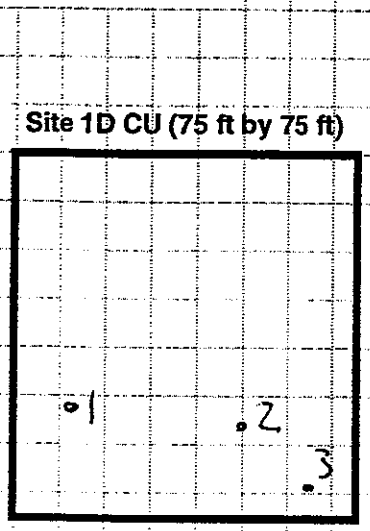
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/6/01
Time: 1045
Date Finished:
Time:
Drilling Contractor: Inter-Phase
Driller's Name: Hill & Gunn
Drilling Method: Geoprobe
Boring Diameter: $1\frac{3}{16}$"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: no cash
PID = 0.1 background + breathing zone
1050 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0–1	SM/sandy silt, dry, light brown, fine-coarse grained, glass	SM/sandy silt, dry, fine-medium grained, pale brown	SM/sandy silt, dry, fine medium grained, light brown
2–3	SM/sandy silt, dry, light brown, fine-medium grained, glass	SM/sandy silt, dry, glass, light brown, fine grained	SP/silty sand, dry, fine-medium grained, moderate brown
4–5	SM/sandy silt, dry, fine medium grained, pale brown, glass	SM/sandy silt, dry, glass, pale brown, fine-coarse grained	SM/silty sand, dry, fine grained, pale brown
6–7	SM/sandy silt, glass, moderate brown, fine grained, dry		
8–9	SM/sandy silt, fine grained, pale brown, dry	A 1105 B 1110 C 1115 D 1120	A 1140 B 1142 C 1146 D 1148
10			

A 1045
B 1050
C 1055
D 1100

CHARACTERIZATION UNIT SAMPLING LOG

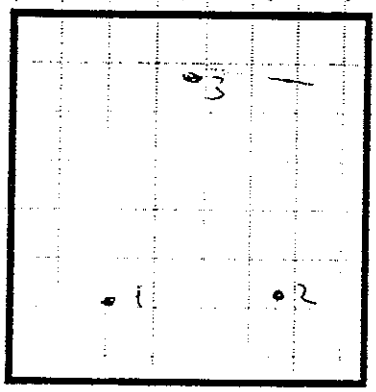
GRID NO.: C10

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	1420
Date Finished:	9/24/01
Time:	1440
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP ~~Hit~~ Sand, light tan, v. fine to medium sand, dry, trace silt (beach sand)	SP Sand, light tan, v. fine to fine sand, dry, trace silt	~~SP Sand, reddish brown, v. fine to coarse sand, dry, trace silt (beach sand)~~
1			ML sandy silt, brown v. fine sand dry
2	SP, AA	SP Sand, light tan, v. fine to medium sand, dry, trace silt (beach sand)	
3			
4	SM Silty sand, brown v. fine to fine sand, dry, 30% woody material	SP Sand, reddish brown, v. fine to coarse sand, dry, trace silt (beach sand)	SP Sand, AA
5			TD @ 4.5'
6	TD @ 4.5'	SP Sand, AA	
7		TD @ 4.5'	
8			
9	A - 1422	A - 1428	A - 1434
	B - 1424	B - 1430	B - 1436
10	C - 1426	C - 1432	C - 1438

CHARACTERIZATION UNIT SAMPLING LOG

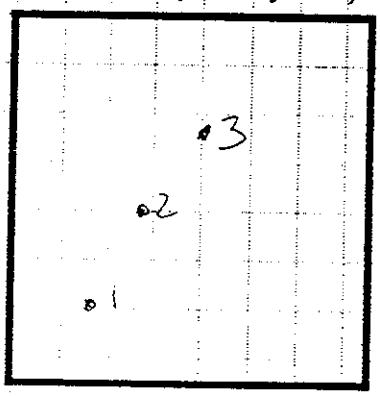
GRID NO.: C11

Project Name: Camp Pendleton OU 4 Geologist: J. Lee

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 1442
Date Finished: 9/24/01
Time: 1500
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0	SP Sand, brown, v. fine to fine sand, dry, trace silt, <2% woody material	SM Silty sand, brown, v fine to fine sand, dry, <2% woody material	ML Sandy silt, light brown, v. fine to fine sand, <2%, woody material, dry
1			
2	SM Silty sand, brown, v. fine to medium sand, dry	ML Sandy silt, brown, v fine sand, dry, <2%, woody material	ML Sandy silt, dark reddish brown, v. fine to coarse sand dry
3			
4	SM Silty sand, brown, v. fine to fine sand, dry	ML, AA	ML, Sandy silt, reddish brown, v. fine to coarse sand dry
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1444 B - 1446	A - 1450 B - 1452	A - 1456 B - 1458
10	C - 1448	C - 1454	C - 1500

CHARACTERIZATION UNIT SAMPLING LOG

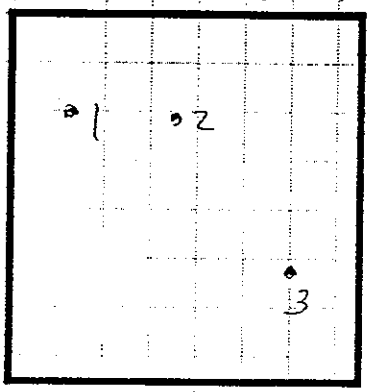
GRID NO.: C 12

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	1240
Date Finished:	9/24/01
Time:	1305
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP Sand, brown, v. fine to fine sand, trace silt, dry	SP Sand, brown, v. fine to fine sand, trace silt, dry	SP Sand, brown, v. fine to fine sand, trace silt, <2% woody material, dry
1			
2	SP Sand, AA	SP Sand, AA	SP Sand, AA
3			
4	SP Sand, AA	SP Sand, AA	SP Sand, AA
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1245 B - 1247	A - 1250 B - 1252	A - 1300 B - 1302
10	C - 1249	C - 1255	C - 1304

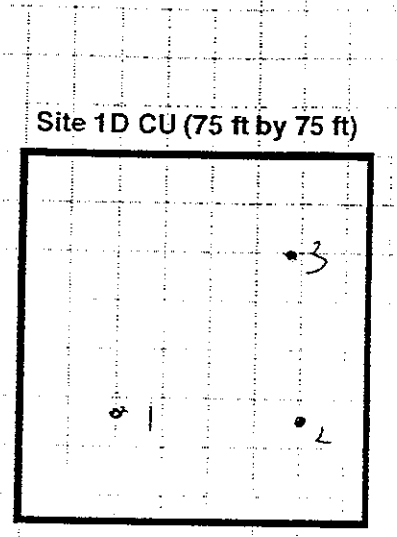
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C13

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	1310
Date Finished:	9/24/01
Time:	1330
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0–1	SP Sand, brown, v. fine to fine sand, trace silt, dry	SP Sand, brown, v fine to fine sand, trace silt, dry	SM Silty Sand, brown, v. fine to fine sand, dry
2	SP Sand, AA	SP Sand, AA	ML Clayey silt, dark brown, slightly plastic
3			
4	SP Sand, AA	SP Sand, AA	ML, AA
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1312 B - 1314	A - 1318 B - 1320	A - 1325 B - 1327
10	C 1316	C 1322	C - 1329

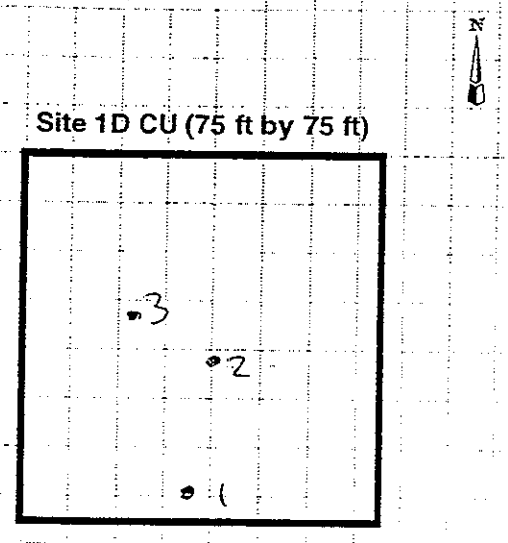
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C14

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	1332
Date Finished:	9/24/01
Time:	1350
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS color %fines % sand % gravel hardness/density, moisture other)

	Boring A 1	Boring B 2	Boring C 3
0–1	ML Sandy silt, brown, very fine sand, dry	ML Sandy silt, light brown, v. fine sand, dry, <10% woody material	ML Sandy silt, light brown, v. fine sand, dry, 30% woody material
2–3	ML Sandy silt, brown, v. fine sand, slightly plastic	ML Sandy silt, brown, v. fine sand slightly plastic	ML Sandy silt, dark brown, v. fine sand, slightly plastic
4–5	ML Sandy silt, dark grayish brown, v. fine sand, slightly plastic	ML Silt w/ sand, dark grayish brown, v. fine sand, slightly plastic	ML Sandy silt, dark grayish brown, v. fine sand, slightly plastic
6	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
7			
8			
9	A - 1335	A - 1340	A - 1345
	B - 1337	B - 1342	B - 1347
10	C - 1339	C - 1344	C - 1349

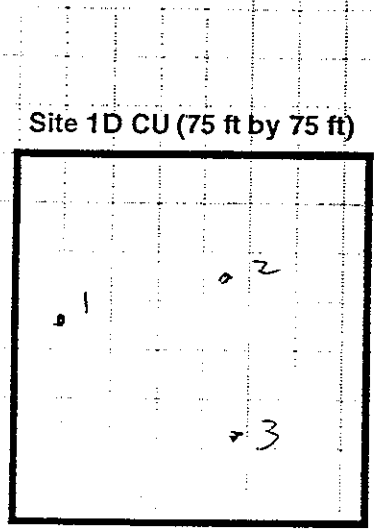
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C15

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 1355
Date Finished: 9/24/01
Time: 1415
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0–1	ML Sandy silt, brown, V. fine sand, dry, <10% woody material	ML Sandy silt, light brown, v. fine sand, dry, 15% woody material	SM Silty sand, brown, f. fine to fine sand, dry, <10% woody material
2–3	ML Sandy silt, dark brown, v. fine sand, slightly plastic	ML Sandy silt, dark brown, v. fine sand, slightly plastic	ML Sandy silt, brown, v. fine sand, slightly plastic
4–5	SP Sand, brown, v. fine, trace silt	ML; ~~AA~~	ML Sandy silt, dark brown, v. fine sand, slightly plastic
	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1355	A - 1402	A - 1408
	B - 1358	B - 1404	B - 1410
10	C - 1400	C - 1406	C - 1412

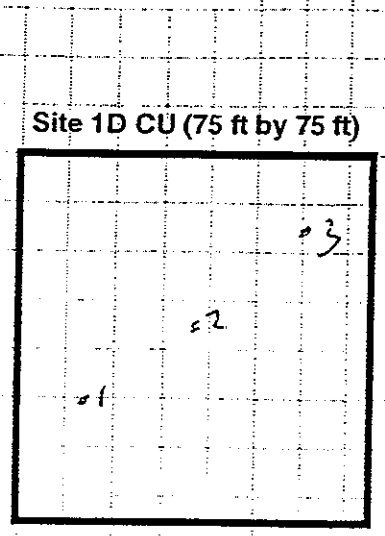
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D01

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/5/01
Time:	0855
Date Finished:	9/5/01
Time:	1000
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

No ASH.
0915 - Background & breathing zone PID - 1.5 ppm

A 900
B 905
C 910

Sample Description

(USCS color, %fines % sand % gravel hardness/density moisture, other)

	Boring A1	Boring B2	Boring C3
0			
1	SM/ Silty sand, tan, fine to ~~med~~ coarse grain sand,	SM/ Silty sand, moderate brown, fine to coarse grain,	SP/ Sand w/ silt, fine to ~~med~~ coarse grain
2	fine gravel, dry	fine gravel, dry	fine gravel, moderate brown to dark, dry
3	SM/ Silty sand, tan, fine to coarse grain,	SM/ Silty sand, mod to dark brown, fine - coarse grain	SM/ Silty sand, mod brown, fine to coarse grain sand,
4	fine gravel, dry	sand, dry	fine gravel, dry
5	SM/ Silty sand, moderate brown, fine to coarse grain, fine	SM/ Silty sand, fine - coarse sand,	SM/ Silty sand, (35% fin moderate brown,
6	gravel, dry	fine - coarse gravel, mod to dark brown,	fine to coarse sand, fine gravel, dry
7	SM/ Silty sand, mod brown, fine - med grain, dry	dry A 935 B 940	A 950 B 954
8	SM/ Silt w/ sand, black, fine - med grain, dry (7-9' bgs)	C 945	C 1003
9	SM/ Silty sand, mod brown, fine - coarse grain, fine gravel, dry		
10			

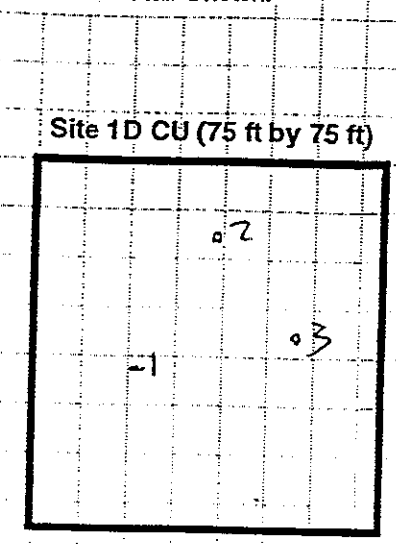
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D07

Project Name: Camp Pendleton OU 4 | Geologist: Cnsty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/5/01
Time:	1005
Date Finished:	9/5/01
Time:	1112
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

1035 - Background & Breathing zone PID - 0.0ppm

No ASH

A - 1010
B - 1015
C - 1020

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring 03
0			
1	SM/ Silty sand, tan, fine to med sand, fine - coarse grand, dry, organics	SM/ Silty sand, light brown organics, fine to med grain, dry	SM/ Silty sand, moderate brown, fine to med grain, sand fine grand, dry
2	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Silty sand, moderate brown, fine to coarse grain sand, fine grand, dry	SM/ Sandy silt, moderate brown, fine to med grain, dry
3	ML/ Silt w/ no reticulate sand, mod to dark brown fine cm grain, dry	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Sandy silt, moderate - dark brown, fine grain, dry
4	SM/ Sandy silt, mod to dark brown, fine to med grain, dry		
5	SM/ Sandy silt, mod to dark brown, fine to med grain, dry		
6	TD @ 10' No ash.		
7		A 1046	A 1102
8		B 1048	B 1107
9		C 1055	C 1112
10			

PARSONS ENGINEERS

CHARACTERIZATION UNIT SAMPLING LOG

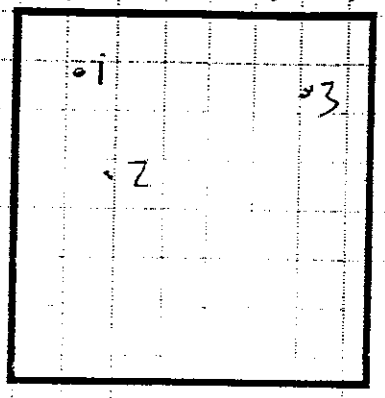
GRID NO.: D03

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/5/01
Time:	1114
Date Finished:	9/5/01
Time:	1330
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
	No ash.

A - 1116
B - 1120
C - 1124

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SP/ Sand w/silt to med, tan, fine grain, dry	SP/ Sand w/silt, glass, moderate brown, fine to coarse sand, dry	SM/ Silty sand, glass, dark brown, fine to med grain, dry
1	SM/ Sandy silt, moderate brown, fine to coarse grain sand, dry	SM/ Silt w/sand, moderate to dark brown, fine to med grain, dry	SM/ Silty sand, glass, med to dark brown, fine to coarse grain, dry
2	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Silt w/sand, moderate to dark brown, fine to med grain dry	SM/ Silty sand, dark brown, fine to coarse, dry
3	SM/ Silty sand, moderate brown w/ white sand, fine to med grain, dry	A - 1145 B - 1148 C - 1150	A - 1320 B - 1323 C - 1324
4	SM/ Sandy silt, glass pieces, moderate brown, fine to med grain, dry TD @ 10'		
5			
6			
7			
8			
9			
10			

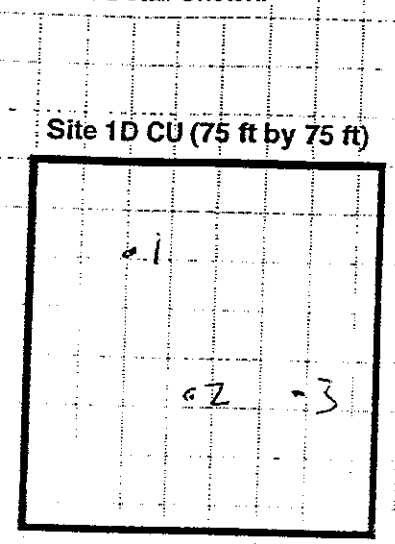
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D04

Project Name: Camp Pendleton OU 4 | Geologist: Christy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
ash 2.0-2.5
① 6-6.5
② 4-4.5 - w/ash
③ 4-4.5

Date Started:	9/5/01
Time:	1330
Date Finished:	9/5/01
Time:	1550
Drilling Contractor:	INTERCHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

1335 - Background & Breathing PID - 0 (ppm)

ASH @ #1, 6.5'
#2, 4-4.5'

A = 1333
B = 1337
C = 1400 SVOCs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/ Sand w/silt fine to coarse sand, moderate brown, dry	SP/ Sand w/silt, fine to coarse grain sand, fine gravel, moderate brown, dry	SM/ Silty sand, fine to med grain, organics, dark brown, dry
1	SM/ Silty sand, glass, fine to coarse grain sand, dark brown, dry	SM/ Silty sand fine to med grain, dark brown, dry, glass	SM/ Silty sand, fine ~~to med~~ coarse grain, fine gravel, dark brown, dry
2	SM/ Sandy silt, moderate brown, fine to med grain, dry	SM/ Silty sand, moderate to dark brown, fine to med grain, ash in soil mix, dry	SP/ Sand w/silt, fine to med grain, moderate brown, dry
3	SM/ Silty sand, ash @ 6.5', glass, moderate brown, fine to med grain dry,	TD @ 6'	SM/ Sandy silt, moderate brown, fine to med grain, dry
4	SM/ Silty sand, glass, moderate brown, fine to med grain, dry	A - 1424 B - 1427 C - 1435 SVOCs	TD @ 8'
5			A - 1445 B - 1447 C - 1500 SVOCs

ASH

PARSONS

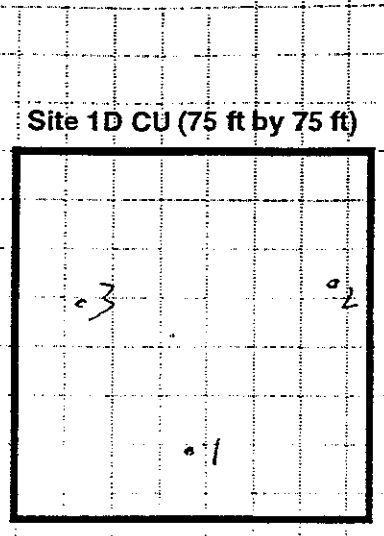
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D/5

Project Name: Camp Pendleton OU 4 | Geologist: Cnsty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

9/5/01

Date Started:	9/5/01	9/6/01
Time:	1500	0730
Date Finished:	9/5/01	9/6/01
Time:	1550	0745
Drilling Contractor:	INTERPHASE	
Driller's Name:	CARLOS, ERIK	
Drilling Method:	GEOPROBE	
Boring Diameter:	1 3/16"	
Drill Rig:	PHASE 12	
Datum: Ground Surface		
Borehole Abandonment:	BENTONITE	
Notes:		
	NO ASH	

A- 1510
B- 1515
C- 1520

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture, other)

	Boring B/1	Boring B/2	Boring B/3
0	SM/ Silty sand, dark brown, fine to medgrain, dry	SP/ Sand w/silt, glass, moderate brown, fine to coarse sand, dry	SP/ Sand w/silt, glass, moderate brown, fine to medgrain, dry ~~smells~~
1	SP/ Sand w/silt, moderate brown, fine to med grain, slightly moist	SP/ Sand w/silt, dark brown, glass, fine to med grain, dry	SP/ Sand w/silt glass, dark brown, fine to medgrain, dry smells like bagged top soil
2	SM/ Silty sand, moderate brown, fine to medgrain, slightly moist	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Tan, fine to med grain, ~~damp~~ slightly moist — Silty Sand
3	SM/ Silty sand, moderate brown, fine to med grain, slightly moist	9/5/01 A - 1542 B - 1544 C - 1546	9/6/01 A - 0732 B - 0734 C - 0735
4	SM/ Silty sand, moderate brown, fine to med grain, slightly moist		
5			
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

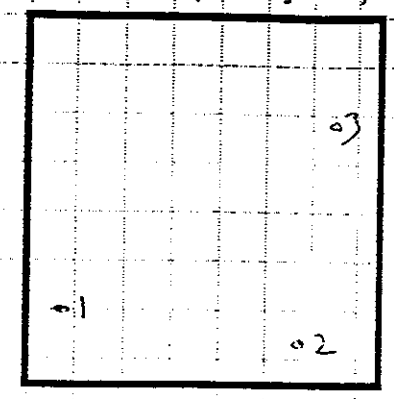
GRID NO.: D06

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	0746
Date Finished:	9/6/01
Time:	0858
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

0753 Background & Breathing zone PID - 1.2 ppm

No OSH

A 0749
B 0753
C 0757
D 0800

Sample Description
(USCS color %fines % sand, % gravel hardness/density, moisture, other)

	Boring A/1	Boring B/3	Boring C/2
0			
1	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Silty sand, light brown, fine to med grain, dry	SP/ Sand w/ silt, moderate brown, fine to coarse grain, wood pieces, dry
2	SM/ Silty sand, moderate brown, fine to med grain, dry	SM/ Silty sand, moderate brown, fine to coarse grain, dry	SM/ Silty sand, moderate brown, fine to coarse sand, fine gravel, glass, metal pieces, dry
3			
4	SM/ Sandy silt, glass, moderate brown, fine to med grain, slightly moist	SW/ sand w/ silt, moderate brown, fine to coarse grain sand, black gravel material, glass	GM/ Sand, gravel, silt, mix moderate brown, fine to coarse sand, fine gravel, dry
5			
6	SM/ Sandy silt, moderate brown, fine grain, slightly moist		
7			
8	SM/ Sandy silt moderate brown, fine grain, slightly moist	A - 0830 B - 0832 C - 0835 D - 0840 (3) (0832)	A - 0847 B - 0850 C - 0855 D - 0860 → 0900 (2)
9			
10	TD 10', no sh.		

CHARACTERIZATION UNIT SAMPLING LOG

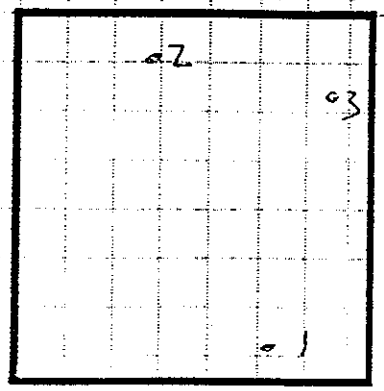
GRID NO.: D07

Project Name: Camp Pendleton OU 4 | Geologist: Cmsty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	0900
Date Finished:	9/6/01
Time:	1020
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

0950 - Background & Breathing zone PID - 0.2 ppm

NO ASH

A - 906
B - 910
C - 915

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring 3
0	SP/ Sand w/silt, light brown, fine to medgrain, dry	SW/ Sand w/silt, light brown, fine to med grain sand, fine to coarse gravel, dry	SM/ Silty sand, dark brown, organics, fine to med grain, dry
1	SP/ Sand w/silt, light brown, fine to medgrain, dry	SW/ Sand w/silt, moderate brown, fine to coarse sand, dry	SM/ Silty sand, wood pieces mod to dark brown, fine to coarse grain,
2	SP/ Sand w/silt, light to med brown, fine to med grain, slightly moist	GW/ Sand, silt, gravel, mix moderate brown, fine to coarse sand, fine gravel, dry	SM/ Silty sand, mod brown, fine to coarse grain, dry
3	SW/ Sand w/ silt, moderate brown, fine to coarse grain, dry	A - 9:48 B - 9:57 C - 10:00	A - 10:11 B - 10:14 C - 10:18
4	SP/ Sand w/silt, fine to coarse grain, moderate brown, dry TD @ 10' no gash.		

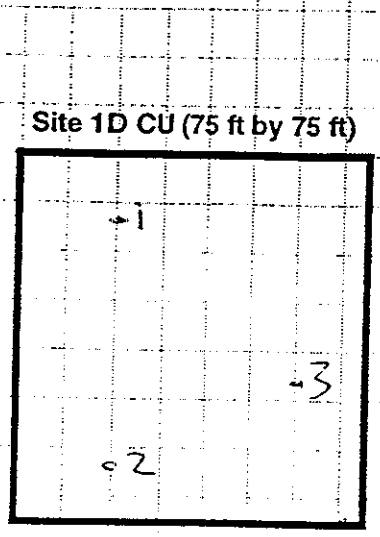
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D/8

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	1020
Date Finished:	9/6/01
Time:	1125
Drilling Contractor:	INTERPHASE
Driller's Name:	GEOPROBE
Drilling Method:	CARLOS, ERIK
Boring Diameter:	1 3/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

1105 Background Breathing zone PID-0.1 ppm

NO ASH

A - 1027
B - 1029
C - 1031

Sample Description

(USCS color %fines, % sand % gravel, hardness/density moisture other)

	Boring A 1	Boring B 4	Boring C 3
0			
1	SW / Sand w/silt, moderate brown, fine to coarse grain sand, fine gravel, organics, dry	SP/ Sand w/silt light to moderate brown, fine to med grain, dry	SM/ Silty sand, light brown, fine to coarse sand, dry
2			
3	SM/ Silty sand, moderate to dark brown, fine to coarse sand, fine gravel, dry	SP/ Sand w/silt, moderate brown, fine to coarse grain, dry	SP/ Sand w/silt, light brown, fine to med grain, slightly moist
4			
5	ML/ Silt w/ no noticeable sand moderate reddish brown, orangish, fine grain, slightly moist	SM/ Sandy Silt, light brown, fine grain, slightly moist	SM/ Silty Sand, light brown, fine to med grain, slightly moist
6			
7	SM/ Silty sand, mod to dark brown, fine to med grain, glass, dry		
8	SP/ Sand w/silt, light brown, organics, fine to med grain, dry	A - 1058 B - 1100 C - 1108	A 1110 B 1120 C 1123
9			
10	TPC 10' nash		

PARSONS

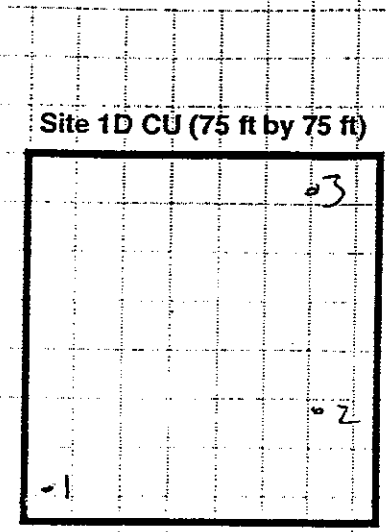
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D09

Project Name: Camp Pendleton OU 4 | Geologist: Cristy + Jason

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	11:35
Date Finished:	9/6/01
Time:	1415
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	no ash
PID = 0.0 ppm background + breathing zone @ 1330 hrs.	
NO ASH	

A 1145
B 1150
C 1152
D 1155

Sample Description

(USCS, color %fines, % sand, % gravel, hardness/density moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/ Sand w/silt, fine to coarse sand, fine gravel, light to dark brown, dry	SP/silty sand, dry, fine-coarse grained, moderate brown	SP/sand w/silt, dry, fine-medium grained, light brown
1			
2	SP/ Sand w/silt, light brown, fine to med grain, dry	SP/silty sand, dry, fine-coarse grained, pale brown	SM/silty sand, dry, pale brown, fine-med. grained
3			
4	SP/sand w/silt, dry, fine med grained, light tan	SP/silty sand, dry, moderate brown fine-medium grained	SP/silty sand, dry, fine grained, light tan
5			
6	SP/sand w/silt, dry, fine-med. grained, light brown.		
7			
8	SP/silty sand, dry, fine-med grained, pale brown		
9		A 1346 B 1350 C 1355 D ~~1355~~ 1406	A 1405 B 1408 C 1410 D 1413
10			

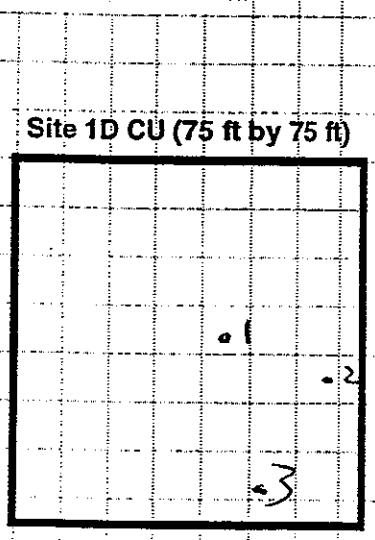
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D10

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/6/01

Time: 1412

Date Finished: 9/6/01

Time: 1530

Drilling Contractor: Interphase

Driller's Name: Hill + Guam

Drilling Method: Geoprobe

Boring Diameter: $1\frac{3}{16}$"

Drill Rig: Phase 13

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.0 ppm background and breathing zone @ 1440 hrs. no odor

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/silty sand, dry, fine-medium grained, pale brown	SP/silty sand, dry, light brown, fine-med. grain	SP/silty sand, dry, fine-coarse grained, light brown
1			
2	SP/silty sand, dry, fine-coarse grained, pale brown	SP/silty sand w/gravel, dry, light brown,	SP/sand w/silt, dry, fine-med. grained, light tan
3			
4	SP/sand w/silt, slightly moist, tan, fine-med. grained	SP/silty sand, dry, pale brown, fine-med. grained	SP/sand w/silt, dry, fine-coarse grained, light tan
5			
6	SP/sand w/silt, slightly moist, tan, fine-med. grained		
7			
8	SP/sand w/silt, slightly moist, light brown, fine-med. grained		
9		A 1430	A 1504
10		B 1435	B 1506
		C 1450	C 1510

A 1412
B 1418
C 1424

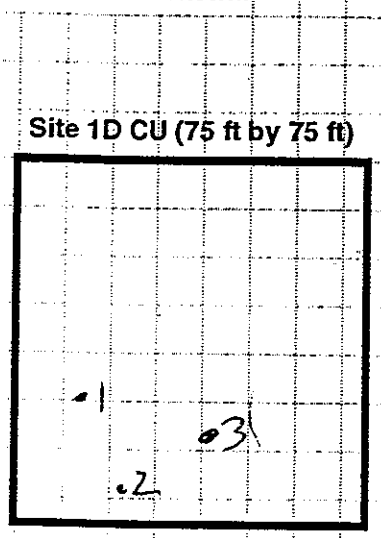
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01
Time: 1300
Date Finished: 9/5/01
Time: 1408
Drilling Contractor: Enviro Phase
Driller's Name: Mike Jun
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Phase B
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: in ash
PID = 0.0 @ 1330 hrs.

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C/3
0–1	SM/silty sand, dry, moderate brown, loos, fine-medium grained	SM/sandy silt, dry, moderate brown, fine grained	SM/sandy silt, dry, fine-medium grained, moderate brown
2–3	SP/silty sand, dry, moderate reddish brown, fine-medium grained	SM/sandy silt, dry, moderate brown, fine-coarse grained	SM/sandy silt, dry, moderate brown, fine grained
4–5	SP/silty sand, dry, moderate brown, fine-medium grained	SP/silty sand, dry, moderate brown, fine-medium grained	SM/sandy silt, dry, moderate brown, fine grained
6–7	SP/sand w/silt, dry, tan, fine-medium grained		
8–9	SP/sand w/silt, dry, moderate reddish brown, fine-medium grained	A 1348 B 1349 C 1352 D 1359	A 1359 B 1403 C 1405 D 1408
10	TD		

A 1310
B 1315
C 1320
D 1330

PARSONS ENGINEERING SCIENCE, INC.

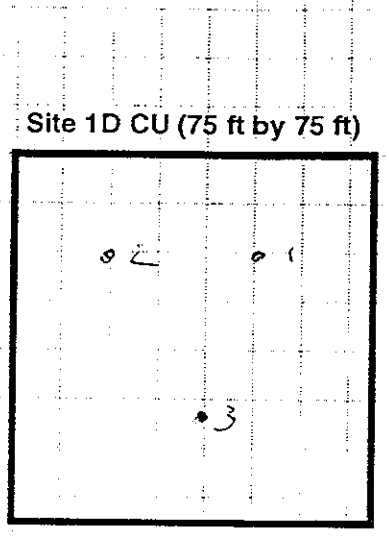
GRIDSAMPLE.CDR

GRID NO.: D12

Project Name: Camp Pendleton OU 4 Geologist: J. Lee

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 1048
Date Finished: 9/24/01
Time: 1110
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

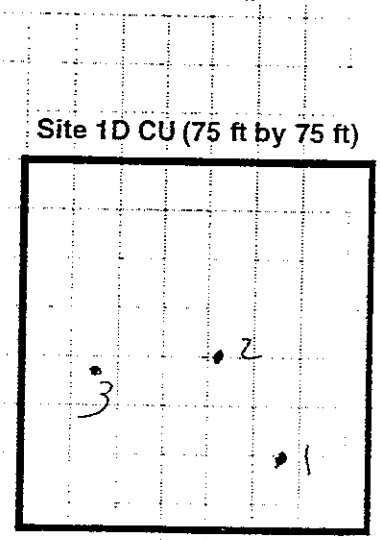
	Boring #1	Boring #2	Boring #3
0	SP Sand ~~SM Silty Sand~~, tan, very fine to fine sand, dry, trace silt	ML Sandy silt, brown, very fine sand <2% woody material, dry	ML Sandy silty brown, very fine sand, <5% woody material, dry
1			
2	SP Sand; AA	ML Sandy silt, dark brown, very fine sand, slightly plastic, w/ specks of fuzzy-looking white material	ML Sandy silt, dark brown, very fine sand, slightly plastic
3			
4	ML Sandy/Clayey silt, dark brown, plastic	CL Silty clay, dark brown, plastic	CL silty clay, dark brown, plastic
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1050 B - 1052 C - 1055	A - 1100 B - 1102 C - 1104	A - 1106 B - 1108 C - 1110
10			

GRID NO.: D13

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 1020
Date Finished: 9/24/01
Time: 1045
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring A2	Boring A3
0	ML sandy silt, dark brown, very fine sand, <2% woody material, slightly plastic	SM silty sand, light brown, very fine sand, dry	SM silty sand, light brown, very fine sand <2% woody material, dry.
1			
2	ML, AA	ML, sandy silt, dark brown, very fine sand plastic. Contains many specks/globules of fuzzy white material.	SM silty sand, dark brown, very fine sand slightly plastic
3			
4	ML, AA	ML, sandy silt, dark brown, very fine sandy slightly plastic	CL silty clay, dark brown, ~~slightly~~ plastic
5	TD @ 4.5'	TD @ 4.5'	
6			
7			
8			
9	A - 1022 B - 1024	A - 1030 B - 1032	A - 1040 B - 1042
10	C - 1026	C - 1034	C - 1044

CHARACTERIZATION UNIT SAMPLING LOG

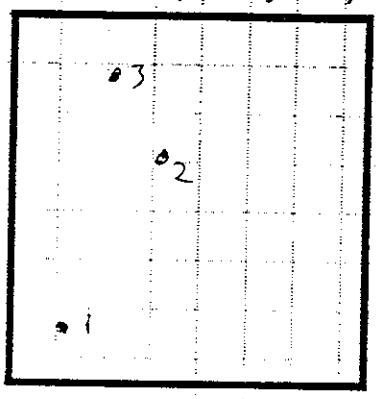
GRID NO.: D14

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/09
Time: 1115
Date Finished: 9/24/09
Time: 1140
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color %fines, % sand % gravel hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0–1	ML Sandy silt, dark brown, very fine sand, <10% woody material, contains specks of fuzzy-looking white material	ML Sandy silt dark brown, very fine sand, <10% woody material	ML Sandy silt, brown, v. fine sand, <10% woody material, contains specks of white-colored material
2–3	ML Sandy silt, dark brown, very fine sand, slightly plastic, contains specks of fuzzy-looking white material	ML Sandy silt dark brown, very fine sand, slightly plastic	ML Sandy silt, dark brown, very fine sand, slightly plastic
4–5	ML Sandy silt, dark brown, very fine sand, slightly plastic	ML, AA	ML, AA
6	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
7			
8			
9	A - 1120 B - 1122 C - 1124	A - 1128 B - 1130 C - 1132	A - 1134 B - 1136 C - 1140
10			

CHARACTERIZATION UNIT SAMPLING LOG

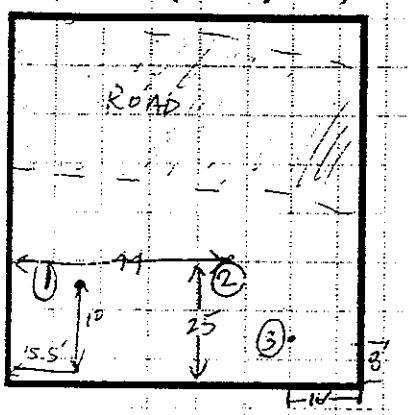
GRID NO.: E-1 8/27/01

Project Name: Camp Pendleton OU 4 Geologist: Jenny & Randy w/ Cnstr

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/27/01
Time:	0900
Date Finished:	8/27/01
Time:	1015
Drilling Contractor:	InterPhase
Driller's Name:	
Drilling Method:	Geoprobe
Boring Diameter:	1.5"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	
Breathing Zone @ 9:25 - 0.0ppm	

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0–1	SM/ Silty Sand, medium tan, fine to med grain, dry	SM/ Silty Sand, tan, fine grain, dry	SM/ Silty Sand w/gravel, tan, fine to sand to fine gravel, dry
2–3	SM/ Sand w/silt, light tan, fine grain, dry	SM/ Silty Sand, tan, fine grain, dry	SM/ Silty Sand, tan, fine grain, dry
4–5	SP/ Sand w/silt, tan, fine grain, dry	SP/ Sand w/ Silt, tan, fine to medium grain, dry	SM/ Silty Sand, tan, lots of silt fine grain, dry
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

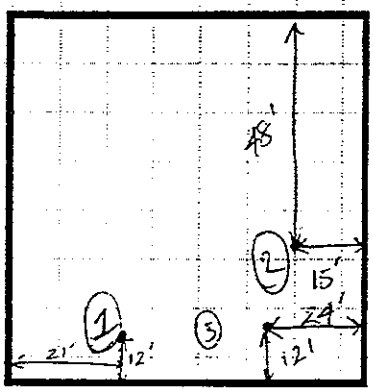
GRID NO.: E02

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/27/01
Time:	1022
Date Finished:	
Time:	11-04
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AUGUSTINE
Drilling Method:	
Boring Diameter:	13/18"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	1026 - Breathing Zone P1D-0 Oppm

Sample Description

(USCS, color %fines % sand, % gravel hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0	SP/ ~~Sandy~~ Sand w/ ~~silt~~ silt and gravel, tan, fine to medium grain sand, dry	SM/Sand w/silt & gravel tan, fine to med grain sand, dry - fine grain gravel, tan	GM/Sandy silt w/gravel and glass (fill?), moderate brown, fine to med grain sand, fine gravel, dry
1			
2			
3	ML/ Silt w/fine sand, fine grain, tan, dry	SW/Well graded sand w/silt moderate brown, fine to coarse sand, dry	SM/Silty sand, grayish brown, fine to med grain, dry
4			
5	GM/ Silty sand w/ gravel, tan, fine to medium grain sand, dry Gravel - fine gravel, very angular	SM/Silty sand, moderate brown, fine grained, dry	SP/ Sand w/ silt, moderate brown, fine to med grain, dry
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

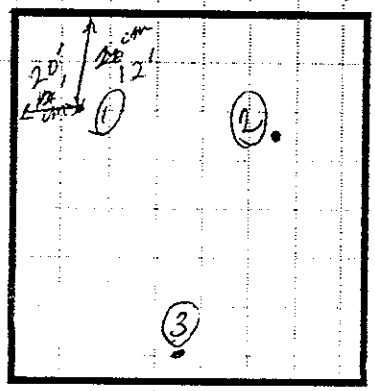
GRID NO.: E03

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/27/01
Time:	11:23
Date Finished:	8/27/01
Time:	13:45
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AUGUSTINE
Drilling Method:	
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	

1134 - Breathing zone PID = 0.0 ppm
1337 - = 0.0 ppm
no ash

Sample Description

(USCS color %fines % sand, % gravel, hardness/density, moisture other)

	Boring A 1	Boring B 2	Boring C 3
0	SM/ Silty Sand, light brown, fine to med grain, dry	SP/ Sand w/silt, tan, fine grain, dry	SM/ Silty Sand, tan, fine grain, dry
1	ML/ Sandy silt pale brown, fine grain, dry	SP/ Sand w/ silt (very little silt), light tan, fine grain, dry	SP/ Sand w/ silt light tan, fine grain, dry
2			
3			
4	CL/ Sandy clay, dark brown, ~~fine~~ cm medium grain sand, dry	SP/ ~~Sandy silty~~ cm cm sand w/ silt, tan/pale brown, fine grain, dry	SP/ Sand w/ silt, light tan, fine grain, dry
5			
6			
7			
8			
9			
10			

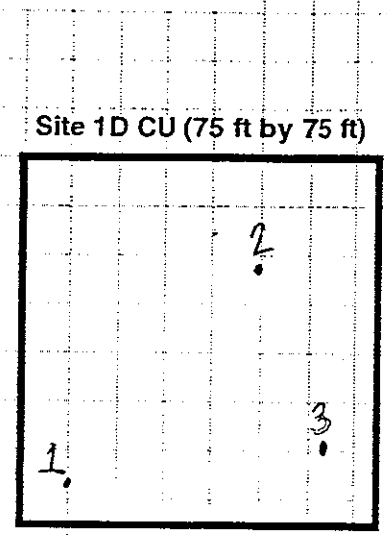
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E04

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/27/01

Time: 13:50 (start grid)

Date Finished: 8/27/01

Time:

Drilling Contractor: INTERPHASE

Driller's Name: FERNANDO, AGUSTIN

Drilling Method: GEOPROBE

Boring Diameter: 13/16"

Drill Rig: GEOPROBE

Datum: Ground Surface

Borehole Abandonment:

Notes:

1429 Breathing zone PID - 0.0 ppm

no ash

Sample Description

(USCS color %fines % sand, % gravel, hardness/density moisture, other)

	Boring A	Boring B	Boring C
0	GM/Sand w/silt & gravel, fine to med grain sand light brown, dry - fine grain gravel	SW/SM/Silty sand, some gravel, fine to medium grain sand, fine gravel, light brown, dry	GM/Sand w/ silt & gravel fine to coarse grain sand, fine gravel, light brown, dry
1			
2	SP/Sand w/ silt, fine grained, light brown, dry	SP/Sand w/silt, light tan, fine grain, dry	ML/Silt w/some sand, ~~moder~~ light brown, fine grained, dry
3			
4	SM/Silty sand, light brown, fine grain, dry	SM/Silt w/ sand, moderate brown, fine grain, dry	SP/Sand w/silt tan, fine to med grain sand, dry
5			
6			
7	Note [a] The 2 and 3 log at 0.0-0.5' should be switched. 2a is a GM & 3a is an SW. The classifications below (2.5' bgs & 4.5' bgs are in the correct columns.) CM 8/27/01		
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

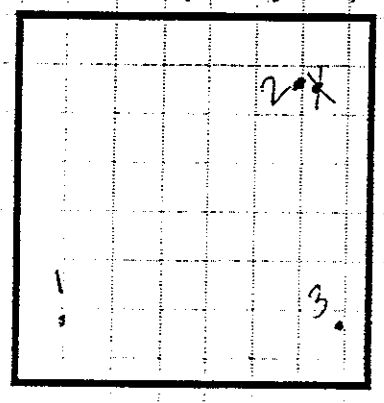
GRID NO.: E05

Project Name: Camp Pendleton OU 4 | Geologist: Cnsty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/27/01
Time:	1405 (A-samples)
Date Finished:	8/27/01
Time:	1530
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AGUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	
440 Breathing zone PID = 0.0ppm	
wash	

Sample Description

(USCS, color %fines, % sand, % gravel, hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0	SP/Sand w/silt moderate brown, fine to coarse sand, fine gravel, dry	SW/Sand w/silt & gravel light brown, fine to coarse sands, fine grain gravels, dry	SP/Sand w/silt moderate brown, fine to medium grain sands
1			
2	SP/Sand w/silt light tan fine to medium grain sand, dry	SP/Sand w/some silt tan to light brown, fine grained, dry	SM/Silty sand tan, fine to coarse grained sand, fine gravel, dry
3			
4	SM/Silty sand, tan to light brown, fine grained, dry	SP/Sand w/silt light brown, fine grained, dry	SM/Silty sand, light brown, fine to med grain sands, dry
5			
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

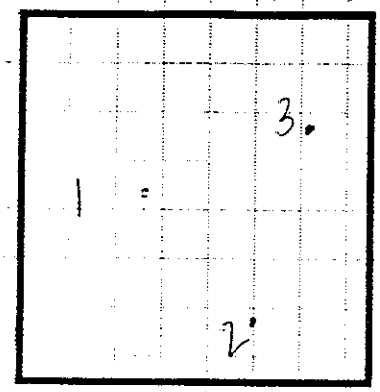
GRID NO.: E06

Project Name: Camp Pendleton OU 4 | Geologist: CMSty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/25/01
Time:	8.00
Date Finished:	8/25/01
Time:	8.45
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AGUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	

Refusal @ 3' on 3rd boring - metal pipe.
offset 2'.
847 Background PID - 0.5ppm
Air monitoring PID - 0.5ppm

Sample Description

(USCS color, %fines % sand % gravel, hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0	SM/ Silty sand, ~~light~~ tan fine to med grain sand, dry	SM/ Silty sand light brown, fine to med grain, dry	SP/ Sand w/ silt, tan, fine to coarse grain sand, dry
1 (8:05)	SM/ Silty sand light brown, fine to med grain sand, dry	SM/ Silt w/ sand light to medium brown, fine to med grain, dry	SP/ Sand w/ silt tan fine to med grain, dry
2 (8:08)	SM/ Silty sand light brown, fine to med grain sand, dry	SP/ Sand w/ silt, fine to med grain, light brown, dry	SM/ Silt w/ sand, tan, fine to med grain sand, dry
3			
4 (8:11)			
5			
6			
7		A 8:18	A 8:35
8		B 8:22	B 8:37
9		C 8:27	C 8:44
10			

CHARACTERIZATION UNIT SAMPLING LOG

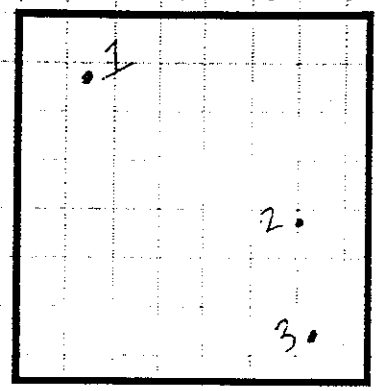
GRID NO.: E07

Project Name: Camp Pendleton OU 4 Geologist: Cristy

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/28/01
Time:	8:50
Date Finished:	8/28/01
Time:	9:55
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AGUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	

0940 Background PID - 0.5ppm
Geoprobe Breathing Zone - 0.5ppm
no 9 8h

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/Silty Sand	SP/ Sand w/silt,	SM/Silty sand,
1	moderate brown fine to med. grain, dry	tan, fine to med grain, dry	tan, some organics - plants, fine to med grain, dry
2	SM/Silty sand,	SP/ Sand w/silt,	SM/Silty sand
3	moderate brown, fine to medium grain sand, dry	tan, fine to med grain, dry	moderate brown, fine to med grain, dry
4	CL/Clay w/Sand,	SM/ Silty sand,	SM/Silty sand
5	moderate brown, dry	tan, fine grain, dry	tan, fine to med grain
6			
7			
8	A 8:59 B 9:01 C 9:04	A: 9:27 B: 9:32 C 9:34	A 9:44 B 9:47 C 9:53
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

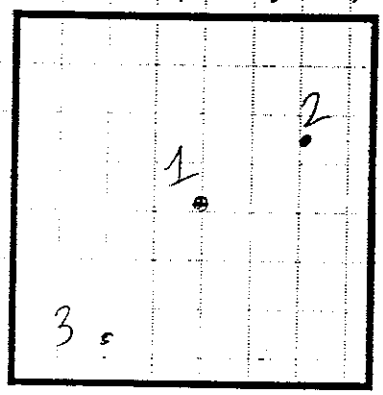
GRID NO.: E08

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
~~2.0-2.5~~ 3-3.5
~~4.0-4.5~~ 6-6.5

Date Started:	8/28/01
Time:	10:00
Date Finished:	8/28/01
Time:	10:58
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/4"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	10:50 Background PID-0.0ppm Breathing zone PID 0.0ppm no HSA

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SW/Sand w/silt tan, fine to med grain, dry	SP/Sand w/silt light tan, fine grain dry	SM/Silty sand, moderate brown, fine to med grain dry
2–4	SM/Silt w/sand light brown, fine grain, dry, moderate reddish brown	SM/Silty sand, light tan, fine grain, dry	SM/Silty sand, moderate brown, fine to med grain, dry
5–7	SW/Sand w/silt light brown fine grain, dry	SM/Silty sand tan, fine to med grain, dry	SM/Silt w/sand tan, fine to med grain, dry
8–10	A - 10:06 B - 10:09 C - 10:14	A 10:25 B 10:27 C 10:30	A 10:38 B 10:50 C 10:56

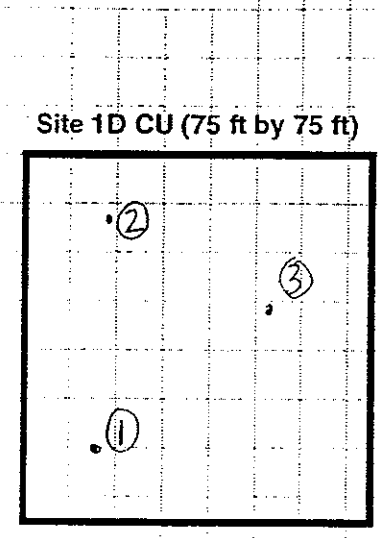
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E09

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2-2.5
4-4.5 4.0-4.5

Date Started:	8/28/01
Time:	11:00
Date Finished:	8/28/01
Time:	13:50
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, AGUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE PACK
Notes:	

FIRST BORING TO 10' bgs - NO ASH.
OTHER BORINGS
THIRD BORING OFFSET 4' SW DUE TO REFUSAL ON LAST SAMPLE INTERVAL

Sample Description

(USCS, color %fines, % sand, % gravel, hardness/density, moisture other)

Boring A 1	Boring B 2	Boring C 3
SM/Silty sand, fine grain, light brown dry	SM/Silty sand, light brown, fine to moderate grain, dry	GM/Sand w/silt & gravel, light brown, fine to coarse sand, fine gravel, dry
SP/Sand w/silt moderate brown, fine to med grain, dry	SM/Silt w/sand, light brown, fine to med grain, dry	
SW/Silty sand w/gravel fine to coarse sand, fine gravel, light brown dry (Nitric 4.5-6)	SM/Silty sand, light brown, fine to med grain, dry	GM/Gravel, sand, silt mix light brown, fine to coarse sand, fine gravel, dry
SW/Sand w/silt, light to moderate brown, fine grain to coarse sand, dry (Nitric 6.5-8)		SM/Silty sand, light brown, fine to medium grain, dry
SP/Sand w/silt moderate brown, fine to medium grain, dry (Nitric 8.5-10)		
A 11:10	A 11:53	A 13:15
B 11:15	B 11:59	B 13:22
C 11:35	C 12:01	C 13:45
D 11:15 → 11:20	D 11:53 → 12:03	D 13:15 → 13:30

TD @ 10'

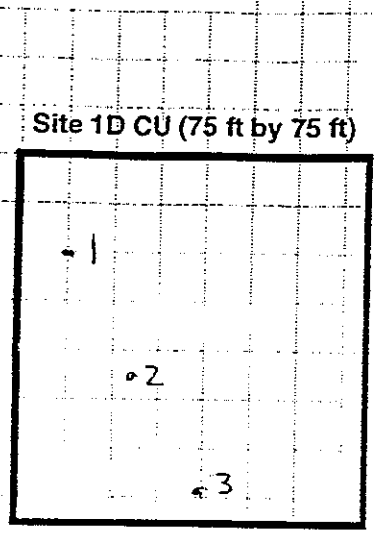
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E10

Project Name: Camp Pendleton OU 4 | Geologist: Jason & Cindy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	1415
Date Finished:	9/6/01
Time:	1545
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	PID = 0.0 ppb background breathing zone @ 1440 hrs.
	KD ash

Sample Description
(USCS color %fines % sand % gravel hardness/density, moisture other)

	Boring #1	Boring #2	Boring #3
0			
1	SP/ silty sand w/ gravel, fine gravel, smooth, fine grained sand	SP/ Sand w/silt tan, fine to coarse sand, dry	SP/ Sand w/silt tan, fine to coarse grain, dry
2	pale brown, dry	SM/ Silty sand, fine to med grain, tan, dry	SP/ Sand w/silt, moderate brown, fine to coarse grain, slightly moist
3	SP/ sand w/silt, dry, fine-medium grained, light tan	SM/ Silty sand, tan, fine to med grain, slightly moist	
4			
5	SP/ sand w/silt, dry, fine-medium grained, light tan		
6			
7	SP/ sand w/silt, dry, fine-coarse grained, pale brown	A - 1512 B - 1515 C - 1517 520	A 1522 B 1525 C - 1532 D - 1537
8			
9	SP/ silty sand, gravel, dry, fine-medium grained, fine angular gravel		
10	light tan		

CHARACTERIZATION UNIT SAMPLING LOG

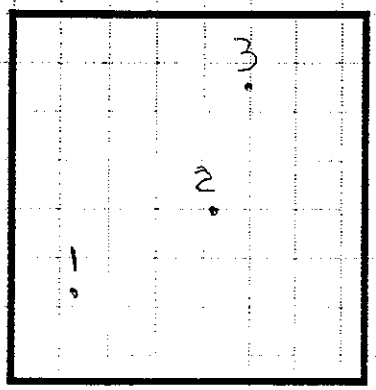
GRID NO.: E11

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/28/01
Time:	14:00
Date Finished:	8/28/01
Time:	15:22
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNADO, AUSTIN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/10"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE PACK
Notes:	

1410 Background PID - 0.1 ppm
Breathing zone PID 0.1 ppm
no ash

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

A - 14:07
B - 14:11
C - 14:30

	Boring A 1	Boring B 2	Boring C 3
0	SW/ Sand w/silt, fine to coarse sand, fine gravel, light brown, dry	SW/ Sand w/silt fine to coarse sand, light brown, dry	ML/ Silty clay, moderate reddish brown, fine to medium grain, dry
1	SM/ Silty sand, moderate brown, fine to medium grain, dry	SM/ Silt w/sand, moderate brown, wood chips, fine to med grain, dry	Silt w/ sand, moderate brown, fine to medium grain, dry
2	SM/ Silty sand, moderate brown, some red, fine to medium grain, dry	SM/ Silty sand, med to dark brown, fine grain, dry	SM/ Sandy silt, light brown to black soil, fine grain, dry (30% recovery)
3			SM/ Sandy silt, mostly black, fine grain, dry (6-6.7
4			SM/ Silty sand, light brown, fine grain dry (6.75-7 (50% re
5	A - 14:50 B - 14:54 C - 14:56	A 15:10 B 15:15 C: 15:20	ML/ Silty clay, dark brown, fine grain, dry (25% recovery) trace
6			A - 14:07 B - 14:11 C - 14:30
7			
8			
9			
10			

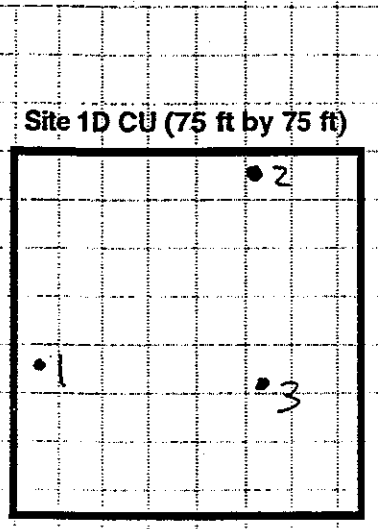
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E12

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 0855
Date Finished: 9/24/01
Time: 0918
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand-auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 @ background
HBZ @ 0910

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

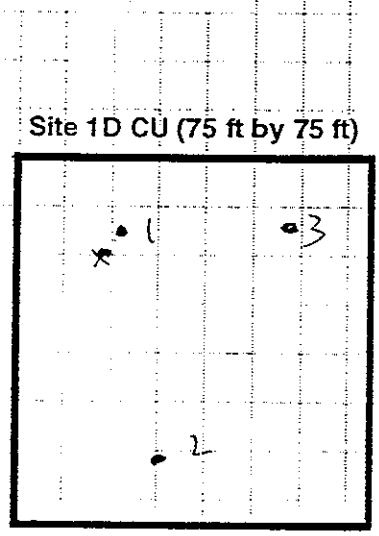
	Boring #1	Boring #2	Boring #3
0	SM Silty sand, brown, very fine to fine sand, w/ <10% woody material, dry	SM Silty sand, ~~tan~~ light brown, very fine to fine sand, w/ <10% woody material, dry	SM Silty sand, light brown very fine to fine sand, w/ woody material <10%, dry
1			
2	SM Silty sand, AA, w/ <2% woody material, dry	SM Silty sand, dark brown, very fine sand slightly plastic	SM Silty sand, dark brown, very fine sand,
3			
4	SM Silty sand, dark brown, very fine sand, slightly plastic	SM Silty sand, AA	SM Silty sand, AA, slightly more plastic
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A-0911 B-0912	A-0906 B-0908	A-0900 B-0902
10	C-0914	C-0910	C-0904

GRID NO.: E13

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	0955
Date Finished:	9/24/01
Time:	1015
Drilling Contractor:	Tri-County
Driller's Name:	
Drilling Method:	hand-auger
Boring Diameter:	
Drill Rig:	N/A
Datum: Ground Surface	∡
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SM Silty sand, light brown; very fine sand, <10% woody material, dry.	ML Sandy silt, brown, very fine sand, <10% woody material	ML Sandy silt, brown, very fine sand, <10% woody material, dry
1			
2	ML Sandy silt, dark brown, v. fine sand, slightly plastic. Contains a few specks of fuzzy white material	ML Sandy silt, dark brown, very fine sand, slightly plastic. Contains a few specks of fuzzy white material	ML Sandy silt, dark brown, very fine sand, slightly plastic. Contains a few specks of fuzzy white material.
3			
4	ML Sandy silt, dark brown, very fine sand, slightly plastic	ML Sandy silt, dark brown, very fine sand, slightly plastic	ML Sandy silt, dark brown, very fine sand, slightly plastic
5	TD @ 4.5'	TD @ 4.5'	TD @ 4.5'
6			
7			
8			
9	A - 1010	A - 1004	A - 0956
	B - 1012	B - 1006	B - 0958
10	C - 1014	C - 1008	C - 1000

PARSONS

GRIDSAMPLE.cpp

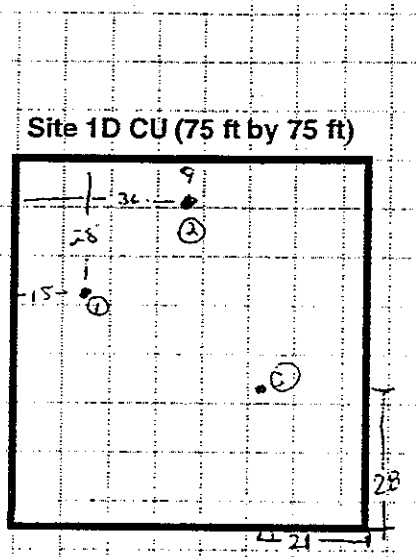
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F1-

Project Name: Camp Pendleton OU 4 | Geologist: Jenny, Randy, + Jason

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/27/01
Time:	0900
Date Finished:	8/27/01
Time:	1020
Drilling Contractor:	Inter phase
Driller's Name:	Gilbert + Daniel
Drilling Method:	
Boring Diameter:	13/16"
Drill Rig:	Geoprobe
Datum: Ground Surface	
Borehole Abandonment:	bentonite ~~sand pack~~
Notes:	0.0ppm PID

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	USCS Boring A 1	USCS Boring ~~B~~ 2	USCS Boring ~~C~~ 3
0	SM/ sand w/ silt light tan fine grain dry	SM/ silty sand ~~tan~~ dry light tan - fine to coarse grained, poorly sorted	SM/ ~~sand w/ silt~~ ~~silt w/ sand~~ light tan, fine-coarse grain dry
1			
2	SP/ ~~sand w/ silt~~ SAND: light tan, fine to medium-grained, damp poorly sorted, micaceous	SP/ sand w/ silt - dry fine grain light tan	ML/ sandy silt fine grained, dry light tan
3			
4	SM/ Silty SAND: tan, fine to medium grain, damp	SP/ sand w/ silt - dry fine grained light tan	SM/ ~~sandy silt~~ silty sand fine to medium grain, light tan, dry
5			
6			
7			
8			
9			
10			

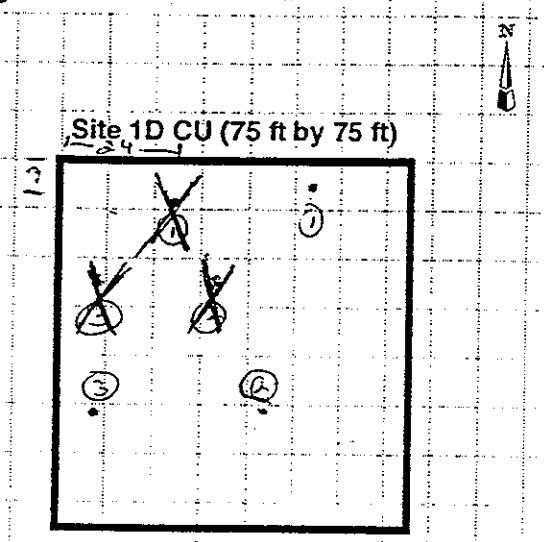
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F-2

Project Name: Camp Pendleton OU 4 | Geologist: Jason

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/27/01

Time: 1022

Date Finished: 8/27/01

Time: 1135

Drilling Contractor: Interphase

Driller's Name: Gilbert + Daniel

Drilling Method:

Boring Diameter: 1 3/16

Drill Rig: Geoprobe

Datum: Ground Surface

Borehole Abandonment: bentonite ~~sand~~ pad

Notes: 0.0 ppm PID
ash @ 5'

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SP/ sand w/silt	GM/ silty sand w/gravel	SM/ silty sand
1	light tan, dry	light tan, dry	fine coarse grain
	fine to medium grain	fine ~~sand~~	dry, pale brown
2		fine gravel, angular	
	SP/ sand w/silt	SM/ silty sand	GM/ sandy silt w/gravel
3	light tan, dry	light tan, dry	fine grained sand + fine gravel
	fine grained	fine-medium grained	moderate brown
4	SM/ silty sand	ML/ sandy silt	SM - silty sand
5	~~light~~ medium tan	fine grained, dry	fine grain, dry
	dry, fine medium grain	pale brown	pale brown
6			
7			
8			
9			
10			

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

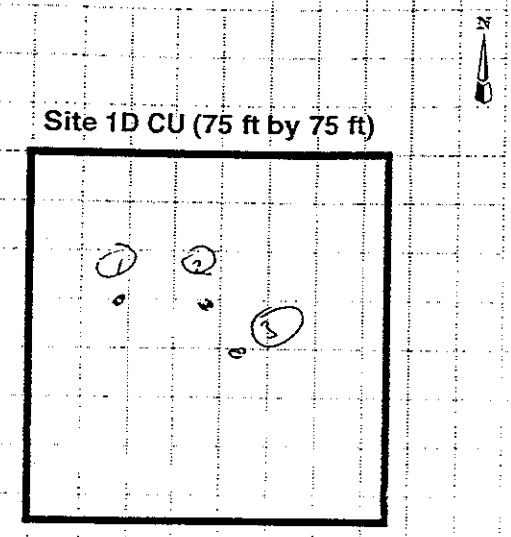
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E3

Project Name: Camp Pendleton OU 4 | Geologist: Jason

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/27/01
Time: 1137
Date Finished: 8/27/01
Time: 1340
Drilling Contractor: Interphase
Driller's Name: Gilbert + Gamel
Drilling Method:
Boring Diameter: 1 3/4
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite ~~sand~~ pack
Notes: 0.0 ppm PID

ASH

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring ~~A~~ 1	Boring ~~B~~ 2	Boring ~~C~~ 3
0–1	GM / ~~silty, gravel~~ sandy silt w/ gravel (fine gravel) angular, dry, light tan	GP / silt, sand w/ fine gravel poorly sorted, angular dry, pale brown	SM / sandy silt, dry fine-grained light tan
2–3	GM / sandy silt w/ fine gravel angular, dry light tan	SM / sandy silt fine-coarse grain, dry moderate brown	SM / sandy silt, dry fine-coarse grained moderate brown
4–5	GM / sandy silt w/ fine gravel angular, dry light tan	SW / sand w/ silt fine grained, well sorted dry, light tan	SM / sandy silt, dry fine-medium grain pale brown - ash in sample (glass)
6			
7			
8			
9			
10			

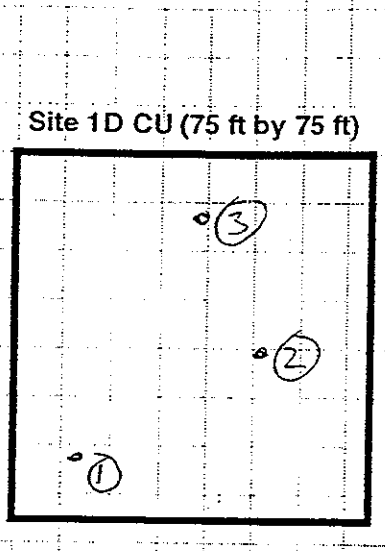
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F4

Project Name: Camp Pendleton OU 4 | Geologist: J Gson

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/27/01

Time: 1239

Date Finished: 8/27/01

Time: 1450

Drilling Contractor: Interphase

Driller's Name: Gilbert + Daniel

Drilling Method:

Boring Diameter: 1 3/12

Drill Rig: Geoprobe

Datum: Ground Surface

Borehole Abandonment: bentonite ~~sand~~ pack

Notes: 0.0 ppm PID

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SP / fine grained, poorly sorted, dry, sand w/ silt,	SP / sand w/ silt & gravel, poorly sorted, fine grained, light tan, dry	SM / silty sand w/ gravel, fine grained, dry, poorly sorted, pale brown
1			
2	SM / silty sand, dry, fine-coarse grained, moderate brown	SP / silt, sand, poorly sorted, pale brown, dry, fine-coarse grained sand	SM / sandy silt, dry, fine grained, light tan
3			
4	SW / sandy silt, fine-medium grained, poorly sorted, light tan	SW / sand w/ silt, dry, fine grained, well sorted, light tan	SW / silt w/ sand, dry, fine grained, moderately sorted, light tan
5			
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

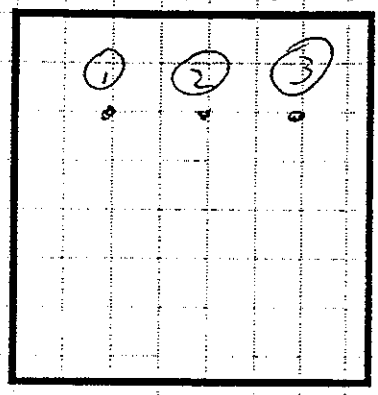
GRID NO.: F5

Project Name: Camp Pendleton OU 4 Geologist:

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/27/01

Time: 1430

Date Finished: 8/27/01

Time:

Drilling Contractor: Interplan

Driller's Name: Gilbert & Daniel

Drilling Method: Geoprobe

Boring Diameter: 1 3/16

Drill Rig:

Datum: Ground Surface

Borehole Abandonment: bentonite ~~sand~~ pack

Notes: PID 0.0 ppm

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring # 1	Boring # 2	Boring # 3
0	GP		
	SP/sand w/silt + gravel (fine)	GP/sand w/silt + gravel (fine)	GP/sand w/silt + gravel (fine)
1	angular, poorly sorted light tan, dry	angular, poorly sorted pale brown, dry	angular, poorly sorted light tan, dry
2	SP/sand w/silt, dry	SP/sand w/silt	SM/silty sand, dry
3	fine-medium grained light tan	fine-medium grained light tan	fine-coarse grained pale brown
4	ML/silt w/sand, dry	ML/silt w/sand dry	SM/sand w/silt
5	pale brown fine grained	pale brown fine grained	fine-coarse grained light tan
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

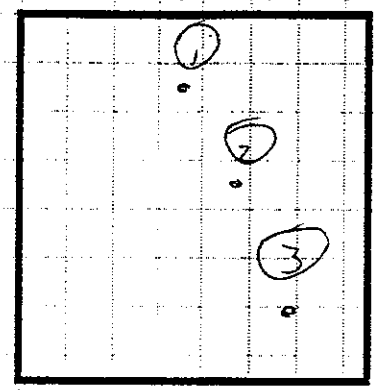
GRID NO.: F6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/28/01
Time: 0800
Date Finished: 8/28/01
Time: 0845
Drilling Contractor: Interphase
Driller's Name: Gilbert + Daniel
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: ~~sand~~ bentonite patch
Notes: Background PID = 0.8 ppm
PID @ site = 0.6 ppm

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring # 1	Boring # 2	Boring # 3
0		0820	
0801 1	SP/sand w/silt, dry light tan, fine-coarse grained	SM/silty sand, dry ~~light tan~~, fine-coarse grained	SM/silty sand, dry fine-coarse grained pale brown
2		0825	
0806 3	SP/sand w/silt, dry light tan, fine-medium grained	SP/sand w/silt, dry light tan, fine-medium grained	SP/silty sand, dry pale brown, fine-medium grained
4		0828	
0809 5	SP/silty sand, dry light tan fine-medium grained	SP/sand w/silt, dry, light tan, fine grained	SP/sand w/silt, dry light tan, fine-medium grained
6			
7			
8	A 0801	A 0820	A 0837
	B 0806	B 0825	B 0840
9	C 0809	C 0828	C 0844
10			

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

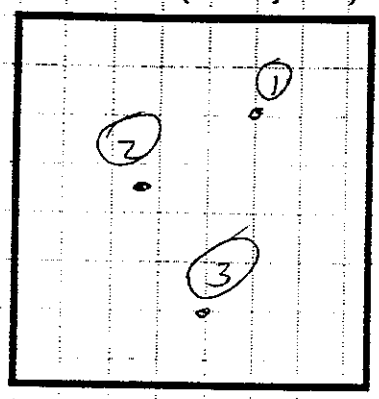
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/28/01
Time: 0853
Date Finished: 8/28/01
Time: 0934
Drilling Contractor: Fire Phase
Driller's Name: Gilbert & Cassil
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: ~~sand~~ bentonite pack
Notes: 0.5 ppm background PID
0.5 ppm PID on site @ 0940 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0–1	SP/sand w/silt, dry, pale brown, fine-medium grained	SP/sand w/silt, dry, pale brown, fine-medium grained	SP/silty sand, dry, moderate brown, fine-medium grained
2–3	SP/silty sand, dry, light tan, fine grained	SP/sand w/silt, dry, light tan, fine-medium grained	CL/sandy ~~clay~~ silt w/clay, pale brown, fine grained
4–5	SP/silty sand, dry, light tan, fine grained	SP/sand w/silt, dry, light tan, fine-medium grain	SP/sand w/silt & gravel, fine gravel, dry, light tan
6–7			
8–9	A 0927 B 0931 C 0934	A = 0910 B 0914 C 0917	A = 0853 B: 0856 C 0901
10			

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F8

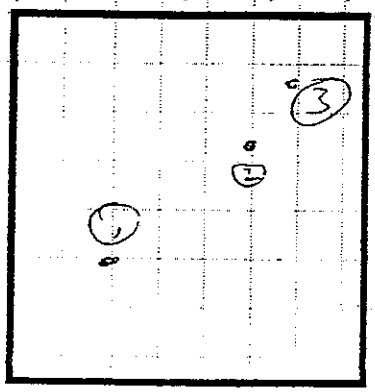
Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

0 = A
3
6 = C

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
~~2.0-2.5~~ 3-3.5
~~4.0-4.5~~ 6-6.5

Date Started:	8/28/01
Time:	0949
Date Finished:	8/28/01
Time:	1056
Drilling Contractor:	Inter Phase
Driller's Name:	Gilbert + Daniel
Drilling Method:	
Boring Diameter:	1 3/16"
Drill Rig:	Geoprobe
Datum: Ground Surface	
Borehole Abandonment:	bentonite ~~sand~~ pack
Notes:	PID = 0.5 background = 0.5 ppm @ site @ 0940 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SP/sand w/ gravel + silt light tan, dry fine gravel, fine-coarse grained sand	SP/silty sand, dry pale brown fine-medium grain	SP/silty sand, dry pale brown, fine-medium grain
1			
2			SP/silty sand, dry pale brown fine-medium grain
3	SP/sand w/ gravel + silt light tan, dry fine gravel, fine gravel + coarse grained sand	GM/gravelly silt w/ sand fine gravel, dry pale brown	
4			
5			
6	SP/sand w/ silt light tan, dry fine-medium grain	SP/silty sand w/ gravel fine gravel, fine grained sand, dry pale brown	SP/sand w/ silt light tan, dry fine grained
7			
8			
9	A 1035	A = 1012	A = 0947
	B 1039	B = 1016	B = 0952
10	C 1056	C 1025	C = 0959

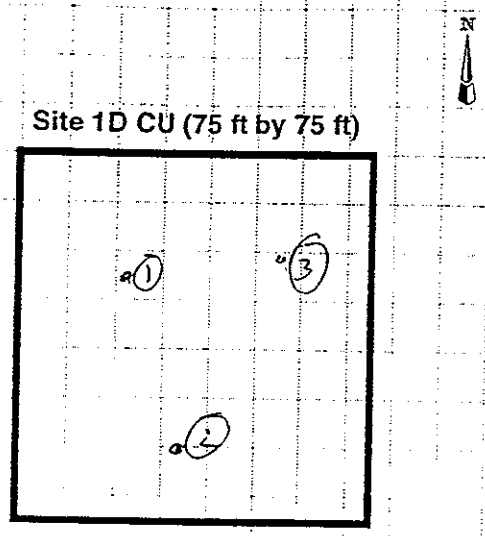
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F-9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5 ?

Date Started: 8/28/01
Time: 1100
Date Finished: 8/28/01
Time: 1320
Drilling Contractor: Inter Phase
Driller's Name: Gilbert + David
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: ~~bentonite~~ ~~sand~~ pack
Notes: no GSH
PID = 0.0 ppm @ 1100 hrs

Sample Description

(USCS color %fines, % sand % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SP/sand w/ silt & gravel fine gravel, poorly sorted fine-coarse grained sand, light tan dry	SP/sand w/ silt & gravel fine gravel, dry light tan	SP/sand w/ silt, dry light tan, fine-medium grained
1			
2		SP/silty sand, dry pale brown fine grained	SP ~~silty sand~~ ~~sand w/ silt~~, dry fine-coarse grained, pale brown
3	SP/silty sand, dry light tan, fine-coarse grained		
4		SP/silty sand, dry pale brown fine grained	
5	SP/silty sand, dry light tan fine-coarse grained		SP/silty sand, dry fine-medium grained light tan
6		SP/silty sand, dry pale brown fine grained	
7			
8		SP/sand w/ silt, dry light tan, fine grained	
9	A: 1149	A = 1105	A = 1310
	B: 1154	B 1110	B = 1313
10	C 1159	C 1115 D = 1112	C = 1316
		no GSH	D = 1319

PARSONS

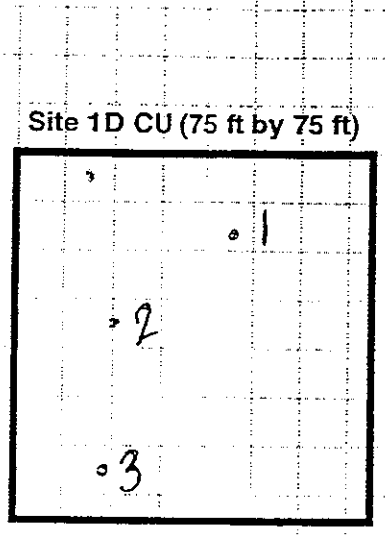
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F10

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/7/01
Time:	0730
Date Finished:	9/7/01
Time:	0835
Drilling Contractor:	INTERPHASE
Driller's Name:	JUAN CARLOS
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
0820 - Breaking a breathing zone	
AD - 0.2ppm	
PID ASH	

A 0740
B 0745
C 0750

Sample Description
(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SP/ Sand w/silt, light to med brown, fine to coarse grain, dry	SP/ Sand w/silt light brown, fine to coarse sand, dry	SP/ Sand w/silt, organics light brown, fine to coarse sand, fine gravel, dry
1			
2	SP/ Sand w/silt moderate brown, fine to ~~coarse~~ med grain slightly moist	SP/ Sand w/silt, light ~~brown~~ to med brown, fine to med grain, slightly moist	SM/ Silty sand, light to med brown, fine to coarse sand, dry
3			
4			
5	SP/ Sand w/silt, light to med brown, fine to med grain slightly moist	SP/ Sand w/silt moderate brown, fine to med grain, dry	SM/ Silty sand, med brown, fine to med grain, slightly moist,
6	SM/ Silty sand, light-brown, fine to coarse grain, dry		
7		A - 805 B - 810 C - 815	A 820 B 825 C 830
8	SM/ Silty sand, light brown, fine to medium grain, dry to slightly moist (9.5-10')		
9			
10	TD @ 10' no ash		

PARSONS

CHARACTERIZATION UNIT SAMPLING LOG

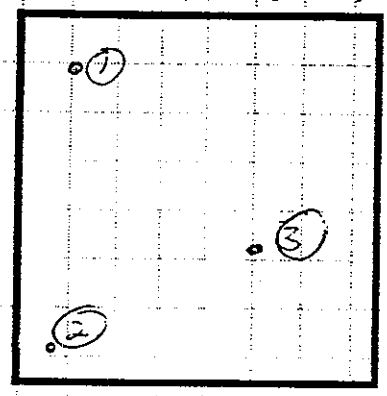
GRID NO.: F11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/28/01
Time: 1330
Date Finished: 8/28/01
Time: 1455
Drilling Contractor: Jones Phase
Driller's Name: Delbert + Daniel
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.1 ppm background = 0.1 @ 1414
no ash

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture other)

	Boring #1	Boring #2	Boring #3
0	GP-gravel sand w/ silt pale brown, dry fine-gravel	SM-sandy silt, dry pale brown, fine-coarse grained	SM-silty sand, dry pale brown, fine-coarse grained
1			
2	SM-silty sand, dry pale brown fine ~~medium~~ coarse grained	SM-sandy silt, dry moderate brown fine-coarse grained	SM-silty sand, dry light tan fine-coarse grained
3			
4	SM-silty sand, dry pale brown, fine-medium grained	SM-sandy silt, dry, grayish brown fine-coarse grain	SM-silty sand, dry light tan fine-coarse grained
5			
6	SW-sand w/ silt, moist from 6.5'-8' moderate brown, medium grained		
7			
8	SM-silty sand, moist moderate brown, fine-medium grained		
9	A)1339	A = 1414	A) 1445
10	B)1334 C)1346 TD	B = 1420 C = 1424	B) 1450 C) 1455

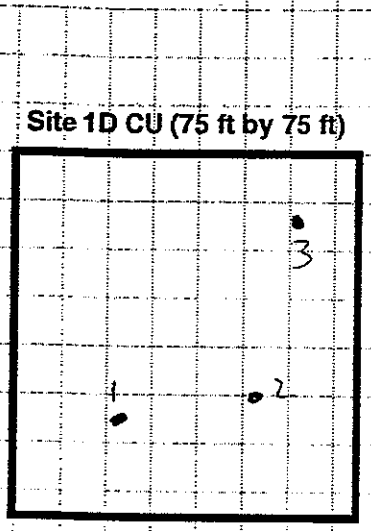
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F12

Project Name: Camp Pendleton OU 4 | Geologist: J. Lee

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/24/01
Time: 0918
Date Finished: 9/24/01
Time: 0950
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter:
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 @ background and BZ @ 0935

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SM silty sand, light brown, v. fine to fine sand, < 2% woody material, dry	SM silty sand, light brown, v. fine to fine sand, < 2% woody material, dry, with 15% fine gravel, ~~some~~ sub-angular gravel,	SM silty sand, dark brown, very fine sand, < 2% woody material, slightly plastic
1			
2	ML sandy silt, dark brown, very fine sand slightly plastic	SM silty sand, brown, v. fine to medium sand, sub-rounded to subangular, dry	SM silty sand AA, no woody material, slightly more plastic
3			
4	ML, AA	SM silty sand, tan, v. fine to medium sand, sub-rounded to subangular dry, with gravel, fine to medium, sub-rounded (mostly v. fine to fine sand)	ML sandy silt, dark brown, very fine sand slightly plastic
5	TD @ 4.5'		
6		TD @ 4.5'	TD @ 4.5'
7			
8	A - 0940	A - 0926	A - 0920
9	B - 0942	B - 0928	B - 0922
	C - 0944	C - 0930	C - 0924
10	D 0946 (dup of A)	D - 0932 (dup of A)	D - 0925 (dup of A)

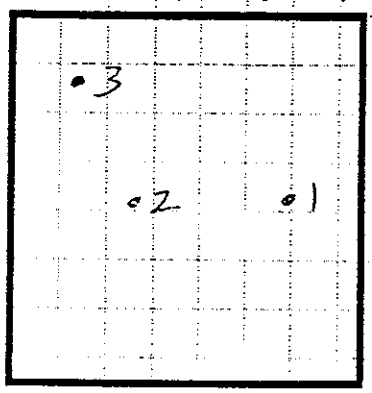
GRID NO.: G1

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/30/01
Time: 1450
Date Finished: 8/31/01
Time: 0755
Drilling Contractor: Inter Phase
Driller's Name: Nilo Augustin
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1450 hrs

no ash

Sample Description

(USCS, color, %fines % sand % gravel, hardness/density moisture other)

	Boring A 1	Boring B 2	Boring C 3
0	SP / sand w/ silt, dry, fine-medium grained, light tan	A SP / silty sand, dry fine-medium grained light tan	SP / silty sand, dry, fine-medium grain light tan
1			
2	SP / silty sand, dry fine-medium grained, light tan	SM / silt w/ sand, dry, fine grained, light tan	SP / silty sand, dry, fine grained, light tan
3			
4	SP / silty sand, dry, fine-medium grained, light tan	SM / silty sand, dry, fine grained, light tan	SM / silt w/ sand, dry fine grained, light tan
5			
6	SP / silty sand, ~~dry~~ slightly moist, fine grained, light tan		
7			
8	SM / silty sand, ~~dry~~ slightly moist, fine grained, light tan	8/31/01 A 0730 B 0735 C 0740	8/31/01 A 0745 B 0750 C 0755
9			
10			

0/30/01
A) 1455
B) 1500
C) 1510

PARSONS

GRIDSAMPLE COR

CHARACTERIZATION UNIT SAMPLING LOG

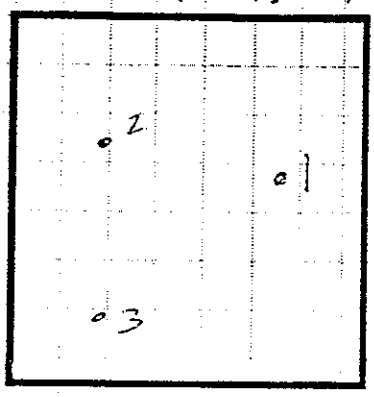
GRID NO.: 62

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/30/01
Time: 1315
Date Finished: 8/30/01
Time: 1445
Drilling Contractor: Interphase
Driller's Name: Gilt, Augustin
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: ash @ 2.5 feet, poorly layered
PID = 0.0 ppm @ 1420
ash @ 2.5

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0–1	SP/sand w/silt, dry, fine-coarse grained, light tan	SP/sand w/silt, dry, fine-coarse grained, light tan	SP/sand w/silt, dry, fine-medium grained, light tan
2–3 (ash)	SM/silty sand, dry, fine-coarse grained, moderate brown	SP/sand w/silt, dry, fine-medium grained, light tan	SP/silty sand, dry, fine-medium grained, light tan
4–5	SP/sand w/silt, dry, fine-medium grain, light tan	ML/clayey silt, dry, moderate brown	SP/silty sand, dry, fine grained, light tan
6–7	ML/clayey silt, dry, moderate brown,		
8	TD		
9	A 1315 B 1320 C 1325 D 1330	A 1355 B 1359 C 1405 D 1410	A 1430 B 1434 C 1440 D 1445

CHARACTERIZATION UNIT SAMPLING LOG

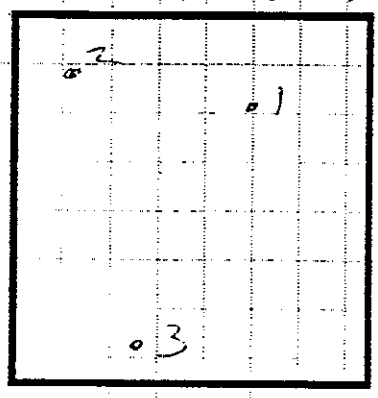
GRID NO.: G3

Project Name: Camp Pendleton OU 4 | Geologist: Ean Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/30/01
Time: 1101
Date Finished: 8/30/01
Time: 1200
Drilling Contractor: Fine grade
Driller's Name: Gil & Augustin
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.0 ppm background
PID=0.0 ppm @ CU @ 1105 hrs
ash @ 3' (mechanical)

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SM, silty sand, dry, fine-medium grained, moderate brown	SM/ ~~SP/silty sand~~, dry, fine-medium grained, ~~light tan~~ moderate brown	SP/ sand w/ silt, dry, fine-medium grain, light tan
1			
2	SM/ silt w/ sand, dry, fine grained (ash) moderate brown	SM/ sandy silt, dry, fine coarse grained ~~(ash)~~ moderate brown	SP/ silty sand, dry, fine-medium grain (ash) light tan
3			
4	SM/ silt w/ sand, dry, fine grained moderate brown	SP/ silty sand, dry, fine-coarse grained, moderate brown	SP/ silty sand, dry, fine-medium grain, light tan
5			
6	SP/ silty sand, dry, fine-medium grain, light tan		
7			
8	TD		
9		A 1149 B 1151 C 1158	A 1130 B 1134 C 1138
10			

A 1108
B 1112
C 1124

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

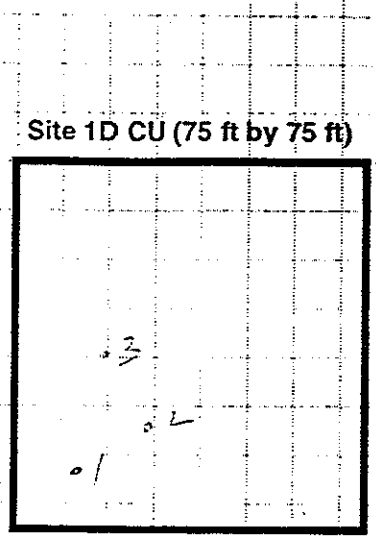
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G4

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/30/01
Time: 0910
Date Finished: 8/30/01
Time: 1100
Drilling Contractor: Interphase
Driller's Name: Gil & Augustine
Drilling Method: Geoprobe
Boring Diameter: 1 3/4
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.4 ppm background
PID=0.4 ppm @ CH @ 0910 hrs
no odor

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SM/silt w/sand, dry, fine grained, pale brown	GM/silty sand w/ fine gravel, smooth fine-coarse grained sand, pale brown, dry	SW/sand w/ silt, dry, fine grained, light tan
1			
2	SM/silty sand, dry, fine grained, light tan	SM/silty sand, dry, fine-coarse grained, pale brown	SP/silty sand, dry, fine-coarse grained, light tan
3			
4	SP/silty sand, dry, fine-medium grained, light tan	SM/silty sand, dry, fine grained, light tan	SM/silt w/sand, dry, fine grained, pale brown
5			
6	SP/sand w/ silt, dry, fine-medium grained, lightt tan		
7			
8	SP/sand w/silt, dry, fine-medium grained, light tan	A 1020 B 1025 C 1030 D 1033	A 1046 B 1047 C 1050 D 1055
9			
10			

A-920
B-925
C-930
D-935

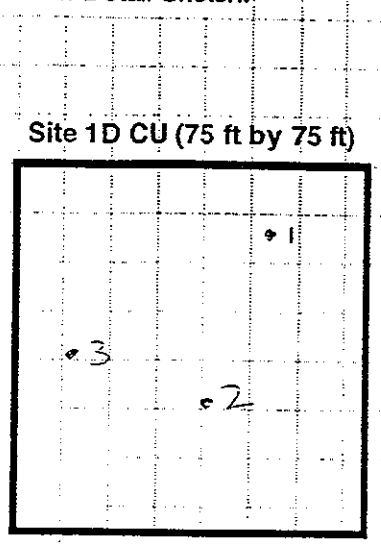
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/30/01
Time: 0745
Date Finished: 8/30/01
Time: 0907
Drilling Contractor: Inner phase
Driller's Name: Gil + Augustine
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.8 ppm background
PID = 0.8 ppm in CU @ 0745 hrs.
~~no ash~~
ash @ 3 feet in 3rd boring only

Sample Description

(USCS color, %fines % sand % gravel hardness/density moisture other)

	Boring A	Boring B	Boring C
0–1	SM/silt w/sand, dry fine-coarse grained, grayish brown	SM/silt w/sand, dry fine-coarse grained, moderate brown	SM/sandy silt, dry, fine-coarse grained, pale brown
1–2	SM/silt w/sand, dry fine-coarse grained, moderate brown	SP/sand w/silt, dry fine-~~medium~~ coarse grained, light tan	SM/SP/sandy silt, dry, fine-coarse grained, (ash) pale brown
2–3	SP/sand w/silt, dry fine-medium grained, light tan	SP/sand w/silt, dry fine-coarse grained, light tan	SM/SP/silt w/sand, dry fine-medium grained pale brown
3–4	SM/sand w/silt, dry fine grained, light tan		
4–5	SP/sand w/silt, dry fine-medium grained, light tan		
Sample labels	A 0748, B 0751, C 0830	A 0831, B 0835, C 0839 (2 labels)	A 0858, B 0904, C 0907 (3 labels)

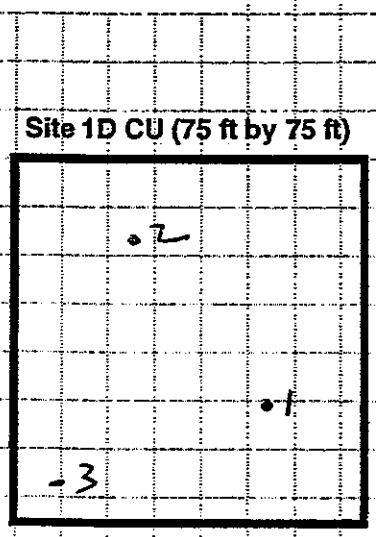
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Groes

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/7/01
Time: 0745
Date Finished: 9/7/01
Time: 0843
Drilling Contractor: Tetra Phase
Driller's Name: Mil
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Phase B
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.2 ppm background and breathing zone @0800
mash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0–1	SP/silty sand, dry, pale brown, fine-coarse grained	SP/silty sand, dry, light brown, fine-coarse grained	SP/silty sand, dry, light brown, fine-coarse grained
2–3	SP/silty sand, dry, pale brown, glass, fine-coarse grained	SP/silty sand, dry, fine-medium grained, light brown	SP/sand w/silt, dry, fine grained, light tan
4–5	SP/sand w/silt, glass, grayish orange, dry, fine-medium grained	SP/sand w/silt, dry, fine-medium grained, light tan	SP/sand w/silt, dry, fine-medium grained, light tan, CLAY LENS
6–7	SP/silty sand, ~~sandy silt~~, dry, glass, light brown, fine-medium grained		
8–9	SP/silty sand, dry, fine-medium grained, light tan	A 0815 B 0820 C 0826	A 0830 B 0833 C 0838
10	A 0745 B 0748 C 0751		

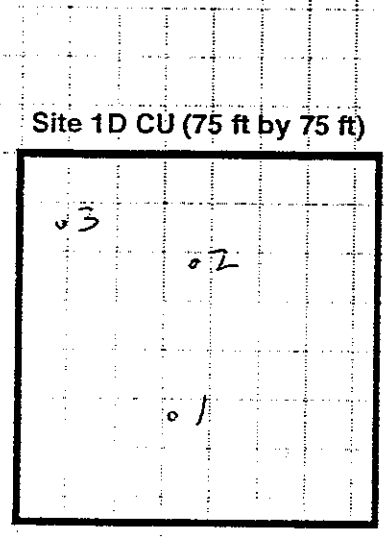
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/29/01
Time: 1415
Date Finished: 8/29/01
Time: 1600
Drilling Contractor: Interphase
Driller's Name: Gil + August
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.3 ppm background
PID = 0.3 ppm @ cm @ 1418 hrs
Ash @ 3' Boring 1 - disposal in drum for SVOC

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SM/sandy silt, dry	SM/silty sand, dry	SM/silty sand, dry
1	pale brown,	pale brown,	light tan
	fine-coarse grained	fine-coarse grained	fine coarse grained
2	SM/sandy silt, dry	SM/sandy silt, dry	SM/silty sand, dry,
3 (ash)	moderate brown (ash)	pale brown, (ash)	pale brown
	fine grained	fine-coarse grained	fine-medium grain
4	SP/light tan, dry	SP/light tan, dry,	SM/silty sand, dry
5	~~sand~~ silty sand,	sand + silt	light tan
	fine grained	fine grained	fine grained
6	TD		
7			
8			
9			
10			

A = 1430
B = 1455 SVOC
C = 1445
D = 1500
B 1515 SVOC
A 1531
B 1545 SVOC

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

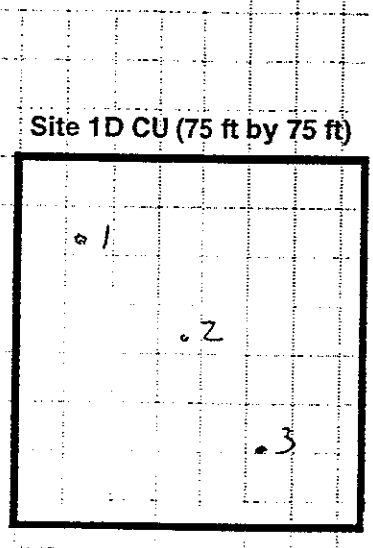
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/29/01
Time: 1200
Date Finished: 8/29/01
Time: 1415
Drilling Contractor: Inter-Phase
Driller's Name: Gilbert & August
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: m ash
0.0 ppm PID @ 1400 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SM/silty sand light tan, dry fine-coarse grained	SM/silty sand, dry pale brown, fine-coarse grained	SM/sandy silt, dry, moderate brown, fine-coarse grained
1			
2	SM/ light tan, dry sandy silt w/ gravel (fine) fine coarse grained angular fine gravel	SM/sandy silt, dry pale brown fine-medium grained	SP/ sand w/silt, dry light tan, fine grained
3			
4	SM/silty sand w/gravel dry light tan fine angular gravel, fine coarse sand	SM/sandy silt, dry pale brown, fine-medium grained	SP /sand w/silt, dry light tan, fine grained
5			
6	SM, silty sand, dry well graded fine grained, light tan		
7			
8	SP/silty sand, dry light tan, fine-medium grain		
9		A: 1355	A) 1408
10	A- 1205 B- 1330 C- 1340 TD	B: 1400 C- 1482	B- 1412 C- 1415

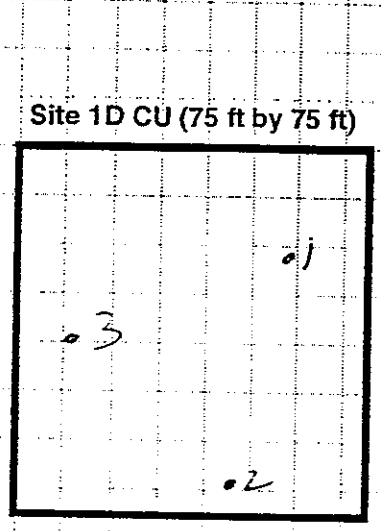
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/29/01
Time: 1015
Date Finished: 8/29/01
Time:
Drilling Contractor: Inter Phase
Driller's Name: Gilbert + Cangut
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: Cash @ 4 feet
0.0 ppm PID @ 1100

SYOC

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SP/sand w/silt, dry, light tan, fine-coarse grained	SM/silty sand, dry, ~~moderate~~ pale brown, fine-medium sand	SM/silty sand, dry, moderate brown, fine-coarse grained
1			
2	GM/gravel, sand, silt mix, dry, angular gravel, fine, fine-coarse sand, poorly sorted (cash)	SM/sandy silt, dry, pale brown, fine-medium sand	SM/silty sand, dry, pale brown, fine-medium grained
3			
4	GM/gravel-sand-silt mix, moderate brown, dry, fine gravel, fine-coarse angular, poorly sorted	SP/silty sand, dry, fine-coarse sand, pale brown (cash)	SW/silty sand, dry, light tan, fine grained
5			
6	SP/sand w/silt, light tan, dry, fine-medium grain		
7			
8	SM/silty sand, dry, light tan, fine medium grained		
9			
10			

A 55
B 1019
1050
C ~~1130~~
JVOC

TD

A = 1106
B 1109 49

A 1128
B 1131

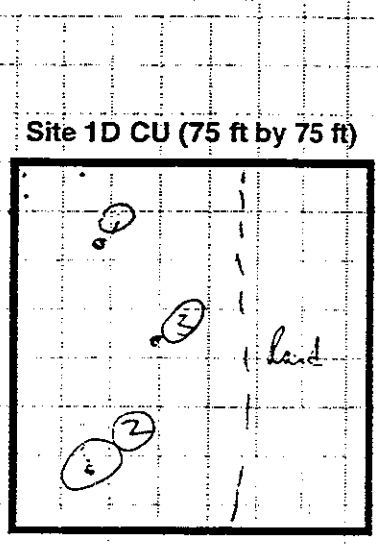
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G10

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/29/01
Time: 0820
Date Finished: 8/29/01
Time: 0930
Drilling Contractor: Interphase
Driller's Name: Wilbert Campos
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: ash @ 4.5 feet - sent for SVOC as green
0.5 ppm PID background @ 0858
0.5 ppm PID @ CU @ 0858
ASH

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SP/sand w/silt, dry, light tan, fine-coarse grained	SP/silty sand, dry, light tan, fine-medium grained	SM/silty sand, dry, light tan, fine-medium grain
1			
2	SP/sand w/silt, dry, light tan, fine medium grained	SM/silty sand, dry, light tan, fine grained-medium	SM/silty sand, dry, pale brown, fine grained
3			
4	SP/sand w/silt, dry, light tan, fine-medium grained (ash @ 4.5 feet)	SM/silty sand, dry, light tan, fine-medium grained	SM/silty sand, dry, light tan, fine-medium grain
5			
6		SM/silty sand, dry, light tan, fine-medium grained	SP/sand w/silt, dry, light tan, fine-medium grain
7			
8		SP/sand w/silt, dry, light tan, fine-medium grained	SP/sand w/silt, dry, light tan, fine grained
9			

A 0835
B 0845
C 0850
D 0840

A 0919
B 0920
C 0923
D 0922

A> 0800
B> 0824
C> 0826 - SVOC
D> 0822

TD TD

CHARACTERIZATION UNIT SAMPLING LOG

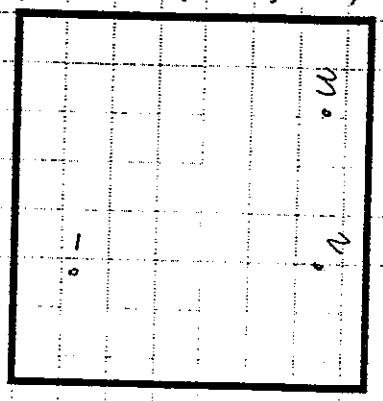
GRID NO.: G11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/28/01
Time: 1515
Date Finished: 8/29/01
Time: 0806
Drilling Contractor: Torrey Chase
Driller's Name: Fernando Augustine
Drilling Method:
Boring Diameter: 1 3/16"
Drill Rig: Geoprobe
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: 0.0 ppm PID background @ 1540 hrs.
0.0 ppm PID in workzone

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SM/silty sand, dry, moderate brown, fine-coarse grained	SM/sandy silt, dry moderate brown fine-medium grained	SM/sandy silt w/fine gravel, fine grained sand, dry pale brown
1			
2	SM/silty sand w/gravel, dry moderate brown, fine-coarse grained fine gravel	SM/sandy silt, dry moderate brown, fine-coarse grain	SM/sandy silt, dry, medium-coarse grain, moderate brown
3			
4	SM/silty sand w/ gravel, fine gravel, pale brown, dry	SM/sandy silt, dry moderate brown, fine-coarse grained	SM/sandy silt, dry, ~~fine-medium~~-coarse grain, moderate brown
5			
6	SM/sandy silt, dry fine-coarse grained, pale brown		
7			
8	SM/sandy silt, dry fine grained pale brown TD	8/29 A 0740 B 0745 C 0750	8/29 A) 0800 B) 0804 C) 0806

A=1515
B=1520
C=1528 10

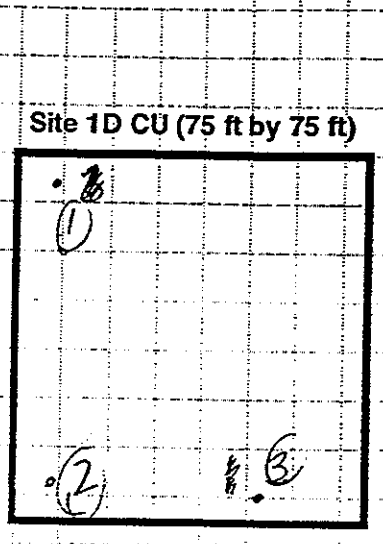
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H01

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/30/01
Time:	14:20
Date Finished:	8/30/01
Time:	15:50
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE (GAS) - 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE

Notes:

1420 - Geoprobe stuck in sand.
1430 - Geoprobe out of sand. Begin grid
1445 - Background & breathing zone PID-0, Oppm
No ash.

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture other)

A - 14:30
B - 14:34
C - 14:37

	Boring #3	Boring #2	Boring #1
0	SM/ Silty sand, tan, fine to coarse grain, dry, fine gravel	SP/ Sand w/silt tan, fine to med grain, dry	SM/ Silt w/sand, tan, fine to medium grain, fine gravel, dry
1			
2	SM/ Silty sand, tan, fine to med grain, dry	SP/ Sand w/silty sand, tan, fine to medium grain, dry	SM/ Silty sand, tan, fine to med grain, dry
3			
4	SM/ Silty sand, moderate brown, fine grain, slightly moist	SM/ Silty sand, moderate brown, fine grain, dry	SM/ Silty sand, tan, fine grain, dry; 3 lines of reddish brown silt @5.25'
5			
6			SP/ Sand w/silt moderate brown, fine grain, dry
7	A - 15 40 B - 15 43 C - 15 47	A 15:28 B 15 30 C - 15 33	
8			SP/ Sand w/silt, moderate brown fine grain, slightly moist
9			
10			TD @ 10'

CHARACTERIZATION UNIT SAMPLING LOG

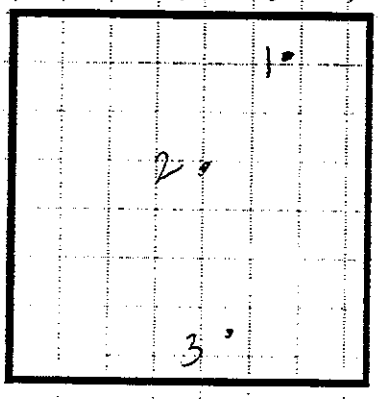
GRID NO.: H02

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/30/01
Time:	11:40 - lunch @ 12:20-1
Date Finished:	8/30/01
Time:	14:00
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE (GAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
	no ash

Start again in 13 ~~00~~

A - 11:45 1.47 cm
B - 11:45 really 11:43
C - 11:47
D - 11:50

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/ Silty sand, tan, fine to med grain, dry	SP/ Sand w/silt, tan, organics, fine to med grain, dry	SW/ Sand w/ silt tan, organics, fine to coarse grain, dry
1	SM/ Silty sand, tan, fine to med grain, dry	SM/ Silty sand, tan, fine to med grain, dry	SM/ Silt w/sand, tan, fine to med grain, dry
2	SP/ Sand w/ silt moderate brown, fine to med grain, slightly moist	SM/ Silty sand, light brown, fine to medium grain, dry	SM/ Silty sand, tan, fine to med grain, dry to slightly moist
3	ML/ Silt w/ sand moderate to dark brown, fine grain, slightly moist		
4	ML/ Silt w/ no noticeable sand, moderate to dark brown, fine grain, slightly moist - no ash	A - 13:35 B - 13:40 C - 13:43 D - 13:45 43 really 13:~~45~~ cm	A - 13:51 B - 13:54 C - 13:58 D - 14:00
5			
6			
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

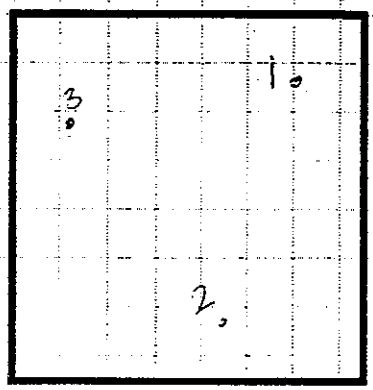
GRID NO.: H03

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

no ash

Date Started:	8/30/01
Time:	10:15
Date Finished:	8/30/01
Time:	11:30
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE (GAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

Borings 1 & 3 switched from usual location on sheets. Labels are correct

1105 - Background PID - 0.0ppm

Breathing zone - 0.0ppm

If not stated, breathing zone readings are for geoprobe & logbooks.

A 10:19
B 10:20
C 10:25

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 3	Boring 2	Boring 1
0			
1	SM/Silty sand, light brown fine to ~~med~~ coarse sand, fine gravel, dry	SW/ Sand w/silt tan, fine to coarse grain, dry	SP/Sand w/silt, organics tan, fine to med grain, dry
2			
3	SM/Silty sand, light brown, fine to coarse sand, dry	SP/ Sand w/silt tan, fine to med grain, dry	SM/ Silty sand, tan, fine to med grain, glass pieces, dry
4	SM/Silty sand, moderate brown fine to med grain, slightly moist	SM/Silty sand, light to moderate brown, fine to med grain, dry	ML/ Silt w/no noticeable sand ~~tan~~ cm moderate to dark brown, slightly moist
5			
6	SM/Silty sand, ~~brown~~ cm fine grain, light to moderate brown, slightly moist		
7			
8			
9	SP/Sandy w/silt, light brown/tan, fine grain, dry	A - 10:55 B - 11:00 C - 11:05	A - 11:17 B - 11:22 C - 11:23
10	CH/Clay, dark reddish brown, slight moist @ 9.75'		

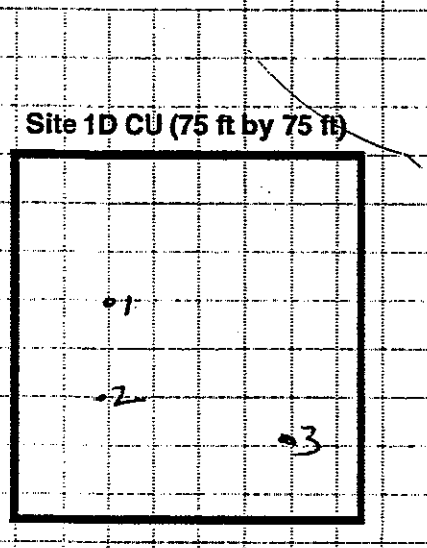
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H4

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross & Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
~~4.0-4.5~~ 3-3.5

Date Started: 9/7/01

Time: 1020

Date Finished: 9/7/01

Time: 1130

Drilling Contractor: InterPhase

Driller's Name: Gil, CARLOS, JUAN

Drilling Method: Geoprobe

Boring Diameter: 1 3/4"

Drill Rig: Phase 13 & Phase 12

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=0.0 ppm background and breathing zone @ 1045 hrs

Cod

(ASH) SVOC

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3	
0–1	SM/silty sand, glass fine coarse grained, light brown, dry	SP/silty sand, dry, light brown, fine coarse grained	SM/ Silty sand, fine to coarse sand, moderate brown, dry	
2–3	SP/silty sand, glass, dry, fine med grained, moderate brown, little ash, little glass	SP/silty sand, dry, fine medium grained, glass, moderate brown	SM/ Silty sand, dry fine to coarse sand, fine gravel, moderate brown, dry	2'-2.5' bgs
4–5	SP/silty sand, dry, glass, moderate brown, fine med. grained	SP/silty sand, dry, fine coarse grained sand, moderate brown	SM/ Silty sand, moderate to dark brown, fine to med grain, dry	3'-3.5' bgs
6–7	SP/silty sand, dry, moderate brown, glass, dry, fine medium grained		A - 1116 B - 1118 C - 1122 SVOC	
8–9	SP/silty sand, dry, fine medium grained, light tan	A 1115 B 1120 C 1125		

A 10444
B 10470
C 1058
SVOC

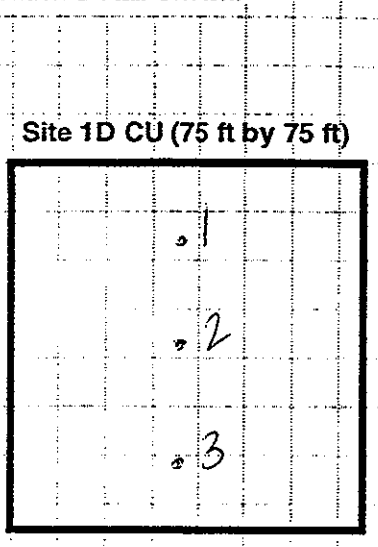
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H05

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
No ash

Date Started:	8/30/01
Time:	9:00
Date Finished:	8/30/01
Time:	10:05
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE (GAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

0910 - Background PID - 0.4
Breathing zone (sample log) 0.4
(Geoprobe) 0.5
(they've turned partially downwind of shower)

A - 9:04
B - 9:05
C - 9:10

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SP/ Sand w/silt, moderate brown, fine to med grain, slightly moist	SP/ Sand w/silt, tan, fine to ~~med~~ coarse grain, dry	SP/ Sand w/silt tan, fine to med grain, dry
1			
2	SP/ Sand w/silt, light to moderate brown, fine to med grain, dry	SP/ Sand w/silt tan, fine to med grain, dry	SP/ Sand w/silt, tan, fine to med grain, dry to slightly moist
3			
4	SP/ Sand w/silt, light brown, fine to med grain w/some fine gravel, slight moist	SP/ Sand w/silt, med brown, tan, fine to med grain, dry/slightly moist in places,	SP/ Sand w/silt, tan, fine to med grain, dry
5			
6	SP/ Sand w/silt, fine to med grain, light brown, slight moist		
7			
8	SP/ Sand w/silt, fine to med grain, light brown, slight moist	A 9:43 B 9:45 C 9:49	A 9:55 B 9:58 C 10:05
9			
10	TD @ 10'		

CHARACTERIZATION UNIT SAMPLING LOG

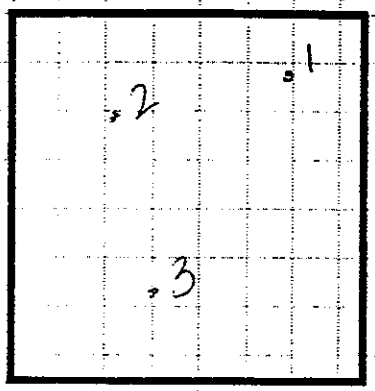
GRID NO.: H06

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/29/01 8/30/01
Time:	15:20 7:35
Date Finished:	8/30/01
Time:	8/29/01 16:00 8:50
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE (GAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
	0750 - Background PID - 0.8ppm
	Breathing zone PID - 0.8ppm
	#SH

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring # 1	Boring # 2	Boring # 3
0	SP/ All ash in boring core Assume for surface fire Black w/ organics, some fine to med sand	SW/ Sand w/ silt tan, fine to coarse grain, dry	SW/ Sand w/ silt fine to coarse grain sand, tan, dry
1		SM/ Silty sand, tan, fine to med grain, dry	SM/ Silty sand, tan, fine to med grain, dry
2	SP/ Sand w/ silt, moderate brown, fine to med grain, dry		
3		SP/ Sand w/ silt moderate brown, fine to med grain, dry - slightly moist from 5'-6' bgs	SP/ Sand w/ silt, light brown, fine to med grain, slightly moist
4	SM/ Silty sand w/ ash 4.5', moderate brown, fine to med grain, dry - Black Ash from 6'-7',		
5		SP/ Sand w/ silt, light brown, fine to med grain, dry No black ash in borings yet continue to 10' for assurance	SP/ Sand w/ silt, light brown, fine to med grain, slightly moist No ash in borings yet will continue to 10' for assurance
6	SM/ medium brown, fine grain dry, Silty Sand		
7			
8			
9	SM/ Silty sand light brown, fine gray, dry TD@10'	SM / Silty sand, light brown, fine to med grain, dry TD@10'	SP/ Sand w/ silt, moderate brown, fine to med grain, slightly moist
10		A 1325 B 1330 C 1334 8/29/01	

PARSONS ENGINEERING SCIENCE, INC.

8/30/01 A 7:40 B 7:45 TD@10

(2) A 8:25 B 8:26 TD@10

(3)

GRIDSAMPLE.CDR

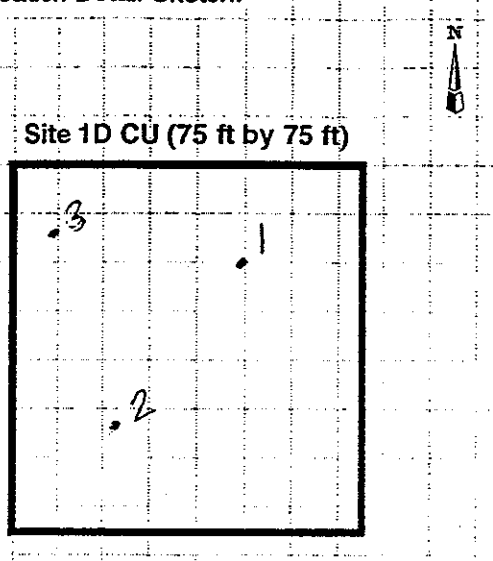
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: HD7

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/29/01
Time:	13:25
Date Finished:	8/29/01
Time:	15:15
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE (OAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

1400 Background PID-0.0ppm
Breathing zone PID-0.0ppm
1440 Lost drive point. Time lost ~~locate~~ CM searching. New point used.
Will bring spare tomorrow & keep eyes open today.

A- 13:39
B- 13:41
C- 13:45
D- 13:50

Sample Description (USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SW/ Sand w/ silt & gravel fine to coarse sand, fine gravel, light brown, dry	SW/ Sand w/ little silt fine to coarse sand, tan, dry	SM/ Silty sand, fine to med grain sand, moderate brown, dry
1 (13:39 ↓ 13:50)			
2	SP/ Sand w/ silt fine to med grain, light brown, dry	SP/ Sand w/ little silt fine to med grain sand, tan, dry	SM/ Silty sand, fine to coarse grain sand, moderate brown, dry
3	GM/ Silty sand w/ gravel fine to coarse grain, fine gravel, tan/ light brown, dry	SW/ Sand w/ silt fine to coarse grain, tan, dry	SM/ Silty sand, fine to medium grain, moderate brown, dry
4	SP/ Sand w/ silt fine to coarse sand, light brown, dry		
5		A- 14:52 B- 14:55 C- 14:59 D- 15:05 (really 14:52)	A- 15:11 B- 15:13 C- 15:15 D- 15:18 (really 15:11)
6	TD@8' - refusal probably rock in ground		
7			
8			
9			
10			

CHARACTERIZATION UNIT SAMPLING LOG

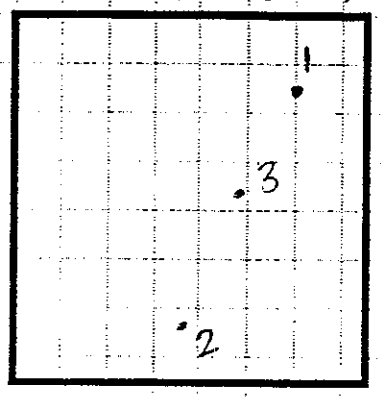
GRID NO.: H08

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
~~10-11.5~~
5-6

Date Started:	8/29/01
Time:	1015
Date Finished:	8/29/01
Time:	1210
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE (GAS)
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
1155 Background PID - 0.0 ppm	
Breathing Zone PID - 0.0 ppm	
ASH	

A 1019
B 1021
C 1024 - SVOC

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0	SW/Sand w/ silt, tan, fine to coarse sand, dry	SM/Silty sand, med brown, some glass frag, organics, fine to med grain, dry	SP/Sandy w/almost no silt, tan, organics, fine to med grain, dry
1			
2	SW/Sand w/ silt, tan to moderate brown, fine to coarse sand, dry	SP/Sand w/silt, light to moderate brown, fine to med grain, glass frag, dry	SP/Sand w/ silt, tan, fine to med grain, dry
3			
4	SP/Sand w/ silt, light brown, fine to med grain, slightly moist, dry Ash about 1" thick @ 4.3' - Above & below soil is SP as described.	SP/Sand w/silt, fine to med grain, moderate brown, dry/slightly moist in parts - 2" rengsilty material @ 4.75'	SP/Sand w/ silt, tan, fine to med grain, dry - Ash from 5'-5.5' Sample collected TD @ 6'
5			
6			
7	SM/Silty sand, light brown, fine grain, slight moist		
8	CL/Clay, moderate brown, slight moist (7.5'-8')		
9	SM/Silty sand, light brown, fine grain, dry TD @ 10'	A 11.46 B 11.51 C 11.57 - SVOC	A 11.10 B 11.14 C 11.22 - SVOC
10			

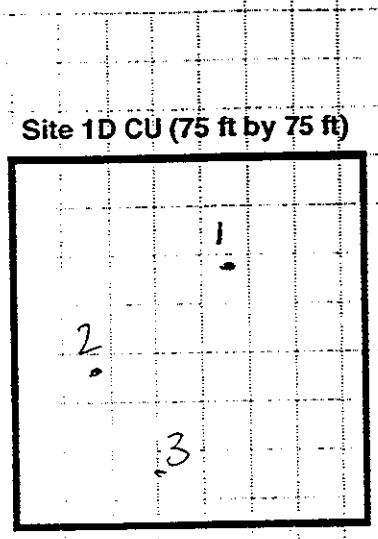
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H09

Project Name: Camp Pendleton OU 4 | Geologist: CM Sty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Ncash.

Date Started:	8/29/01
Time:	8:20
Date Finished:	8/29/01
Time:	9:35
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE PACK
Notes:	

0850 Background PID-0 5ppm
breathing zone PID-0.5ppm
0945 JUAN FERN LEAVE SITE
TO FILL-UP GEOPROBE W/GAS

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/Sand w/silt, tan fine to med grain, dry	SM/Silt w/sand, light brown, fine to coarse sand, dry	SM/Silty sand, tan, fine to coarse sand, dry
1	SP/Sand w/silt moderate reddish brown, fine to med grain, dry	SM/Silty sand, light to moderate brown, fine to medium grain, dry to slightly moist	SM/Silt w/sand, tan, fine to med grain, dry
2	SP/Sand w/silt, moderate brown, fine to med grain, dry	SM/Silty sand, moderate brown, fine to med grain, dry	SM/Silty sand, tan, fine to med grain, dry
3	SM/Silty sand, fine to coarse sand, moderate brown, dry		
4	SM/Silty sand moderate reddish brown, fine to med grain, dry, some silt at 8'-8.5'		
5			
6			
7			
8			
9			
10			

A 8:26
B 8:30
C 8:35
D 8:26
8:40

A - 9.07
B - 9.11
C - 9.13
D - 9:07 → 9.15

A 9.22
B 9.25
C 9.31
D 9.22 → 9:35

would be Mistaken for ash, but Jason & I agree it's

CHARACTERIZATION UNIT SAMPLING LOG

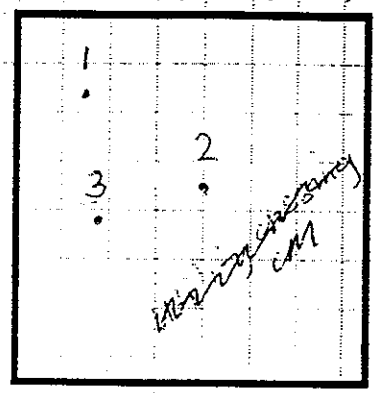
GRID NO.: H10

Project Name: Camp Pendleton OU 4 | Geologist: CMsty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/28/01
Time:	15:33 stopped 16:10 on 8/28/01
Date Finished:	8/29/01
Time:	8:10am
Drilling Contractor:	INTERPHASE
Driller's Name:	GILBERT, DANIEL
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE PACK
Notes:	1535 Background PID-0.0ppm Breathing Zone PID-0.0ppm No odor

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A 1	Boring B 2	Boring C 3
0			
1	SM/ Silty sand, tan, medium to coarse sand, fine grain, dry	SM/ Silty sand, tan, fine to med grain, dry	SM/ Silty sand, light brown, fine to coarse sand dry
2	SM/ Silty sand, fine to med grade, light brown, dry	SM/ Sand w/silt light brown tan, fine to coarse grain, dry	SM/ Silt w/ sand, moderate brown, fine grain, dry
3			
4	SM/ Silty sand light brown, fine to med grain, dry	SP/ ~~Sand~~ CM Sand w/silt, light brown, fine to med grain, dry	SM/ Silt w/ sand moderate brown, fine to med grain, dry
5			
6		CL/ Clay, medium brown, ~~dry~~ CM slightly moist (6-7)	
7		~~SM/ Sand w/silt~~ Silty sand, medium brown, dry, fine grain	
8	A - 7:42 B - 7:47 C - 7:49 8/29/01	SM/ Sand w/silt, moderate brown, fine to medium grain, dry (8.5-8.5)&(9.5-10)	A - 8:01 B - 8:04 C - 8:06
9		A - 15:36 B 15:40 C 15:47	
10		CL/ Clay, dark grayish brown, slightly moist	

PARSONS ENGINEERING SCIENCE, INC. 8/29/01 47 TD @ 10' 8/29/01 GRIDSAMPLE.CDR

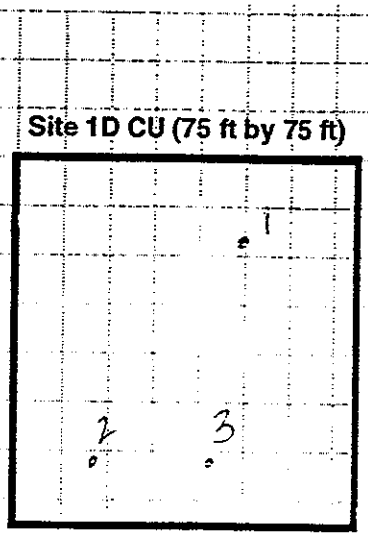
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I02

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
No ash.

Date Started:	8/31/01
Time:	7:40
Date Finished:	8/31/01
Time:	8:30
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, TIAN
Drilling Method:	GEOPROBE
Boring Diameter:	GEOPROBE PHASE 12
Drill Rig:	1 3/16"
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

CS10 Background PID - 0.0ppm
Breathing zone PID - 0.0ppm
CS40 - Sample on geoprobe is leaking up - will take 5min to replace now

A - 7:50
B - 7:54
C - 7:58

Sample Description (USCS, color, %fines, % sand, % gravel, hardness/density, moisture other)

	Boring #1	Boring #2	Boring #3
0	SM/ Silty sand, tan, fine to coarse grain, organics, dry	SP/ Sand w/silt, tan, fine to med grain, dry	SP/ Sandy silt, tan, fine to med grain, dry
1			
2	SM/ Silty sand, tan, fine to med grain, dry	SP/ Sand w/silt, moderate brown, fine to med grain, dry	SP/ Silty sand, tan, fine to med grain, dry
3			
4	SM/ Silty sand, moderate brown, fine grain, slightly moist	SM/ Sandy silt, moderate brown, fine to med grain, dry to slightly moist	SP/ Sand w/silt tan, fine to med grain, organics, dry
5			
6	ML/ Silts w/ almost no sand, can make paddy but not worm, tan, slightly moist		
7			
8	SP/ Sand w/some silt, fine to med grain, tan, slightly moist - No ash in boring TD @ 10'	H 0840	H 8:20
9		B 0845	B 8:25
		C 0845	C 8:25
10			

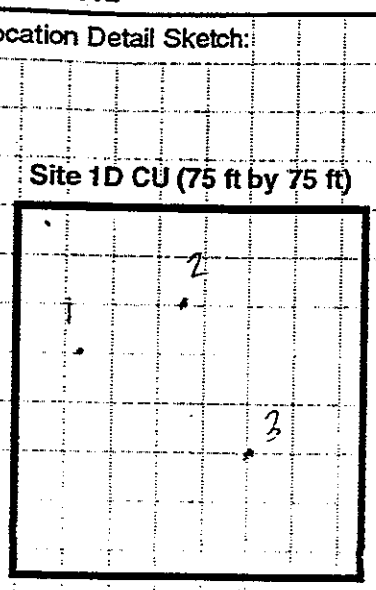
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I03

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/31/01
Time:	8:50
Date Finished:	8/31/01
Time:	10:15
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE - Phase 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

0900 Background PID - 0.3 ppm
Breathing zone PID-0.3 ppm
No ash.

A-958
B-901
C-1005
D-958 → 958 Boring #1

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0			
1	SP/ Sand w/silt, fine to med grain, tan, dry	SP/ Sand w/silt, tan, fine to med grain, dry	SM/ Silty sand, tan, fine to medium grain, dry
2	SP/ Sand w/silt, fine to ~~med~~ coarse grain,	SM/ Silt w/sand tan, fine grain,	SP/ Sand w/silt, tan, fine to med
3	tan, slightly damp	slightly moist	grain, damp
4	SP/ Sand w/silt, fine to med grain,	SP/ Sand w/silt, fine to med grain,	SP/ Sand w/silt, moderate brown,
5	moderate brown. slightly moist (damp)	tan, slightly moist	fine grain, slightly moist
6	SP/ Sand w/silt, fine to med grain, moderate brown,	A - 955	A 1010
7	damp.	B - 957	B 1012
		C - 1000	C 1014
8	SM/ Silt w/sand, fine grain,	D - 955 → 1003	D 1010 → 1016
9	moderate yellowish brown, damp		
	No ash		
10	TD @ 10'		

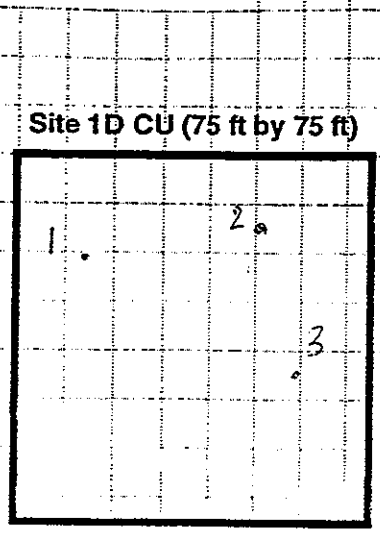
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: IC4

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/31/01
Time:	1015
Date Finished:	8/31/01
Time:	11:10
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

HCC Background PID - 0.0ppm
Breathing zone - 0.0ppm
No ASH

A 1020
B 1023
C 1025

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SM/ Silty sand, fine to med grain, tan, dry	SP/ Sand w/silt, fine to coarse grain, light brown, dry	SM/ Silt w/sand, tan, fine to med grain, dry
1	SM/ Silty sand, moderate brown, fine to med grain, 1 piece gravel, dry	SM/ Silty sand, moderate brown, fine grain, slightly moist	SP/ Sand w/silt, moderate to dark brown, fine to med grain, slightly moist
2	SW/ Sand w/silt, moderate to dark brown, fine to med, slightly moist - ~~0.4~~ cm black unit	SM/ Silty sand, moderate brown, fine grain, slightly moist	SM/ Silty sand, fine to med grain, moderate brown, slightly moist
3	~~neck at 5', path sample jar~~ cm		
4	SM/ Silty ~~sand~~, fine grain, slightly moist, light brown	A - 1045 B - 1047 C - 1050	A - 1055 B - 1058 C - 1053
5	TD = 5'		
6	Hold drillers to stop at 5' bls through asphalt -		

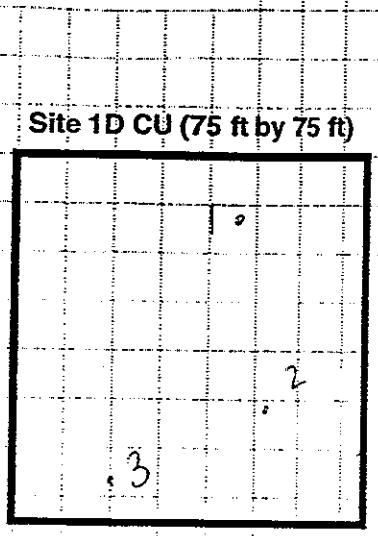
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I05

Project Name: Camp Pendleton OU 4 | Geologist: Cm Sty

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	8/31/01
Time:	11:10
Date Finished:	8/31/01
Time:	13:40
Drilling Contractor:	INTERPHASE
Driller's Name:	FERNANDO, JUAN
Drilling Method:	GEOPROBE
Boring Diameter:	13/16"
Drill Rig:	GEOPROBE 12
Datum: Ground Surface	BENTONITE
Borehole Abandonment:	BENTONITE
Notes:	

1245 - Background PID - 0.0ppm
Breathing zones - 0.0ppm
No ash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

A 11:13
B 11:16
D 11:20

	Boring A	Boring B	Boring C
0			
1	SP/ Sand w/silt, tan, fine to med grain, dry	SP/ Sand w/silt, tan, fine to med grain, dry	SP/ Sand w/silt, fine to med grain, moderate brown, dry
2	SP/ Sand w/silt, tan, fine to medium grain, dry	SP/ Sand w/silt moderate brown, fine to med grain, slightly ~~tan~~ cm moist	SP/ Sand w/silt, fine to coarse grain, moderate brown, dry
3			
4	SM/ Silty sand, tan, fine to medium grain, dry to slightly moist	SP/ Sand w/silt moderate ~~cm tan~~ cm brown, organics, fine to med grain, dry	SM/ Silty sand, fine to med grain, moderate brown to dark brown, dry
5			
6			SM/ ~~BWM~~ Silty sand, fine to coarse grain, fine gravel, dry - glass in ~~sam~~ core
7	A - 13.44	A - 12.54	
8	B - 13.16	B - 12.56	SP/ Sand w/silt light brown, fine to med grain, slightly moist
9	C - 13.20 D - 13.24 (really 13.20)	C - 13.01 D - 13.05 (really 13.01)	TD @ 10'
10			

CHARACTERIZATION UNIT SAMPLING LOG

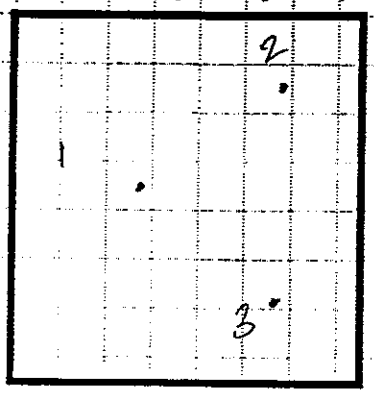
GRID NO.: I04

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
No ash

Date Started:	CM 9/4/01
Time:	7:45
Date Finished:	~~9:30~~ CM 9/4/01
Time:	9:30
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE 12
Boring Diameter:	13/16"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	

08:10 - Background DID - 1.1 ppm
Breathing zone ND - 1.1 ppm

Skip grid 107 per Randy instructions

A - 7.55
B - 7.91
C - 8.25

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/ Sand w/ silt, moderate brown, fine to med grain, slightly moist	SP/ Sand w/ silt, tan, organics, fine to med grain, dry	SP/ Sand w/ silt, tan, organics, fine to coarse grain, some fine gravel, dry
1			
2	SP/ Sand w/ silt, fine to coarse grain moderate brown slightly moist	SP/ Sand w/ silt, tan, fine to med grain, dry to slightly moist	SM/ Silty sand dark brown, fine to coarse grain sand, dry - some black potential ash at top of core - added to sample
3			
4	SM/ Silty sand, fine to med grain, med brown, slightly moist	SM/ Silty sand tan fine to med grain, dry to slightly moist	4: SM/ Silty sand, moderate reddish brown. fine grained, dry to slightly moist
5			
6	ML/ Sandy silt, fine grain, med reddish brown to med brown, slightly moist		
7		A - 8.40 B - 8.45 C - 9.03	A - 9.15 B - 9.20 C - 9.26
8	ML/ Silty w/ slight plasticity, med brown, slightly moist		
9			
10	No ash. TD @ 10'		

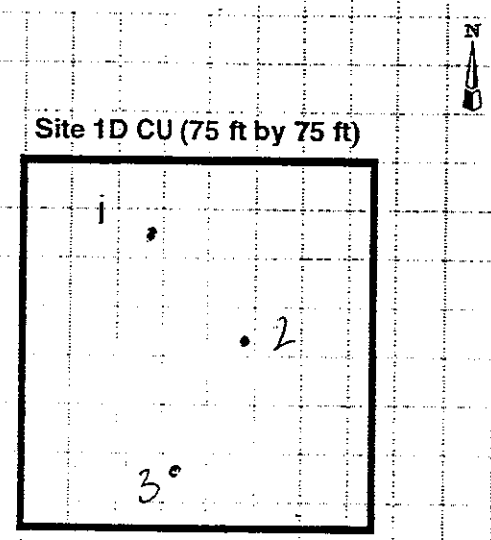
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: 107

Project Name: Camp Pendleton OU 4 | Geologist: Cinsky

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
C - 8.7-9.2 8.45, 4.55', 2.55'

Date Started:	9/7/01
Time:	0840
Date Finished:	9/7/01
Time:	1100
Drilling Contractor:	INTERPHASE
Driller's Name:	JUAN, CARLOS
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/4"
Drill Rig:	PHASE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	0850 - Breathing & Background PID 0.0ppm

ASH

Sample Description
(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring A	Boring B	Boring C
	A 855, B 900, C 920 SVOC		A 0925, B 0930, C 1000 SVOC; A 1030, B 1033, C 1100 SVOC
0			
1	SP/ Sand w/silt, dark brown, fine to coarse sand, dry, glass	SP/ Sand w/silt, fine to coarse sand, fine gravel, dark brown, dry	SM/ Silty sand, fine to coarse sand, med to dark brown, dry, organics
2	SM/ Silty Sand, glass, dark brown, fine to med grain, dry	SM/ Silty sand, glass fine to coarse sand, moderate brown, slightly moist	SP/ Sand w/silt, light to moderate brown, fine to coarse sand, dry
3			
4	SP/ Sand w/silt, fine to med sand, fine gravel, moderate brown, dry, glass ash @ 4.5'	SM/ Silty sand, moderate to dark brown, fine to coarse sand, organics, dry ash @ 5' glass	SP/ Sand w/silt, light to mod brown, fine to coarse sand, slightly moist
5	ash	ash	
6			
7	SM/ Sand w/silt light to moderate brown, fine to med grain, dry, glass	SP/ Sand w/silt light brown, fine to med grain, dry	SP/ Sand w/silt, moderate brown to mod reddish brown, fine to med grain, slightly moist
8		SP/ Sand w/silt, light brown, fine to med grain, dry TD @ 10' Ash @ 5' only	
9	SM/ Silty Sand, glass dark brown, fine to med grain, dry, ash @ 9'		SM/ Silty sand moderate brown, fine to med grain, slightly moist
10	ash		

CHARACTERIZATION UNIT SAMPLING LOG

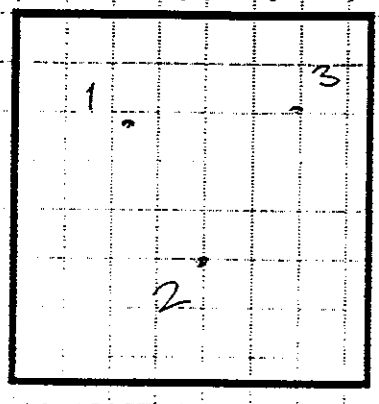
GRID NO.: I08

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
Potential ash.

Date Started:	9/4/01
Time:	9:35
Date Finished:	9/4/01
Time:	@ 11.25
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE 12
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	skipped I07 per Randy's instructions. 0945 - Backfilling ground & Breathing zone PID - 1.0 ppm 1045 - Geoprobe not to fill up gas. 1107 - Geoprobe returns

A - 7.40
B - 9.45
C - 9.52

Sample Description (USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A/1	Boring B/2	Boring C/3
0	SP/ Sand w/ silt fine to coarse sand, tan, dry	SP/ Sand w/ silt, fine to med grain, moderate brown, dry	SP/ Sand w/ silt, fine to coarse grain sand, med brown, dry
1	SP/ Sand w/ silt, fine to med grain, moderate brown, slightly moist - some glass in sample	SM/ Sand w/ silt, fine to coarse grain, tan, dry	SM/ Silty sand, fine to coarse grain dark brown, dry
2	SP/ Sand w/ silt, fine to med grain, med brown, slightly moist, some black & white mixed through sample & core → potential ash.	SP/ Sand w/ silt, dark brown, fine to med grain, slightly moist	SM/ Silty sand, fine to coarse grain, moderate brown dry
3	SP/ Sand w/ silt, fine to med sand, some coarse, slightly moist, moderate brown w/ black and white mix as noted above	A 10 16 B 10 20 C 10 27	A 11 10 B 11 15 C 11 20
4	SP/ Sand w/ silt, fine to coarse grain, moderate brown		
5			
6			
7			
8			
9			
10			

A - 5.7
B - 5.1
C - 5.1

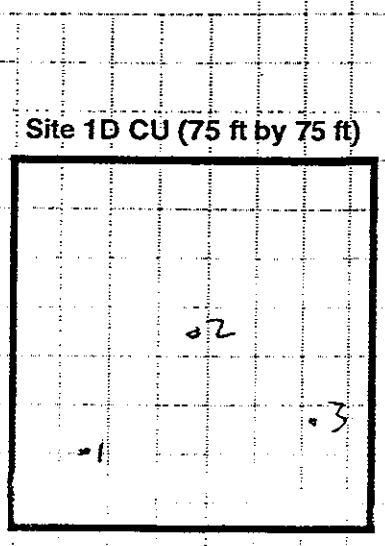
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I09

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5
no ash

Date Started:	9/4/01
Time:	11:30
Date Finished:	9/4/01
Time:	13:50
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIK
Drilling Method:	GEOPROBE 4
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	1330 Breathing zone A Background PID - 0.0 ppm

(2) # 1131
b 1138
c 1140
D 1131-1145 Boring 1 (2) Boring 2 (1) Boring 3

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1 (2)	Boring 2 (1)	Boring 3
0	SP/ Sand w/silt, tan, fine to coarse, sand, fine gravel, dry	SP/ Sand w/silt, tan fine to med grain organics, dry	SP/ Sand w/silt, tan, fine to med grain, dry
1			
2	SM/ Silty Sand, tan, fine to med grain, dry	SM/ Silty sand, fine to med grain, tan to med. brown, dry	SP/ Sand w/silt, moderate brown, fine to med grain, slightly moist
3			
4	SM/ Silt w/sand, tan, fine grain, dry	SM/ Silty sand, fine to coarse grain, tan, dry	ML/ Silt w/a few clay clumps, fine grain, moderate brown, slightly moist
5			
6	CL/ Silt/clay - very low plasticity, med brown w/ reddish clay/silts, slightly moist	A - 1315 B - 1320 C - 1325 D - 1330 (really 1315)	A 1340 B 1343 C 1345 D 1348 (really 1340)
7			
8	ML/ Silt w/no plasticity moderate brown, fine sand - 9' - moderate reddish brown, fine sand, very silty TD 10'		
9			
10			

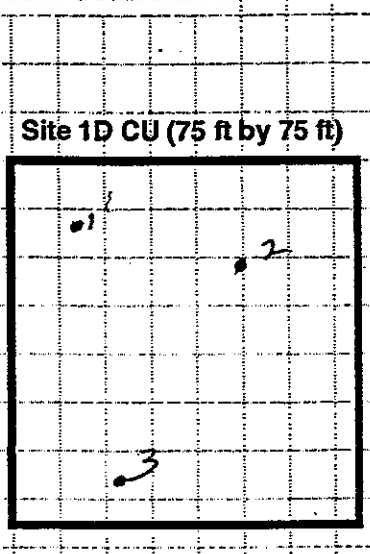
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: J5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/31/01
Time: 0800
Date Finished: 8/31/01
Time: 0915
Drilling Contractor: Interphase
Driller's Name: Gil + Daniel
Drilling Method: Geoprobe
Boring Diameter: 1 7/16
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: 0.8 ppm PID background
0.8 ppm PID @ CU @ 0758
ash @ 4 feet (B1+B2)
ash @ 3 feet (B2)

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring B1	Boring B2	Boring B3
0	SP/silty sand, dry, fine-coarse grained, light tan	SP/silty sand w/ gravel, angular, fine-coarse grained sand, fine-coarse gravel, dry, pale brown	SP/silty sand, dry, fine medium grained, tan
1			
2	SM/silty sand, dry, fine-grained, pale brown	SM/silty sand, dry, fine-medium grained, moderate brown	SP/silty sand, dry, fine grained, pale brown
3			
ash 4	SP/sand w/silt, dry, fine medium grained, light tan	SM/sandy silt, dry, fine grained, moderate brown (ash)	SM/silty sand, dry, fine grained, moderate brown
5			
6	SP/sand w/silt, dry, fine grained, light tan		
7			
8	SP/sand w/silt, dry, fine grained, light tan		
9		A 0825 B 0827 C 0830 D 0837	A 0845 B 0850 C 0855 D 0900
10	TD		

A 0800
B 0805
C 0810
D 0815

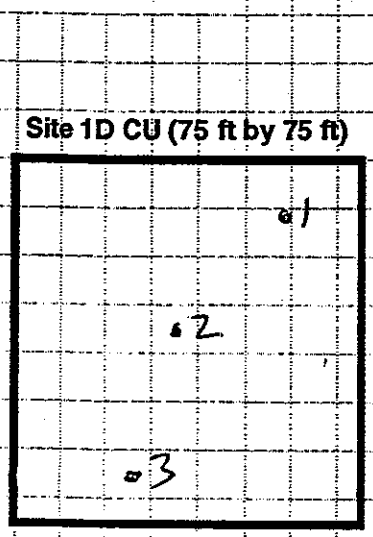
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: J6

Project Name: Camp Pendleton OU 4 | Geologist: J Sean Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/7/01
Time: 0845
Date Finished: 9/7/01
Time: 1015
Drilling Contractor: Inter-Phase
Driller's Name: Gil
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 background and breathing zone @ 0850
no odor

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/silty sand, dry, fine-coarse grained, light brown	SP/silty sand, dry, fine-medium grained, light brown	SP/silty sand, dry, fine-coarse grain, light brown
1			
2	SP/silty sand, glass fine coarse grained, light brown, dry	SP/silty sand, dry, fine-medium grained, pale brown, glass	SP/silty sand, dry, fine-med. grained, light tan.
3			
4	SP/silty sand, dry, fine-coarse grained, pale brown	SP/silty sand, dry, fine-coarse grained, light brown	SM/sandy silt, dry, fine grained, light tan
5			
6	SP/silty sand, dry, pale brown, fine-medium grained		
7			
8	SP/silty sand, dry, tan, fine-medium grained		
9			
10		A 0940 B 0945 C 0956	A 1000 B 1005 C 1010

A 0900
B 0910
C 0915

TD

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

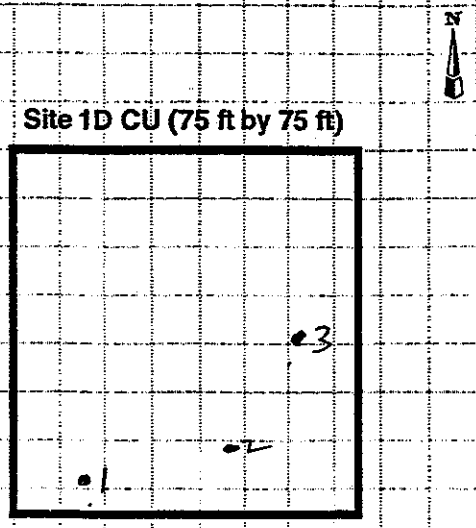
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: J7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: ~~08~~ 08/31/01

Time: 0930

Date Finished: 8/31/01

Time: 1030

Drilling Contractor: Inter-Phase

Driller's Name: Mil + Daniel

Drilling Method: Geoprobe

Boring Diameter: 1 3/16

Drill Rig: Chase 13

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: no ash

0.0 PID @ 0955 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SP/silty sand, dry	SP/sand w/silt, dry,	SP/sand w/silt, dry
1	fine-coarse grained, light tan	fine-coarse grained, light tan	fine-coarse grained light tan,
2	SP/sand w/silt, dry,	SP/sand w/silt, dry,	SP/sand w/silt
3	fine-medium grained, light tan	fine-medium grained, light tan	fine medium grained, light tan, slightly moist
4	SP/sand w/silt, dry	SC/clayey sand,	SP/sand w/silt,
5	fine medium grain, light tan	slightly moist, moderate brown,	slightly moist light tan, fine-
6	SP/sand w/silt, dry, slightly moist	fine-coarse grained	medium grain
7	fine-coarse grained, light tan-pale brown- (SM, sandy silt)		
8	SP/silty sand,		
9	slightly moist,	A 1000	A 1020
10	fine-medium grained, pale brown	B 1005 C 1010 D 1015	B 1022 C 1025 D 1030

A 0935
B 0938
C 0942
D 0945

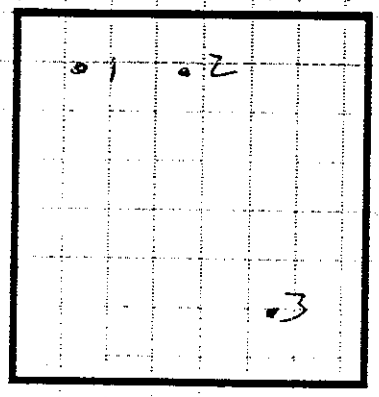
GRID NO.: J8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/31/01
Time: 1030
Date Finished: 8/31/01
Time: 1145
Drilling Contractor: Interphase
Driller's Name: Gil + Daniel
Drilling Method: Geoprobe
Boring Diameter: 1 3/16
Drill Rig: Chase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 @ 1030
wash

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring A1	Boring B2	Boring C3
0	SP/silty sand, dry	SP/sand w/silt, dry,	SM/silty sand, dry
1	light tan,	light tan,	tan, fine grained
	fine-coarse grained	fine-coarse grained	
2	SP/silty sand, dry,	SP/sand w/silt, dry,	SM/silty sand, dry
3	fine-medium grained,	light tan,	pale brown,
	light tan	fine-medium grained	fine grained
4	SP/silty sand, dry,	SP/sand w/ silt,	SM/silty sand, dry,
5	fine-medium grained,	slightly moist,	moderate brown,
	light tan	fine-medium grained	fine grained
6	(slightly moist)		
	SM/silt w/sand, dry,		
7	light tan,		
	fine grained		
8			
9	SP/silty sand, slightly	A 1115	A 1130
	moist, tan,	B 1120	B 1135
	fine-medium grained	C 1125	C 1140
10	TD		

A 1035
B 1040
C 1045

PARSONS

GRIDSAMPLE.CDR

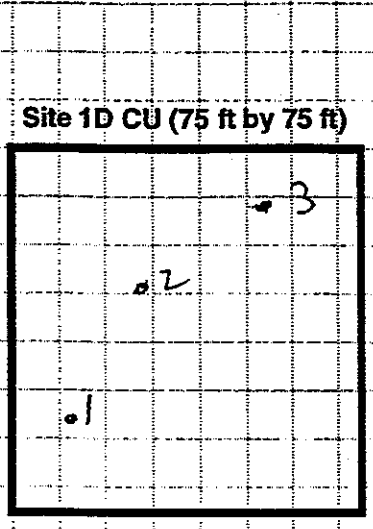
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: J9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 8/31/01
Time: 1245
Date Finished: 8/31/01
Time: 1335
Drilling Contractor: Inter Phase
Driller's Name: Gil + Dan
Drilling Method: Geoprobe
Boring Diameter: $1\frac{3}{16}$"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 @ 1245
~~[illegible]~~ mash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0–1	SP/sand w/silt, dry, light tan, fine grained	SP/silty sand, dry, pale brown, fine-coarse grained	SP/silty sand, dry, pale brown, fine coarse grained
2–3	SP/silty sand, dry, light tan, fine grained	SP/silty sand, dry, light tan, fine-medium grained	SP/silty sand, dry, light tan, fine medium grained
4–5	SP/silty sand, dry, light tan, fine-medium grained	SP/silty sand, dry, slightly moist, light tan, fine-medium grained	SP/silty sand, dry, slightly moist, light tan, fine-medium grained
6–7	SP/silty sand, dry, light tan, fine-medium grained		
8–9	SP/silty sand, dry, light tan, fine-medium grain	A 1312 B 1345 C 1317	A 1320 B 1325 C 1335
10			

A1245
B1250
C 1300

CHARACTERIZATION UNIT SAMPLING LOG

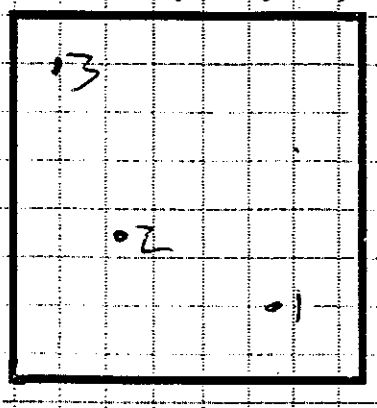
GRID NO.: K5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/4/01
Time: 1315
Date Finished: 9/4/01
Time: 1440
Drilling Contractor: Interphase
Driller's Name: Mil
Drilling Method: Geoprobe
Boring Diameter: $1\frac{3}{16}$
Drill Rig: Chase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: 1315 hrs - PID = 0.0 ppm @ ch
no ash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SP/silty sand, dry, pale brown, fine-coarse grained	SP/silty sand, dry, pale brown, fine-coarse grained	SP/silty sand, dry, pale brown, fine-coarse grained
1			
2	SP/sand w/silt, dry, light tan, fine-medium grained	SP/sand w/silt, slightly moist, fine-medium grained, pale brown	SP/silty sand, dry, pale brown, fine-medium grained
3			
4	SP/silty sand, dry, pale brown, fine-grained	SP/sand w/silt, slightly moist, pale brown, fine-medium grained	SP/sand w/silt, slightly moist, fine-medium grained, tan
5			
6	SP/sand w/silt, slightly moist, fine-medium grained, tan		
7			
8	SP/sand w/silt, slightly moist, fine-medium grained, tan		
9		A 1400 B 1405 C 1410 D 1415	A 1420 B 1425 C 1430 D 1435
10	A 1320 B 1330 C 1335 D 1340		

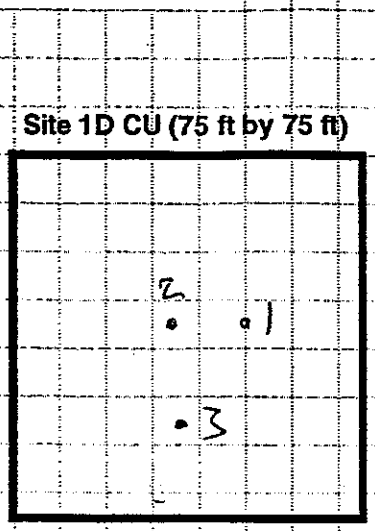
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: K6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/4/01

Time: 1030

Date Finished: 9/4/01

Time: 1200

Drilling Contractor: Tyrrhephase

Driller's Name: Gil

Drilling Method: Geoprobe

Boring Diameter: 1 3/16"

Drill Rig: Phase 13

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=0.0 ppm @ 1110 hrs
no ash

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SP/sand w/silt, dry fine grained, light tan	SP/silty sand, dry, light tan fine-~~medium~~ coarse grained	SP/silty sand, fine grained, dry light tan
1			
2	SM/silty sand, dry, fine grained, ~~light~~ pale brown	SP/sand w/ silt, slightly moist, fine-medium grained, light tan	SP/~~silty sand~~ sand w/silt, slightly moist fine grained, tan
3			
4	SM/silty sand, dry, fine grained, light tan	SP/sand w/ silt, dry, fine-medium grained, light tan	SP/sand w/ silt, slightly moist, fine grained, tan
5			
6	SP/sand w/silt, slightly moist, fine-medium grained, tan		
7			
8	SP/sand w/silt, slightly moist, fine-medium grained tan		
9		A 1139	A 1155
10		B 1142	B 1200
		C 1150	C 1205

A 1153
B 1057
C 1058

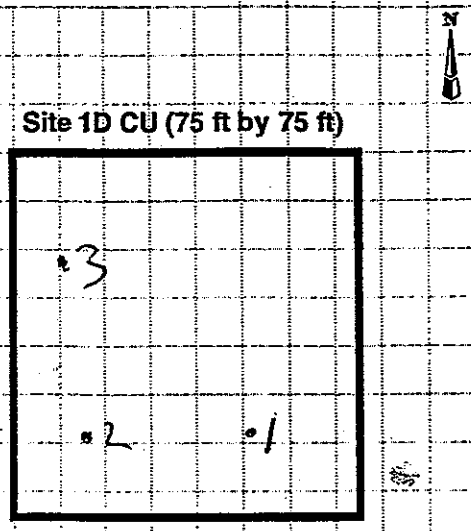
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: K7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/4/01

Time: 0910

Date Finished: 9/4/01

Time: 1030

Drilling Contractor: InterPhase

Driller's Name: Nil

Drilling Method: Geoprobe

Boring Diameter: 1 3/16

Drill Rig: Chase 13

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: no ash
PID = 1.0 ppm background
PID = 1.0 ppm @ cu @ 0945 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring #1	Boring #2	Boring #3
0	SP/silty sand, dry, light tan, fine-coarse grained	SP/sand w/ silt, dry, fine-coarse grained, light tan	SP/silty sand, dry, pale brown, fine-coarse grained
1			
2	SP/silty sand, dry, light tan, fine-coarse grained	SP/sand w/ silt, slightly moist, tan, fine-medium grained	SP/sand w/ silt, dry, tan, fine-medium grained
3			
4	SP/silty sand, slightly moist, fine-medium grained, light tan	SP/sand w/ silt, slightly moist, tan, fine-medium grained	SP/sand w/ silt, slightly moist, tan, fine-medium grained
5			
6	SP/silty sand, slightly moist, tan, fine-medium grained		
7			
8	SP/silty sand, slightly moist, tan, fine-medium grained		
9		A 1005 B 1008 C 1012	A 1022 B 1026 C 1030

A 0925
B 0930
C 0923

TD2

PARSONS ENGINEERING SCIENCE, INC.

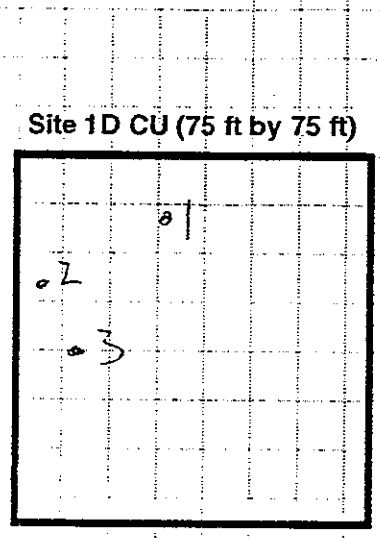
GRIDSAMPLE.CDR

GRID NO.: K8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/4/01
Time: 0745
Date Finished: 9/4/01
Time: 0905
Drilling Contractor: Firestone
Driller's Name: [illegible]
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Plane 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: no ash
PID = 1.1 ppm background
PID = 1.1 ppm @ on @ 0810 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0–1	SP/ silty sand, dry, light tan, fine-medium grained	SP/ silty sand, dry, light tan, fine-coarse grained	SP/ silty sand, dry, light tan, fine-coarse grained
2–3	SP/ sand w/ silt, dry, light tan, fine-medium grained	SM/ sandy silt, dry, light tan, fine-coarse grained	SM/ silty sand, dry, fine-medium grained, light tan
4–5	SP/ sand w/ silt, slightly moist, tan fine-medium grained	SM/ sandy silt, dry, light tan, fine-coarse grained	SP/ sand w/ silt, dry, fine-medium grained, light tan
6–7	~~SM~~ ML/ silt w/ sand, slightly moist, pale brown, fine grained		
8–9	SP/ sand w/ silt, dry, light tan, fine-medium grained		
10	A 0745 B 0750 C 0800	A 0836 B 0836 C 0845	A 0857 B 0900 C 0905

PARSONS

GRIDSAMPLE.DOC

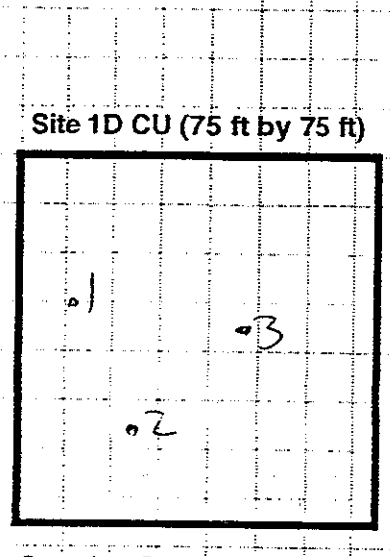
GRID NO.: 25

CHARACTERIZATION UNIT SAMPLING LOG

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/4/01
Time: 1500
Date Finished: 9/5/01
Time: 0845
Drilling Contractor: Jones Chase
Driller's Name: Gil
Drilling Method: Geoprobe
Boring Diameter: 1 3/4
Drill Rig: Chase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm background + breathing zone @ CW @ 1500 hrs.
no ash

Sample Description

(USCS, color, %fines, % sand % gravel, hardness/density moisture other)

	Boring A1	Boring B2	Boring C3
0	SP/silty sand, dry, pale brown, fine coarse grained	SP/silty sand, dry, pale brown, fine-coarse grained	SP/sand w/silt, dry, light tan, fine medium grained
1			
2	SP/sand w/silt, slightly moist, tan, fine medium grain	SP/silty sand, dry, pale brown, fine coarse grained	SP/silty sand, dry, fine medium grained, light tan
3			
4	SP/sand w/silt, slightly moist, tan, fine medium grain	SP/sand w/silt, dry, light tan, fine medium grained	SP/sand w/silt, slightly moist, tan, fine medium grained
5			
6	SP/sand w/silt, slightly moist, tan, fine medium grained		
7			
8	SP/sand w/silt, moist, tan, fine medium grain		
9		9/4/01 A 1540 B 1544 C 1547	9/5/01 A 0822 B 0830 C 0832

A 1500
B 1010

TD

PARSONS

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: L6

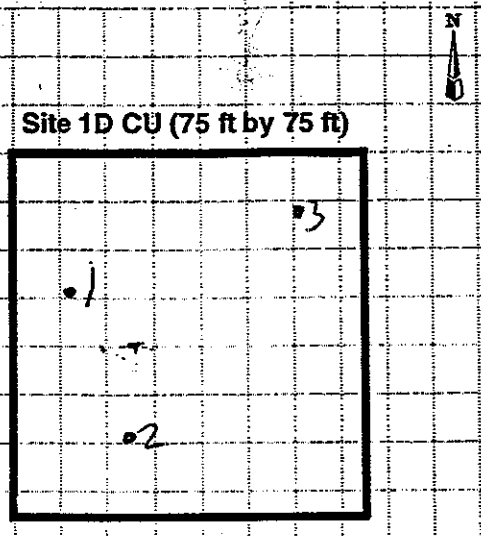
Project Name: Camp Pendleton OU 4

Geologist: Jason + Cristy

Project No.: 740012

Site: 1D

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/5/01

Time: 0745

Date Finished: 9/5/01

Time: 0855

Drilling Contractor: Tmorphase

Driller's Name: Gil + Santiago, Carlos & Erik

Drilling Method: Geoprobe

Boring Diameter: 1 3/16

Drill Rig: Phase 13, Phase 12

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: no cob

PID 2.3 ppm background + breathing zone @ 0810 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A1	Boring B2	Boring C3
0	SP/silty sand, dry, fine-coarse grained, pale brown	SM/ Silty sand, dry, fine to med grain, tan	SP/ Sand w/ silt, dry, fine to med grain, tan
1			
2	SP/sand w/silt, slightly moist, tan, fine-medium grained	SM/ Silty sand, dry, tan, fine to med grain	SP/ Sand w/silt, slightly moist moderate brown, fine to med grain,
3			
4	SM/sandy silt, fine-medium grained, pale brown, dry	SM/ Silty sand, fine to med grained, moderate brown, slightly moist	SM/ Silty sand, fine to coarse grain (coarse = slough?), pale brown, dry
5			
6	SP/sand w/ silt, slightly moist, fine-medium grained tan	A - 8:05 B - 8:09 C - 8:14 D - 8:18 (really 8:09)	A - 8:31 B - 8:35 C - 8:40 D - 8:45 (really 8:31)
7			
8	SP/silty sand, moist, fine-medium grained, moderate brown,		
9	TD		

A 0749
B 0751
C 075810
D 0801

CHARACTERIZATION UNIT SAMPLING LOG

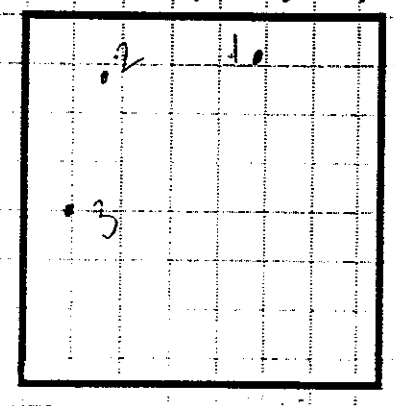
GRID NO.: L04

Project Name: Camp Pendleton OU 4 | Geologist: Cristy

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

9/4/01
A - 1506
B - 1504
C - 1511

Date Started:	9/4/01	9/5/01
Time:	14:55	7:40
Date Finished:	9/4/01	9/5/01
Time:	13:50	8:00

Drilling Contractor: INTERPHASE

Driller's Name: CARLOS, ERIC

Drilling Method: GEOPROBE

Boring Diameter: 13/16"

Drill Rig: GEOPROBE 12

Datum: Ground Surface

Borehole Abandonment: BENTONITE

Notes:

15:15 Background & Breathing zone PID 0.0ppm

NO ASH

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring #1	Boring #2	Boring #3
0	SM | Silty sand, moderate brown, fine to med grain, dry	SP | Sand w/ silt, moderate brown, fine to med grain, dry	SM | Silty sand, fine to coarse sand, fine gravel, tan, dry
1			
2	SM | Silty sand, mod to dark brown, fine to med grain, slightly moist	SP | Sand w/ silt, med brown, fine to med grain, slightly moist	SP | Sand w/ silt moderate brown, fine to med grain, slightly moist
3			
4	ML | Silt w/ significant/trace sand, moderate brown, fine grain, slightly moist	SP | Sand w/ silt fine to coarse grain, slightly moist, med brown	SP | Sand w/ silt, moderate to dark brown, slightly moist fine to med grain
5			
6	SM | Sandy silt, fine to med grain sand, mod reddish brown, slightly moist 6.7 - 7.2, mod brown silt, moist (7.2-8 - SM)	9/4/01	A - 7:45
7	ML	A - 15:35	B - 7:48
8		B - 15:39	C - 7:51
		C - 15:43	9/5/01
9	SM | Sandy silt, fine to med grain, mod reddish brown, slightly moist		
10			

CHARACTERIZATION UNIT SAMPLING LOG

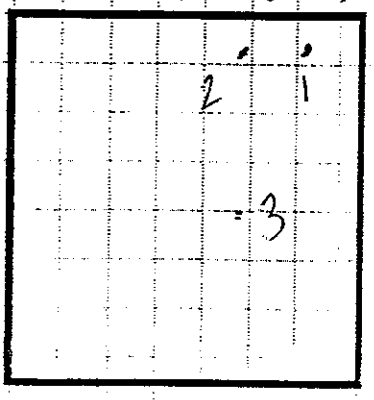
GRID NO.: L8

Project Name: Camp Pendleton OU 4 | Geologist: Crisby

Project No.: 740012 | Site: 1D

Boring Location Detail Sketch:

Site 1D CU (75 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/4/01
Time:	~~AM~~ 13:50
Date Finished:	9/4/01
Time:	PM 14:55
Drilling Contractor:	INTERPHASE
Driller's Name:	CARLOS, ERIC
Drilling Method:	GEOPROBE
Boring Diameter:	1 3/16"
Drill Rig:	GEOPROBE 12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	
	No ash

A - 1350
B - 1400
C - 1404

Sample Description

(USCS, color %fines % sand % gravel hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SP/ Sand w/ silt, tan, fine to coarse, dry, moderate brown	SP/ Sand w/ silt, light to moderate brown, fine to coarse grain, dry	SP/ Sand w/ silt, ~~light~~ light brown, fine to coarse grain ~~sand~~, fine gravel, dry
1			
2	SM/ Silty sand, fine to med grain, moderate brown, slightly moist	SP/ Sand w/ silt, moderate brown, fine to coarse grain, slightly moist	SM/ Silty sand, light brown, fine grain, slightly moist
3			
4	SM/ Sandy silt, fine to med grain, moderate brown, dry	SM/ Silty sand, moderate brown, fine to med grain, slightly moist	SM/ Silty sand, light brown, fine grain, slightly moist
5			
6	SM/ Silty sand, fine to med grain, light brown, dry	A 1430 B - 1434 C - 1436	A - 1442 B - 1447 C - 1453
7			
8	SM/ Silty sand, fine to med grain, moderate brown, dry - no ash or bonkey. TD @ 10'		
9			
10			

APPENDIX D2
SITE 1E-1 BORING LOGS

LOG OF BORING 1E1B-01

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	September 26, 2001
Borehole Location:	2034802.92 N, 6212416.37 E	**Elevation and Datum:**	145.0 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	19 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
		1E1B-01-A	13 11 11 11	SILTY SAND, yellowish brown (10YR 5/4), dry to slightly moist, very fine to coarse grained, dense.	SM		
5							
				Same as above, gravel lens			
10							
15		1E1B-01-B (MS/MSD)	27 29 30 50	SILTY SAND, yellowish brown to gray with orange staining, slightly moist, very fine to medium grained dense.	SM		Black ash and burned debris encountered at ~15 feet bgs
			33 54 54 60	SILTY SAND, yellowish brown, dense, with cobbles (cobble in shoe at 18.75 ft bgs). Native material	SM		
20				End of boring at 19 feet below ground surface Groundwater not encountered Grouted to surface.			
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1E1B-02

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R Brand	**Date Complete:**	September 26, 2001
Borehole Location:	2034809 78 N, 6212473.35 E	**Elevation and Datum:**	143.8 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	22 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1E1B-02-A	10 10 11 16	SILTY SAND, yellowish red (5YR 5/6), dry, fine to coarse grained, dense with trace gravel/cobbles.	SM		
5							
10							
				Same as above gravel lenses 13 0 to 14 5 ft bgs			
15				Same as above moist with some clay lenses			
	■	1E1B-02-C	3 9 13 22	SANDY SILT, light olive gray with orange staining, moist stiff with 10 % very fine sand.	ML		
20							
	■	1E1B-02-C	10 17 32 36	SANDY CLAY light olive gray with orange staining, moist, stiff low plasticity with <5% fine sand	CL		
25				End of boring at 22 feet below ground surface Groundwater not encountered Grouted to surface			
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1E1B-03

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 27 2001
Project Number: 740012	**Logged By:** R Brand	**Date Complete:**	September 27, 2001
Borehole Location:	2034813.21 N, 6212528.13 E	**Elevation and Datum:**	144.4 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	22 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
		1E1B-03-A	16 12 27 25	SILTY SAND, yellowish brown (10YR 5/4), dry, very fine to coarse grained, dense	SM		
5							Glass and debris encountered in boring at ~7.5 feet bgs
10		1E1B-03-B 1E1B-03-D (field replicate)	7 10 20 23 12 24 30 45	SANDY SILT, light olive gray with orange staining, slightly moist, stiff, and slightly plastic.	ML		
15							
20		1E1B-03-C	6 17 22 32	Same as above. Native material.			
25				End of boring at 22 feet below ground surface. Groundwater not encountered Grouted to surface			
30							

REGISTERED GEOLOGIST STEVEN T. GRISWOLD NO. 1457 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LOG OF BORING 1E1B-04

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	September 26, 2001
Borehole Location:	2034827 96 N, 6212416.36 E	**Elevation and Datum:**	142.0 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	22 feet bgs
Driller:	M Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
5, 10	■	1E1B-04-A	11 8 11 17	SILTY SAND, yellowish brown (10YR 5/4), dry, very fine to coarse grained, dense.	SM		Grayish green clay nodules at surface and staining to 2 ' bgs (likely reseeding after excavation of Site 1E)
15	■	1E1B-04-B	4 12 20 25	SANDY SILT, light olive gray with orange staining, slightly moist, stiff with <10% very fine sand	ML		
20	■	1E1B-04-C	5 16 15 33	SILTY CLAY, light olive gray with orange staining slightly moist. stiff, with interbeds of very fine sand	CL		
25, 30				End of boring at 22 feet below ground surface Groundwater not encountered Grouted to surface			

REGISTERED GEOLOGIST STEVEN T. GRISWOLD NO. 1457 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LOG OF BORING 1E1B-05

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R Brand	**Date Complete:**	September 26, 2001

Borehole Location:	2034810.73 N, 6212366.21 E	**Elevation and Datum:**	142.0 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	17 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1E1B-05-A	16 16 16 16	SILTY SAND, brownish yellow (10YR 6/6), dry, fine to medium grained	SM		
5							
10			10 13	Same as above dense			
	■	1E1B-05-B	19 24				
15							
			9 13	SILT AND SAND, olive gray with orange staining, slightly moist, very fine grained, dense	ML/ SP		
	■	1E1B-05-C	19 29				
20				End of boring at 17 feet below ground surface Groundwater not encountered Grouted to surface			
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1E1B-06

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R Brand	**Date Complete:**	September 26, 2001
Borehole Location:	2034778 08 N, 6212437.06 E	**Elevation and Datum:**	148 9 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	22 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1E1B-06-A 1E1B-06-D (field replicate)	10 18 20 12	SILTY SAND, yellowish brown (10YR 5/4), dry, fine to coarse grained, dense	SM		
5							
10							
				Same as above, with gravel/cobbles 13.5 to 14 0 ft bgs			
15	■	1E1B-06-B	23 32 40 60/1"	Same as above.	SM		
20	■	1E1B-06-C	23 38 40 60/1"	SANDY CLAY, light olive gray moist, low plasticity	CL		
25				End of boring at 22 feet below ground surface. Groundwater not encountered Grouted to surface			
30							

REGISTERED GEOLOGIST STEVEN T. GRISWOLD NO. 1457 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LOG OF BORING 1E1B-07

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 26, 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	September 26, 2001
Borehole Location:	2034780.17 N, 6212520.92 E	**Elevation and Datum:**	148.6 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	22 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1E1B-07-A (MS/MSD)	12 13 25 22	SILTY SAND, moderate yellow brown, dry, fine to coarse grained, dense, with trace gravel	SM		
5							
10	■	1E1B-07-B	8 6 6 5	SILTY SAND, yellowish brown (10YR 5/4), very fine to coarse grained medium dense with trace clay	SM		
15							
20	■	1E1B-07-C	4 6 11 15	SILT, light olive gray slightly moist firm with trace fine sand and clay Native material at 21 ft bgs.	ML		Waste encountered 20 to 21 ft bgs.
25				End of boring at 22 feet below ground surface Groundwater not encountered Grouted to surface.			
30							

REGISTERED GEOLOGIST STEVEN T. GRISWOLD NO. 1457 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LOG OF BORING 1E1B-08

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1E-1	**Date Started:**	September 27, 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	September 27, 2001
Borehole Location:	2034862.06 N, 6212653.97 E	**Elevation and Datum:**	159.9 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	27 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
		1E1B-08-A	29 33 33 32	SILTY SAND, yellowish brown (10YR 5/4), dry, fine to coarse grained, dense with >10% fines	SM		
5							
10				Same as above, gravel lens			
		1E1B-08-B 1E1B-08-D (field replicate)	11 24 35 50/5 ½" 15 24 26 36	SILTY CLAY AND SILTY SAND, dark gray (5Y 4/1) and yellowish brown (10YR 5/4), interbedded slightly moist, stiff clay and fine grained, dense sand	CL/ SM		Waste encountered at ~12 feet bgs
15							
20							
25		1E1B-08-C		SANDY SILT, light olive gray with orange staining, slightly moist, stiff, with very fine grained sand	ML		
30				End of boring at 27 feet below ground surface. Groundwater not encountered. Grouted to surface.			

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

S. Griswold

APPENDIX D3
SITE 1H BORING LOGS

LOG OF BORING 1HSB-01

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001
Borehole Location:	2101922.85 N, 6162036.11 E	**Elevation and Datum:**	315.2 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	8-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	15 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-01-A		SILTY SAND, dark grayish brown (10YR 4/2), slightly moist, very fine to fine grained, with 5% woody material	SM		
	■	1HSB-01-B 1HSB-01-F (field replicate)	24 15 11	Same as above, contains small pieces of glass ≤ 1 cm	SM		
5	■	1HSB-01-C	18 15 14	Same as above	SM		
				Same as above, with gravel (up to 2" diameter)	SM		
10	■	1HSB-01-D	4 16 21	SILTY SAND/SANDY SILT with GRAVEL, yellowish brown (10YR 4/4) mottled with olive gray (5Y 5/2), slightly moist, very fine to fine sand, with small pieces of glass (<0.2 cm) and rounded gravel up to 2" diameter	SM/ ML		
15	■	1HSB-01-E	24 15 11	SANDY SILT, yellowish brown (10YR 5/4) slightly moist, very stiff, very fine sand.	ML		
20				End of boring at 16 feet below ground surface Groundwater not encountered. Grouted to surface.			
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1HSB-02

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001
Borehole Location:	2101690.05 N, 6162097.06 E	**Elevation and Datum:**	312.6 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	8-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	15 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-02-A (MS/MSD)		SILTY SAND, yellowish brown (10YR 5/4), slightly moist, very fine to fine grained, dense	SM		
	■	1HSB-02-B	50/6"	Same as above, dark grayish brown (10YR 4/2), with pieces of glass and brick fragments (up to 1.5 cm)			
5	■	1HSB-02-C	22 15 50	SANDY SILT, yellowish brown (10YR 5/4), slightly moist, very fine to fine sand	ML		
10	■	1HSB-02-D 1HSB-02-F (field replicate)	35 24 25	Same as above, dark grayish brown (10YR 4/2)	ML		
15	■	1HSB-02-E	13 37 5	Same as above, yellowish brown (10YR 5/4)	ML		
20				End of boring at 16 feet below ground surface Groundwater not encountered Grouted to surface			
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1HSB-03

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 11 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	October 11, 2001
Borehole Location:	2101881 36 N, 6162137.35 E	**Elevation and Datum:**	297.0 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Hand Auger
Drilling Equipment:	Hand Auger	**Borehole Diameter:**	2.5-inch
Drilling Method:	Hand Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	NA	**Total Depth:**	6.5 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-03-A		SILTY SAND, yellowish red (5YR 5/6), slightly moist, very fine to medium grained.	SM		Waste material encountered at 3.5 feet bgs
5	■	1HSB-03-B		Same as above, reddish brown (5YR 4/4) slightly moist.	SM		Burnt glass, metal, and other debris encountered at 5 feet bgs
10				End of boring at 6.5 feet below ground surface. Groundwater not encountered. Grouted to surface			
15							
20							
25							
30							

REGISTERED GEOLOGIST STEVEN T. GRISWOLD NO. 1457 CERTIFIED ENGINEERING GEOLOGIST STATE OF CALIFORNIA

LOG OF BORING 1HSB-04

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 11, 2001
Project Number: 740012	**Logged By:** R. Brand	**Date Complete:**	October 11, 2001
Borehole Location:	2101731.10 N, 6162180 75 E	**Elevation and Datum:**	284 0 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Hand Auger
Drilling Equipment:	Hand Auger	**Borehole Diameter:**	2 5-inch
Drilling Method:	Hand Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	NA	**Total Depth:**	6 5 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-01-B 1HSB-01-F (field replicate)		SILTY SAND, light reddish brown (5YR 6/4), slightly moist, very fine to medium grained, medium dense	SM		
5	■	1HSB-04-B		Same as above, reddish brown (5YR 4/4), slightly moist, with occasional gravel.	SM		
				End of boring at 6.5 feet below ground surface. Groundwater not encountered. Grouted to surface			
10							
15							
20							
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1HSB-05

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001

Borehole Location:	2101630 65 N, 6162139.11 E	**Elevation and Datum:**	305.2 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	8-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	11 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-05-A		SILTY SAND, yellowish brown (10YR 5/4), slightly moist, very fine to medium sand, with <5% woody material.	SM		
5	■	1HSB-05-B	8 24 27	Same as above, with light olive gray (5Y 6/2) weathered cobbles, dense	SM		
10	■	1HSB-05-C	30 25 4	Same as above, yellowish brown (10YR 5/4), slightly moist, very fine to fine sand, dense.	SM		
				End of boring at 11 feet below ground surface Groundwater not encountered. Grouted to surface			
15							
20							
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

S T Griswold

LOG OF BORING 1HSB-06

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001
Borehole Location:	2101687.89 N, 6162056.99 E	**Elevation and Datum:**	319.1 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	8-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	11 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-06-A		SILTY SAND, yellowish brown (10YR 5/4), slightly moist, very fine to medium grained, hard, with <10% woody material	SM		
5	■	1HSB-06-B	20 9 8	Same as above	SM		
10	■	1HSB-06-C	16 27 46	Same as above, with rounded gravel up to 4 cm diameter.	SM		
				End of boring at 11 feet below ground surface. Groundwater not encountered Grouted to surface			
15							
20							
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1HSB-07

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001
Borehole Location:	2101867 90 N, 6161979.93 E	**Elevation and Datum:**	319.2 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	8-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	11 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-07-A		SAND w/ SILT, yellowish brown (10YR 5/6), slightly moist, very fine to medium grained with <5% woody material.	SP		
				SILTY SAND, yellow (10YR 8/6), slightly moist, fine to medium grained.	SM		
5	■	1HSB-07-B	36 26 40	CLAY (weathered bedrock), light olive gray (5Y 6/2), stiff	CL		
10	■	1HSB-07-C	36 28 40	SANDY SILT (weathered bedrock), dark grayish brown (10YR 4/2) with pale yellow (5Y 7/4), very fine sand.	ML		
				End of boring at 11 feet below ground surface. Groundwater not encountered. Grouted to surface			
15							
20							
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

LOG OF BORING 1HSB-08

PARSONS ENGINEERING SCIENCE, INC.

Project Name:	MCB Camp Pendleton OU 4 FS, Site 1H	**Date Started:**	October 15, 2001
Project Number: 740012	**Logged By:** J. Lee	**Date Complete:**	October 15, 2001
Borehole Location:	2101855.18 N, 6162110.50 E	**Elevation and Datum:**	311.7 Above Mean Sea Level
Drilling Contractor:	Tri-County Drilling	**Sampling Method:**	Split-Spoon Sampler
Drilling Equipment:	CME-550 (All Terrain)	**Borehole Diameter:**	10-inch
Drilling Method:	Hollow Stem Auger	**Groundwater Depth:**	NA
Hammer Type/Weight:	Automatic/140-lb and 30-inch drop	**Total Depth:**	13 feet bgs
Driller:	M. Ferguson	**Borehole Abandonment:**	Grouted to Surface

Depth (feet)	Sample	Sample Number	Blow Counts	Lithologic Description	USCS	Symbol	Notes
	■	1HSB-08-A		SILTY SAND, light brownish gray (10YR 6/2) slightly moist, very fine to medium grained.	SM		
5	■	1HSB-08-B	50/6"	SANDY SILT, dark grayish brown (10YR 4/2), slightly moist, very fine to fine sand.	ML		Hard, burned material encountered at 5 feet bgs
10							
	■	1HSB-08-C	5 4 3	SILTY SAND, dark grayish brown (10YR 4/2), slightly moist, very fine to fine, w/ rounded cobbles and small glass shards.	SM		
				End of boring at 13 feet below ground surface. Groundwater not encountered Grouted to surface			
15							
20							
25							
30							

REGISTERED GEOLOGIST
STEVEN T. GRISWOLD
NO. 1457
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

APPENDIX D4
SITE 30 GRID LOGS

CHARACTERIZATION UNIT SAMPLING LOG

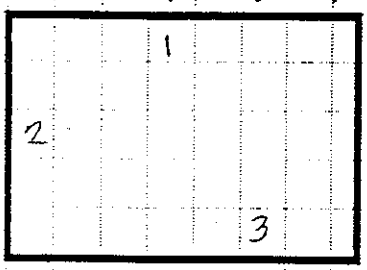
GRID NO.: A6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/12/01

Time: 1300

Date Finished: 9/12/01

Time: 1343

Drilling Contractor: Tri-County Drilling

Driller's Name: LaGusta and Tony

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=0.0 @ 1310 hrs.

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring 3
0–1	ML/silt w/sand, dry, pale yellowish brown, fine grained	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained
2–3	SM/sandy silt, dry, fine-medium grained, pale brown	SM/silt w/sand, dry, moderate yellowish brown, fine grained	ML/silt w/sand dry, moderate yellowish brown, fine grained
4–5	ML/silt w/sand, dry, pale brown, fine grained	SM/silt w/sand, dark yellowish brown, slightly moist, fine-medium grained	ML/silt w/sand, dry, dark yellowish brown, fine grained
6–8			
9–10	A* 1300 B 1305 C 1310	A* 1320 B 1325 C 1330	A* 1335 B 1340 C 1343

CHARACTERIZATION UNIT SAMPLING LOG

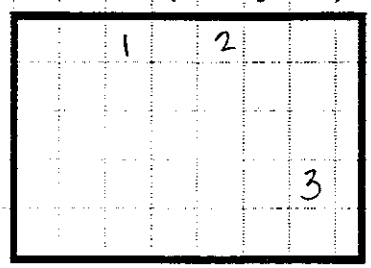
GRID NO.: A07

Project Name: Camp Pendleton OU 4 | Geologist: [illegible]

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/12/01
Time: 1346
Date Finished: 9/12/01
Time: 1417
Drilling Contractor: Tri County Drilling
Driller's Name: LeGusta + Tony
Drilling Method: Hand Auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.0 ppm @ 1430 hr.

Sample Description

(USCS color, %fines, % sand % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/ sandy silt, dry light tan, fine grained	SP/ silty sand, dry, fine-coarse grained light tan	SP/ sandy silt dry, fine grained pale yellowish brown
2–3	SM/ sandy silt, dry, light tan fine grained	ML/ silt w/ sand, dry fine grained, light tan	SM/ sandy silt, dry pale brown fine med. grained
4–5	SM/ sandy silt, dry fine medium grained pale brown,	ML/ silt w/ sand, dry pale brown, fine grained	SM/ silty sand, dry, fine grained light tan
6			
7			
8	A 1346	A 1357	A 1410
9	B 1349	B 1359	B 1412
	C 1351	C 1402	C 1415
10	D 1355	D 1405	D 1417

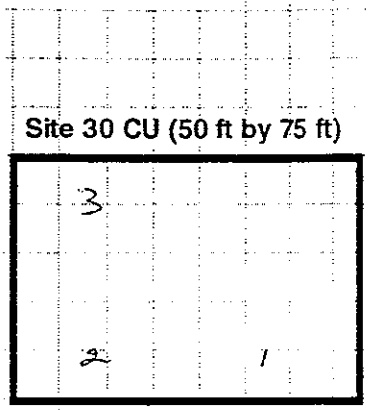
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: B6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1040
Date Finished: 9/13/01
Time: 1110
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand augers
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand, dry, light brown, fine grained	SM/silt w/sand, dry, fine grained, pale brown	SM/sandy silt, dry, fine grained, pale brown
1			
2	ML/silt w/sand, dry, fine grained, pale brown	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, light brown, fine grained
3			
4	ML/silt w/sand, dry, fine grained, pale yellowish brown	ML/silt w/sand, dry, pale yellowish brown, fine grained	ML/silt w/sand, dark yellowish brown, fine grained
5			
6			
7			
8			
9	A 1041 B 1044	A 1052 B 1056	A 1103 B 1107
10	C 1049	C 1059	C 1110

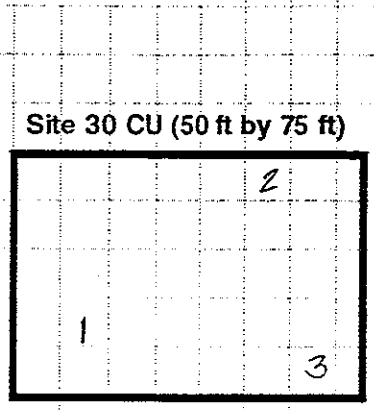
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: B07

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/12/01
Time: 1420
Date Finished: 9/12/01
Time: 1515
Drilling Contractor: Tri-County Drilling
Driller's Name: LeGuster & Tom
Drilling Method: Hand Auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID - 0.0 @ 1447 hrs

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM/silty sand, dry, light tan, fine-medium grained	SM/sandy silt, dry, fine-medium grained, light tan	SM/sandy silt, dry, pale brown, fine-medium grained
1			
2	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, fine-medium grained, pale brown	ML/silt w/sand, dry, pale brown, fine grained
3			
4	ML/silt w/sand, slightly moist, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale yellowish brown	ML/silt w/sand, dry, pale brown, fine grained
5			
6			
7			
8	A 1420	A 1438	A 1500
9	B 1424 C 1429	B 1444 C 1449	B 1505 C 1510
10	D 1433	D 1455	D 1515

GRID NO.: C17

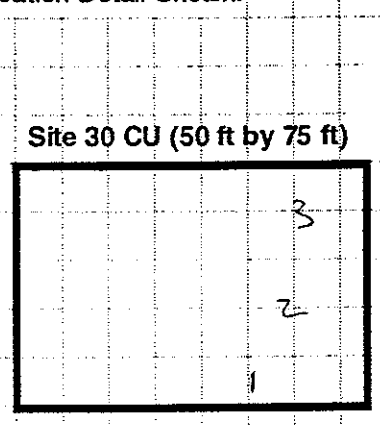
Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012

Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: 1405

Date Finished: 9/19/01

Time: 1435

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.0 ppm @ 1420 hrs
breathing zone + backyard

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained
1			
2	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained
3			
4	ML/silt w/sand, dry, moderate brown, fine grained	ML/silt w/sand, dry, moderate brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained
5			
6			
7			
8	A 1405	A 1418	A 1430
9	B 1409 C 1413	B 1421 C 1425	B 1431 C 1433
10	D 1415	D 1429	D 1435

PARSONS

GRIDSAMPLE.CDR

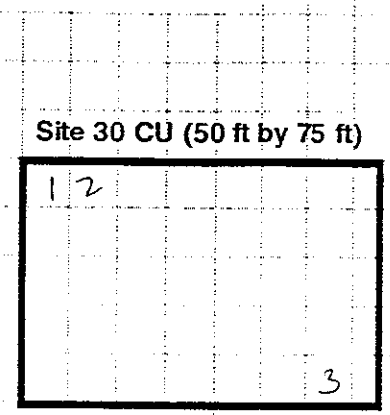
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C18

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 0915
Date Finished: 9/11/01
Time: 1015
Drilling Contractor: Intro Phase
Driller's Name: Milo Gun
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Mole + Phantom
Datum: Ground Surface
Borehole Abandonment:
Notes: PID = 2.4 ppm background and breathing space

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0–1	SM/sandy silt, dry pale brown fine grained	SM/sandy silt, dry, pale yellowish brown, fine grained	SM/sandy silt, dry: pale brown fine grained
2–3	ML/silt w/sand, pale brown, dry fine grained	SM/sandy silt, dry, pale yellowish brown, fine grained	ML/sandy silt, dry, light brown fine grained
4–5	ML/silt w/sand, dry dark yellowish brown, fine grained	SM/sandy silt, dry, fine-medium grained, pale brown	ML/silt w/sand grayish brown, dry fine grained
6–8			
9–10	A 0920 B 0925 C 0931	A 1005 B 1010 C 1013	A 0950 B 0955 C 1000

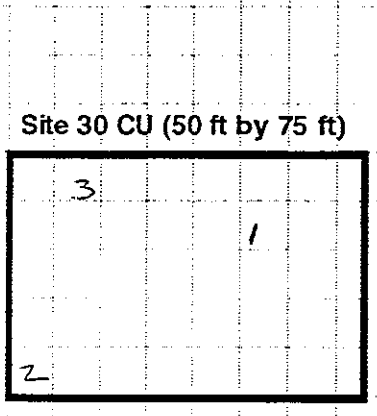
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 7/13/01
Time: 0810
Date Finished: 7/13/01
Time: 0850
Drilling Contractor: Tri-County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes:

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/ ~~silt~~ sandy silt, dry, fine grained, pale brown	SM/sandy silt, dry, fine grained, pale brown	SM/sandy silt, pale brown, dry fine grained
1			
2	SM/sandy silt, dry fine grained, pale brown	SM/sandy silt, dry fine grained, pale brown	SM/silt w/sand, and smooth, medium gravel, grayish brown, fine grained, slightly moist
3			
4	SM/silt w/sand, slightly moist, pale brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	SM/silt w/sand, dusky yellowish brown moist, fine grained
5			
6			
7			
8			
9	A 0810	A 0821	A 0835
	B 0813	B 0824	B 0841
10	C 0816	C 0827	C 0849

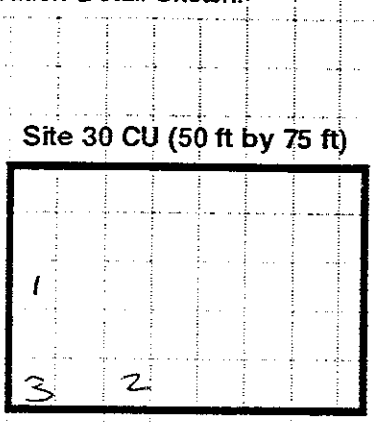
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 0740
Date Finished: 9/13/01
Time: 0810
Drilling Contractor: Tri-County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 3	Boring 2
0–1	SM/sandy silt, dry light tan, fine-medium grained	SP/silty sand, dry moderate brown, fine medium grained	SP/silty sand, dry, moderate brown, fine-medium grained
2–3	SM/sandy silt, dry, pale brown, fine grained	SM/sandy silt, pale brown, slightly moist, fine grained	SM/sandy silt, moderate yellowish brown, slightly moist, fine grained
4–6	SM/sandy silt, dry, dark yellowish brown, fine grained	ML/silt w/sand, slightly moist, pale yellowish brown, fine grained	ML silt w/sand, slightly moist, fine grained, pale yellowish brown
7			
8	A 0740	A 0751	A 0802
9	B 0743	B 0753	B 0804
	C 0747	C 0756	C 0806
10	D 0750	D 0759	D 0810

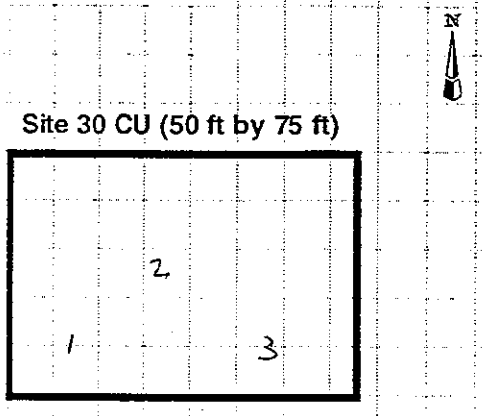
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: C8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1335
Date Finished: 9/13/01
Time: 1400
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.2 ppm background + breathing zone @ 1336 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel hardness/density moisture other)

	Boring A	Boring B	Boring C
0–1	SM/sandy silt, dry, pale yellowish brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	SM/silty sand, dry, pale brown, fine grained
2–3	ML/silt w/sand, dry, pale yellowish brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained	SM/sandy silt, dry, fine-medium grained, light brown
4–5	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained
6			
7			
8			
9	A 1336	A 1346	A 1358
	B* 1339	B* 1349	B* 1359
10	C 1341	C 1353	C 1400

D4

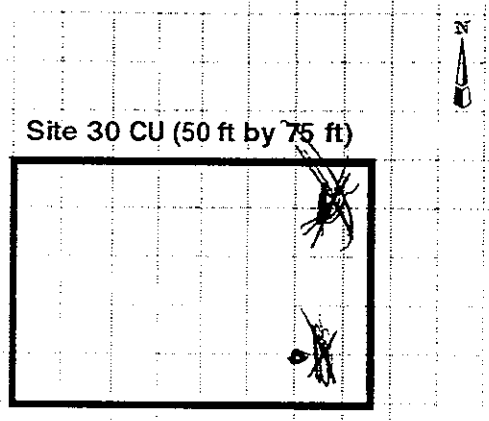
GRID NO.: ~~E4~~

CHARACTERIZATION UNIT SAMPLING LOG

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gomez

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/24/01
Time:	0830
Date Finished:	9/24/01
Time:	0905
Drilling Contractor:	Chatterjee
Driller's Name:	Nick + Eric
Drilling Method:	hand probe
Boring Diameter:	1 3/16"
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	N/A
Notes:	

Sample Description

(USCS color, %fines, % sand % gravel, hardness/density moisture, other)

	Boring A	Boring B	Boring C
0	ML/sandy silt, moist		
1	fine grained		
	Dusky yellowish brown		
2	ML/silt + sand, moist		
3	fine grained,		
	Dusky yellowish brown		
4			
5			
6			
7			
8			
9	A 0835		
10	B 0840		

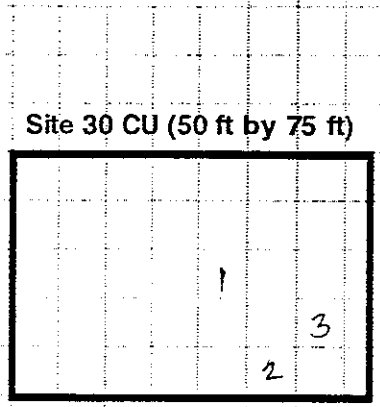
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1530
Date Finished: 9/12/01
Time: 1130
Drilling Contractor: Tri-County Drilling
Driller's Name: LeGuste + Tony
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.2 ppm background and breathing zone @ 1115 hrs

Sample Description

(USCS color %fines % sand, % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/silt w/sand, dry, moderate yellowish brown, fine grained	SM/silt w/ sand, moist, dusky yellowish brown, fine grained	SM/silt w/sand, slightly moist, dark yellowish brown, fine grained
2–3	SM/silty sand, moist dusky yellowish brown, dusky yellowish brown	SM/silty sand, moist dusky yellowish brown, fine grained	SM/silt w/sand, moist, dusky yellowish brown fine grained
4–5	SM/silty sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/ sand, moist, fine grained, dusky yellowish brown
6–7			
8–10	9/12/01 A 1130 B 1120 C 1125 D 1130	9/11/01 A 1543 B 1546 C 1548 D 1550	9/11/01 A 1530 B 1535 C 1540 D 1542

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D05 (swamp)

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/26/01

Time: 1200

Date Finished: 9/20/01

Time: 1245

Drilling Contractor: Interphase

Driller's Name: Gil + Ernie

Drilling Method: hand punch

Boring Diameter: 1 3/16"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: N/A

Notes: sample taken from 0-1 ft bgs.

Sample Description

(USCS color %fines % sand, % gravel hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM / silty sand, moist, dark yellowish brown, fine-med grained		
2			
3			
4			
5			
6			
7			
8	30-D05-A4		
9	@1245		
10			

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

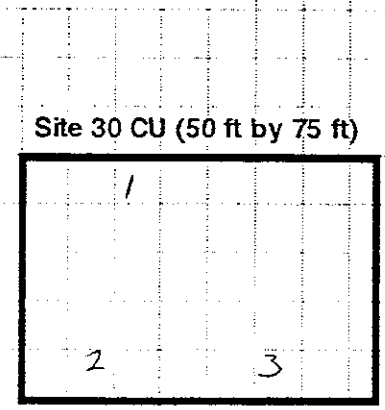
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D6

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 0905
Date Finished: 9/13/01
Time: 0945
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 1.2 background and breathing zone 0910 hrs

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring A	Boring B	Boring C
0–1	ML/ PALE BROWN, SILT W/ SAND MED ANGULAR GRAVEL, ~~FINE~~ MED FINE ~~COARSE~~ GRAINED	ML/ PALE YELLOWISH BROWN, SILT W/ SAND MED. ANGULAR GRAVEL, MED FINE GRAINED.	SM/ SANDY SILT, MODERATE BR. MED. ANGULAR GRAVEL, ~~MED. FINE~~ COARSE GRAINED.
2–3	ML/ PALE BROWN, SILT W/ SAND MED. ANGULAR GRAVEL, ~~COARSE~~ MED FINE GRAINED	ML/ DULLY YELLOWISH BROWN, SILT W/ SAND, MED. ANGULAR GRAVEL, MED FINE GRAINED	SM/ DK. YELLOWISH BR, ~~MODERATE~~ SANDY SILT MED. ANGULAR GRAVEL, ~~MED. FINE~~ COARSE GRAINED.
4–5	ML/ DULLY YELLOWISH BROWN, SILT W/ SAND, ~~MED~~ FINE GRAINED	ML/ DK YELLOWISH BR, SILT W/ SAND FINE GRAINED, MOIST	ML/ GRAYISH BR, SILT W/ SAND, MED FINE GRAINED.
6–7			
8–9	A - 0905 B - 0910 C - 0915	A - 0920 B - 0925 C - 0930	A - 0935 B - 0940 C - 0945
10			

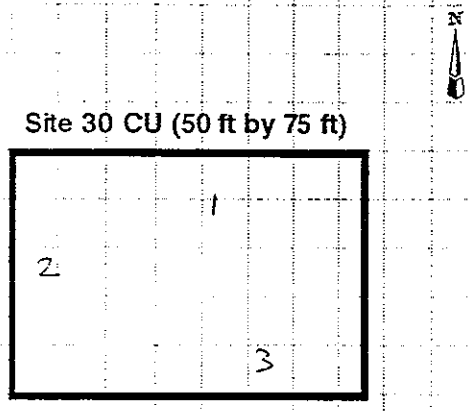
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Bo[illegible]

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1300
Date Finished: 9/13/01
Time: 1335
Drilling Contractor: T.A. Cauty
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.3 ppm background and breathing zone @ 1313 hrs.

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SP/silty sand, dry, moderate brown, fine-medium grained	SP/silty sand, dead, fine-medium grained, moderate brown	SM/silty sand, dry, fine grained, pale yellowish brown
2–3	SM/sandy silt, dry, pale brown, fine grained	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown
4–6	ML/silt w/sand, dry, fine grained, pale brown, wood chips	ML/silt w/sand, slightly moist, fine grained, pale brown	SM/silty sand, dry, light tan, fine grained
9	A 1303	A 1311	A 1321
	B 1307	B 1315	B 1324
10	C 1309	C 1317	C 1330

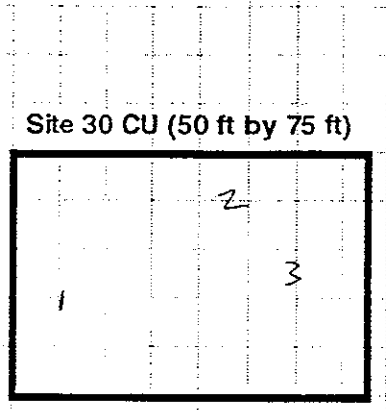
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 7/13/01
Time: 1400
Date Finished: 7/13/01
Time: 1435
Drilling Contractor: Tr. Canyon Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.1ppm background breathing zone 2 1414 hrs.

Sample Description

(USCS color, %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/silty sand, dry, moderate brown, fine-medium grained	SM/silty sand, dry, fine-medium grained pale brown	SM/silty sand, dry, pale yellowish brown, fine-medium grained
2–3	ML/silt w/sand, dry pale yellowish brown, fine grained	SM/silty sand, dry fine medium grained moderate yellowish brown	SM/sandy silt dry, fine grained pale yellowish brown
4–5	ML/silt w/sand dry pale yellowish brown, fine grained	SM/silty sand, dry fine grained, pale yellowish brown	ML/silt w/sand, dry, pale yellowish brown, fine grained
6–7			
8–10	A 1400 B 1403 * C 1408 D 1412	A 1414 B 1418 C 1421 D 1424	A 1426 B 1428 C 1431 D 1435

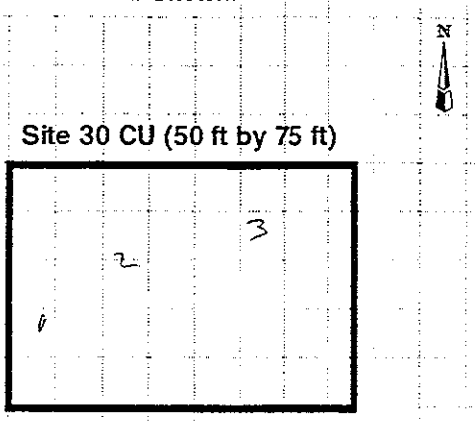
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1435
Date Finished: 9/13/01
Time: 1450
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1440 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SM/silty sand, dry, fine-medium grained, pale brown	SM/silty sand, dry, fine medium grained, pale yellowish brown	SM/silty sand, dry, pale brown, fine grained
2–3	SM/silty sand, dry, fine coarse grained, pale yellowish brown	SM/silty sand, dry, fine grained, pale yellowish brown	ML/sandy silt, dry, pale yellowish brown, fine grained
4–5	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown	ML/sandy silt, dry, pale yellowish brown, fine grained
6–8			
9–10	A 1436 B 1439 C 1441	A 1443 B 1445 C 1447	A 1448 B 1449 C 1450

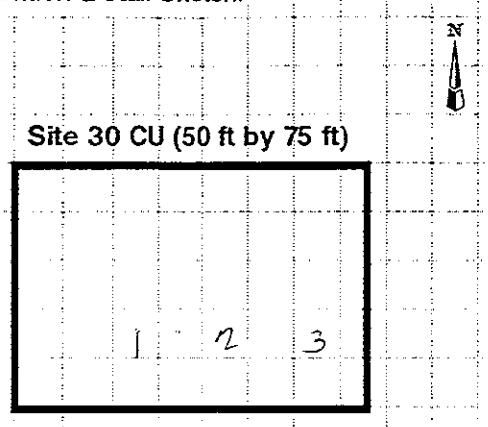
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: D16

Project Name: Camp Pendleton OU 4 | Geologist: Justin Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1145
Date Finished: 9/11/01
Time: 1215
Drilling Contractor: Geo-Probe
Driller's Name: Juan
Drilling Method: Macrocore
Boring Diameter: 1 7/16"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 1.9 ppm background and breathing zone @ 1145 hrs.

Sample Description

(USCS, color %fines % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring C
0–1	ML/silt w/sand, dry, pale brown, fine grained	SM/sandy silt, dry, pale brown, fine grained	SM/silty sand, dry, light tan, fine grained
2–3	ML/sandy silt, dry, pale brown, fine grained	ML/silt w/ sand, dry, pale yellowish brown, fine grained	SM/sandy silt, dry, pale yellowish brown, fine grained
4–5	ML/silt w/ sand, dry, grayish brown, fine grained	ML/silt w/ sand, dry, dusky yellowish brown, fine grained	ML/silt w/sand, dry, light brown, fine grained
6			
7			
8			
9	A 1145 B 1147 C 1149 D 1151	A 1153 B 1155 C 1158 D 1200	A 1202 B 1206 C 1210 D 1215
10			

CHARACTERIZATION UNIT SAMPLING LOG

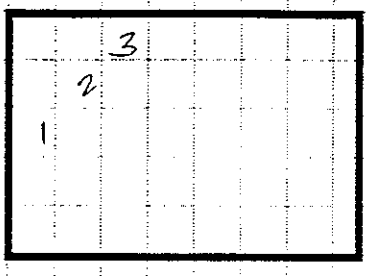
GRID NO.: 017

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1330
Date Finished: 9/11/01
Time: 1430
Drilling Contractor: Tetra Phase
Driller's Name: Juan
Drilling Method: geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Phase 3
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS. color %fines % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring B
0–1	SM/ SANDY SILT, PALE BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC	SM/ SANDY SILT, PALE BROWN, COARSE SAND, MED. ANGULAR GRAVEL, NON-PLASTIC COARSE SAND	SM/ SANDY SILT, PALE BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC
2	SM/ SANDY SILT, PALE BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC	SM/ SANDY SILT, DK YELLOWISH BR, MED. ANGULAR GRAVEL, NON PLASTIC COARSE SAND	SM/ SANDY SILT, DK YELLOWISH BR, MED ANGULAR GRAVEL, NON-PLASTIC COARSE SAND
3			
4–5	SM/ SANDY SILT, DK YELLOWISH BR, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR, MED, ANGULAR GRAVEL, NON PLASTIC COARSE SAND	SM/ SANDY SILT, DK YELLOWISH BR, MED ANGULAR GRAVEL, NON-PLASTIC COARSE SAND
6			
7			
8			
9	A - 1330	A - 1345	A - 1400
	B - 1335	B - 1350	B - 1410
10	C - 1340	C - 1355	C - 1420

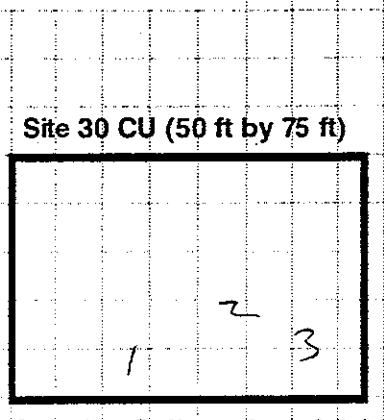
GRID NO.: D18

Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: 1340

Date Finished: 9/19/01

Time: 1400

Drilling Contractor: Tri County Drilling

Driller's Name: 1435

Drilling Method: hand augers

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.0 ppm @ 1355, breathing zone & background

Sample Description

(USCS, color, %fines % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring 3
0–1	ML/sandy silt, dry, pale brown, fine grained	ML/sandy silt, dry, fine grained, pale brown	ML/sandy silt, dry, fine grained, pale brown
2–3	ML/silt w/sand, dry, fine grained, brownish gray,	ML/silt w/sand, dry, brownish gray, ~~pale brown~~ fine grained	ML/silt w/sand, dry, fine grained, brownish gray
4–5	ML/silt w/sand, dry, brownish gray, fine grained,	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/silt w/sand, slightly moist, fine grained, dark gray
6–7			
8–10	A 1340 B 1342 C 1344 D 1346	A 1348 B 1350 C 1352 D 1353	A 1354 B 1356 C 1358 D 1400

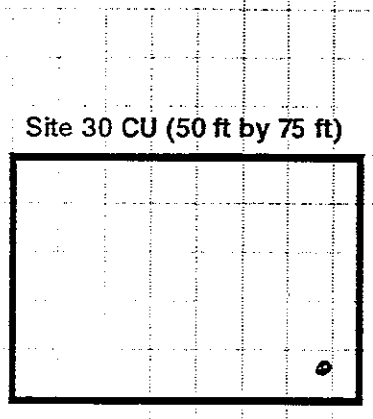
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E1

Project Name: Camp Pendleton OU 4 | Geologist: Jason (illegible)

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 7/21/01
Time: 0905
Date Finished: 7/21/01
Time: 0920
Drilling Contractor: Indo-Pacific
Driller's Name: Nick + Eric
Drilling Method: hand probe
Boring Diameter: 1 3/16"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: N/A
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring C
0	SM/silty sand, moist, dark yellowish brown, fine-med grained		
1			
2	ML/sandy silt, moist, dark yellowish brown, fine grained		
3			
4			
5			
6			
7			
8			
9	A* 0905		
10	B 0915		

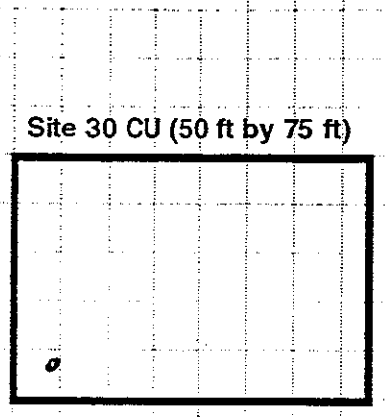
GRID NO.: E2

CHARACTERIZATION UNIT SAMPLING LOG

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/21/01
Time: 0925
Date Finished: 9/21/01
Time: 0940
Drilling Contractor: Interphase
Driller's Name: Mike + Eric
Drilling Method: hand probe
Boring Diameter: 1 3/4"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: N/A
Notes:

Sample Description

(USCS color %fines, % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring 3
0	SM/silty sand		
1	moist, fine grained, dark		
2	yellowish brown		
3	ML/silt w/sand, moist, fine grained, dark yellowish brown		
4			
5			
6			
7			
8			
9	A 0926 B 0931		
10	D 0938		

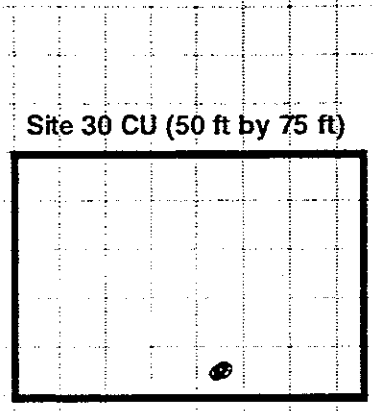
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E3

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/21/01
Time: 0945
Date Finished: 9/21/01
Time: 1010
Drilling Contractor: Entrophase
Driller's Name: Mil
Drilling Method: push probe
Boring Diameter: 1 3/16"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: N/A
Notes:

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture, other)

	Boring A	Boring B	Boring C
0–1	ML/silt w/sand, moist, fine grained, dark yellowish brown		
2–3	ML/silt w/sand, moist dusky yellowish brown, fine grained		
4–10			

A 0950
B 1000

GRID NO.: ~~B4~~ ~~B5~~ E4

CHARACTERIZATION UNIT SAMPLING LOG

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/21/01
Time:	0800
Date Finished:	9/21/01
Time:	0830
Drilling Contractor:	Intertechnics
Driller's Name:	Nigel + Eric
Drilling Method:	~~Hand~~ Direct push
Boring Diameter:	1 3/16"
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	N/A
Notes:	

Sample Description

(USCS color, %fines % sand % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring C
0	ML/sandy silt, moist,		
1	dark yellowish brown		
	fine grained		
2	ML/silt w/sand, moist,		
3	fine grained,		
	dusky yellowish brown		
4			
5			
6			
7			
8			
9	A 0800		
10	B 0810		

CHARACTERIZATION UNIT SAMPLING LOG

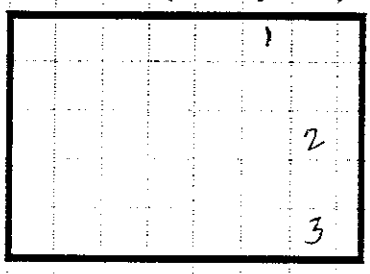
GRID NO.: E5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1530
Date Finished: 9/12/01
Time: 1130
Drilling Contractor: Tri County Drillers
Driller's Name: LaGusta + Tonn
Drilling Method: Hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.2 ppm background and breathing zone @ 1115 hrs.

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring B
0–1	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, ~~moist~~ fine grained, ~~dusky~~ dark yellowish brown	SM/silt w/sand, moist, fine-grained, dusky yellowish brown
2–3	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, fine grained, dusky yellowish brown
4–5	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, fine grained, dusky yellowish brown
6–7			
8	9/11/01	9/12/01	9/12/01
9	A 1530 B 1535 C 1540	A 1055 B 1100 C 1105	A 1115 B 1120 C 1125
10	D 1545	D 1110	D 1130

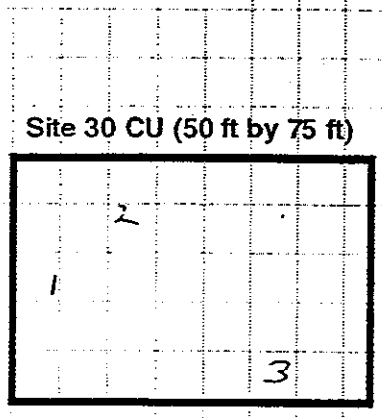
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 0945
Date Finished: 9/13/01
Time: 1030
Drilling Contractor: Tri-County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.9 ppm background & breathing zone @ 1010 hrs
LEAD fragments

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0–1	ML/silt w/sand, dry, light brown, fine grained	ML/silt w/sand, dry, fine grained, pale yellowish brown	SM/sandy silt, dry, fine grained, (lead), light brown
2–3	SM/silt w/sand dry, dark yellowish brown, fine-medium grained	ML/silt w/sand, dry, dusky yellowish brown, fine grained	SM/silt w/sand, dry, moderate brown, fine grained
4–6	ML/silt w/sand, slightly moist, dusky yellowish brown, fine grained	ML/silt w/sand slightly moist, dusky brown, fine grained	ML/silt w/sand, dry, moderate yellowish brown, fine grained
7–8			
9	A 0946	A 0959	A 1018
9	B 0949	B 1005	B 1022
10	C 0954 TD=10'	C 1010	C 1027

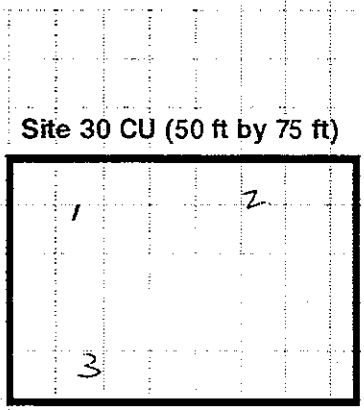
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1135
Date Finished: 9/13/01
Time: 1210
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: ~~HSA~~ hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, lead, dry, moderate brown, fine grained	SM/sandy silt, dry, light tan, fine grained	SM/sandy silt, lead, dry, light brown, fine-coarse grained
1			
2	ML ~~SB~~, silt w/sand, slightly moist, fine grained, dusky brown	ML/silt w/sand ~~SM~~, tan, dry, fine grained	ML/silt w/sand, slightly moist, fine-coarse grained, dark yellowish brown
3			
4			
5	ML/silt w/sand, slightly moist, dark yellowish brown fine-medium grained	ML/silt w/sand, slightly moist, tan fine grained	ML/silt w/sand, slightly moist, fine-medium grained
6			
7			
8	A 1137	A 1151	A 1201
9	B 1141	B 1153	B 1205
	C 1148	C 1157	C 1209
10			

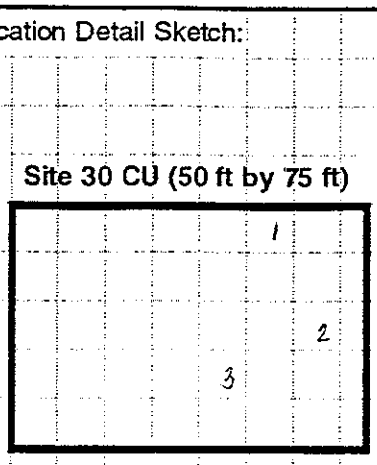
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E08

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30 | 1.5 PID

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/6/01
Time:	1130
Date Finished:	9/6/01
Time:	1215
Drilling Contractor:	INTERPHASE
Driller's Name:	JOHN V.
Drilling Method:	GEO PROBE
Boring Diameter:	1 5/16"
Drill Rig:	12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	PID READ = 1.5 @ 1135

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/ SANDY SILT, LT BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON PLASTIC	SM/ SANDY SILT, LT BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC	SM/ SANDY SILT, LT-BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON-PLASTIC
2–3	ML ~~SM~~/ SILT W/ SAND, DK YELLOWISH BROWN MED. ANGULAR GRAVEL, ~~COARSE SAND~~ ~~NON PLASTIC~~	ML/ SILT W/ SAND, DK. YELLOWISH BROWN MED ANGULAR GRAVEL, NON-PLASTIC	ML ~~SM~~/ SILT WITH LITTLE SAND, DK YELLOWISH BROWN, MED. ANGULAR GRAVEL, ~~NON-PLASTICITY~~ NON-PLASTIC COARSE SAND
4–5	ML/ SILT W/ SAND, DK YELLOWISH BROWN MED. ANGULAR GRAVEL, ~~GRAVEL~~ NON PLASTIC	ML/ SILT WITH SAND, DK YELLOWISH BROWN, MED. ANGULAR GRAVEL NON-PLASTIC	ML SILT W/ SAND DK YELLOWISH ~~SM/ SANDY SILT, LT BROWN~~ BROWN ~~COARSE SAND~~, MED. ANGULAR GRAVEL, ~~NON PLASTICITY~~ NON-PLASTIC FINES
6–8			
9	A – ~~1212~~ 1132	A – 1200	A – ~~1132~~ 1212
	B – ~~1217~~ 1149	B – 1205	B – ~~1149~~ 1217
10	C – ~~1219~~ 1150	C – 1209	C – ~~1150~~ 1219

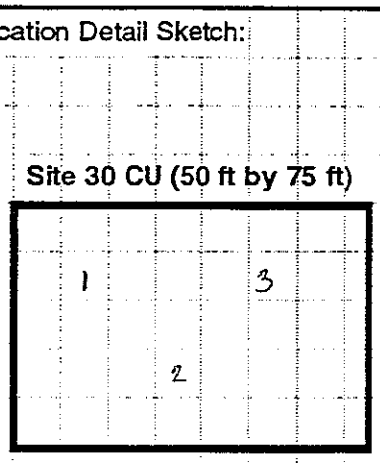
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E09

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/10/01
Time:	1338
Date Finished:	9/10/01
Time:	1436
Drilling Contractor:	INTERPRISE
Driller's Name:	SHAN V.
Drilling Method:	GEO PROBE
Boring Diameter:	1 3/16"
Drill Rig:	12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	PID PID = 0.0 @ 1350

Sample Description

(USCS color %fines % sand, % gravel, hardness/density moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/SANDY SILT, LT. BROWN, COARSE	SM/SANDY SILT, LT. BROWN, COARSE	SM/SANDY SILT, LT. BROWN, COARSE
1	SAND, MED. ANGULAR GRAVEL, NON-PLASTIC	SAND, MED. ANGULAR GRAVEL, NON-PLASTIC	SAND, MED. ANGULAR GRAVEL, NON-PLASTIC
2	ML/ SILT W/ SAND, DK. YELLOWISH BROWN	ML/ SILT W/ SAND, DK. YELLOWISH BR.	SM SANDY SILT ~~ML/ SILT W/ SAND~~, DK. YELLOWISH BROWN COARSE SAND
	MED. ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, NON-PLASTIC
3			
4	ML/ SILT W/ SAND, DK. YELLOWISH BR.	ML/ SILT W/ SAND, DK. YELLOWISH BR.	SM/SANDY SILT, DK. YELLOWISH BROWN
	MED. ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, COARSE SAND,
5			NON-PLASTIC
6			
7			
8			
9	A - 1345 D - 1400	A - 1406 D - 1420	A - 1426 D - 1435
	B - 1348	B - 1409	B - 1429
10	C - 1351	C - 1415	C - 1430

CHARACTERIZATION UNIT SAMPLING LOG

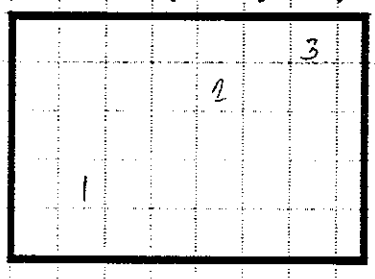
GRID NO.: E10

Project Name: Camp Pendleton OU 4 | Geologist: Jason Grass

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/10/01

Time: 1330

Date Finished: 9/10/01

Time: 1420

Drilling Contractor: Interphase

Driller's Name: Phil

Drilling Method: Geoprobe

Boring Diameter: 1 3/16"

Drill Rig: Phase B

Datum: Ground Surface

Borehole Abandonment:

Notes: PID = 0.0 background + breathing zone @ 1345 hr

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SP/silty sand, dry light brown, fine grained sand	SP/silty sand, dry, fine grained, light brown	SM/sandy silt, dry, fine grained light brown
2–3	SP/silty sand, dry light brown, fine medium grained	SP/silty sand, dry, fine grained, light brown	ML/silt w/ sand/dry, fine grained, light brown
4–6	SP/silty sand w/ fine gravel (lead) fragments, fine med. grained sand	SP/silty sand, dry, fine grained, light brown	SP/sandy silt, dry, fine-medium grained, pale brown
9	A 1335 B 1340 C 1345	A 1350 B 1356 C 1357	A 1407 B 1415 C 1417

CHARACTERIZATION UNIT SAMPLING LOG

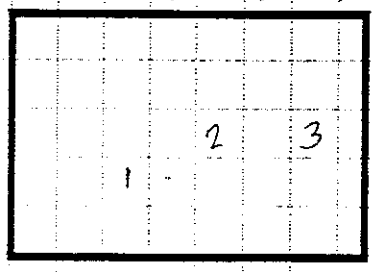
GRID NO.: E11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/10/01
Time:	1130
Date Finished:	9/10/01
Time:	1215
Drilling Contractor:	Interphase
Driller's Name:	[illegible]
Drilling Method:	Geoprobe
Boring Diameter:	1 3/16"
Drill Rig:	Chem 13
Datum:	Ground Surface
Borehole Abandonment:	bentonite
Notes:	PID = 1.5 background and breathing zone @ 1145 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/sandy silt, dry	ML/~~silty sand~~ sandy silt, dry,	ML/~~silt~~ sandy silt, dry,
1	pale yellowish brown, fine grained sand	fine grained, pale brown	fine grained, pale brown
2	ML/silt w/ sand, dry	ML/silt w/ sand, dry,	ML/sandy silt, dry,
3	pale brown, fine grained sand	fine grained pale brown	fine grained, pale brown
4	ML/silt w/ sand, dry,	ML/silt w/ sand, dry,	ML/~~sandy~~ silt w/ sand, dry,
5	pale brown fine grained sand	fine grained, pale brown	fine grained, pale brown
6			
7			
8			
9	A 1140 B 1143 C 1148	A 1150 B 1155 C 1200	A 1208 B 1210 C 1213
10			

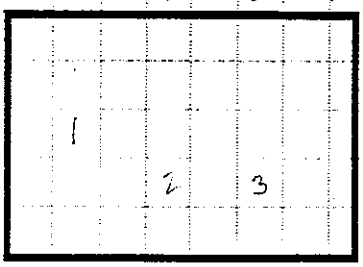
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E12

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/10/01
Time: 1430
Date Finished: 9/10/01
Time: 1535
Drilling Contractor: Intra Phase
Driller's Name: Mel
Drilling Method: Geoprobe
Boring Diameter: 1 3/4"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: PID = 0.0 background breathing zone @ 1435

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown	SM/sandy silt, dry, pale yellowish brown, fine grained
1			
2	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained	SM/sandy silt, dry, pale yellowish brown, fine grained
3			
4	ML/silt w/sand, dry, pale yellowish brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	SM/sandy silt, dry, pale yellowish brown, fine grained
5			
6			
7			
8			
9	A ~~1525~~ 1440	A 1510	A 1525
	B 1442	B 1514	B 1530
10	C 1445	C 1520	C 1533

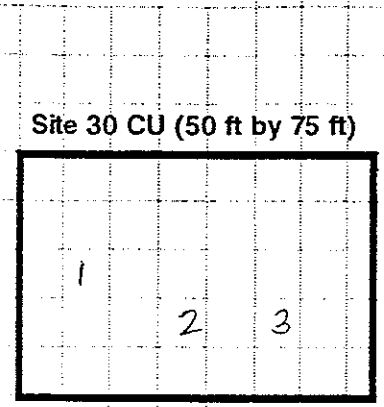
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E13

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9-10-01
Time:	1442
Date Finished:	9/10/01
Time:	1545
Drilling Contractor:	INTERPHASE
Driller's Name:	JUAN V.
Drilling Method:	GEO PROBE
Boring Diameter:	1 3/16"
Drill Rig:	12
Datum: Ground Surface	
Borehole Abandonment:	BENTONITE
Notes:	PID HDC = 0.0 @ 1435

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/ SILT W/ SAND, PALE YELLOWISH BROWN	ML/ SILT W/ SAND, PALE YELLOWISH BROWN	ML/SILT W/ SAND, PALE YELLOWISH BR
1	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, NON-PLASTIC
2	ML/ SILT W/ SAND, PALE YELLOWISH BR	ML/ SILT W/ SAND, PALE-YELLOWISH BR	ML/ SILT W/ SAND, PALE YELLOWISH BR
	MED. ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC	MED. ANGULAR GRAVEL, NON-PLASTIC
3			
4	ML/ SILT W/ SAND, ~~PALE~~ DARK YELLOWISH BR	ML/ SILT W/ SAND, PALE-YELLOWISH BR	ML/ SILT W/ SAND, PALE BROWN
	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC
5			
6			
7			
8			
9	A - 1442 BR	A - 1523	A - ~~HOT~~ 1540
	B - 1445	B - 1524	B - ~~1505~~ 1545
10	C - 1511	C - 1533	C - 1548

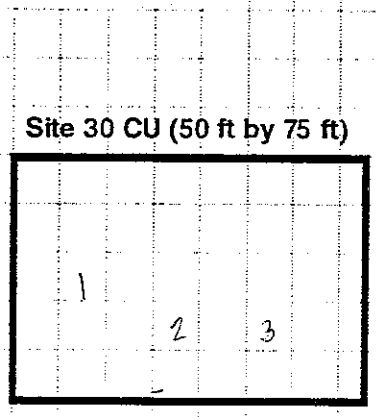
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E14

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/10/01
Time: 1540
Date Finished: 9/10/01
Time: 1630
Drilling Contractor: Tri-Phase
Driller's Name: Gil
Drilling Method: Geoprobe
Boring Diameter: 1 3/4"
Drill Rig: Phase 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: 0.0 ppm PID background
breathing zone @ 1610 hrs.

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, dry, pale brown, fine grained	SM/silty sand, dry, fine grained, pale brown	SM/sandy silt, dry, grayish orange pink, fine grained
1			
2	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	SM/sandy silt, dry, pale brown, fine grained
3			
4	SM/sandy silt, dry, moderate ~~pale yellowish~~ brown, fine grained	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/sandy silt, dry, moderate brown, fine grained
5			
6			
7			
8			
9	A 1545 B 1550 C 1554 D 1558	A 1600 B 1606 C 1610 D 1613	A 1619 B 1622 C 1625 D 1627
10			

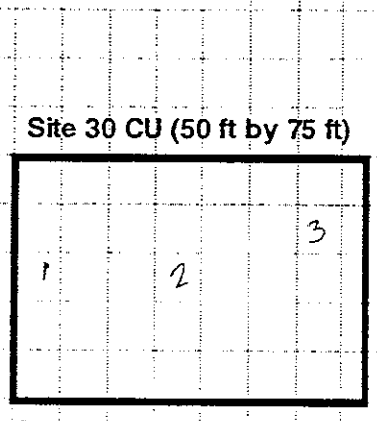
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E15

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9-10-01
Time:	1548
Date Finished:	9-10-01
Time:	
Drilling Contractor:	INTERPHASE
Driller's Name:	JUAN V.
Drilling Method:	GEO PROBE
Boring Diameter:	1
Drill Rig:	12
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	PID BDG = 0.0 @ 1616

Sample Description

(USCS, color %fines % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring C
0	ML/ SILT W/ SAND, PALE BROWN	ML/ SILT W/ SAND, PALE BROWN	SM/ ~~SILTY~~ SANDY SILT, PALE BROWN
1	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC COARSE SAND
2	ML/SILT W/ SAND, PALE BROWN	ML/ SILT W/ SAND, DK YELLOWISH BR	SM/SANDY SILT, PALE BROWN
	MED. ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, COARSE SAND
3	~~ML/SC~~		NON-PLASTIC
4	ML/ SILT W/ SAND, DK YELLOWISH BR	ML/ SILT W/ SAND, PALE BROWN	ML SILT W/ SAND ~~SM/ SANDY SILT~~, DUSKY YELLOWISH
	MED ANGULAR GRAVEL, NON-PLASTIC	MED ANGULAR GRAVEL, NON-PLASTIC	SAND, MED. ANGULAR GRAVEL, NON-PLASTIC
5			
6			
7			
8			
9	A - 1601	A - 1618	A - 1635
	B - 1605	B - 1622	B - 1640
10	C - 1609	C - 1626	C - 1643

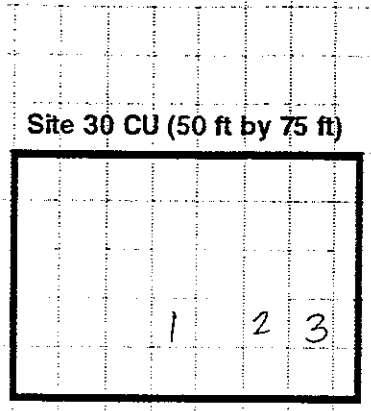
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: E16

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9-11-01
Time:	0829
Date Finished:	9-11-01
Time:	
Drilling Contractor:	INTER-PHASE
Driller's Name:	JUAN V
Drilling Method:	GEO PROBE
Boring Diameter:	1
Drill Rig:	12
Datum: Ground Surface	
Borehole Abandonment:	
Notes:	PID PDG =

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

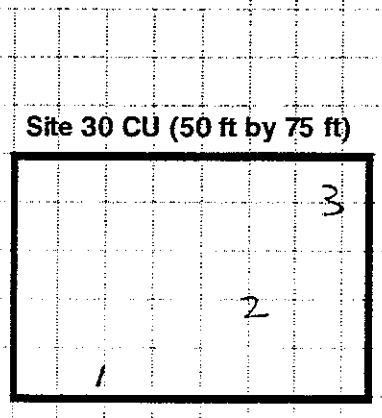
	Boring 1	Boring 2	Boring 3
0	SM/SANDY SILT, PALE YELLOWISH BROWN	SM/ SANDY SILT, ~~DK~~ PALE YELLOWISH BROWN, COARSE SAND, MED ANGULAR GRAVEL, NON PLASTIC	SM/ SANDY SILT, ~~DK~~ PALE YELLOWISH BROWN COARSE SAND, MED. ANGULAR GRAVEL NON-PLASTIC
1	MED ANGULAR GRAVEL, NON-PLASTIC COARSE SAND		
2	SM/ SANDY SILT, DK. YELLOWISH BROWN, MED ANGULAR GRAVEL, NON-PLASTIC, COARSE SAND	SM/SANDY SILT, GRAYISH BROWN COARSE, SAND, MED. ANGULAR GRAVEL NON-PLASTIC	SM/SANDY SILT, GRAYISH BROWN COARSE SAND, MED. ANGULAR GRAVEL NON-PLASTIC
3			
4	SM/SANDY SILT, DK. YELLOWISH BROWN, MED ANGULAR GRAVEL, NON-PLASTIC, COARSE SAND	SM/SANDY SILT, DK. YELLOWISH BROWN MED-ANGULAR GRAVEL, NON-PLASTIC COARSE, SAND	SM/SANDY SILT, GRAYISH BROWN COARSE SAND, MED ANGULAR GRAVEL NON-PLASTIC
5			
6			
7			
8			
9	A - 838	A - 903	A - 919
	B - 849	B - 969	B - 925
10	C - 856	C - 912	C - 930

GRID NO.: ~~E14~~ E17

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01
Time: 1110
Date Finished: 9/19/01
Time: 120
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.0 ppm background & breathing zone @ 1130 hrs.

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	ML/silt w/sand, dry, pale brown, fine grained	ML/sandy silt, dry, pale brown, fine grained,	ML/silt w/sand, dry fine grained, pale brown
2–3	ML/silt w/sand, dry, fine grained dark yellowish brown	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown
4–5	ML/silt w/sand, dry, fine grained, moderate yellowish brown	ML/silt w/sand, dry, fine grained pale brown	ML/silt w/sand, dry, fine grained, dark yellowish brown
6			
7			
8			
9	A 1110	A 1128	A 1143
	B 1115	B 1134	B 1152
10	C 1121	C 1139	C 1159

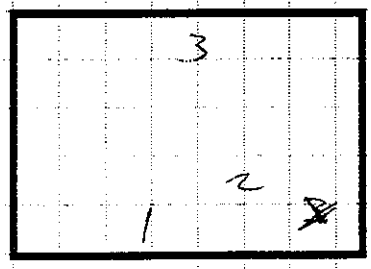
GRID NO.: DNA E18

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: ~~1340~~ 1255

Date Finished: 9/19/01

Time: 1335

Drilling Contractor: T. Carrillo Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.0 ppm @ 1300 hrs
breathing zone & background

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	ML/silt w/sand, dry, fine grained, tan	ML/sandy silt, dry, fine grained moderate yellowish brown	ML/~~silt~~ sandy silt, dry, pale brown, fine grained
2–4	ML/silt w/sand, slightly moist, fine grained, dark yellowish brown	ML/sandy silt, dry, dark yellowish brown, fine grained	ML/silty sand, dry, dark yellowish brown, fine grained
5–6	ML/silt w/sand slightly moist fine grained, dark yellowish brown	ML/silt w/sand, dark yellowish brown, fine grained	ML/silt w/sand, dry, dark yellowish brown, fine grained
8	A 1300	A 1312	A 1325
9	B 1305	B 1316	B 1329
	C 1308	C 1321	C 1333
10			

GRID NO.: F1

Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012

Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: 0845

Date Finished: 9/20/01

Time: 0913

Drilling Contractor: Intor Place

Driller's Name:

Drilling Method: ~~mu~~ geoprobe

Boring Diameter: $1\frac{3}{16}$"

Drill Rig: mule

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=1.2 ppm breathing zone and background

Sample Description

(USCS color, %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/silty sand,		
1	slightly moist,		
	fine-coarse grained,		
2	pale yellowish brown		
	ML/silt w/sand,		
3	dark yellowish brown		
	fine grained, slightly		
4	moist,		
	ML/silt w/sand,		
5	slightly moist,		
	fine grained		
6	dark yellowish brown		
7			
8			
9	A 0901		
	B 0909		
10	C 0913		

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

GRID NO.: F2

Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012

Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: 0915

Date Finished: 9/26/01

Time: 0930

Drilling Contractor: Interphase

Driller's Name: Gil + Erik

Drilling Method: geoprobe

Boring Diameter: 1 3/16"

Drill Rig: Mule

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand,		
1	slightly moist,		
	fine grained		
2	pale yellowish brown		
	ML/silt w/sand,		
3	slightly moist,		
	fine grained,		
4	pale yellowish brown		
	SM/sandy silt,		
5	slightly moist,		
	fine-coarse grained		
6	dark yellowish brown		
7			
8			
9	A 916		
	B 920		
10	C 926		

GRID NO.: E3

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: ~~9/20/01~~ 0932

Date Finished: 9/20/01

Time: 0945

Drilling Contractor: Interphase

Driller's Name: Mike Eric

Drilling Method: geoprobe

Boring Diameter: 1 3/16"

Drill Rig: mule

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes:

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring C
0			
1	m/sandy silt, slightly moist, fine grained		
2	pale brown		
3	m/silt w/sand, slightly moist, fine grained		
4	pale yellowish brown		
5	m/silt w/sand, slightly moist, fine grained,		
6	pale yellowish brown		
7			
8			
9	A* 0934 B 0942		
10	C 0944		

PARSONS ENGINEERING SCIENCE, INC.

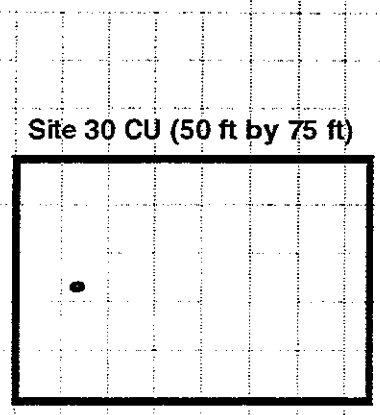
GRIDSAMPLE.CDF

GRID NO.: F 4

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/20/01
Time:	0947
Date Finished:	9/20/01
Time:	1004
Drilling Contractor:	Introphase
Driller's Name:	Gil + Sue
Drilling Method:	geoprobe
Boring Diameter:	1 3/16"
Drill Rig:	mule
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	PID = 0.9 ppm @ 0957 hrs.

Sample Description

(USCS, color, %fines, % sand % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring C
0	SM/ sandy silty clay,		
1	pale yellowish brown,		
	fine grained,		
2	ML/ silty sand,		
3	slightly moist,		
	fine grained,		
4	pale yellowish brown		
	ML/ silt w/ sand,		
5	slightly moist,		
	dark yellowish brown,		
6	fine grained		
7			
8	A 0948 -		
9	B 0950		
	C 0954		
10	D 0958		

PARSONS ENGINEERING SCIENCE INC

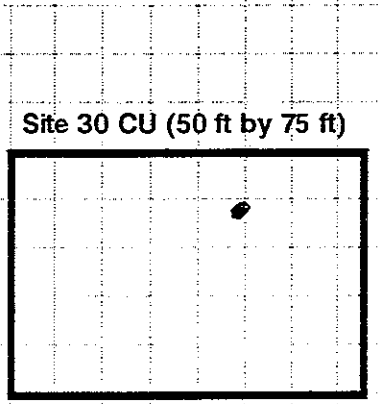
GRIDSAMPLE.CDR

GRID NO.: F5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gray

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01
Time: 1008
Date Finished: 9/20/01
Time: 1020
Drilling Contractor: Into Place
Driller's Name: Gil + Eric
Drilling Method: geoprobe
Boring Diameter: 1 3/16"
Drill Rig: mule
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 1.0 ppm @ 1008 breathing zone + background

Sample Description
(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	ML/silty sand, dry, dark yellowish brown, fine grained		
2–3	ML/sandy silt, dry, fine grained, moderate yellowish brown		
4–5	ML/silt + sand, dry, fine grained moderate yellowish brown		
6–8			
9–10	A – 1008 B – 1011 C – 1022		

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

CHARACTERIZATION UNIT SAMPLING LOG

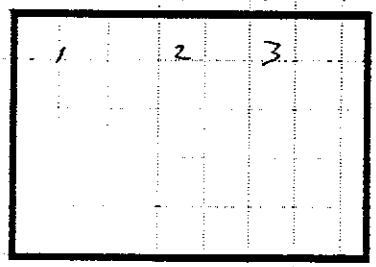
GRID NO.: F6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1115
Date Finished: 9/13/01
Time: 1135
Drilling Contractor: T. County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 1.1 ppm background + breathing zone @ 1126 hr

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/silty sand, dry fine grained, pale brown	SM/sandy silt, dry pale yellowish brown, fine grained	ML/silt w/sand, dry fine grained pale brown
1			
2	ML/sandy silt dry pale yellowish brown, fine grained	ML/silt w/sand, slightly moist, dark yellowish brown, fine grained	ML/slightly moist, dry, fine grained, dark yellowish brown silt w/sand,
3			
4	ML/silt w/sand, dry, moderate yellowish brown, fine grained	ML/slightly moist, silt w/sand, fine grained, dark yellowish brown	ML/silt w/sand, moderate yellowish brown, slightly moist, fine grained
5			
6			
7			
8			
9	A 1115	A 1125	A 1131
	B 1117	B 1127	B 1133
10	C 1122	C 1129	C 1135

GRID NO.: F7

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: 1028

Date Finished: 9/20/01

Time: 1048

Drilling Contractor: Tetra Phase

Driller's Name: Gil + Eric

Drilling Method: geoprobe

Boring Diameter: 1 3/4"

Drill Rig: mule

Datum: Ground Surface

Borehole Abandonment: ~~bentonite~~

Notes: PID = 0.7 ppm background + breathing zone @ 1008

Sample Description

(USCS color, %fines % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/silty sand, dry, fine grained, dark yellowish brown,		
1			
2	ML/silt w/sand, dry, pale yellowish brown, fine grained		
3			
4	ML/silt w/sand, dry, pale yellowish brown, fine grained		
5			
6			
7			
8			
9	a - 1028 b - 1032		
10	c - 1037		

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

GRID NO.: F8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01
Time: 1050
Date Finished: 9/20/01
Time: 1101
Drilling Contractor: Tetra Phase
Driller's Name: Gil + Eric
Drilling Method: geoprobe
Boring Diameter: 1 3/4"
Drill Rig: truck
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.5 ppm @ 1055 hrs
breathing zone and background

Sample Description

(USCS, color, %fines % sand % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/~~cell~~ sandy silt, dry, fine grained pale yellowish brown		
1			
2	ML/silty sand, dry, fine grained pale yellowish brown		
3			
4	ML/silty sand, dry, fine grained pale yellowish brown		
5			
6			
7			
8	A 1050		
9	B 1053		
	C* 1057		
10	D 1100		

GRID NO.: F9

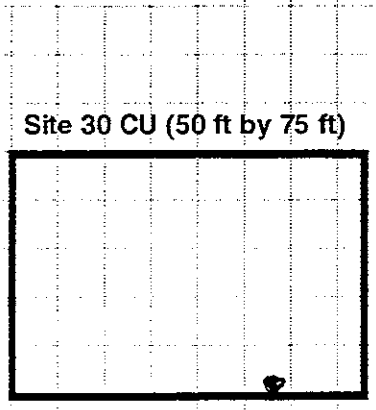
Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012

Site: 30

Boring Location Detail Sketch:



Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: 1105

Date Finished: 9/20/01

Time: 1115

Drilling Contractor: Inter Phase

Driller's Name: Hilf + Eric

Drilling Method: Geoprobe

Boring Diameter: $1\frac{3}{16}$"

Drill Rig: Mule

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.6 ppm @ 1104 hrs, breathing zone + background

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	ML/ sandy silt, dry, fine grained, pale yellowish brown		
1			
2	ML/ silt w/ clay, slightly moist, very slight plasticity, light brownish gray		
3			
4			
4.4	CL Silty clay, olive gray, slightly plastic, mottled with orange		
5			
6			
7			
8			
9	A 1105 B 1109		
10	C 1114		

PARSONS ENGINEERING SCIENCE, INC

GRIDSAMPLE.CDR

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F10

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01
Time: 1525
Date Finished: 9/20/01
Time:
Drilling Contractor: Inter Phase
Driller's Name: Mike Eric
Drilling Method: ~~Sequence~~ hand auger
Boring Diameter: ~~[illegible]~~ 3"
Drill Rig: ~~Hole~~ N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.1 ppm @ 1526 background + breathing zone

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	~~SP~~ Silty sand, reddish brown, very fine sand, with small gravel		
1			
2	ML Sandy silt, light reddish brown, very fine to fine sand		
3			
4	ML Sandy silt, brown, very fine to fine sand		
5			
6			
7			
8			
9	1 - ~~1545~~ 1538 3 - ~~1550~~ 1547		
10	2 - ~~1555~~ 1550		

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

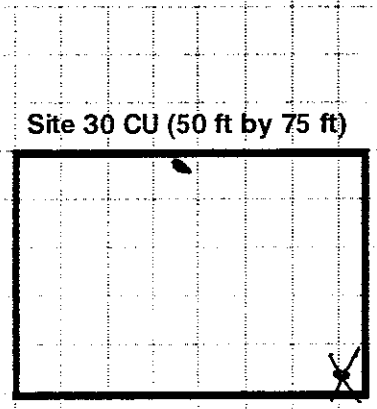
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01

Time: 1120

Date Finished: 9/20/01

Time: 1155

Drilling Contractor: Intro Phase

Driller's Name: Gil + Ernie

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.5 ppm @ 1125 hrs breathing zone + background

LEAD fragments

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring C
0	SM/silty sand, dry,		
1	fine grained,		
	moderate brown		
2	lead fragments		
	SM/silty sand, dry,		
3	fine grained,		
	light tan,		
4	sandy silt		
	ML/~~silty sand~~, dry,		
5	fine grained		
	pale yellowish brown		
6			
7			
8			
9	A - 1120		
	B - 1135		
10	C - 1155		

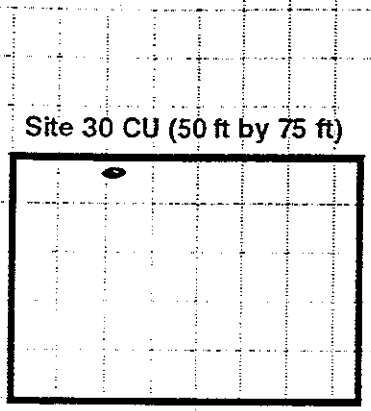
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F12

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/20/01
Time: 1500
Date Finished: 9/20/01
Time: 1522
Drilling Contractor: Interphase
Driller's Name: Mil + Eric
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Mule
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.1 ppm @ 1515 hrs

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML Clayey silt with sand, grayish brown, very fine sand, hard, dry		
1			
2	ML silt with sand, light gray, very fine sand dry		
3			
4	ML, AA		
5			
5.7-6	SP Sand, light gray, very fine to fine sand, trace silt		
6			
7			
8			
9	A - 1525 B - 1530 C - 1535		
10			

PARSONS ENGINEERING SCIENCE, INC

GRIDSAMPLE.CDR

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F13

Project Name: Camp Pendleton OU 4

Geologist: J. G. / L. L.

Project No.: 740012 Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/20/01
Time:	1600
Date Finished:	9/20/01
Time:	1620
Drilling Contractor:	Interphase
Driller's Name:	Gil & Enz
Drilling Method:	~~hand auger~~ Geoprobe
Boring Diameter:	1 3/16"
Drill Rig:	truck
Datum:	Ground Surface
Borehole Abandonment:	bentonite
Notes:	PID=0.0 ppm @ 1600 hrs breathing zone background

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM Silty Sand, light gray, very fine sand		
1			
2	ML Sandy silt, grayish brown, very fine sand		
3			
4	ML, AA		
5			
6			
7			
8	A 1605		
9	B 1610		
	C 1615		
10	D 1620		

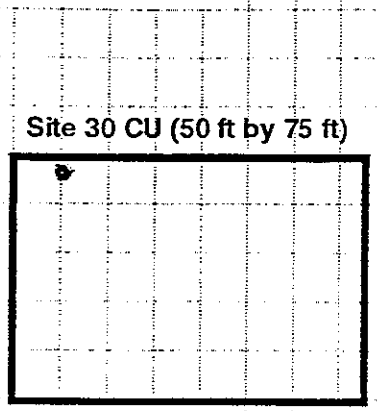
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: F14

Project Name: Camp Pendleton OU 4 | Geologist: J. Gilbert

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/20/01
Time:	1620
Date Finished:	9/20/01
Time:	1631
Drilling Contractor:	Interphase
Driller's Name:	Gil & Eric
Drilling Method:	Geoprobe
Boring Diameter:	1 3/8"
Drill Rig:	mule
Datum: Ground Surface	
Borehole Abandonment:	Bentonite
Notes:	PID = 0.0 ppm @ 1625 hrs. background breathing zone

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SP Sand with silt, light gray very fine sand, trace silt		
1			
2	SP Sand, AA, mottled with orange		
3			
4	SP Sand, AA		
5			
6			
7			
8			
9	A - 1621 B - 1628		
10	C - 1631		

GRID NO.: F15

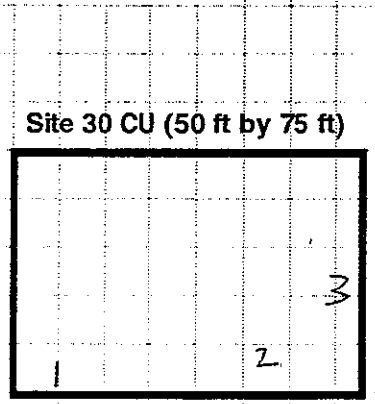
Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012

Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: 0910

Date Finished: 9/19/01

Time: 0940

Drilling Contractor: Tri County

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 0.9 ppm background and breathing zone 0930

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

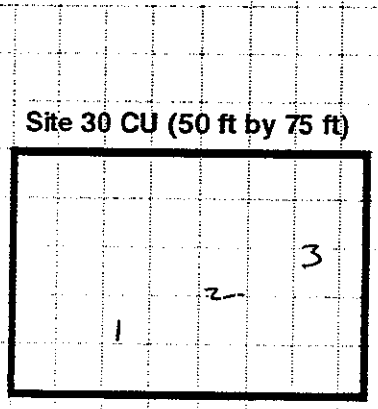
	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand, dry, pale yellowish brown, fine grained	SM/silty sand, dry, light tan, fine grained	SM/sandy silt, dry, fine grained, pale yellowish brown
1			
2	ML/silt w/sand, dry, fine grained, moderate yellowish brown	ML/silt w/sand, dry, fine grained, pale brown	ML/silt w/sand dry, fine grained, dark yellowish brown
3			
4	ML/sandy silt, dry, tan, fine grained	ML/silt w/sand, dry, fine grained, dark yellowish brown	ML/silt w/sand, dry, fine grained, pale yellowish brown
5			
6			
7			
8			
9	A 0911 B 0913	A 0917 B 0920	A 0924 B 0926
10	C* 0915	C* 0922	C* 0929

GRID NO.: F16

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01
Time: 0945
Date Finished: 9/19/01
Time: 1030
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.5 ppm breathing zone + background = 1000 hrs

Sample Description
(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

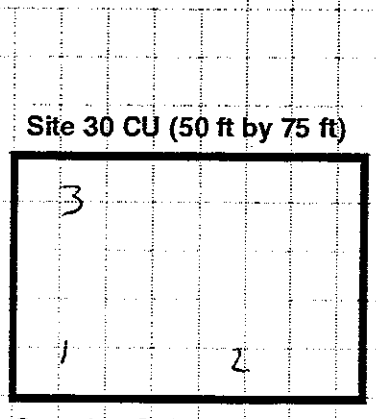
	Boring 1	Boring 2	Boring 3
0–1	SM/silty sand, dry, pale yellowish brown, fine grained	ML/silty sand, dry, fine grained, tan	ML/silt w/sand, dark yellowish brown, fine grained
2–3	ML/fine grained, silt w/sand, dry, dark yellowish brown	ML/silt w/sand, gravel, fine, smooth gravel, fine grained sand, moderate yellowish brown	ML/silt w/sand, dry, dark yellowish brown, fine grained
4–5	ML/silt w/sand, dry, fine grained, dark yellowish brown	ML/silt w/sand, dry, fine grained, moderate yellowish brown	ML/silt w/sand, dry, fine grained, moderate yellowish brown
6			
7			
8			
9	A 0950	A 1005	A 1020
	B 0955	B 1010	B 1025
10	C 1000	C 1015	C 1030

GRID NO.: F17

Project Name: Camp Pendleton OU 4 Geologist: Jason Goss

Project No.: 740012 Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01
Time: 1035
Date Finished: 9/19/01
Time: 1105
Drilling Contractor: Tri County
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1055 hrs breathing zone and background

Sample Description
(USCS color, %fines, % sand, % gravel, hardness/density moisture, other)

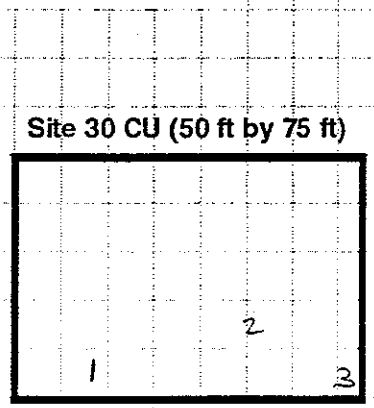
	Boring 1	Boring 2	Boring 3
0–1	ML/silt w/sand, dry, moderate yellowish brown,	ML/silty sand, dry, fine grained, moderate yellowish brown	ML/silt w/sand, dry, moderate yellowish brown, fine grained
2–3	ML/silt w/sand, dry, moderate yellowish brown, fine grained	ML/sandy silt, dry, brownish gray, fine grained	ML/silty sand, dry, moderate yellowish brown, fine grained
4–5	ML/silt w/sand, dry, fine grained, dark yellowish brown	ML/silt w/sand, moist, fine grained, dark gray	ML/silt w/sand, dry, fine grained, dark yellowish brown
6–8			
9–10	A 1036 B 1040 C 1044	A 1048 B 1053 C 1057	A 1100 B 1102 C 1104

GRID NO.: G 1

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: 1440

Date Finished: 9/19/01

Time: 1515

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=0.0 ppm @ 1445 hrs
background breathing zone

Sample Description

(USCS color, %fines % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0–1	SM/silty sand, dry, fine-medium grained, light brown	ML/silt w/sand, slightly moist, fine grained, dark yellowish brown	ML/silt w/sand, slightly moist, fine grained, moderate brown
2–3	ML/silt w/sand, moist, dusky yellowish brown, fine grained	ML/silt w/sand, moist, fine grained, dark yellowish brown	ML/silt w/sand, moist, fine grained, dark yellowish brown
4–5	ML/silt w/sand, moist, moderate brown, fine grained	ML/silt w/sand, moist, fine grained, dusky yellowish brown	ML/silt w/sand, dusky yellowish brown, fine grained, moist
6			
7			
8	A 1440	A 1452	A 1509
9	B 1445	B 1459	B 1511
	C 1449	C 1502	C 1514
10	D 1452	D 1507	D 1515

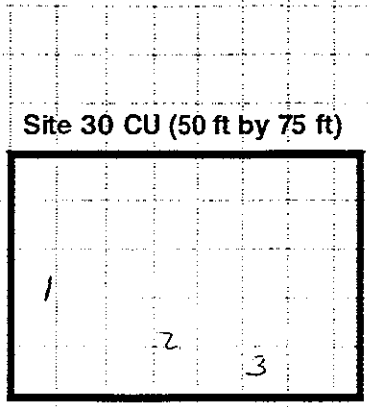
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G2

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 09/18/01
Time: 0730
Date Finished: 09/18/01
Time: 0815
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM/silty sand, dry, w/gravel	SM/sandy silt, dry,	ML/sandy silt, dry
1	pale yellowish brown,	fine grained	pale yellowish brown,
	fine, angular gravel,	moderate yellowish brown	fine grained
2	fine-coarse grained sand		
	ML/silt w/sand,	ML/silt w/clay, very	ML/sandy silt,
3	slightly moist, dark	slightly plastic,	slightly moist
	yellowish brown,	brownish gray	fine grained,
4	fine grained	slightly moist	dark yellowish brown
	ML/silt w/sand,	ML/sandy silt,	ML/sandy silt,
5	brownish gray,	slightly moist,	grayish brown,
	fine grained,	fine-coarse grained,	slightly moist,
6	slightly moist	dark yellowish brown	fine grained
7			
8			
9	A 0735	A 0752	A 0805
	B 0741	B 0756	B 0809
10	C 0748	C 0800	C 0813

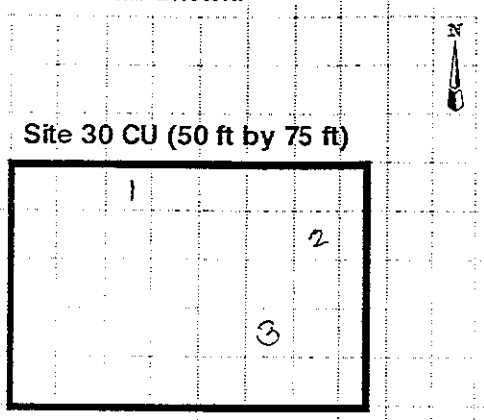
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G3

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01

Time: 1430

Date Finished: 9/11/01

Time: 1510

Drilling Contractor: Eth-o Phase

Driller's Name: [illegible]

Drilling Method: Hargstrom

Boring Diameter: 1 3/4"

Drill Rig: Chase 13

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 1.1 ppm B.Z. + background

Sample Description

(USCS color %fines, % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/ sand, moist, dusky yellowish brown, fine grained	SM/sandy silt, moist, grayish brown, fine-medium grained
2–3	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/ sand, moist, dusky yellowish brown, fine grained	SM/sandy silt, moist, grayish brown, fine-medium grained
4–5	SM/sandy silt, moist dusky yellowish brown, fine grained	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/sand, moist dusky yellowish brown, fine grained
6			
7			
8			
9	A - 1430	A - 1445	A - 1500
	B - 1435	B - 1450	B - 1505
10	C - 1440	C - 1455	C - 1510

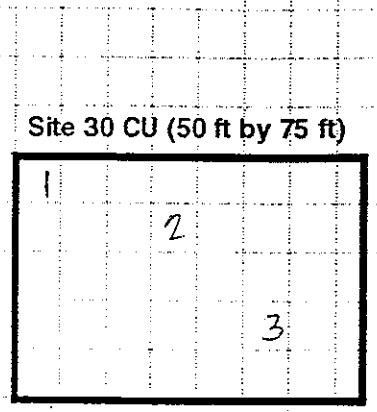
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G11

Project Name: Camp Pendleton OU 4 | Geologist:

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1145
Date Finished: 9/11/01
Time: 1230
Drilling Contractor: Interphase
Driller's Name: Juan
Drilling Method: Geoprobe
Boring Diameter: 1 3/4"
Drill Rig: Phase 3
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 1.5 background breathing zone

Sample Description

(USCS color %fines. % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC
2–3	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC
4–5	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC	SM/ SANDY SILT, DUSKY YELLOWISH BR. MOIST, MED. ANGULAR GRAVEL, COARSE SAND, NON-PLASTIC
6			
7			
8	A 1145	A 1201	A 1220
9	B 1150	B 1208	B 1222
	C 1153	C 1214	C 1226
10	D 1159	D 1217	D 1230

CHARACTERIZATION UNIT SAMPLING LOG

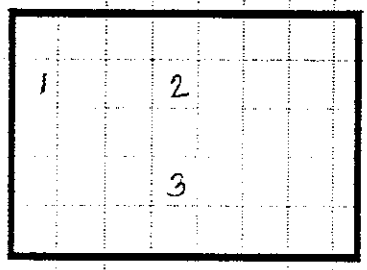
GRID NO.: G5

Project Name: Camp Pendleton OU 4 Geologist: [illegible]

Project No.: 740012 Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 1515
Date Finished: 9/11/01
Time: 1550
Drilling Contractor: Little Stage
Driller's Name: [illegible]
Drilling Method: Geoprobe
Boring Diameter: $1\frac{3}{16}$"
Drill Rig: Geoprobe 13
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.5 background breathing zone

Sample Description

(USCS color %fines % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring 3
0–1	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/sand, moist, fine medium grained, dusky yellowish brown	SM/sandy silt, moist, moderate brown, fine grained
2–3	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/sand, moist, fine grained, dusky yellowish brn.	SM/silt w/sand, moist, dusky yellowish brown, fine grained
4–5	SM/silt w/sand, moist, dusky yellowish brown, fine grained	SM/silt w/sand, moist, fine grained, dusky yellowish brown	SM/silt w/sand, moist, very dusky red, fine grained
6			
7			
8			
9	A 1515	A 1530	A 1537
	B 1520	B 1535	B 1542
10	C 1525	C 1437	C 1549

PARSONS ENGINEERING SCIENCE, INC.

GRIDSAMPLE.CDR

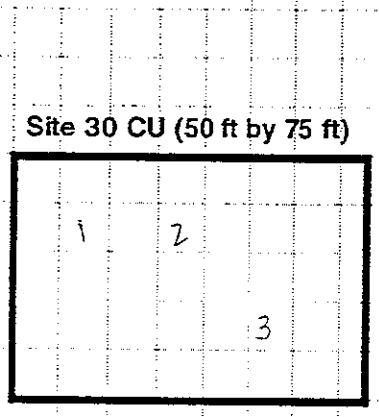
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: ~~G7 → outside~~ G6?

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/11/01
Time: 0815
Date Finished: 9/11/01
Time: 0915
Drilling Contractor: Tri-Phase
Driller's Name: Neil
Drilling Method: Geoprobe
Boring Diameter: 1 3/16"
Drill Rig: Mule
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:
this grid was the G6

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density, moisture other)

	Boring A	Boring B	Boring C
0–1	SM/sandy silt, dry, pale brown, fine grained	SM/sandy silt, dry, pale brown, fine-medium grained	SM/sandy silt, dry, pale brown, fine-medium grained
2–3	SM/sandy silt, dry, fine-medium grained, pale brown	ML/sandy silt, dry, pale brown, fine grained	SM/sandy silt, dry, pale brown, fine-medium grained
4–5	SM/sandy silt, dry, fine-medium grained, pale brown	ML/silt w/sand, dry, moderate yellowish brown, fine grained	ML/silt w/sand, dry, moderate yellowish brown, fine grained
6			
7			
8			
9	A 0815	A 0830	A 0845
	B 0820	B 0835	B 0850
10	C 0825	C 0840	C 0855

CHARACTERIZATION UNIT SAMPLING LOG

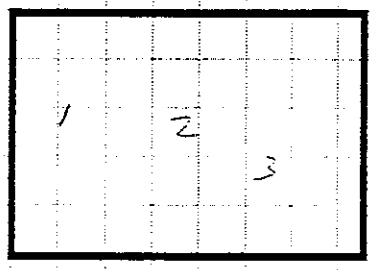
GRID NO.: G7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 0910
Date Finished: 9/18/01
Time: 0930
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.1 ppm breathing zone and background @ 0912 hrs.

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring 3
0–1	ML/silt w/sand, dry, pale brown, fine grained	SM/sandy silt, dry, moderate brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown
2–4	ML/silt w/sand, pale brown, fine grained, slightly moist	ML/silt w/sand, pale yellowish brown, fine grained	ML/silt w/sand, slightly moist, fine grained, pale yellowish brown
5–6	ML/silt w/sand, fine grained pale brown, slightly moist	ML/silt w/sand, fine grained, slightly moist, dark yellowish brown	ML/silt w/sand, slightly moist, fine grained, pale brown
7–8			
9	A 0912	A 0920	A 0926
	B 0915	B 0922	B 0928
10	C* 0918	C* 0924	C* 0930

CHARACTERIZATION UNIT SAMPLING LOG

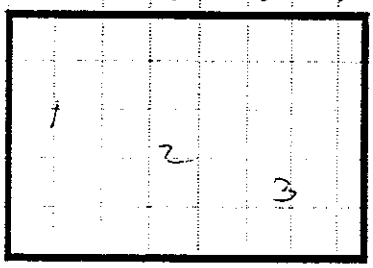
GRID NO.: G-8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 0850
Date Finished: 9/18/01
Time: 0910
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.1 ppm breathing zone and background @ 0905 hrs

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, dry, tan, fine med grain	SM/silty sand, dry, light tan, fine grained	SM/silty sand, dry, light tan, fine-coarse grained
1			
2	ML/silt w/sand, slightly moist, fine grained, pale yellowish brown	ML/silt w/sand, slightly moist, fine grained, pale brown	ML/silt w/sand, slightly moist, fine grained, pale brown
3			
4	ML/silt w/sand, slightly moist, fine grained, pale yellowish brown	ML/silt w/sand, light brownish gray, fine grained	ML/silt w/sand, slightly moist, moderate yellowish brown, fine grained
5			
6			
7			
8			
9	A - 0851	A - 0900	A - 0906
	B - 0856	B - 0901	B - 0908
10	C - 0890	C - 0903	C - 0910

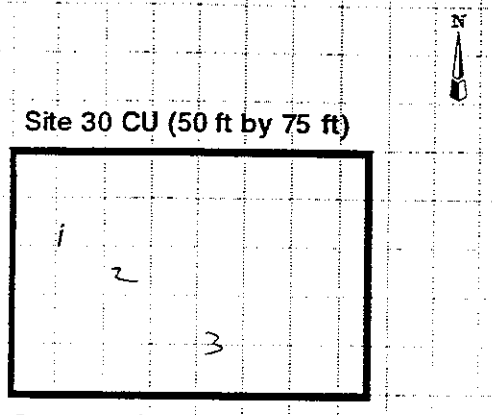
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G-9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 0935
Date Finished: 9/18/01
Time: 1015
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1010 background and breathing zone

LEAD fragments

Sample Description

(USCS color, %fines, % sand % gravel, hardness/density moisture other)

	Boring 3	Boring 2	Boring 1
0	SM/silty sand, dry, light brown, fine-med grained (LEAD)	SM/silty sand, dry, (LEAD) fine med. grained, light brown	SM/sandy silt, dry, light tan, fine grained
2	ML/silt w/sand, dry, fine grained, pale yellowish brown	ML/silt w/sand ~~SM/silty sand~~, dry, fine grained, dark yellowish brown	ML/silt w/sand, dry, fine grained, pale yellowish brown
4	ML/silt w/sand, dry, pale brown fine grained	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown
6			
7			
8	Boring 1		Boring 3
	A 0935	A 0952	A 1006
9	B 0939	B 0955	B 1009
	C 0941	C 0958	C 1011
10	D 0947	D ~~0910~~ 1000	D 1015

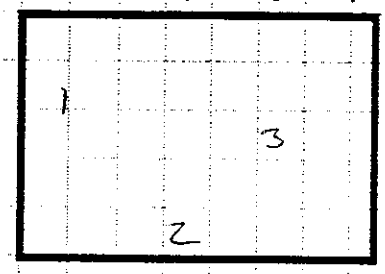
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G10

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gates

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 1015
Date Finished: 9/18/01
Time: 1105
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SM/sandy silt, dry, fine grained, pale brown	SM/sandy silt, dry, fine med grained, moderate yellowish brown	SM/sandy silt, dry, fine grained, pale yellowish brown
2–3	ML ~~SM~~/sandy silt, dry, fine ~~med~~ grained, light ~~moderate~~ yellowish brown	SM/sandy silt, dry, pale yellowish brown, fine grained	ML/silt w/sand, dry, fine grained, dark yellowish brown
4–6	ML/silt w/sand, ~~mod~~ dark yellowish brown, fine grained, slightly moist	ML/sandy silt w/gravel, dry, fine, smooth grained, fine grained sand, pale brown	SM/sandy silt, slightly moist, fine med grained, moderate yellowish brown
7–8			
9	A 1020	A 1034	A 1048
	B 1024	B 1040	B 1054
10	C 1029	C 1044	C 1059

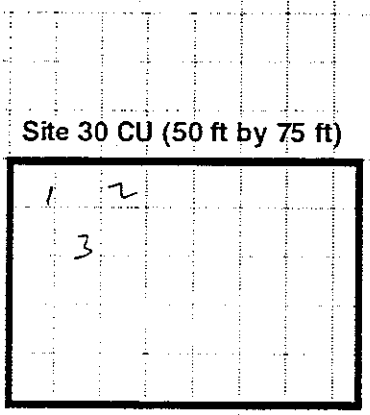
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G1

Project Name: Camp Pendleton OU 4 | Geologist: Jason Goss

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01

Time: 1110

Date Finished: 9/18/01

Time: ~~1530~~ 1315

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: backfill

Notes: PID = 0.0 ppm @ 1118 hrs breathing zone + background

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SM/silty sand, dry, moderate yellowish brown, fine med. grained	ML/sandy silt, dry, pale yellowish brown, fine grained	ML/sandy silt, dry, fine grained, pale yellowish brown
2–3	SM/sandy silt, dry, fine grained, dark yellowish brown	SM/sandy silt, dry, fine med. grained, moderate yellowish brown	ML/sandy silt, dry, fine grained, dark yellowish brown
4–5	ML/sandy silt, dry, dark yellowish brown, fine grained	ML/sandy silt, dry, dark yellowish brown, fine grained	ML/sandy silt, dry, fine med. grained, dark yellowish brown
6–8			
9–10	A 1115 B 1120 C 1125	A 1130 B 1135 C 1145	A 1245 B 1255 C 1305

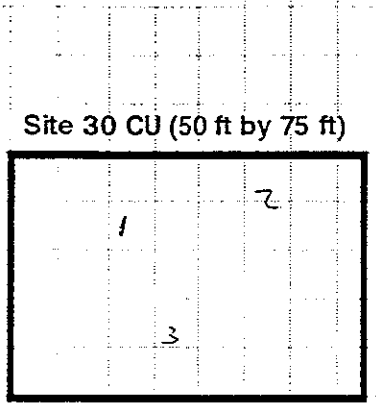
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G12

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 1320
Date Finished: 9/18/01
Time: 1358
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1335
backgrnd & breathing zone

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring 3	Boring 2	Boring 1
0–1	SM/silty sand, dry, fine-med. grained, pale brown	SM/silty sand fine-med grained, dry moderate yellowish brown	SM/silty sand, dry, fine grained, light tan
2–3	ML/sandy silt, dry, fine grained, pale brown	ML/silty sand, dry, moderate yellowish brown, fine grained	ML/silt w/sand, dry, dusky yellowish brown, fine grained
4–5	SM/silty sand, dry, pale brown, fine-med. grained	ML/silt w/sand, slightly moist, fine grained moderate yellowish brown	ML/silt w/sand, dry, fine grained, dark yellowish brown
6–7			
8	Boring 3		Boring 3
9	A 1321	A 1334	A 1348
	B 1325	B 1338	B 1352
10	C 1329	C 1343	C 1356

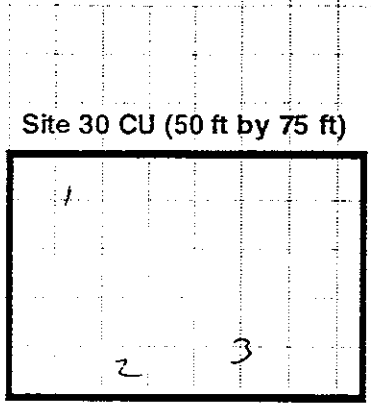
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: G13

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/18/01
Time: 1400
Date Finished: 9/18/01
Time: 1437
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1414 hrs, background + breathing zone.

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density moisture, other)

	Boring 1	Boring 3	Boring 2
0	SM/sandy silt, dry, fine grained pale yellowish brown	SM/sandy silt, dry, moderate yellowish brown fine-med. grained	SM/silty sand, dry, dark yellowish brown, fine-coarse grained
1			
2	ML/sandy silt, dry, fine grained, moderate yellowish brown	ML/silt w/sand, slightly moist, fine grained, dark yellowish brown	ML/silt w/sand, dry, fine grained, pale brown
3			
4	ML/silt w/sand, slightly moist, moderate yellowish brown	ML/silt w/sand, slightly moist, fine grained dark yellowish brown	ML/sandy silt, dry fine med. grained, dark yellowish brown
5			
6			
7			
8		Boring 2	Boring 3
9	A 1405	A 1417	A 1427
	B 1409	B 1422	B 1429
10	C 1413	C 1425	C 1435

CHARACTERIZATION UNIT SAMPLING LOG

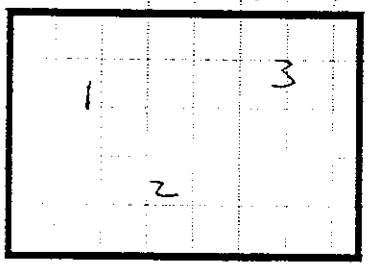
GRID NO.: G14

Project Name: Camp Pendleton OU 4 | Geologist: J. Cason Brooks

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/18/01
Time:	1440
Date Finished:	9/18/01
Time:	1520
Drilling Contractor:	Tri County Drilling
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	3"
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	bentonite
Notes:	PID = 0.0 ppm @ 1450 hrs. background and breathing zone

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

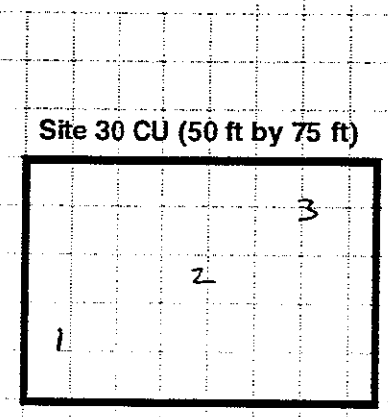
	Boring 1	Boring 2	Boring 3
0–1	SM/sandy silt, dry, fine grained, tan	SP/silty sand, dry, fine-coarse grained, moderate yellowish brown	SM/sandy silt, dry, pale brown, fine grained
2–3	ML/silt w/sand, dry, fine grained, pale brown	ML/silt w/sand, slightly moist, fine grained, pale brown	ML/sandy silt, dry, fine grained, pale brown
4–6	ML/sandy silt, slightly moist, fine grained, dark yellowish brown	ML/fine grained silt w/sand, slightly moist, pale brown	ML/silt w/sand, dry, fine grained, moderate yellowish brown
7–8			
9	A 1440	A 1450	A 1505
9	B 1443	B 1455	B 1510
10	C 1448	C 1500	C 1515

GRID NO.: G15

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01
Time: 0730
Date Finished: 9/19/01
Time: 0830
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.8 ppm breathing zone and background @ 0815

Sample Description

(USCS, color %fines % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	ML/sandy silt, dry, fine grained, pale yellowish brown	SM/sandy silt, dry, fine-coarse, smooth gravel, fine-coarse grained sand, pale brown	SM/sandy silt, dry, pale yellowish brown, fine-med. grained,
1			
2	ML/silt w/sand, dry, fine grained, pale brown	ML/silt w/sand, dry, fine-med. grained, pale yellowish brown	ML ~~SM~~/~~silty~~ silt w/sand, dry, fine grained, dark yellowish brown
3			
4	ML/silt w/sand, dry, fine grained, dark yellowish brown	ML/sandy silt, dry, fine grained, pale yellowish brown	ML/silt w/sand, dry, moderate yellowish brown, fine grained
5			
6			
7			
8			
9	A* 0735	A* 0801	A* 0816
	B 0740	B 0806	B 0821
10	C 0749	C 0810	C 0829

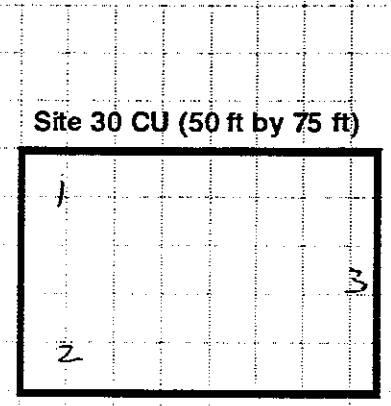
GRID NO.: G16

Project Name: Camp Pendleton OU 4

Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/19/01

Time: 0835

Date Finished: 9/19/01

Time: 0900

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 1.1 ppm breathing zone and background @ 0850 hrs.

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/silty sand, dry,	ML/sandy silt, dry,	SM/sandy silt, dry,
1	moderate yellowish brown,	fine grained,	fine grained
	fine-med grained	dark yellowish brown	pale yellowish brown
2	ML/silt w/sand, dry,	ML/silt w/clay,	ML/silt w/sand,
3	fine grained,	slight plasticity,	slightly moist,
	tan	med, dark gray,	fine grained,
4			dark gray
	ML/silt w/sand, dry,	ML/silt w/sand,	ML/silt w/ sand,
5	fine grained,	slightly moist,	slightly moist,
	pale brown	dark gray,	dark gray,
6		fine grained	fine grained
7			
8	A 0837	A 0843	A 0852
9	B 0838	B 0845	B 0855
	C 0840	C 0847	C 0857
10	D 0842	D 0850	D 0900

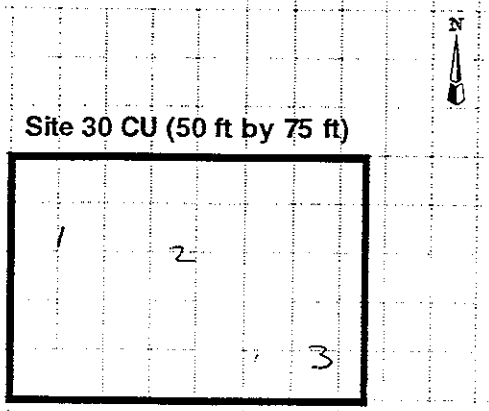
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H4

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1452
Date Finished: 9/13/01
Time: 1532
Drilling Contractor: Jo Conn, Driller
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1456

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring C
0	ML/sandy silt,	ML/silt w/sand,	ML/silt w/sand,
1	grayish brown	dusky brown,	slightly moist
	slightly moist,	slightly moist,	grayish brown,
2	fine grained	fine grained	fine grained
	ML/silt w/sand,	SM/sandy silt,	ML/silt w/sand,
3	moist, fine grained,	dusky brown,	dark yellowish brown,
	dusky yellowish	slightly moist	fine grained, moist
4	brown	fine grained	
	ML/silt w/sand,	ML/silt w/sand, moist	ML/moist, silt w/sand,
5	moist, fine grained	grayish black,	dusky yellowish brown
	dusky yellowish brown	fine grained	fine grained
6			
7			
8	A 1453	A 1502	A 1514
9	B 1455	B 1508	B 1518
	C 1458	C 1511	C 1524
10			

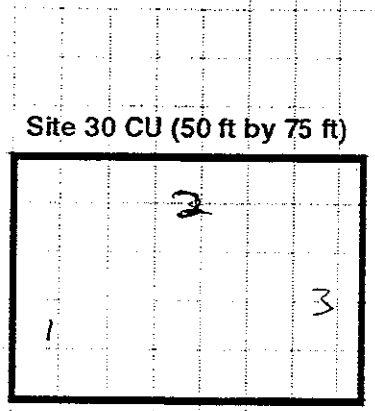
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: A5

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/14/01

Time: 0745

Date Finished: 9/14/01

Time: 0830

Drilling Contractor: Tri County

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 3.0 ppm background and breathing zone @ 0820 hrs

Sample Description

(USCS, color %fines % sand, % gravel, hardness/density moisture other)

	Boring A	Boring B	Boring 3
0	ML/silt w/sand, slightly moist, dusky yellowish brown, fine grained	ML/silt w/sand, moderate yellowish brown fine grained,	SM/silty sand dry, moderate brown, fine-medium grained
1			
2	ML/silt w/sand, dusky yellowish brown, slightly moist, fine grained	ML/silt w/sand dusky brown, slightly moist, fine grained	SM/sandy silt, dry, moderate brown, fine grained
3			
4	ML/silt w/sand, grayish black, slightly moist fine grained	ML/silt w/sand, moist, dusky yellowish brown fine grained	SM/sandy silt, moderate brown, slightly moist, fine grained
5			
6			
7			
8	A 0750	A 0807	A 0819
9	B 0753	B 0809	B 0822
	C 0758	C 0813	C 0827
10	D 0802	D 0816	D 0829

CHARACTERIZATION UNIT SAMPLING LOG

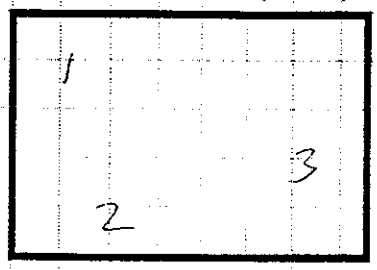
GRID NO.: H6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/14/01
Time: 0833
Date Finished: 9/14/01
Time: 0912
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color %fines % sand, % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/silty sand, dry, fine grained moderate brown	ML/silt w/sand, dry, fine grained, dark yellowish brown	ML/sandy silt, dry moderate brown, fine grained
1			
2	ML/silt w/sand, slightly moist, fine grained grayish brown	ML/silt w/sand, moist, dark gray, fine grained	ML/silt w/sand, slightly moist, moderate brown. fine grained
3			
4	ML/silt w/sand, slightly moist, fine grained moderate brown	ML/silt w/sand, moist grayish black, fine grained	ML/slightly moist, fine grained, silt w/sand, grayish brown
5			
6			
7			
8			
9	A 0833	A 0843	A 0857
	B 0837	B 0847	B 0904
10	C 0841	C 0853	C 0912

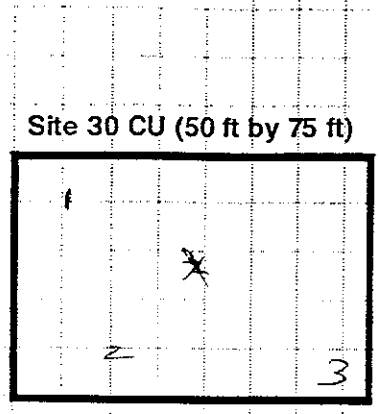
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/14/01
Time: 0915
Date Finished: 9/14/01
Time: 1029
Drilling Contractor: Tr. County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=7.7 ppm background and breathing zone @ 0920 hrs.

Sample Description

(USCS, color %fines % sand % gravel, hardness/density moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SM/ silty sand, dry, fine-medium grained, moderate yellowish brown	SM/ sandy silt, dry, pale yellowish brown, fine grained	SM/ sandy silt, dry pale brown, fine grained
2–3	ML/ silty sand, dry, fine grained, moderate yellowish brown	ML/ silt w/ sand, + clay very slight plasticity, slightly moist, fine grained, dark grayish brown	SM/ sandy silt slightly moist, fine-coarse grained, pale brown
4–5	ML/ silt w/ sand, dry pale yellowish brown, fine grained	ML/ silt w/ sand, slightly moist, fine grained, dark yellowish brown	SM/ silt w/ sand, slightly moist, dark yellowish brown
6–8			
9	A 0926	A 0940	A 1001
	B 0927	B 0948	B 1014
10	C 0933	C 0953	C 1021

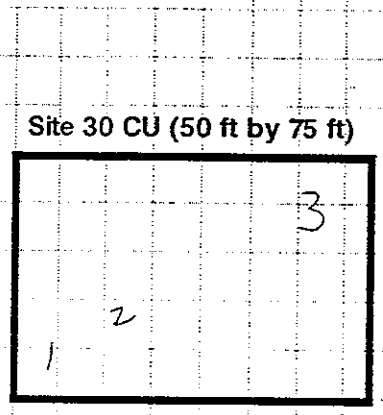
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 5/14/01
Time: 1318
Date Finished: 5/14/01
Time: 1355
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS color, %fines % sand % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, dry, fine grained, moderate yellowish brown	ML/silt w/sand dry dark yellowish brown, fine grained	SM/silty sand, dry, fine coarse grained, moderate yellowish brown
1			
2	ML/silt w/sand, slightly moist, medium gray fine grained	ML/silt w/sand, slightly moist, pale brown, fine grained	SM/silty sand, dry, moderate yellowish brown, fine grained
3			
4	ML/silt w/sand, slightly moist, dark yellowish brown fine grained	ML/silt w/sand slightly moist fine grained dark yellowish brown	ML/silt w/sand, moist, dark yellowish brown, fine grained
5			
6			
7			
8	A 1320	A 1333	A 1348
9	B 1324	B 1335	B 1349
	C 1328	C 1339	C 1352
10	D 1330	D 1342	D 1355

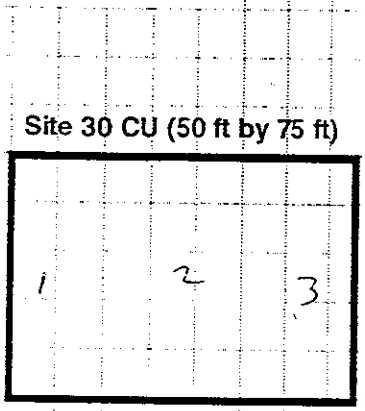
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H9

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01
Time: 0948
Date Finished: 9/17/01
Time: 1045
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: Hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: PID = 0.0 ppm background and breathing zone @ 1000 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained	ML/silt w/sand, dry, pale yellowish brown, fine grained
2–3	ML/silt w/sand, slightly moist, dark yellowish brown	ML/silt w/sand, slightly moist, fine grained moderate yellowish brown	ML/silt w/sand, slightly moist light brownish gray
4–5	ML/sandy silt, grayish black, moist, fine grained	ML/silt w/sand, moist, fine grained, brownish gray	ML/sandy silt, moist fine grained, brownish black
6–7			
8	A 0949	A 1006	A 1028
9	B 0954	B 1010	B 1036
	C 0958	C 1015	C 1040
10	D 1002	D 1022	D 1044

CHARACTERIZATION UNIT SAMPLING LOG

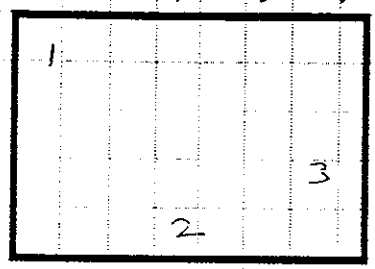
GRID NO.: H10

Project Name: Camp Pendleton OU 4 | Geologist: Jason (Gary)

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01
Time: 1235
Date Finished: 9/17/01
Time: 1325
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment:
Notes: PID = 0.0 ppm breathing zone + background @ 1257 hrs.

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0–1	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/silt w/sand, dry, grayish brown, fine grained	ML/silt w/sand, dry, grayish brown, fine grained
2–4	ML/silt w/sand, slightly moist, brownish gray, fine grained	SM/silty sand, slightly moist, fine grained, brownish gray	SM/silty sand, slightly moist, brownish gray, fine grained
5–6	SM/sandy silt, moist, fine grained, brownish black	SM/silty sand, moist, dark gray, fine grained.	SM/silty sand, moist, med. dark gray, fine grained
7–8			
9	A 1238	A 1258	A 1311
10	B 1242 C 1250	B 1303 C 1308	B 1315 C 1322

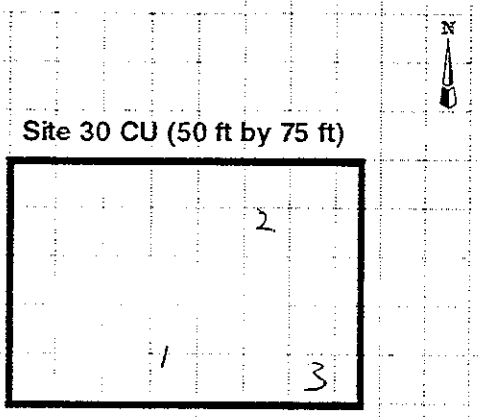
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: H11

Project Name: Camp Pendleton OU 4 Geologist: Jason Gross

Project No.: 740012 Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01

Time: 1415

Date Finished: 9/17/01

Time: 1500

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: Hand Auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=0.0 ppm background breathing zone @ 1420 hrs

Sample Description

(USCS color %fines % sand % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand, dry grayish brown, fine grained	ML/silt w/sand, ~~slightly~~ moist, ML/silt w/sand, dry fine grained grayish brown	ML/silt w/sand, dry moderate brown, fine grained
1			
2	SM/silty sand, slightly moist, med brownish gray	ML/silt w/sand, slightly moist, fine grained, dark yellowish brown	SM/sandy silt, slightly moist, fine grained, brownish gray
3			
4	SM/silty sand, moist, fine grained, med dark gray	SM/silty sand, slightly moist, fine grained brownish gray	SM/silt w/sand, grayish black, moist, fine grained
5			
6			
7			
8	A ~~[illegible]~~ 1415	A 1427	A 1440
9	B ~~[illegible]~~ 1417	B 1432	B 1445
	C ~~[illegible]~~ 1421	C 1436	C 1453
10	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~

CHARACTERIZATION UNIT SAMPLING LOG

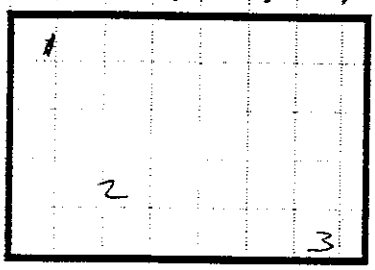
GRID NO.: H12

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01
Time: 1504
Date Finished: 9/17/01
Time: 1550
Drilling Contractor: Tr. County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID=0.0 ppm @ 1510 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0–1	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/sandy silt, dry, fine grained, dark yellowish brown	ML/silt w/sand, dry, fine grained, dark yellowish brown
2–3	ML/sandy silt, slightly moist, dark yellowish brown, fine grained	SM/silty sand, slightly moist, fine grained, dark gray	SM/silty sand, slightly moist, fine grained, pale brown
4–5	ML/silt w/sand, moist, dark gray, fine grained	ML/silt w/sand, moist, fine grained, dark gray	SM/silty sand, moist, fine grained, med. dark gray
6–7			
8–10	A 1505 B 1510 C 1514 D 1518	A 1523 B 1528 C 1533 D 1540	A 1541 B 1543 C 1547 D 1550

CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: 15

Project Name: Camp Pendleton OU 4 | Geologist: Jason Grant

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

N

Site 30 CU (50 ft by 75 ft)

0

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/21/01
Time:	1012
Date Finished:	9/21/01
Time:	1035
Drilling Contractor:	Interphase
Driller's Name:	Gil
Drilling Method:	push probe
Boring Diameter:	1 3/16"
Drill Rig:	N/A
Datum: Ground Surface	
Borehole Abandonment:	N/A
Notes:	

Sample Description

(USCS color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	ML/silt w/sand, moist, fine grained, dusky yellowish brown		
1			
2	ML/silt w/sand, moist, dark yellowish brown, fine grained		
3			
4			
5			
6			
7			
8			
9	A 1015		
10	B 1030		

CHARACTERIZATION UNIT SAMPLING LOG

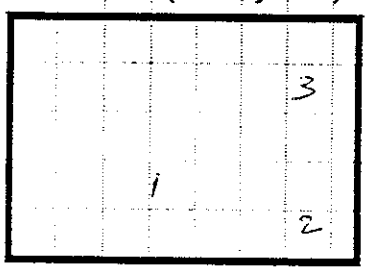
GRID NO.: I6

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/14/01
Time: 1125
Date Finished: 9/14/01
Time: 1200
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0 0 ppm background breathing zone @ 1125 hrs.

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	ML/silt w/sand, dark yellowish brown slightly moist, fine grained	ML/silt w/sand, dry, fine grained, dusky yellowish brown	SM/sandy silt, dry, fine grained, pale brown
2–3	ML/silt w/ sand, moist, fine grained, dusky yellowish brown	ML/silt w/sand dark gray, fine grained	SM/silt w/ sand dark gray, slightly moist, fine grained,
4–5	ML/silt w/sand, moist, dark gray, fine grained	ML/silt w/sand, med. dark gray, fine grained	SM/silt w/sand slightly moist dark gray, fine grained,
6–8			
9	A - 1126	A - 1138	A - 1150
	B - 1130	B - 1142	B - 1155
10	C - 1135	C - 1147	C - 1159

CHARACTERIZATION UNIT SAMPLING LOG

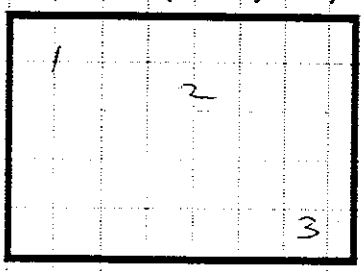
GRID NO.: 17

Project Name: Camp Pendleton OU 4 | Geologist: Jason Bracy

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



(3 is opposite corner of 1)

Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1040
Date Finished: 9/13/01
Time: 1120
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.2 ppm background & breathing zone @ 1050 hrs

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 2	Boring 1	Boring 3
0	ML/silt w/sand, dry, dark yellowish brown, fine grained	ML/silt w/sand, slightly moist, dark yellowish brown fine grained	ML/dark yellowish brown, silt w/sand, fine grained, slightly moist,
1	ML/slightly moist, fine grained, silt w/sand, dark gray, fine grained	ML/silt w/sand, moist, dark gray fine grained	SM/silty sand, slightly moist, dark gray, fine grained
2	ML/dark gray, silt w/sand, moist, fine grained	ML/silt w/sand, dark gray, fine grained, slightly moist	~~ML/silt w/sand, slightly moist, fine grained, dark yellowish brown~~
3			ML/silt w/sand, slightly moist, fine grained dark gray
4			
5			
6			
7			
8			
9	A 1041	A 1057	A 1109
10	B 1048	B 1100	B 1115
	C 1052	C 1104	C 1119

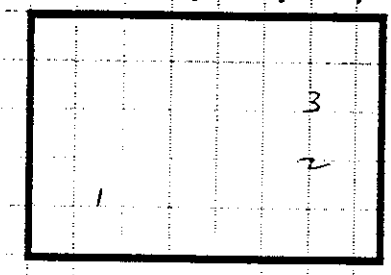
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01

Time: 0730

Date Finished: 9/17/01

Time: 0860

Drilling Contractor: Tri County Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID = 1.8 ppm background and breathing zone 0750

Sample Description

(USCS color %fines, % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0–1	SP/sandy silt, dry, fine grained, pale brown	ML/silt w/ sand, dry tan, fine grained	SM/sandy silt, dry fine grained, tan
2–3	ML/silt w/sand, slightly moist, fine grained, dusky yellowish brown	ML/silt w/sand, slightly moist, dusky yellowish brown	SM/sandy silt, dry slightly moist, dark yellowish brown
4–5	ML/silt w/sand, moist, fine grained, dusky yellowish brown	SM sandy silt ~~ML~~/moist, dark gray, fine grained ~~silty sand~~	SM/silty sand, slightly moist, dark gray
6–8			
9	A 0731	A 0742	A 0751
	B 0734	B 0746	B 0754
10	C 0739	C 0749	C 0758

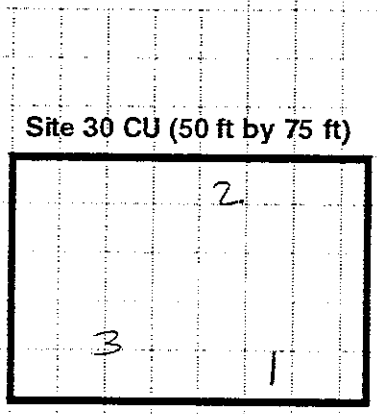
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01
Time: 0845
Date Finished: 9/17/01
Time: 0932
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: Hand Auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: Bentonite
Notes: PID = 0.1 ppm breathing zone and background @ 0905

Sample Description

(USCS color %fines % sand, % gravel, hardness/density moisture other)

	Boring 1	Boring 2	Boring 3
0	SM/silty sand, dry pale brown, fine grained	ML/silt w/sand, dry, fine grained moderate yellowish brown	SM/silty sand, dry tan, fine grained
1			
2	SM/silty sand, slightly moist fine grained, dark yellowish brown	SM/silty sand, dry fine grained pale yellowish brown	SM/sandy silt, slightly moist, fine grained dark yellowish brown
3			
4	SM/silty sand, grayish black moist, fine grained	ML/silt w/sand, moist, fine grained, dark yellowish brown	SM/silty sand, moist, fine grained, dark yellowish brown
5			
6			
7			
8	A 0847	A 0901	A 0918
9	B 0852 C 0855	B 0905 C 0909	B 0921 C 0925
10	D 0859	D 0915	D 0929

CHARACTERIZATION UNIT SAMPLING LOG

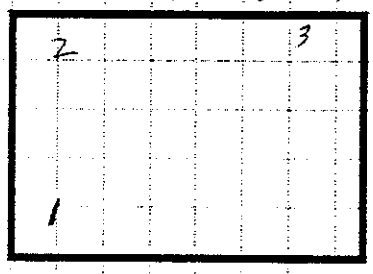
GRID NO.: 210

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01

Time: 1048

Date Finished:

Time: 1200

Drilling Contractor: Jr. Canny Drilling

Driller's Name:

Drilling Method: hand auger

Boring Diameter: 3"

Drill Rig: N/A

Datum: Ground Surface

Borehole Abandonment: bentonite

Notes: PID=1145 Ins=0.0 ppm in breathing zone and background

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring A	Boring B	Boring C
0	SM/silty sand, dry, tan, fine grained	ML/silt w/sand, slightly moist, fine grained, dusky yellowish brown	ML/silt w/sand, slightly moist, fine grained, dusky yellowish brown
1			
2			
3	ML/silt w/sand, slightly moist, fine grained, dusky yellowish brown	SM/silty sand, slightly moist, fine grained, dark yellowish brown	SM/silty sand, slightly moist, dark yellowish brown
4			
5	SM/silty sand, slightly moist, fine grained, dark gray	SM/silty sand, dark gray, fine grained, moist	SM/silty sand, moist, fine grained, dark gray
6			
7			
8			
9	A 1050	A 1115	A 1130
	B 1057	B 1120	B 1135
10	C 1105	C 1125	C 1145

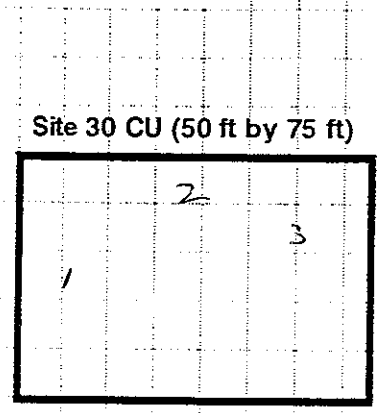
CHARACTERIZATION UNIT SAMPLING LOG

GRID NO.: I11

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started:	9/17/01
Time:	1335
Date Finished:	9/17/01
Time:	1411
Drilling Contractor:	Tri County Drilling
Driller's Name:	
Drilling Method:	hand auger
Boring Diameter:	3'
Drill Rig:	N/A
Datum:	Ground Surface
Borehole Abandonment:	bentonite
Notes:	

Sample Description

(USCS color %fines % sand % gravel, hardness/density, moisture other)

	Boring 1	Boring 2	Boring 3
0	ML/silt w/sand, dry, grayish brown, fine grained	ML/silty w/sand, dry, dusky yellowish brown, fine grained	ML/silt w/sand, dry, pale brown, fine grained
1			
2	SM/silty sand, slightly moist, fine grained, brownish gray	SM/silty sand, slightly moist, fine grained, brownish gray	SM/silty sand, slightly moist, brownish black fine grained
3			
4	ML/silt w/sand, slightly moist, fine grained dark gray	ML/silt w/sand, grayish black, moist, fine grained	SM/silty sand, moist, fine grained, dark gray
5			
6			
7			
8			
9	A 1335	A 1344	A 1358
	B 1338	B 1347	B 1401
10	C 1341	C 1356	C 1404
		D 1353	D 1412

CHARACTERIZATION UNIT SAMPLING LOG

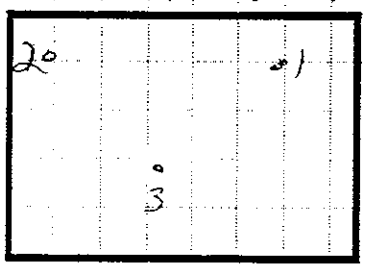
GRID NO.: J7

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/13/01
Time: 1245
Date Finished: 9/13/01
Time: 1313
Drilling Contractor: Tri County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes: PID = 0.0 ppm @ 1255

Sample Description

(USCS color %fines % sand % gravel hardness/density moisture other)

	Boring A	Boring 2	Boring 3
0	SM/sandy silt, dry, pale brown, fine grained	SM/silty sand dry, pale yellowish brown, fine grained	SM/sandy silt, dry fine grained pale brown
1			
2	SM/silty sand, slightly moist, fine grained, pale brn.	ML/silt w/sand, slightly moist, fine grained, dusky yellowish brown	SM/silty sand, dry, fine grained, ~~pale brown~~ dusky yellowish brown
3			
4	SML/silt w/sand greyish black, moist, fine grained	SM/silty sand, moist, fine grained, dark gray	SM/silty sand, moist, fine grained dark gray
5			
6			
7			
8	A 1248	A 1300	A 1310
9	B 1250	B 1304	B 1311
	C 1253	C 1308	C 1312
10	D 1257	D 1309	D 1313

CHARACTERIZATION UNIT SAMPLING LOG

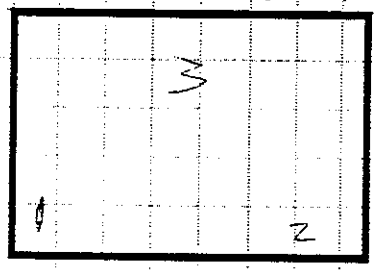
GRID NO.: J8

Project Name: Camp Pendleton OU 4 | Geologist: Jason Gross

Project No.: 740012 | Site: 30

Boring Location Detail Sketch:

Site 30 CU (50 ft by 75 ft)



Samples Collected at: 0.0-0.5
2.0-2.5
4.0-4.5

Date Started: 9/17/01
Time: 0804
Date Finished: 9/17/01
Time: 0831
Drilling Contractor: T. County Drilling
Driller's Name:
Drilling Method: hand auger
Boring Diameter: 3"
Drill Rig: N/A
Datum: Ground Surface
Borehole Abandonment: bentonite
Notes:

Sample Description

(USCS, color, %fines, % sand, % gravel, hardness/density, moisture, other)

	Boring 1	Boring 2	Boring 3
0	SM/sandy silt, dry, pale brown, fine grained	ML/silt w/sand, dry, fine grained, pale brown	ML/silt w/sand, dry, pale brown, fine grained
1			
2	ML/silt w/sand, dry, yellowish brown, slightly moist, fine grained	SM/silty sand, dry, tan, fine grained	SM/silty sand, dry, pale brown, fine grained
3			
4	SM/silty sand, dark gray, moist, dark gray	SM/silty sand, slightly moist, fine grained	SM/sandy silt, dry, slightly moist, fine grained, dark yellowish brown
5			
6			
7			
8			
9	A 0805 B 0810	A 0814 B 0817	A 0822 B 0825
10	C 0812	C 0821	C 0829

APPENDIX D5
SITE 30 GEOTECHNICAL RESULTS

PTS Laboratories
Geotechnical Services
8100 Secura Way • Santa Fe Springs • CA 90670
Phone (562) 907-3607 • Fax (562) 907-3610

November 21, 2001

Ms. Hsin-yi Lee
APCL
13760 E. Magnolia Ave
Chino, CA 91710

Re: Camp Pendleton OU 4 FS 740012
PTS File: 31613

Dear Ms. Lee:

Enclosed is final data for from your Camp Pendleton OU 4 FS 740012 Project. All analyses were performed by applicable ASTM, EPA or API methodology. Samples will be retained for 30 days before disposal unless other arrangements are made.

We appreciate the opportunity to be of service and trust these data will prove beneficial in the development of this project. Please feel free to call myself or Larry Kunkel, District Manager, should you have any questions or require additional information.

Sincerely,

PTS Laboratories, Inc.

Rick Young
Project Manager

RY/vk

encl

PTS Laboratories, Inc.

A.P.C.L.
PTS File No: 31613

PARTICLE SIZE SUMMARY
(METHODOLOGY: ASTM D422M)

PROJECT NAME: Camp Pendleton OU 4 FS 740012
PROJECT NO: NA

Sample ID	Depth, ft.	Number 4 Sieve Percent Retained	Number 10 Sieve Percent Retained	Number 200 Sieve	
				Percent Retained	Percent Passing
30-C07-Bulk A1	NA	7.48	2.28	62.50	27.73
30-C07-Bulk B1	NA	0.00	0.00	72.05	27.95
30-G08-Bulk A1	NA	5.21	4.13	65.68	24.98
30-G08-Bulk B1	NA	0.00	0.00	58.34	41.66

PTS Laboratories, Inc.

A.P.C.L.
PTS File No: 31613

PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D4464M)

PROJECT NAME: Camp Pendleton OU 4 FS 740012
PROJECT NO: NA

Sample ID	Depth, ft.	Description USCS/ASTM (1)	Median Grain Size mm	Particle Size Distribution, wt. percent						Silt & Clay
				Gravel	Sand Size			Silt	Clay	
					Coarse	Medium	Fine			
30-C07-Bulk A1	NA	Silt	0.070	0.00	0.00	7.00	40.29	46.64	6.08	52.71
30-C07-Bulk B1	NA	Silt	0.065	0.00	0.00	0.00	45.20	48.29	6.51	54.80
30-G08-Bulk A1	NA	Silt	0.048	0.00	0.00	9.43	27.82	54.50	8.24	62.75
30-G08-Bulk B1	NA	Silt	0.046	0.00	0.00	0.06	33.46	58.69	7.78	66.47

NOTE: Analysis performed on material passing #10 Sieve

(1) based on Mean from Trask

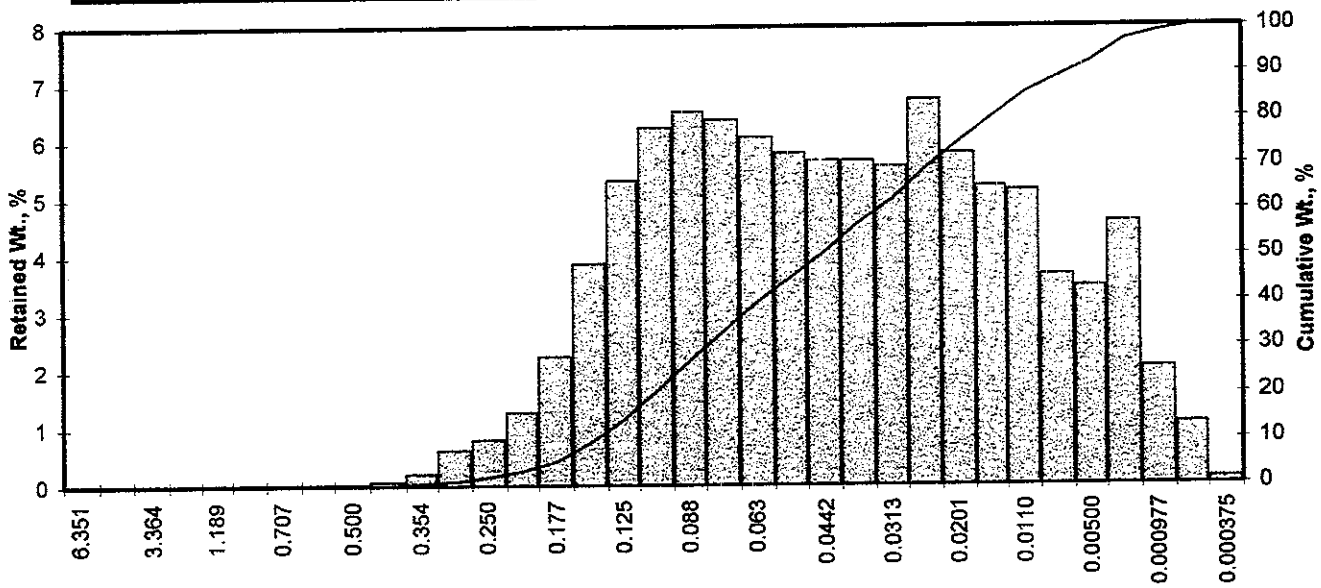
PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client: A.P.C.L.
Project: Camp Pendleton OU 4 FS 740012
Project No: NA

PTS File No: 31613
Sample ID: 30-G08-Bulk B1
Depth, ft: NA

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Particle Size, mm

Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.06	0.06	0.06
0.0139	0.354	1.50	45	0.21	0.21	0.28
0.0117	0.297	1.75	50	0.62	0.62	0.90
0.0098	0.250	2.00	60	0.81	0.80	1.70
0.0083	0.210	2.25	70	1.27	1.27	2.97
0.0070	0.177	2.50	80	2.25	2.25	5.22
0.0059	0.149	2.75	100	3.85	3.85	9.07
0.0049	0.125	3.00	120	5.31	5.31	14.38
0.0041	0.105	3.25	140	6.24	6.24	20.62
0.0035	0.088	3.50	170	6.52	6.52	27.14
0.0029	0.074	3.75	200	6.39	6.39	33.53
0.0025	0.063	4.00	230	6.06	6.06	39.59
0.0021	0.053	4.25	270	5.81	5.81	45.40
0.00174	0.0442	4.50	325	5.67	5.67	51.07
0.00146	0.0372	4.75	400	5.65	5.65	56.72
0.00123	0.0313	5.00	450	5.55	5.55	62.27
0.000986	0.0250	5.32	500	6.72	6.72	68.98
0.000790	0.0201	5.64	635	5.80	5.80	74.78
0.000615	0.0156	6.00		5.21	5.21	79.99
0.000435	0.0110	6.50		5.15	5.15	85.14
0.000308	0.00781	7.00		3.64	3.64	88.78
0.000197	0.00500	7.65		3.44	3.44	92.22
0.000077	0.00195	9.00		4.58	4.58	96.80
0.000038	0.000977	10.00		2.02	2.02	98.82
0.000019	0.000488	11.00		1.07	1.07	99.89
0.000015	0.000375	11.38		0.11	0.11	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.48	0.0071	0.180
10	2.79	0.0057	0.144
16	3.06	0.0047	0.119
25	3.42	0.0037	0.094
40	4.02	0.0024	0.062
50	4.45	0.0018	0.046
60	4.90	0.0013	0.034
75	5.65	0.0008	0.020
84	6.39	0.0005	0.012
90	7.23	0.0003	0.007
95	8.47	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median phi	4.45	4.45	4.45
Median, in	0.0018	0.0018	0.0018
Median mm	0.046	0.046	0.046
Mean phi	4.14	4.73	4.64
Mean, in	0.0022	0.0015	0.0016
Mean mm	0.057	0.038	0.040
Sorting	0.461	1.662	1.739
Skewness	0.944	0.165	0.252
Kurtosis	0.268	0.802	1.098
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

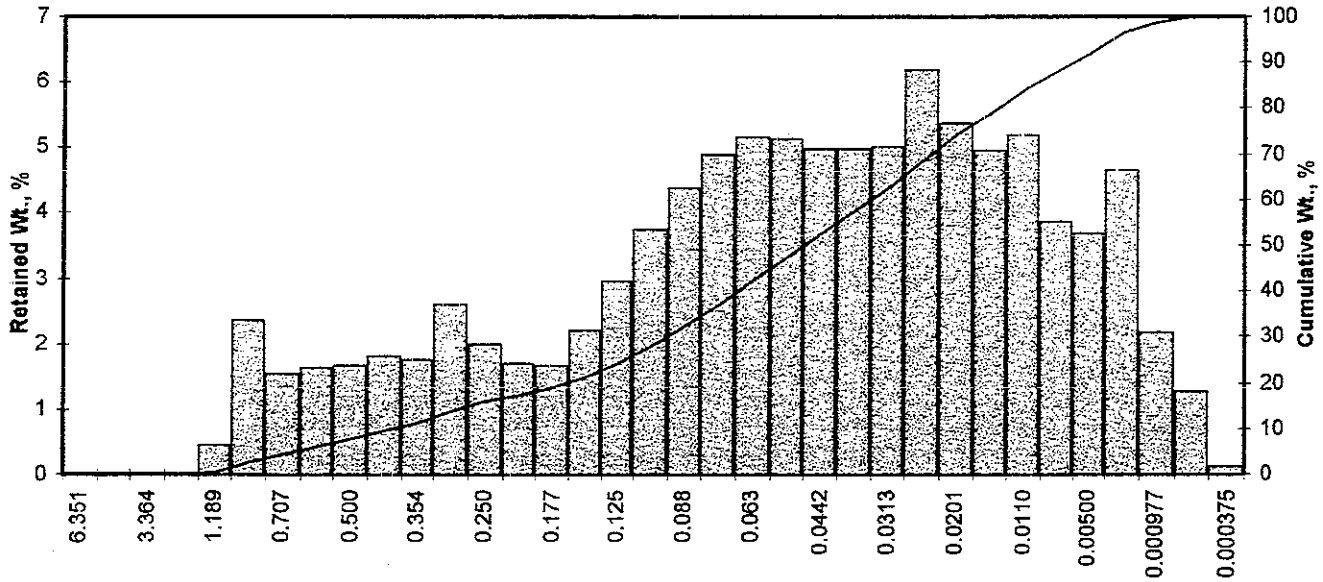
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.06
Fine Sand	200	33.46
Silt	>0.005 mm	58.69
Clay	<0.005 mm	7.78
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	A.P.C.L.	**PTS File No:**	31613
Project:	Camp Pendleton OU 4 FS 740012	**Sample ID:**	30-G08-Bulk A1
Project No:	NA	**Depth, ft:**	NA

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.45	0.45	0.45
0.0331	0.841	0.25	20	2.34	2.34	2.79
0.0278	0.707	0.50	25	1.55	1.55	4.34
0.0234	0.595	0.75	30	1.63	1.63	5.97
0.0197	0.500	1.00	35	1.65	1.65	7.62
0.0166	0.420	1.25	40	1.81	1.81	9.43
0.0139	0.354	1.50	45	1.74	1.74	11.17
0.0117	0.297	1.75	50	2.59	2.59	13.76
0.0098	0.250	2.00	60	2.00	2.00	15.76
0.0083	0.210	2.25	70	1.68	1.68	17.44
0.0070	0.177	2.50	80	1.66	1.66	19.10
0.0059	0.149	2.75	100	2.19	2.19	21.29
0.0049	0.125	3.00	120	2.97	2.97	24.26
0.0041	0.105	3.25	140	3.73	3.73	27.99
0.0035	0.088	3.50	170	4.36	4.36	32.35
0.0029	0.074	3.75	200	4.90	4.90	37.25
0.0025	0.063	4.00	230	5.17	5.17	42.42
0.0021	0.053	4.25	270	5.14	5.14	47.56
0.00174	0.0442	4.50	325	4.99	4.99	52.55
0.00146	0.0372	4.75	400	4.98	4.98	57.53
0.00123	0.0313	5.00	450	5.00	5.00	62.53
0.000986	0.0250	5.32	500	6.17	6.17	68.70
0.000790	0.0201	5.64	635	5.38	5.38	74.08
0.000615	0.0156	6.00		4.96	4.96	79.04
0.000435	0.0110	6.50		5.18	5.18	84.23
0.000308	0.00781	7.00		3.85	3.85	88.08
0.000197	0.00500	7.65		3.68	3.68	91.76
0.000077	0.00195	9.00		4.66	4.66	96.42
0.000038	0.000977	10.00		2.17	2.17	98.59
0.000019	0.000488	11.00		1.28	1.28	99.87
0.000015	0.000375	11.38		0.13	0.13	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	0.60	0.0260	0.659
10	1.33	0.0156	0.397
16	2.04	0.0096	0.244
25	3.05	0.0048	0.121
40	3.88	0.0027	0.068
50	4.37	0.0019	0.048
60	4.87	0.0013	0.034
75	5.71	0.0008	0.019
84	6.48	0.0004	0.011
90	7.34	0.0002	0.006
95	8.59	0.0001	0.003

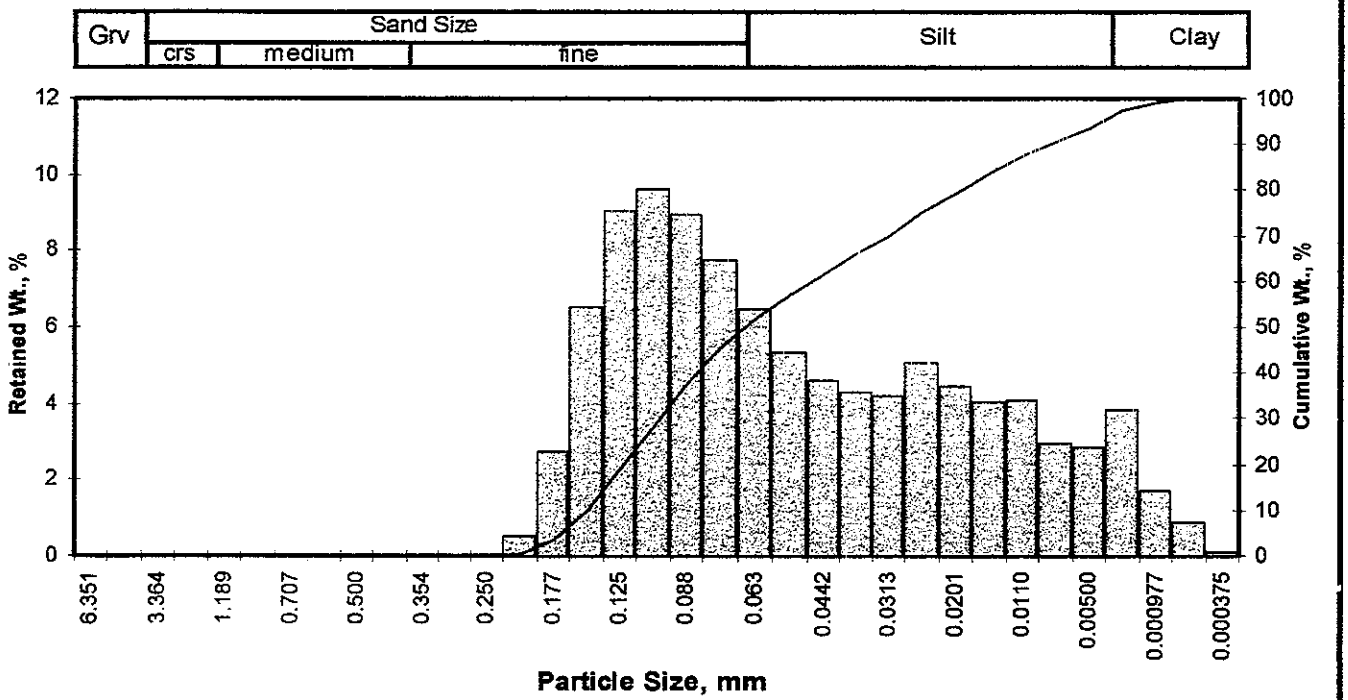
Measure	Trask	Inman	Folk-Ward
Median, phi	4.37	4.37	4.37
Median, in	0.0019	0.0019	0.0019
Median, mm	0.048	0.048	0.048
Mean, phi	3.84	4.26	4.30
Mean, in	0.0028	0.0021	0.0020
Mean, mm	0.070	0.052	0.051
Sorting	0.398	2.221	2.321
Skewness	0.996	-0.052	0.002
Kurtosis	0.130	0.798	1.232
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	9.43
Fine Sand	200	27.82
Silt	>0.005 mm	54.50
Clay	<0.005 mm	8.24
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	A.P.C.L.	**PTS File No:**	31613
Project:	Camp Pendleton OU 4 FS 740012	**Sample ID:**	30-C07-Bulk B1
Project No:	NA	**Depth, ft:**	NA



Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.00	0.00	0.00
0.0278	0.707	0.50	25	0.00	0.00	0.00
0.0234	0.595	0.75	30	0.00	0.00	0.00
0.0197	0.500	1.00	35	0.00	0.00	0.00
0.0166	0.420	1.25	40	0.00	0.00	0.00
0.0139	0.354	1.50	45	0.00	0.00	0.00
0.0117	0.297	1.75	50	0.00	0.00	0.00
0.0098	0.250	2.00	60	0.02	0.02	0.02
0.0083	0.210	2.25	70	0.50	0.50	0.52
0.0070	0.177	2.50	80	2.76	2.76	3.28
0.0059	0.149	2.75	100	6.54	6.54	9.82
0.0049	0.125	3.00	120	9.03	9.03	18.85
0.0041	0.105	3.25	140	9.62	9.62	28.47
0.0035	0.088	3.50	170	8.95	8.95	37.42
0.0029	0.074	3.75	200	7.78	7.78	45.20
0.0025	0.063	4.00	230	6.44	6.44	51.64
0.0021	0.053	4.25	270	5.32	5.32	56.96
0.00174	0.0442	4.50	325	4.59	4.59	61.55
0.00146	0.0372	4.75	400	4.30	4.30	65.85
0.00123	0.0313	5.00	450	4.17	4.17	70.02
0.000986	0.0250	5.32	500	5.07	5.07	75.09
0.000790	0.0201	5.64	635	4.43	4.43	79.52
0.000615	0.0156	6.00		4.04	4.04	83.56
0.000435	0.0110	6.50		4.09	4.09	87.65
0.000308	0.00781	7.00		2.97	2.97	90.62
0.000197	0.00500	7.65		2.87	2.87	93.49
0.000077	0.00195	9.00		3.83	3.83	97.32
0.000038	0.000977	10.00		1.69	1.69	99.01
0.000019	0.000488	11.00		0.90	0.90	99.91
0.000015	0.000375	11.38		0.09	0.09	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	2.57	0.0067	0.169
10	2.75	0.0058	0.148
16	2.92	0.0052	0.132
25	3.16	0.0044	0.112
40	3.58	0.0033	0.083
50	3.94	0.0026	0.065
60	4.42	0.0018	0.047
75	5.31	0.0010	0.025
84	6.05	0.0006	0.015
90	6.90	0.0003	0.008
95	8.18	0.0001	0.003

Measure	Trask	Inman	Folk-Ward
Median, phi	3.94	3.94	3.94
Median in	0.0026	0.0026	0.0026
Median mm	0.065	0.065	0.065
Mean, phi	3.87	4.49	4.30
Mean, in	0.0027	0.0018	0.0020
Mean mm	0.069	0.045	0.051
Sorting	0.474	1.566	1.634
Skewness	0.812	0.352	0.432
Kurtosis	0.310	0.792	1.068
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

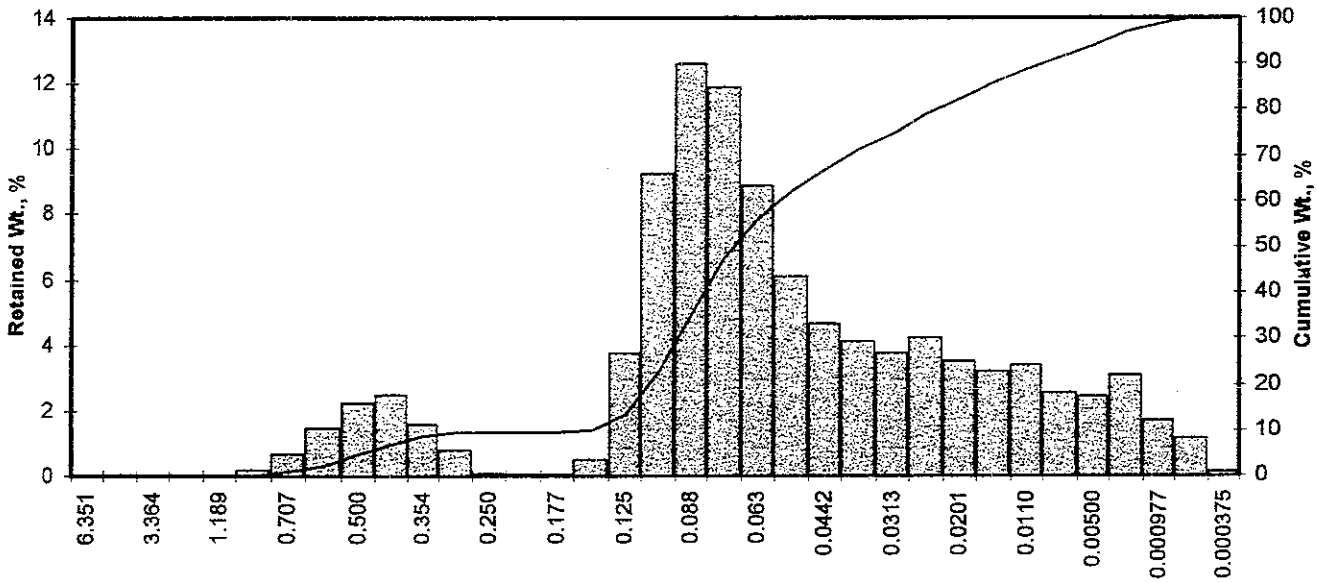
Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	0.00
Fine Sand	200	45.20
Silt	>0.005 mm	48.29
Clay	<0.005 mm	6.51
	Total	**100**

PTS Laboratories, Inc.

Particle Size Analysis - ASTM D4464M

Client:	A.P.C.L.	**PTS File No:**	31613
Project:	Camp Pendleton OU 4 FS 740012	**Sample ID:**	30-C07-Bulk A1
Project No:	NA	**Depth, ft:**	NA

Grv	Sand Size			Silt	Clay
	crs	medium	fine		



Particle Size, mm

Opening Inches	Opening Millimeters	Phi of Screen	U.S. No.	Sample Weight, grams	Increment Weight, percent	Cumulative Weight, percent
0.2500	6.351	-2.67	1/4	0.00	0.00	0.00
0.1873	4.757	-2.25	4	0.00	0.00	0.00
0.1324	3.364	-1.75	6	0.00	0.00	0.00
0.0787	2.000	-1.00	10	0.00	0.00	0.00
0.0468	1.189	-0.25	16	0.00	0.00	0.00
0.0331	0.841	0.25	20	0.19	0.19	0.19
0.0278	0.707	0.50	25	0.68	0.68	0.88
0.0234	0.595	0.75	30	1.43	1.43	2.31
0.0197	0.500	1.00	35	2.23	2.23	4.54
0.0166	0.420	1.25	40	2.46	2.46	7.00
0.0139	0.354	1.50	45	1.54	1.54	8.54
0.0117	0.297	1.75	50	0.76	0.76	9.29
0.0098	0.250	2.00	60	0.04	0.04	9.33
0.0083	0.210	2.25	70	0.00	0.00	9.33
0.0070	0.177	2.50	80	0.00	0.00	9.34
0.0059	0.149	2.75	100	0.48	0.48	9.82
0.0049	0.125	3.00	120	3.74	3.74	13.56
0.0041	0.105	3.25	140	9.23	9.23	22.79
0.0035	0.088	3.50	170	12.58	12.58	35.37
0.0029	0.074	3.75	200	11.91	11.91	47.29
0.0025	0.063	4.00	230	8.87	8.87	56.16
0.0021	0.053	4.25	270	6.11	6.11	62.27
0.00174	0.0442	4.50	325	4.62	4.62	66.89
0.00146	0.0372	4.75	400	4.08	4.08	70.97
0.00123	0.0313	5.00	450	3.72	3.72	74.69
0.000986	0.0250	5.32	500	4.21	4.21	78.90
0.000790	0.0201	5.64	635	3.49	3.49	82.39
0.000615	0.0156	6.00		3.21	3.21	85.60
0.000435	0.0110	6.50		3.38	3.38	88.98
0.000308	0.00781	7.00		2.53	2.53	91.51
0.000197	0.00500	7.65		2.41	2.41	93.92
0.000077	0.00195	9.00		3.10	3.10	97.02
0.000038	0.000977	10.00		1.70	1.70	98.72
0.000019	0.000488	11.00		1.15	1.15	99.87
0.000015	0.000375	11.38		0.13	0.13	100.00
TOTALS				**100.00**	**100.00**	**100.00**

Cumulative Weight Percent greater than			
Weight percent	Phi Value	Particle Size Inches	Particle Size Millimeters
5	1.05	0.0191	0.484
10	2.76	0.0058	0.147
16	3.07	0.0047	0.119
25	3.29	0.0040	0.102
40	3.60	0.0033	0.083
50	3.83	0.0028	0.070
60	4.16	0.0022	0.056
75	5.02	0.0012	0.031
84	5.82	0.0007	0.018
90	6.70	0.0004	0.010
95	8.12	0.0001	0.004

Measure	Trask	Inman	Folk-Ward
Median phi	3.83	3.83	3.83
Median in	0.0028	0.0028	0.0028
Median, mm	0.070	0.070	0.070
Mean, phi	3.91	4.44	4.24
Mean, in	0.0026	0.0018	0.0021
Mean mm	0.066	0.046	0.053
Sorting	0.549	1.377	1.760
Skewness	0.794	0.448	0.331
Kurtosis	0.258	1.566	1.675
Grain Size Description (ASTM-USCS Scale)		Silt (based on Mean from Trask)	

Description	Retained on Sieve #	Weight Percent
Gravel	4	0.00
Coarse Sand	10	0.00
Medium Sand	40	7.00
Fine Sand	200	40.29
Silt	>0.005 mm	46.64
Clay	<0.005 mm	6.08
	Total	100

3613

APCL

Applied P & Ch Laborat.

13760 E. Magnolia Ave., Chino CA 91710
Tel: (909) 590-1828 Fax: (909) 590-1498

Subcontract Chain of Custody

Please Print in pen

Page ____ of ____

TO: PTS

Address | Contact Larry | Tel: ( ) | Fax: ( )

APCL Project Title/Code Camp Pendleton OU4 | City | State | Zip code

Bill to (if different from above) | Sampler | Sample disposition: Date ☐client; ☐APCL

Due date ☐regular ☐rush | Quotation # | P.O.#

Client signature | Date

Sample Description	Date Collected	Time Collected	Matrix	Pres. Y/N	Filtered Y/N	Analysis items	Unit Price*	APCL Lab-ID
30-C07-BulkA1	9/20/01	930	S			Please Run Grain size distribution.		6006
30-G08-BulkA1	9/20/01	1155	↓					↓
30-G08-BulkB1	9/21/01	1120				Run through #4, #10, and #200 seives, then resubmit fractions to APCL (we will pick up)		
30-C07-BulkB1	9/21/01	1100	✓					
						Call enc with Questions 909-590-1828 x104		

Sample Conditions: Seal ☐ Intact ☐ Broken ☐ None; Temperature ☐Cold ☐ Room; Other

Relinquished by [signature] Date/Time | Received by [signature] PTS Date/Time 10-18-01 100 pm

Relinquished by Date/Time | Received by Date/Time

Relinquished by Date/Time | Received by Date/Time

Relinquished by Date/Time | Received by Date/Time

* APCL must be notified if unit price is incorrect.

APPENDIX E
CORRELATION ANALYSES FOR SITES 1D AND 30

APPENDIX E1
SITE 1D CORRELATION ANALYSIS

Site 1D Correlation Analysis

The following is an evaluation of the use of lead as an indicator analyte, or surrogate, for other metals in supplemental FS sampling. The concept behind the use of a surrogate, or proxy, COC for sampling is that one or several COCs can be used to identify areas of contamination for those COCs that are driving the risk at the site. The use of a surrogate can be appropriate if site COCs have similar release mechanisms and are therefore spatially collocated. A surrogate allows for effective characterization of the spatial distribution of those COCs that drive risk by allowing for more samples to be taken.

If one COC is primarily responsible for driving the risk at the site, then that COC can be selected as a surrogate for characterization purposes. The following evaluation of the potential use of lead as a surrogate focuses on the correlation between the concentrations of other COCs and the surrogate COC.

The supplemental FS sampling data was tabulated and plotted to evaluate the correlation between concentrations of lead vs. other COCs (i.e., antimony, arsenic, chromium, copper, iron, and zinc). Scatter plots of paired data (lead and COC of interest) in the upper 5 feet of the site are presented to graphically depict the relationship between lead and the other COCs. Data from the upper 5 feet is used because of the relative absence of COCs above the established remedial goals (RGs) below 5 feet. For each COC other than lead, a contingency table is presented. Data in the contingency tables consist of pairs between the COC of interest and lead for each given sample location. If both COCs are not detected at a given borehole and depth combination, then the pair was excluded from the contingency table. The RGs for lead and the other COC of interest in the plot are depicted as vertical and horizontal lines (respectively) in the plots.

The results for antimony, arsenic, and zinc showed a 100% positive correlation with lead. Out of the sample set of 17 samples, only one lead sample was below the RG where chromium, copper, and iron were above their respective RGs (1D-A07-B at 2.0 to 2.5 ft bgs) for a 94% positive correlation.

Site 1D
Correlation Annalysis Plots

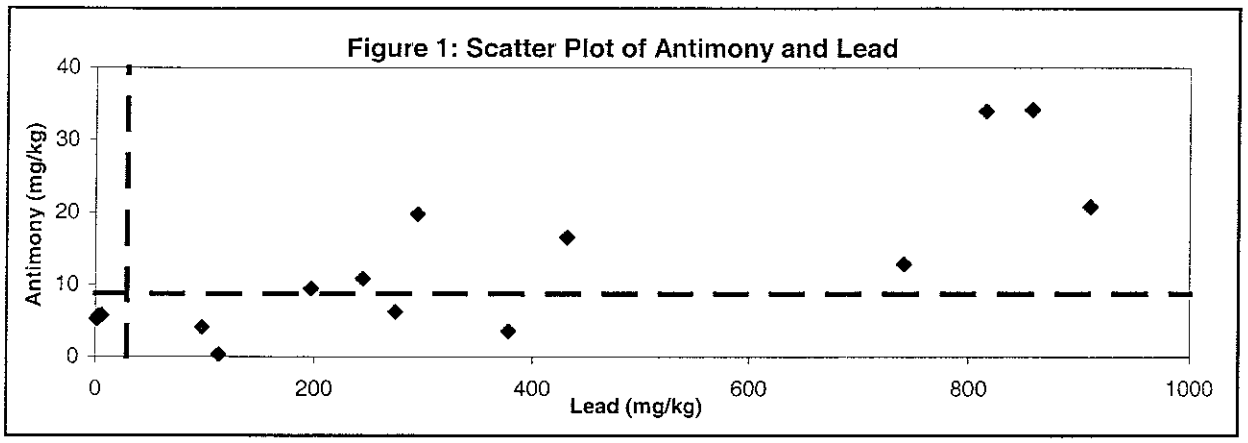


Table 1: Summary of Relationship Between Antimony and Lead

		Lead		
		<RG	>RG	Total
Antimony	<RG	5	4	9
	>RG	0	8	8
	Total	5	12	17

Table 1 shows that for all 17 values where antimony exceeded the RG (8.8 mg/kg), lead exceeded its RG (29 mg/kg) as well (100% positive correlation). Based on this data set, lead is a reasonable proxy for detecting antimony contamination.

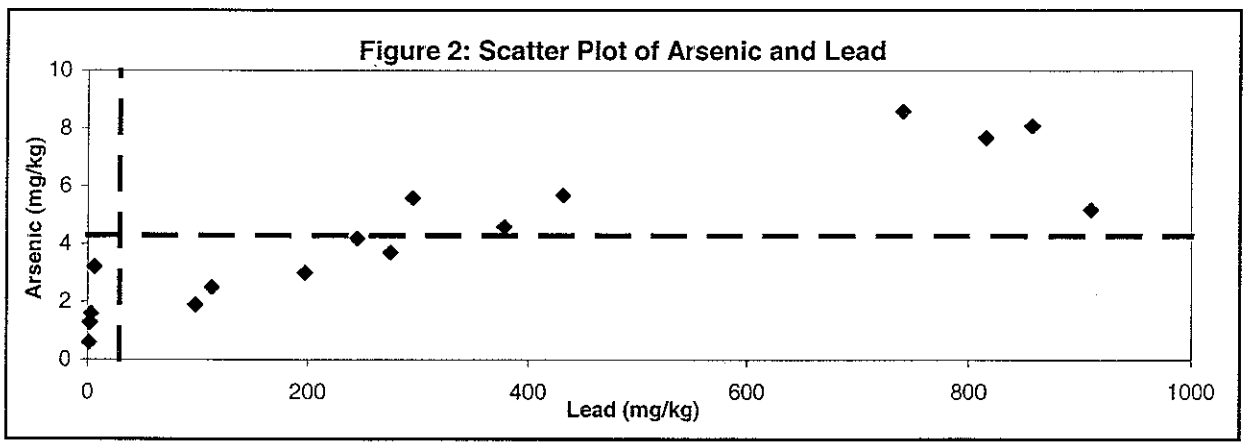


Table 2: Summary of Relationship Between Arsenic and Lead

		Lead		
		<RG	>RG	Total
Arsenic	<RG	5	5	10
	>RG	0	7	7
	Total	5	12	17

Table 2 shows that for all 17 values where arsenic exceeded the RG (4.3 mg/kg), lead exceeded its RG (29 mg/kg) as well (100% positive correlation). Based on this data set, lead is a reasonable proxy for detecting arsenic contamination.

Site 1D
Correlation Annalysis Plots

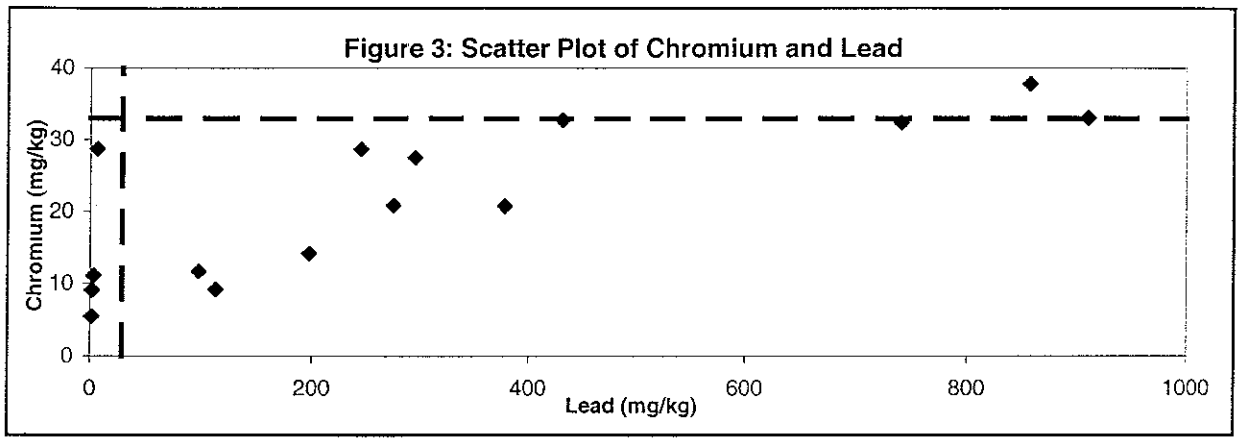


Table 3: Summary of Relationship Between Chromium and Lead

		Lead		
		<RG	>RG	Total
Chromium	<RG	4	8	12
	>RG	1	4	5
	Total	5	12	17

Table 3 shows that out of a total sample set of 17, there was only 1 instance of chromium exceeding its RG (33 mg/kg) where was lead below its RG (29 mg/kg) (94% positive correlation). This makes lead a good choice as a proxy for the detection of chromium.

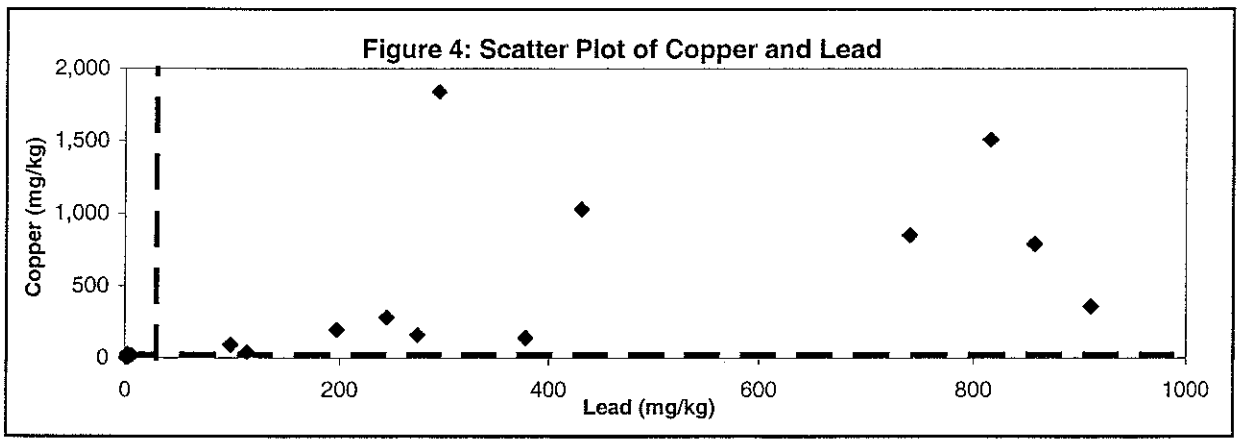


Table 4: Summary of Relationship Between Copper and Lead

		Lead		
		<RG	>RG	Total
Copper	<RG	4	0	4
	>RG	1	12	13
	Total	5	12	17

Table 4 shows that out of a total sample set of 17, there was only 1 instance of copper exceeding its RG (26 mg/kg) where was lead below its RG (29 mg/kg) (94% positive correlation). This makes lead a good choice as a proxy for the detection of copper.

Site 1D
Correlation Annalysis Plots

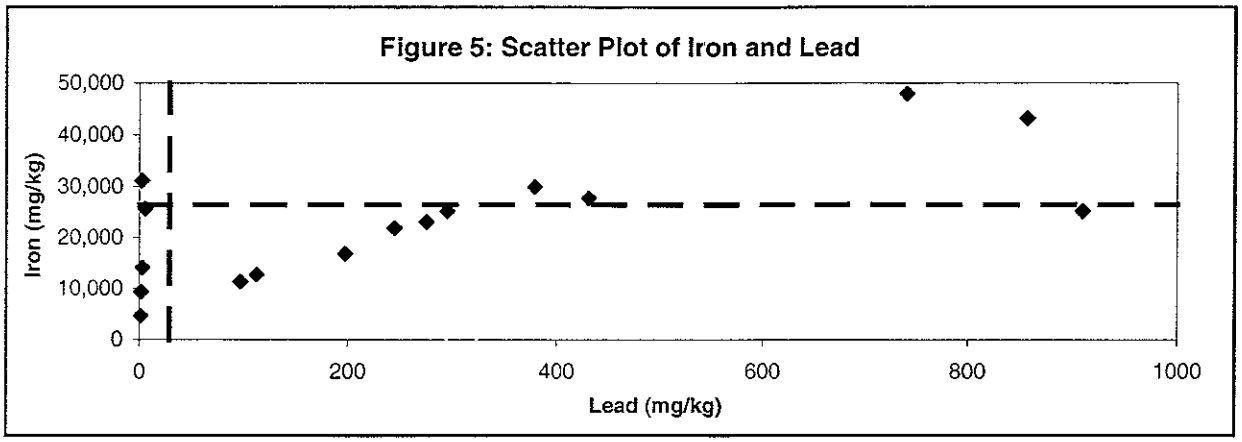


Table 5: Summary of Relationship Between Iron and Lead

		Lead		
		<RG	>RG	Total
Iron	<RG	4	7	11
	>RG	1	5	6
	Total	5	12	17

Table 4 shows that out of a total sample set of 17, there was only 1 instance of iron exceeding its RG (26,549 mg/kg) where was lead below its RG (29 mg/kg) (94% positive correlation). This makes lead a good choice as a proxy for the detection of iron.

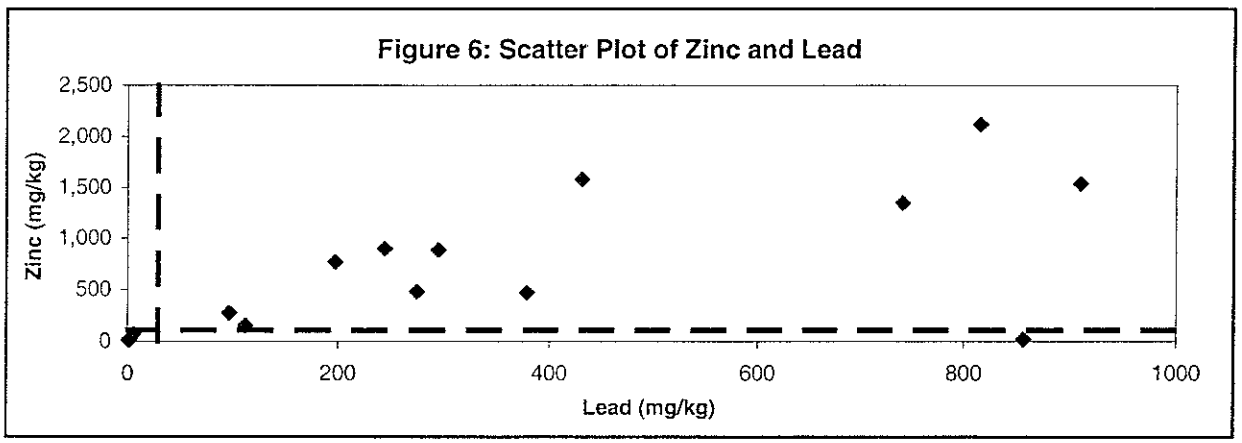


Table 6: Summary of Relationship Between Zinc and Lead

		Lead		
		<RG	>RG	Total
Zinc	<RG	5	0	5
	>RG	0	12	12
	Total	5	12	17

Table 1 shows that for all 17 values where zinc exceeded the RG (111 mg/kg), lead exceeded its RG (29 mg/kg) as well (100% positive correlation). Based on this data set, lead is a reasonable proxy for detecting zinc contamination.

APPENDIX E2
SITE 30 CORRELATION ANALYSIS

Site 30 Correlation Analysis

The following is an evaluation of the use of lead as an indicator analyte, or surrogate, for other metals in supplemental FS sampling. The concept behind the use of a surrogate, or proxy, COC for sampling is that one or several COCs can be used to identify areas of contamination for those COCs that are driving the risk at the site. The use of a surrogate can be appropriate if site COCs have similar release mechanisms and are therefore spatially collocated. A surrogate allows for effective characterization of the spatial distribution of those COCs that drive risk by allowing for more samples to be taken

If one COC is primarily responsible for driving the risk at the site, then that COC can be selected as a surrogate for characterization purposes. The following evaluation of the potential use of lead as a surrogate focuses on the correlation between the concentrations of other COCs and the surrogate COC.

The supplemental FS sampling data was tabulated and plotted to evaluate the correlation between concentrations of lead vs. other COCs (i.e., antimony, arsenic, chromium, cobalt, and copper). Scatter plots of paired data (lead and COC of interest) in the upper 5 feet of the site are presented to graphically depict the relationship between lead and the other COCs. Data from the upper 5 feet is used because of the relative absence of COCs above the established remedial goals (RGs) below 5 feet. For each COC other than lead, a contingency table is presented. Data in the contingency tables consist of pairs between the COC of interest and lead for each given sample location. If both COCs are not detected at a given borehole and depth combination, then the pair was excluded from the contingency table. The RGs for lead and the other COC of interest in the plot are depicted as vertical and horizontal lines (respectively) in the plots.

The results for antimony and arsenic showed a 100% positive correlation with lead. The results for chromium showed a 93% positive correlation with lead; one sample (30-D04-A) contained chromium at 37.5 mg/kg (slightly above its RG of 33), while lead was below its RG at that depth (5.5 mg/kg at 0.0 to 0.5 ft bgs). The results for copper showed an 87% positive correlation with lead; two samples (30-B06-C and 30-D04-A) where copper was detected at 28.3 and 30.5 mg/kg, respectively (slightly above its RG of 26 mg/kg), while lead was below its RG in those samples. The results for cobalt showed an 87% positive correlation with lead; two samples (30- F17-C and 30-D04-A) where cobalt was detected at 13.8 and 19 mg/kg, respectively (slightly above its RG of 13 mg/kg), while lead was below its RG in those samples.

Site 30
Correlation Analysis Plots

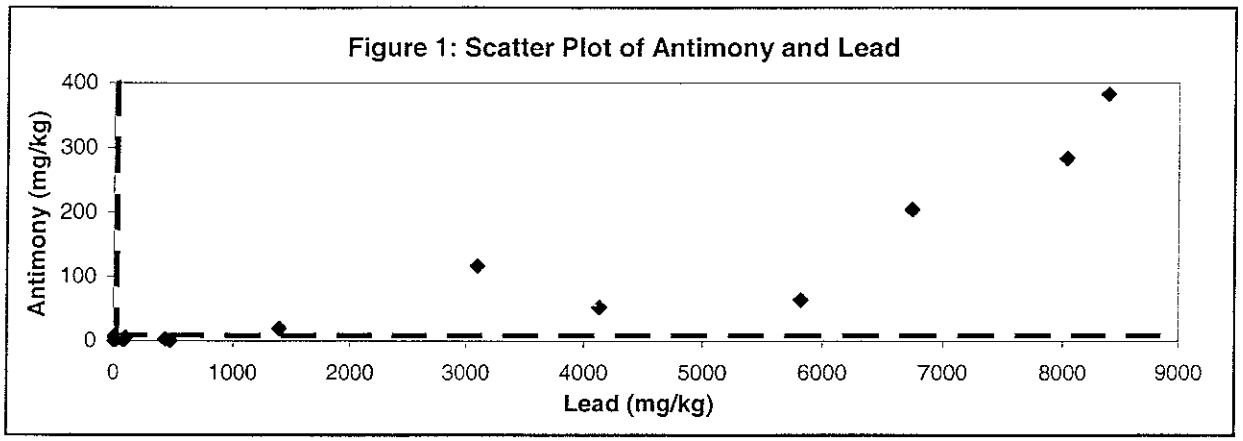


Table 1: Summary of Relationship Between Antimony and Lead

		Lead		
		<RG	>RG	Total
Antimor	<RG	4	3	7
	>RG	0	8	8
	Total	4	11	15

Table 1 shows that for all 15 values where antimony exceeded the RG (8.8 mg/kg), lead exceeded its RG (29 mg/kg) as well (100% positive correlation). Based on this data set, lead is a reasonable proxy for detecting antimony contamination.

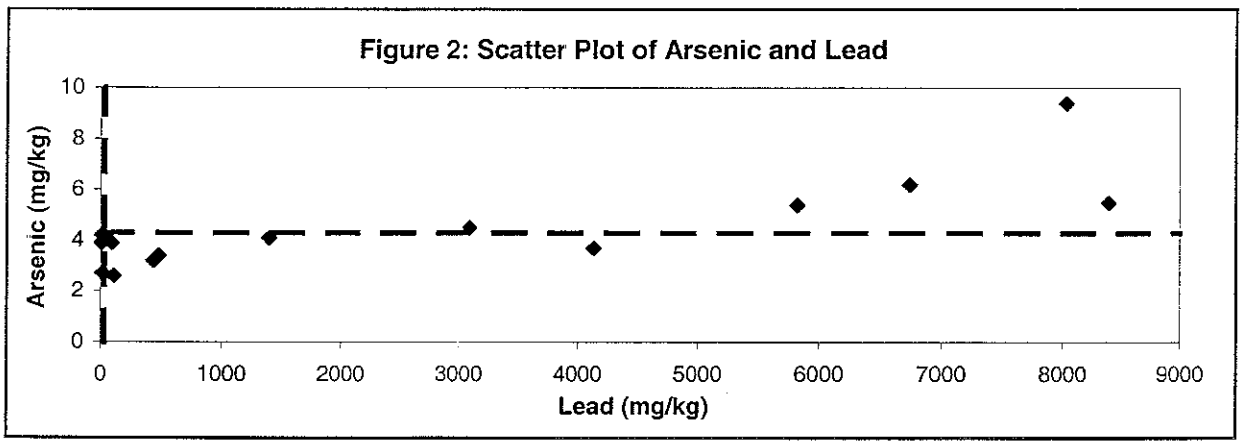


Table 2: Summary of Relationship Between Arsenic and Lead

		Lead		
		<RG	>RG	Total
Arsei	<RG	4	6	10
	>RG	0	5	5
	Total	4	11	15

Table 2 shows that for all 15 values where arsenic exceeded the RG (4.3 mg/kg), lead exceeded its RG (29 mg/kg) as well (100% positive correlation). Based on this data set, lead is a reasonable proxy for detecting arsenic contamination.

Site 30
Correlation Analysis Plots

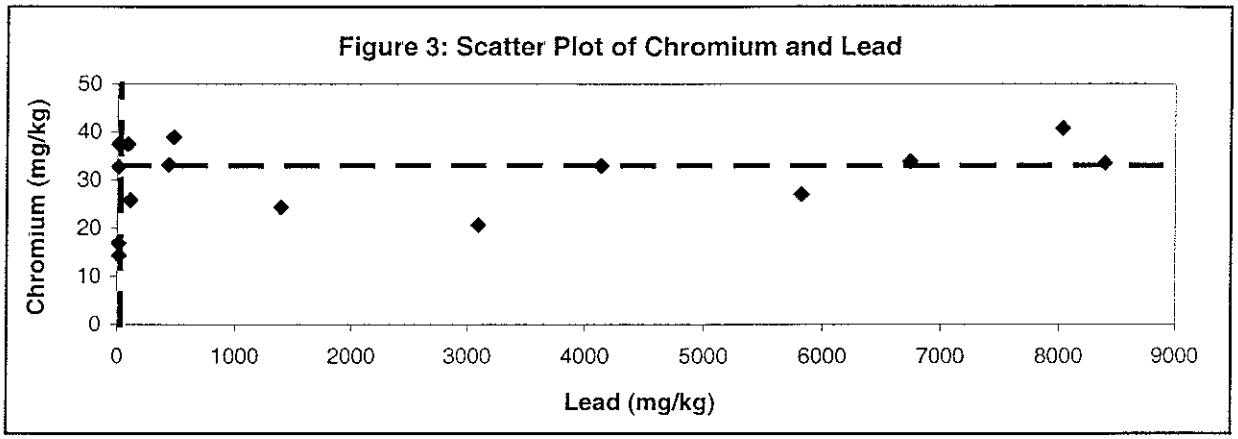


Table 3: Summary of Relationship Between Chromium and Lead

		Lead		
		<RG	>RG	Total
Chrom	<RG	3	5	8
	>RG	1	6	7
	Total	4	11	15

Table 3 shows that out of a total sample set of 15, there was only 1 instance of chromium exceeding its RG (33 mg/kg) where was lead below its RG (29 mg/kg) (94% positive correlation). This makes lead a good choice as a proxy for the detection of chromium.

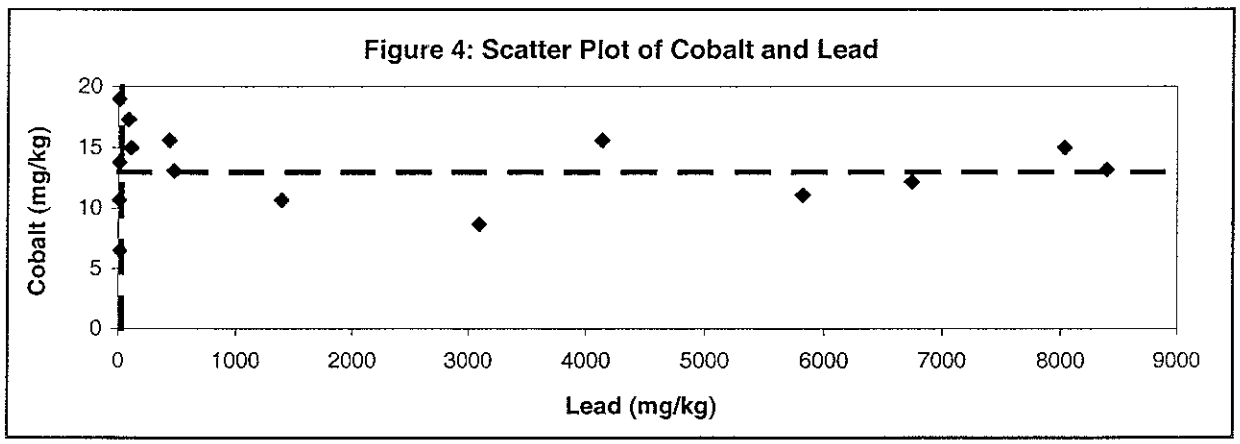


Table 4: Summary of Relationship Between Cobalt and Lead

		Lead		
		<RG	>RG	Total
Coba	<RG	2	4	6
	>RG	2	7	9
	Total	4	11	15

Table 4 shows that out of a total sample set of 15, there were only 2 instances of cobalt exceeding its RG (13 mg/kg) where was lead below its RG (29 mg/kg) (87% positive correlation). It should be noted that cobalt concentrations in those samples exceeding the RGs were 19.0 mg/kg and 13.8 mg/kg. While these levels are above the RG for cobalt, they may be naturally occurring.

Site 30
Correlation Analysis Plots

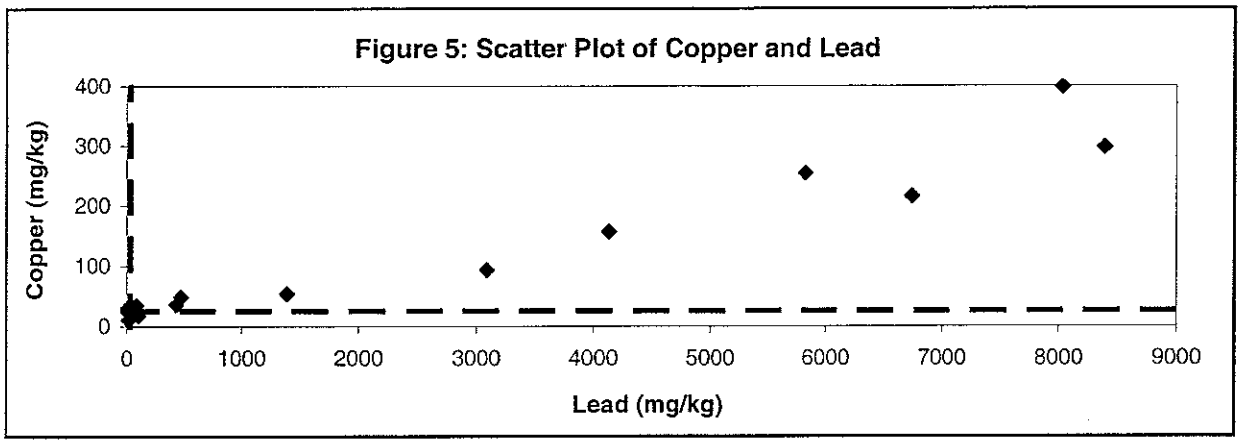


Table 5: Summary of Relationship Between Copper and Lead

		Lead		
		<RG	>RG	Total
Copp	<RG	2	1	3
	>RG	2	10	12
	Total	4	11	15

Table 5 shows that out of a total sample set of 15, there were only 2 instances of copper exceeding its RG (26 mg/kg) where was lead below its RG (29 mg/kg) (87% positive correlation). It should be noted that copper concentrations in those samples exceeding the RGs were 28.3 mg/kg and 30 5 mg/kg. While these levels are above the RG for copper, they may be naturally occurring.

APPENDIX F
DATA QUALITY ASSESSMENT

APPENDIX F
DATA QUALITY ASSESSMENT REPORT

F1 INTRODUCTION

This Data Quality Assessment (DQA) has been prepared for data collected at OU 4 Sites 1D, 1E-1, 1H and 30. Data were collected during field investigations under Naval Facilities Engineering Services Center (NFESC) Contract Number GS-10F-0179J, Delivery Order N68711-00-F-7907. Environmental samples were collected at Marine Corps Base (MCB) Camp Pendleton from August 27 through October 15, 2001.

The samples were collected and analyzed in accordance with the Draft Final Quality Assurance Project Plan (QAPP) for Supplemental OU 4 Remedial Investigation/Feasibility Study for MCB Camp Pendleton, California (Parsons, 2001b). The analytical results were validated by Laboratory Data Consultants, Carlsbad, California using the following guidelines:

- Draft Final Quality Assurance Project Plan Supplemental OU 4 Remedial Investigation/Feasibility Study for Marine Corps Base Camp Pendleton, March 2001
- USEPA, Contract Laboratory Program National Functional Guidelines for Organic Data Review, October 1999
- USEPA, Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, February 1994, and
- USEPA SW 846, Third Edition, *Test Methods for Evaluating Solid Waste*, update 1, July 1992; update IIA, August 1993, update II, September 1994; update IIB, January 1995; update III, December 1996.

For the purposes of this report, validation procedures are described as Level III with 20 percent of the data validated at Level IV, and are defined in Section F2.1. This report discusses the data validation process, analytical methods performed, and results of the validation review.

F1.1 Project Data Uses

The primary objective of the environmental investigations conducted at MCB Camp Pendleton was to assess the lateral and vertical extent of contaminants at the OU 4sites. The data collected during these investigations may be used for one or more of the following purposes:

- To determine distribution of contamination at each site and their impact on underlying groundwater;
- To assess human health risk and/or ecological risk;
- To obtain the data needed to evaluate the effectiveness of specific remedial alternatives;
- To establish site-specific remediation goals that minimize or eliminate potential risk to receptors and limit off-site migration of site-related contamination; and
- To implement the approved remedial action.

Quality assurance and quality control (QA/QC) were ensured through appropriate sample collection, preservation, and transportation methods, as well as through laboratory performance within project-specific analytical protocols.

F1.2 Project Data Quality Objectives (DQOs)

The project DQOs were designed to obtain data results that were valid, reliable, defensible, and of known precision and accuracy. Laboratory QA efforts ensured that:

- Analytical procedures provided sufficient, accuracy and precision to reliably quantify contaminant levels in the environmental samples;
- Analyzed portions were representative of each sample; and
- Results obtained from analysis of each sample were comparable to those obtained from analysis of other similar samples.

DQOs were developed in general accordance with the seven-step DQO process presented in the EPA QA/G-4 (2000) guidance. Table 2-1 of the QAPP (Parsons, 2001b) summarizes the results of the DQA process for the supplemental RI/FS at Sites 1D, 1E-1, 1H, 30 and 22/23 Area. The analytical levels for this project's DQOs conform to the following two USEPA-defined categories of data:

- Screening Data with Definitive Confirmation - Screening data are generated by rapid, less precise methods of analysis with less rigorous sample preparation. Sample preparation steps may be restricted to simple procedures such as dilution with a solvent, instead of elaborate extraction/digestion and cleanup. Screening data provide analyte identification and quantification, although the quantification may be relatively imprecise. Results of field laboratory analyses conducted at the site will be considered screening-category data
- Definitive Data - Definitive data are generated using rigorous analytical methods, such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce tangible raw data (e.g., chromatograms, spectra, digital values) in the form of hard-copy printouts or computer-generated electronic files. Data may be generated at the site or at an off-site location, as long as the QA/QC requirements are satisfied. For data to be definitive, either analytical or total measurement error must be determined. Results of fixed-based laboratory analyses of samples collected at the site will be considered definitive data.

This DQA report evaluates the data collected at MCB Camp Pendleton for usability in accordance with the project DQOs.

F2 DATA REVIEW PROCESS

Data validation included a review of data results to assess data usability and application of data qualifiers to the analytical results based on adherence to method protocols and project-specific QA/QC limits.

F2.1 Data Validation

A complete validation of all definitive analytical data for soil and groundwater samples was performed. All data were validated at Level III, and 20 percent of the data were reviewed to Level IV as described below.

Level III validation consisted of examining the analytical summary data deliverables to determine data quality. QC data reviewed for Level III include:

- Analytical holding times
- Initial and continuing calibration
- Method blanks (MB)

- Trip blanks (TB)
- Equipment blanks (EB)
- GC/MS instrument performance check
- ICP Interference Check Sample (ICS) Analysis
- Matrix spikes/matrix spike duplicates (MS/MSD)
- Laboratory duplicates
- Field replicates
- Laboratory control samples (LCS)
- Internal standards
- ICP serial dilution
- Surrogate spikes
- Chain of custody
- Sample temperatures upon receipt by the laboratory.

Level IV validation includes the Level III criteria listed above and includes the following additional reviews:

- Chromatograms and spectra for organic analyses
- Review of the quantitation and calculation algorithms for each analysis
- Transcription check.

Data qualifiers were applied to analytical results during the data validation process, based on adherence to method protocols and QA/QC limits with results of the validation described in Section F5. All data were validated using method-applicable guidelines defined in Tables 8-1 and 8-2 of the QAPP (Parsons 2001b). These validation guidelines were developed in accordance with the National Functional Guidelines for Organic Data Review (USEPA 1999d) and the National Functional Guidelines for Inorganic Data Review (USEPA 1994d) and reference to the required methods when the method is not defined as part of the USEPA guidance.

Tables 8-1 and 8-2 of the QAPP contain expanded validation criteria developed to address consistent use of professional judgment. All QC guidelines are specified in the analytical method protocols, or in the QAPP (Parsons, 2001b) when specifications differ from method protocols.

The following definitions provide explanations of the USEPA (1994d and 1999d) qualifiers assigned to analytical results during data validation. The data qualifiers described below were applied to both inorganic and organic results:

U - The analyte was analyzed for and is not present above the reported practical quantitation limit (PQL).

J - The analyte was analyzed for and was positively identified, but the associated numerical value may not be consistent with the amount actually present in the environmental sample due to values exceeding a specific Quality Control (QC) limit. The data should be considered as a basis for decision-making per the

affect of the QC violation (or bias) on the data. These data are usable for most project purposes.

J1 - The analyte was analyzed for and positively identified. The analyte was quantified below the PQL and above the method detection limit.

R - The data are rejected as unusable for all purposes. The analyte was analyzed for, but the presence or absence of the analyte was affected by a QC violation that renders the final result as unusable. Resampling and reanalysis are necessary to confirm the presence or absence of the analyte.

UJ - The analyte analyzed for was not present above the reported PQL. The associated numerical value may not accurately or precisely represent the concentration necessary to detect the analyte in the sample.

F3 SAMPLE COLLECTION

All sample collection and handling procedures are described in the QAPP (Parsons, 2001b) and the Draft Final OU 4 Supplemental Feasibility Study Field Sampling Plan (FSP) for Sites 1D, 1E-1, 1H, 30 and 22/23 Area (Parsons, 2001a). Table 2-3 in the QAPP lists analytical holding times, sample containers, and preservation requirements for all methods used. Definitions of field-specific QA/QC samples (i.e., field duplicates and field blanks) may be found in Section A4.0 of the QAPP.

F4 LABORATORY ANALYTICAL METHODS AND PROCEDURES

Applied Physics & Chemistry Laboratory (APCL) Chino, California was the contract laboratory for all soil and groundwater analyses. Samples for dioxin analysis were subcontracted to Triangle Laboratories, Durham, North Carolina. Samples for geotechnical analyses were subcontracted to PTS Laboratories, Santa Fe Springs, California. The analytical methods performed are listed in Table 6-1 of the QAPP. All analytical methods used were in accordance with the QAPP and based on methods described in the following documents:

- Methods for Chemical Analysis of Water and Wastes (USEPA 1983)
- Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, Third Editions Update IIB (USEPA 1996d).

Section 7.0 of the QAPP defines laboratory-specific method QA/QC requirements (i.e., laboratory control sample (LCS), matrix spike/ matrix spike duplicate (MS/MSD), and method blanks). Table 7-1 in the QAPP defines a summary of laboratory internal QC procedures. The practical reporting limits (PRLs) for soil and water are found in Table 6-2 in the QAPP. The QA objectives for precision and accuracy are defined in Table 2-2 in the QAPP.

F5 DATA QUALITY

Data quality for each QC parameter where exceptions were noted during the validation is summarized in this section. All frequency requirements specified in the QAPP for field sample collection of QA/QC samples (MS/MSDs, field replicates, and trip blanks) were met with exceptions noted below. For GC/MS analyses, instrument performance checks were run at the proper frequency and ion abundance criteria were met. Table F5-1 summarizes the impact of data qualifiers on results obtained from each site.

F5.1 Holding Time and Sample Handling

Data have been qualified for exceeding holding time criteria as summarized in Table F5-2. Data are possibly biased low due to loss and degradation of the compounds. Results obtained from samples analyzed past holding times are qualified as estimates ("J" detects, "UJ" non-detects). However, holding times that were exceeded by greater than two times the established holding time resulted in the rejection of non-detected results. All sample handling and cooler temperature requirements were met.

F5.2 Initial and Continuing Calibration

Organic initial and continuing calibration response factors (RF), relative standard deviations (RSD), and continuing calibration percent difference (%D) of the RFs were out-of-control for numerous VOC and SVOC compounds. When an RF is below the QC limit, positive data are qualified as estimated; whereas, non-detect data are rejected and unusable for project purposes. As the number decreases, the sensitivity of the instrument to detect the compound decreases and false negatives may be reported. When the %D of the RF grossly exceeds the QC limit (> 2 x control limit), all data for that compound are rejected. When the %D of the RF exceeded the acceptance limit, all associated data for that compound are flagged as estimates ("J" detect, "UJ" non-detect). In cases where the %RSD exceeds the acceptance criteria, the laboratory used a calibration curve to evaluate the compound. Coefficients of determination (r^2) are calculated and when r^2 is less than 0.990 all associated data for the impacted compound are flagged as estimates ("J" detects, "UJ" non-detects). Table F5-3 shows the impact of these qualifications on this project. It should be noted that the highest calibration standard check was not performed for metals and organic lead analyses; however, this did not result in the flagging of data.

F5.3 Matrix Spikes and Matrix Spike Duplicates

MS/MSD validation qualifiers were applied only to the parent sample from a non-compliant MS/MSD. Sample results were not qualified on an analytical batch basis. Table F5-4 shows the overall project impact of the sample results based on MSD/duplicate precision violations. Table F5-5 shows the overall project impact of the sample results based on MS recoveries outside established control limits. Out-of-control analytes are considered related to matrix interference. For inorganic analyses, a matrix duplicate was sometimes performed rather than an MSD. MS/MSD analysis was not performed on several wet chemistry analytical batches and dioxins (method 8280A); however, data qualifiers were not added to the analytical results. Analytical performance was evaluated based on LCS recovery. MS and duplicate analysis was not performed for organic lead analyses and some mercury analyses; however, data qualifiers were not added to the analytical results. Analytical precision was evaluated based on LCS recovery.

F5.4 Surrogates

Surrogates are non-naturally occurring compounds similar to target analytes in chemical composition and behavior in the analytical process. Surrogate recoveries are used to ascertain analytical performance for each individual sample. Surrogate recoveries were above the upper limit for a number of project samples. Table F5-6 shows the impact of out-of-control surrogate spikes on the project data set. Impacted sample results were flagged as estimated (Site 1E-1).

F5.5 Laboratory Control Samples

The laboratory control sample (LCS) is a measure of laboratory accuracy for a pristine matrix. The LCS aids to determine if laboratory performance is acceptable in the absence of matrix effects. Table F5-7 shows the impact of data qualified for out-of-control LCS measurements.

F5.6 Internal Standards

Internal standards performance ensures that GC/MS sensitivity and response are stable during each analysis. Internal standard recoveries were low for some dioxin analyses. Affected results were qualified as estimated values. Table F5-8 shows the impact of data qualified for out-of-control internal standards.

F5.8 ICP Serial Dilution

Serial dilution of samples analyzed by ICP is performed to assess whether or not significant physical or chemical interferences exist due to sample matrix. If results obtained from the initial or diluted sample analysis differ by more than 10 percent, data are qualified as estimated values. Table F5-9 shows the impact of ICP serial dilution violations on project data.

F5.9 Method and Field Blanks

Blank contamination was present in both laboratory and field blanks resulting in data qualification. The highest concentrations of an analyte detected in any blank (method, equipment or trip) are identified. All associated samples with concentrations for that analyte less than 5 times the blank concentration (or 10 times for common laboratory contaminants) are qualified as non-detect. Data are considered to be fully usable as undetected values for project purposes. Common laboratory contaminants are methylene chloride, 2-butanone (MEK), toluene, acetone and phthalates. Table F5-10 shows the impact of blank contamination on project data.

F5.10 Quantitation and Project Reporting Limits (PRLs)

Several organic analytes and geochemical parameters exceeded PQLs set forth in the QAPP. However, to meet the QAPP PQLs the laboratory was asked to report and flag data detected below the PQL and method detection limit (MDL). The MDLs in most cases met the PQL with few exceptions. Dioxin/furan PQLs were exceeded in samples analyzed by method 8280A. Samples escalating risk calculations were reanalyzed by method 8290 and met project PQLs. Ranges of laboratory PQLs and MDLs have been added to analytical tables.

F5.11 Field Duplicates

Field duplicate validation qualifiers were applied only to the duplicate pair for non-compliant soil and water samples. Variability was observed in soil field duplicate results due to matrix heterogeneity with the variance increasing as the RPD value increases. Sample results were not qualified on an analytical batch basis. When one sample of a duplicate pair was reported non-detect and the other reported detect, the RL of the non-detect sample was used to calculate the RPD; however, RPDs were not calculated when the detected concentration was within two times the reporting limit which is considered acceptable precision. RPDs were not calculated for rejected data.

F6 SUMMARY OF PRECISION, ACCURACY, REPRESENTATIVENESS, COMPARABILITY, AND COMPLETENESS

DQA criteria were used to evaluate the quality of the field sampling efforts, field screening results, and laboratory results for compliance with project DQOs. DQA criteria are expressed in terms of analytical precision, accuracy, representativeness, comparability, and completeness (PARCC). Procedures used to assess data accuracy and precision are in accordance with the respective analytical methods and QAPP requirements. Section F5.11 discusses the results of field precision measurements. Data completeness is the percentage of laboratory measurements judged to be valid on a method-by-method basis. Overall laboratory data completeness for this project was 99 percent usable, which exceeds the 90 percent criteria established in the QAPP. Comparability of data collected for this project was ensured by adherence to standard field measurement procedures, standard sample collection procedures, and standard reporting methods (including consistent units). To support the comparability of fixed-base laboratory data, analytical results were obtained using USEPA-approved methods, where available. Representative samples were obtained by:

- Collection of samples from locations fully representing site conditions;
- Use of appropriate sampling procedures, including proper equipment and equipment decontamination; and
- Use of appropriate analytical methods for the required parameters and PQLs.

Table F5-1 Impact ata Validation
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Analysis (Method Number)	Qualifier Added	Reason for Qualification and Compounds Impacted
Site 1D		
Metals (6010B)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration (lead, cadmium, silver, molybdenum, selenium).
Metals (6010B)	J	Lab duplicate/primary sample pair exceeds 20% RPD (antimony, chromium, copper, iron, lead, nickel, molybdenum).
Metals (6010B)	J	MS/MSD RPD exceeds acceptance limit, flag added to detected concentrations (calcium).
Metals (6010B)	J	ICP serial dilution performed (not required) and exceeded 10% D, flag added if compound detected (calcium, potassium, aluminum, nickel, lead).
Metals (6010B)	UJ	ICP serial dilution performed (not required) and exceeded 10% D, flag added if compound not detected (lead).
SVOC (8270C)	UJ	CCAL exceeded 25% D criteria by more than two times (2,4-dinitrophenol; 4-nitrophenol; butyl benzylphthalate; bis(2-ethylhexyl)phthalate).
Dioxins (8280A)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration.
Dioxins (8290)	J	Internal standard recovery below acceptance range, flag added to detected compounds (OCDD, OCDF).
Dioxins (8290)	J	Reported results exceeded calibration range (2,3,7,8-TCDF, Total TCDF).
Site 1H		
Metals (6010B)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration (antimony, sodium, molybdenum).
Metals (6010B)	J	ICP serial dilution performed (not required) and exceeded 10% D, flag added if compound detected (copper, potassium).
Metals (6010B)	J	MS/MSD recoveries below acceptance limit, flag added to detected concentrations (barium).
Metals (6010B)	J	MS/MSD recoveries above acceptance limit, flag added to detected concentrations (zinc).
Metals (6010B)	J	Lab duplicate/primary sample pair exceeds 20% RPD (barium, manganese, nickel, molybdenum).
Site 30		
Metals (6010B)	J	Lab duplicate/primary sample pair exceeds 20% RPD (lead, aluminum, manganese, arsenic, nickel).
Metals (6010B)	J	ICP serial dilution performed (not required) and exceeded 10% D, flag added if compound detected (Lead, calcium).
Metals (6010B)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration.
Metals (6010B)	UJ	MS/MSD recoveries below acceptance limit, flag added to non-detect concentrations (thallium, sodium).
Metals (6010B)	J	MS/MSD RPD exceeds acceptance limit, flag added to detected concentrations (lead, zinc).
Nitroglycerine (8332)	UJ	Holding time requirements exceeded, flag added to non-detect results.
SVOC (8270C)	UJ	CCAL exceeded 25% D criteria, flag added to non-detect compounds (4-chloroaniline;hexachlorocyclopentadiene; 3-nitroaniline; 3,3'-dichlorobenzidine).

Table F5-1 Impact of Data Validation
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Analysis (Method Number)	Qualifier Added	Reason for Qualification and Compounds Impacted
		Site 1E1
Dioxins (8280A)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration.
Dioxins (8280A)	R	LCS recovery grossly exceeds upper control limit (2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,7,8,9-HpCDF).
VOC (8260B)	J	The ICAL coefficient of determination (r2) did not meet 0.990 criteria, flag added to detected compound (acetone).
VOC (8260B)	UJ	The ICAL coefficient of determination (r2) did not meet 0.990 criteria, flag added to non-detect compound (acetone).
VOC (8260B)	J	ICAL RRF below acceptance criteria, flag added to detected compounds (TBA, acetone).
VOC (8260B)	R	ICAL RRF below acceptance criteria, flag added to non-detect compounds (TBA, acetone).
VOC (8260B)	R	CCAL %D criteria grossly exceeded (greater than 2 times control limit) - (acetone).
VOC (8260B)	J	CCAL %D criteria exceeded, flag added to detected compounds (2-butanone, carbon disulfide; dichlorodifluoromethane, bromomethane, acetone, dibromomethane, bromoform; 1,1,1,2-tetrachloroethane).
VOC (8260B)	UJ	CCAL %D criteria exceeded, flag added to non-detect compounds (2-butanone, carbon disulfide; dichlorodifluoromethane, bromomethane, acetone, dibromomethane, bromoform; 1,1,1,2-tetrachloroethane).
VOC (8260B)	J	CCAL RRF below acceptance criteria, flag added to detected compounds (TBA or acetone).
VOC (8260B)	R	CCAL RRF below acceptance criteria, flag added to non-detect compounds (TBA or acetone).
VOC (8260B)	U	Compound observed in associated lab, trip or field blank. Sample result was less than 10 times blank concentration for common laboratory contaminants or less than 5 times blank concentration for other compounds (methylene chloride, acetone, 2-hexanone).
VOC (8260B)	J	Surrogate recovery above upper control limit, flag detected concentrations as estimates.
Metals (6010B)	J	Holding time requirements grossly exceeded (greater than 2 times), flag added to detected compounds (mercury).
Metals (6010B)	J	ICP serial dilution performed (not required) and exceeded 10% D, flag added if compound detected (barium, chromium, cobalt, lead, nickel, zinc).
Metals (6010B)	U	Compound observed in associated lab or field blank. Sample result was less than 5 times blank concentration.
Metals (6010B)	J	MS/MSD recoveries below acceptance limit, flag added to detected concentrations (barium, cobalt, zinc).
Metals (6010B)	UJ	MS/MSD recoveries below acceptance limit, flag added to non-detect concentrations (thallium).
Metals (6010B)	R	MS/MSD RPD grossly exceeds acceptance limit (greater than two times control limit) (zinc).
Metals (6010B)	J	MS/MSD RPD exceeds acceptance limit, flag added to detected concentrations (zinc).
SVOC (8270C)	UJ	CCAL %D criteria exceeded, flag added to non-detect compounds (4-chloroaniline; hexachlorocyclopentadiene; 3,3'-dichlorobenzidine; benzoic acid; 4,6-dinitro-2-methylphenol; benzo(g,h,I)perylene; 2,4-dinitrophenol).
SVOC (8270C)	R	CCAL %D criteria exceeded by more than 200%, flag added to non-detect compounds (3-nitroaniline; 2,4-dinitrophenol).

Table F5-2 Data Impacte Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-07	E1B-07C	8290	NORM	1,2,3,7,8-PeCDD	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total HpCDD	2.4	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,6,7,8-HpCDD	10.7	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total HpCDD	21.9	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	10	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	100	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total PeCDF	6.3	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	2,3,7,8-TCDD	0.2	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.5	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,7,8-PeCDF	0.44	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	2,3,4,7,8-PeCDF	0.67	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,7,8-PeCDD	0.08	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-01	1E1B-01B	7470A	SPLP	MERCURY	0.22	ug/L	21357	SOIL	J	26-Sep-01	31-Jan-02
1E1	B-04	E1B-04A	8290	NORM	Total HxCDF	0.64	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total HxCDD	5.9	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,7,8,9-HxCDD	0.77	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,6,7,8-HxCDD	0.69	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,7,8-HxCDD	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total HxCDF	9.1	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.94	pg/g	56607	SOIL	UJ	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,7,8,9-HxCDD	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total HxCDD	1.3	pg/g	56607	SOIL	UJ	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.85	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.5	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total TCDF	18.2	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total TCDF	0.18	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.16	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,7,8-HxCDD	0.1	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,6,7,8-HxCDD	0.1	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,7,8,9-HxCDD	0.09	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total HxCDD	0.66	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.08	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total HpCDD	0.16	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.26	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	0.86	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02

Table F5-2 Data Impacted by Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-04	E1B-04A	8290	NORM	2,3,4,6,7,8-HxCDF	0.06	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total TCDD	1.2	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-04	E1B-04A	8290	NORM	2,3,7,8-TCDF	0.06	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	1.5	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-04	E1B-04A	8290	NORM	2,3,7,8-TCDD	0.07	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,7,8-PeCDF	0.04	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total PeCDF	0.14	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total TCDD	0.18	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total PeCDD	0.27	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	2,3,4,7,8-PeCDF	0.04	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,7,8-HxCDF	0.19	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,7,8,9-HxCDF	0.25	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,6,7,8-HxCDF	0.2	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.1	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-04	E1B-04A	8290	NORM	Total HpCDF	0.09	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07A	8290	NORM	2,3,7,8-TCDD	0.2	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total TCDF	0.6	pg/g	56607	SOIL	UJ	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	2,3,7,8-TCDF	0.24	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	2,3,7,8-TCDF	1	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	1.6	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	2,3,7,8-TCDF	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,7,8-HxCDF	1.7	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total PeCDD	2.7	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,7,8-PeCDD	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total PeCDF	7.3	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	2,3,4,7,8-PeCDF	0.73	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total HpCDF	0.85	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total TCDD	0.66	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,7,8-PeCDF	0.1	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,7,8,9-HxCDD	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total HxCDD	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	1.3	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total HpCDD	0.6	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.6	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total HpCDF	0.4	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02

Table F5-2 Data Impacte Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.4	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.3	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	2,3,4,6,7,8-HxCDF	1.1	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total TCDF	7.5	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,7,8-PeCDF	0.46	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total PeCDD	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	Total HpCDF	21.6	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	2.9	pg/g	56607	SOIL	UJ	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,7,8-HxCDD	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total HxCDF	2.2	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,7,8,9-HxCDF	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	2,3,4,6,7,8-HxCDF	0.42	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,6,7,8-HxCDF	0.38	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,7,8-HxCDF	0.67	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total PeCDD	0.93	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,6,7,8-HxCDF	0.87	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	2,3,7,8-TCDD	0.19	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,7,8-PeCDD	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total TCDD	0.19	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,7,8-HxCDF	0.22	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,6,7,8-HxCDF	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	2,3,4,6,7,8-HxCDF	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,7,8,9-HxCDF	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,7,8,9-HxCDF	0.3	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total PeCDF	0.09	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,7,8-HxCDD	0.2	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	1,2,3,6,7,8-HxCDD	0.3	pg/g	56607	SOIL	R	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	Total HxCDF	0.22	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-03	E1B-03A	8290	NORM	2,3,4,7,8-PeCDF	0.09	pg/g	56607	SOIL	J	27-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	Total HpCDD	2	pg/g	56607	SOIL	UJ	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07C	8290	NORM	1,2,3,6,7,8-HxCDD	0.4	pg/g	56607	SOIL	R	26-Sep-01	12-Feb-02
1E1	B-02	E1B-02A	8290	NORM	2,3,7,8-TCDF	0.35	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total TCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total PeCDF	0.16	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,7,8-PeCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02

Table F5-2 Data Impacted by Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-02	E1B-02A	8290	NORM	Total PeCDD	0.57	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,7,8-HxCDF	0.2	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,6,7,8-HxCDF	0.14	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,7,8-PeCDF	0.08	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,7,8-HxCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,6,7,8-HxCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,7,8,9-HxCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	2,3,4,6,7,8-HxCDF	0.13	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total HpCDD	0.91	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	2,3,4,6,7,8-HxCDF	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total TCDF	0.62	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	2,3,7,8-TCDD	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	2,3,4,7,8-PeCDF	0.16	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.31	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total HpCDF	0.31	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total HxCDF	0.47	pg/g	56607A	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.49	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.25	pg/g	56607A	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	2.9	pg/g	56607A	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	1,2,3,7,8,9-HxCDF	0.1	pg/g	56607A	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total HxCDF	1.3	pg/g	56607B	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-01	1E1B-01B	7470A	TCLP	MERCURY	0.11	ug/L	21357	SOIL	J	26-Sep-01	31-Jan-02
1E1	B-03	E1B-03B	8290	NORM	2,3,7,8-TCDF	0.64	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.34	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,6,7,8-HxCDD	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,7,8-PeCDD	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total HxCDD	0.2	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,7,8-PeCDF	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	2,3,4,7,8-PeCDF	0.12	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total HpCDF	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total HxCDF	0.15	pg/g	56607A	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,7,8-HxCDD	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,7,8,9-HxCDF	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02

Table F5-2 Data Impact Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-03	E1B-03B	8290	NORM	Total PeCDF	0.35	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total TCDD	0.12	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total HpCDD	0.49	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	1.8	pg/g	56607A	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,7,8,9-HxCDD	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total TCDF	0.64	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	2,3,7,8-TCDD	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	Total PeCDD	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,7,8-HxCDF	0.1	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.2	pg/g	56607A	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07A	8290	NORM	1,2,3,4,6,7,8-HpCDF	14.8	pg/g	56607	SOIL	J	26-Sep-01	12-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,7,8-PeCDF	0.19	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total HxCDD	1.9	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,7,8,9-HxCDF	0.1	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,7,8,9-HxCDD	0.3	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.2	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total TCDD	0.1	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	2,3,7,8-TCDD	0.1	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,6,7,8-HxCDD	0.18	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	2,3,7,8-TCDF	0.63	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total TCDF	1.8	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.49	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,6,7,8-HxCDD	0.2	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total HpCDF	0.49	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8-HpCDD	1.2	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	2,3,4,7,8-PeCDF	0.17	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total PeCDF	1.1	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,7,8-PeCDD	0.1	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,6,7,8-HxCDF	0.19	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	4.7	pg/g	56607B	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	Total PeCDD	0.15	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,7,8-HxCDF	0.36	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	2,3,4,6,7,8-HxCDF	0.15	pg/g	56607B	SOIL	J	26-Sep-01	21-Feb-02
1E1	B-02	E1B-02A	8290	NORM	Total HxCDD	0.84	pg/g	56607A	SOIL	J	26-Sep-01	21-Feb-02

Table F5-2 Data Impacted by Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1E1	B-03	E1B-03B	8290	NORM	1,2,3,6,7,8-HxCDF	0.15	pg/g	56607A	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.27	pg/g	56607B	SOIL	UJ	26-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total TCDD	0.2	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	2,3,7,8-TCDD	0.2	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total TCDF	0.1	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,7,8-HxCDD	0.1	pg/g	56607B	SOIL	R	26-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,7,8,9-HxCDD	0.2	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	2,3,7,8-TCDF	0.1	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total HpCDD	0.85	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	2,3,4,7,8-PeCDF	0.09	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,7,8-HxCDF	0.28	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.44	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,7,8-PeCDF	0.24	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,7,8-PeCDD	0.23	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total HxCDD	1.4	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,7,8,9-HpCDF	0.2	pg/g	56607B	SOIL	R	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.43	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total PeCDF	0.33	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,7,8-HxCDD	0.2	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total HpCDF	0.17	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8-HpCDF	0.17	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,7,8,9-HxCDF	0.25	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total PeCDD	0.6	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	3.6	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	Total HxCDF	0.81	pg/g	56607B	SOIL	UJ	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	2,3,4,6,7,8-HxCDF	0.14	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1E1	B-08	E1B-08A	8290	NORM	1,2,3,6,7,8-HxCDF	0.15	pg/g	56607B	SOIL	J	27-Sep-01	21-Feb-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,7,8-HxCDF	0.07	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,7,8,9-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8,9-OCDD	0.11	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total HpCDF	0.11	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8,9-OCDF	0.05	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	2,3,4,6,7,8-HxCDF	0.05	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	2,3,7,8-TCDF	0.01	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02

Table F5-2 Data Impacte Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,7,8,9-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total HxCDF	0.19	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,6,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total HxCDD	0.05	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total HpCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,6,7,8-HxCDF	0.04	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8-HpCDD	0.05	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total HpCDD	0.11	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total HxCDF	0.12	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,7,8,9-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8,9-OCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	2,3,4,7,8-PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,7,8-PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,7,8,9-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	2,3,4,6,7,8-HxCDF	0.03	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8-HpCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total TCDF	0.05	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,6,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,7,8-PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.03	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total HpCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,7,8-HxCDF	0.05	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	2,3,7,8-TCDF	0.04	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,6,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,7,8,9-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02

Table F5-2 Data Impacted by Hodling Time Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date	Extraction date
1H	B-02	1HSB-02D	8280A	NORM	Total HpCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,6,7,8-HpCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,6,7,8-HxCDF	0.03	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,7,8,9-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total TCDF	0.1	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	2,3,7,8-TCDD	0.01	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total TCDD	2.4	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,7,8-PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	2,3,4,7,8-PeCDF	0.04	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	Total PeCDF	0.08	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,7,8-PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,7,8-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	2,3,7,8-TCDD	0.01	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	2,3,7,8-TCDF	0.04	ppb	56389A	SOIL	J	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total TCDF	0.09	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	2,3,7,8-TCDD	0.01	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02C	8280A	NORM	Total TCDD	2.1	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.11	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,6,7,8,9-OCDD	0.04	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,7,8-HxCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	2,3,4,6,7,8-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8,9-OCDD	0.16	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total TCDD	1.9	ppb	56389A	SOIL	UJ	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,7,8-PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	2,3,4,7,8-PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total PeCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,7,8-PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total PeCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,6,7,8-HxCDF	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	Total HpCDD	0.02	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
1H	B-02	1HSB-02D	8280A	NORM	1,2,3,4,6,7,8,9-OCDF	0.03	ppb	56389A	SOIL	R	15-Oct-01	16-Jan-02
30	D06	30-D06-A(1 TO 3)	8332	NORM	Nitroglycerin	520	ug/kg	16047	SOIL	UJ	13-Sep-01	2-Oct-01
30	H05	30-H05-C(1 TO 3)	8332	NORM	Nitroglycerin	610	ug/kg	16047	SOIL	UJ	14-Sep-01	2-Oct-01

Table F5-3 Impact of Cali on on Data Qualification
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date	ICAL	CCAL
1D	H08	1D-H08-C(1 TO 3)	SW8270C	NORM	Benzo(g,h,i)perylene	520	ug/kg	15569	SOIL	UJ	29-Aug-01		X
1D	H08	1D-H08-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15569	SOIL	R	29-Aug-01	X	X
1D	G07	1D-G07-B(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15570	SOIL	R	29-Aug-01	X	X
1D	G07 Dup	1D-G07-D(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15570	SOIL	R	29-Aug-01	X	X
1D	G09	1D-G09-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15570	SOIL	R	29-Aug-01	X	X
1D	G10	1D-G10-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15570	SOIL	R	29-Aug-01	X	X
1D	G03	1D-G03-B(1 TO 3)	SW8270C	NORM	Butyl Benzyl Phthalate	520	ug/kg	15595	SOIL	UJ	30-Aug-01		X
1D	G03	1D-G03-B(1 TO 3)	SW8270C	NORM	Bis(2-Ethylhexyl)Phthalate	520	ug/kg	15595	SOIL	UJ	30-Aug-01		X
1D	G03	1D-G03-B(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	520	ug/kg	15595	SOIL	UJ	30-Aug-01		X
1D	G03	1D-G03-B(1 TO 3)	SW8270C	NORM	4-Nitrophenol	2600	ug/kg	15595	SOIL	UJ	30-Aug-01		X
1D	D04	1D-D04-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	10000	ug/kg	15651	SOIL	UJ	05-Sep-01		X
1D	D04	1D-D04-C(1 TO 3)	SW8270C	NORM	Bis(2-Ethylhexyl)Phthalate	2100	ug/kg	15651	SOIL	UJ	05-Sep-01		X
1D	D04	1D-D04-C(1 TO 3)	SW8270C	NORM	Butyl Benzyl Phthalate	2100	ug/kg	15651	SOIL	UJ	05-Sep-01		X
1D	D04	1D-D04-C(1 TO 3)	SW8270C	NORM	4-Nitrophenol	10000	ug/kg	15651	SOIL	UJ	05-Sep-01		X
1D	J05	1D-J05-C(1 TO 3)	SW8270C	NORM	4-Nitrophenol	5200	ug/kg	15622	SOIL	UJ	31-Aug-01		X
1D	J05	1D-J05-C(1 TO 3)	SW8270C	NORM	Bis(2-Ethylhexyl)Phthalate	1000	ug/kg	15622	SOIL	UJ	31-Aug-01		X
1D	J05	1D-J05-C(1 TO 3)	SW8270C	NORM	Butyl Benzyl Phthalate	1000	ug/kg	15622	SOIL	UJ	31-Aug-01		X
1D	J05	1D-J05-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	5200	ug/kg	15622	SOIL	UJ	31-Aug-01		X
1D	C06	1D-C06-C(1 TO 3)	SW8270C	NORM	Bis(2-Ethylhexyl)Phthalate	2000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C06	1D-C06-C(1 TO 3)	SW8270C	NORM	Butyl Benzyl Phthalate	2000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C06	1D-C06-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	10000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C06	1D-C06-C(1 TO 3)	SW8270C	NORM	4-Nitrophenol	10000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C08	1D-C08-C(1 TO 3)	SW8270C	NORM	Bis(2-Ethylhexyl)Phthalate	1000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C08	1D-C08-C(1 TO 3)	SW8270C	NORM	Butyl Benzyl Phthalate	1000	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C08	1D-C08-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	5100	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	C08	1D-C08-C(1 TO 3)	SW8270C	NORM	4-Nitrophenol	5100	ug/kg	15677	SOIL	UJ	06-Sep-01		X
1D	H04	1D-H04-C(1 TO 3)	SW8270C	NORM	Bis(2-Chloroethyl)Ether	180	ug/kg	15695	SOIL	UJ	07-Sep-01		X
1D	H04	1D-H04-C(1 TO 3)	SW8270C	NORM	n-Nitrosodi-n-propylamine	120	ug/kg	15695	SOIL	UJ	07-Sep-01		X
1D	I07	1D-I07-C(1 TO 3)	SW8270C	NORM	Bis(2-Chloroethyl)Ether	170	ug/kg	15695	SOIL	UJ	07-Sep-01		X
1D	I07	1D-I07-C(1 TO 3)	SW8270C	NORM	n-Nitrosodi-n-propylamine	120	ug/kg	15695	SOIL	UJ	07-Sep-01		X
30	D06	30-D06-A(1 TO 3)	SW8270C	NORM	4-Chloroaniline	1000	ug/kg	16047	SOIL	UJ	13-Sep-01		X
30	D06	30-D06-A(1 TO 3)	SW8270C	NORM	3,3'-Dichlorobenzidine	1000	ug/kg	16047	SOIL	UJ	13-Sep-01		X
30	D06	30-D06-A(1 TO 3)	SW8270C	NORM	Hexachlorocyclopentadiene	720	ug/kg	16047	SOIL	UJ	13-Sep-01		X
30	D06	30-D06-A(1 TO 3)	SW8270C	NORM	3-Nitroaniline	2600	ug/kg	16047	SOIL	UJ	13-Sep-01		X
30	H05	30-H05-C(1 TO 3)	SW8270C	NORM	4-Chloroaniline	1200	ug/kg	16047	SOIL	UJ	14-Sep-01		X
30	H05	30-H05-C(1 TO 3)	SW8270C	NORM	3,3'-Dichlorobenzidine	1200	ug/kg	16047	SOIL	UJ	14-Sep-01		X
30	H05	30-H05-C(1 TO 3)	SW8270C	NORM	Hexachlorocyclopentadiene	860	ug/kg	16047	SOIL	UJ	14-Sep-01		X

Table F5-3 Impact of Calibration on Data Qualification
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date	ICAL	CCAL
30	H05	30-H05-C(1 TO 3)	SW8270C	NORM	3-Nitroaniline	3100	ug/kg	16047	SOIL	UJ	14-Sep-01		X
30	D07	30-D07-C(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	560	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	D07	30-D07-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2800	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	D08	30-D08-C(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	550	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	D08	30-D08-C(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2800	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	D09	30-D09-A(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	520	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	D09	30-D09-A(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	E06	30-E06-B(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	550	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	E06	30-E06-B(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	E07	30-E07-A(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	520	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	E07	30-E07-A(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	15858	SOIL	UJ	13-Sep-01		X
30	E09	30-E09-B(1 TO 3)	SW8270C	NORM	Benzo(a)anthracene	550	ug/kg	15858	SOIL	UJ	10-Sep-01		X
30	E09	30-E09-B(1 TO 3)	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	15858	SOIL	UJ	10-Sep-01		X
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	Acetone	50	ug/L	16090	Water	R	27-Sep-01	X	X
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	2-Butanone (MEK)	10	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	Carbon Disulfide	0.5	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	Dichlorodifluoromethane	0.5	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	TBA	10	ug/L	16090	Water	R	27-Sep-01	X	X
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	Acetone	50	ug/L	16090	Water	R	27-Sep-01	X	X
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	2-Butanone (MEK)	10	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	Carbon Disulfide	0.5	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	Dichlorodifluoromethane	0.5	ug/L	16090	Water	UJ	27-Sep-01		X
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	TBA	10	ug/L	16090	Water	R	27-Sep-01	X	X
1E1	B-03	1E1B-03A	SW8270C	NORM	2,4-Dinitrophenol	2900	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03	1E1B-03A	SW8270C	NORM	Hexachlorocyclopentadiene	820	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03	1E1B-03B	SW8260B	NORM	Acetone	18	ug/kg	16090	SOIL	UJ	27-Sep-01	X	X
1E1	B-03	1E1B-03B	SW8260B	NORM	TBA	22	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-03	1E1B-03B	SW8270C	NORM	Hexachlorocyclopentadiene	820	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03	1E1B-03C	SW8260B	NORM	Acetone	15	ug/kg	16090	SOIL	UJ	27-Sep-01	X	X
1E1	B-03	1E1B-03C	SW8260B	NORM	TBA	22	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-03	1E1B-03C	SW8270C	NORM	2,4-Dinitrophenol	3000	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03	1E1B-03C	SW8270C	NORM	Hexachlorocyclopentadiene	850	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	Acetone	18	ug/kg	16090	SOIL	UJ	27-Sep-01	X	X
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	TBA	21	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-03 Dup	1E1B-03D	SW8270C	NORM	2,4-Dinitrophenol	2900	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-03 Dup	1E1B-03D	SW8270C	NORM	Hexachlorocyclopentadiene	820	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-04	1E1B-04A	SW8270C	NORM	Hexachlorocyclopentadiene	790	ug/kg	16090	SOIL	UJ	27-Sep-01		X

Table F5-3 Impact of Cal ion on Data Qualification
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date	ICAL	CCAL
1E1	B-04	1E1B-04B	SW8260B	NORM	Acetone	11	ug/kg	16090	SOIL	12UJ	27-Sep-01	X	X
1E1	B-04	1E1B-04B	SW8260B	NORM	TBA	23	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-04	1E1B-04B	SW8270C	NORM	2,4-Dinitrophenol	3100	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-04	1E1B-04B	SW8270C	NORM	Hexachlorocyclopentadiene	870	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-04	1E1B-04C	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01	X	X
1E1	B-04	1E1B-04C	SW8260B	NORM	TBA	23	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-04	1E1B-04C	SW8270C	NORM	Hexachlorocyclopentadiene	910	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-08	1E1B-08A	SW8270C	NORM	Hexachlorocyclopentadiene	720	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-08	1E1B-08B	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01	X	X
1E1	B-08	1E1B-08B	SW8260B	NORM	TBA	25	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-08	1E1B-08B	SW8270C	NORM	Hexachlorocyclopentadiene	850	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-08	1E1B-08C	SW8260B	NORM	Acetone	8	ug/kg	16090	SOIL	11UJ	27-Sep-01	X	X
1E1	B-08	1E1B-08C	SW8260B	NORM	TBA	21	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-08	1E1B-08C	SW8270C	NORM	Hexachlorocyclopentadiene	830	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	Acetone	6	ug/kg	16090	SOIL	9.8UJ	27-Sep-01	X	X
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	TBA	20	ug/kg	16090	SOIL	R	27-Sep-01	X	X
1E1	B-08 Dup	1E1B-08D	SW8270C	NORM	Hexachlorocyclopentadiene	800	ug/kg	16090	SOIL	UJ	27-Sep-01		X
1E1	B-01	1E1B-01A	SW8270C	NORM	4-Chloroaniline	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01A	SW8270C	NORM	3,3'-Dichlorobenzidine	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01A	SW8270C	NORM	Hexachlorocyclopentadiene	760	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01A	SW8270C	NORM	3-Nitroaniline	2700	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-01	1E1B-01B	SW8260B	NORM	Acetone	13	ug/kg	16040	SOIL	UJ	26-Sep-01	X	X
1E1	B-01	1E1B-01B	SW8260B	NORM	TBA	22	ug/kg	16040	SOIL	R	26-Sep-01	X	X
1E1	B-01	1E1B-01B	SW8270C	NORM	4-Chloroaniline	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01B	SW8270C	NORM	3,3'-Dichlorobenzidine	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01B	SW8270C	NORM	Hexachlorocyclopentadiene	750	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-01	1E1B-01B	SW8270C	NORM	3-Nitroaniline	2700	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-02	1E1B-02A	SW8270C	NORM	4-Chloroaniline	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-02	1E1B-02A	SW8270C	NORM	3,3'-Dichlorobenzidine	1100	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-02	1E1B-02A	SW8270C	NORM	Hexachlorocyclopentadiene	750	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-02	1E1B-02A	SW8270C	NORM	3-Nitroaniline	2700	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-05	1E1B-05A	SW8270C	NORM	4-Chloroaniline	1000	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05A	SW8270C	NORM	3,3'-Dichlorobenzidine	1000	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05A	SW8270C	NORM	Hexachlorocyclopentadiene	720	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05A	SW8270C	NORM	3-Nitroaniline	2600	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-05	1E1B-05B	SW8260B	NORM	Acetone	12	ug/kg	16040	SOIL	UJ	26-Sep-01	X	X
1E1	B-05	1E1B-05B	SW8260B	NORM	TBA	19	ug/kg	16040	SOIL	R	26-Sep-01	X	X

Table F5-3 Impact of Calibration on Data Qualification
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date	ICAL	CCAL
1E1	B-05	1E1B-05B	SW8270C	NORM	Benzo(g,h,i)perylene	540	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05B	SW8270C	NORM	Benzoic acid	3600	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05B	SW8270C	NORM	4,6-Dinitro-2-methylphenol	2700	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05B	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-05	1E1B-05C	SW8260B	NORM	Acetone	11	ug/kg	16040	SOIL	R	26-Sep-01	X	X
1E1	B-05	1E1B-05C	SW8260B	NORM	TBA	23	ug/kg	16040	SOIL	R	26-Sep-01	X	X
1E1	B-05	1E1B-05C	SW8270C	NORM	Benzo(g,h,i)perylene	630	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05C	SW8270C	NORM	Benzoic acid	4200	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05C	SW8270C	NORM	4,6-Dinitro-2-methylphenol	3200	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-05	1E1B-05C	SW8270C	NORM	2,4-Dinitrophenol	3200	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-06	1E1B-06A	SW8270C	NORM	Benzo(g,h,i)perylene	540	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06A	SW8270C	NORM	Benzoic acid	3500	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06A	SW8270C	NORM	4,6-Dinitro-2-methylphenol	2700	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06A	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	16040	SOIL	R	26-Sep-01		X
1E1	B-06	1E1B-06B	SW8260B	NORM	Acetone	7	ug/kg	16040	SOIL	9.2UJ	26-Sep-01	X	X
1E1	B-06	1E1B-06B	SW8260B	NORM	TBA	18	ug/kg	16040	SOIL	R	26-Sep-01	X	X
1E1	B-06	1E1B-06B	SW8270C	NORM	Benzoic acid	3500	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06B	SW8270C	NORM	4,6-Dinitro-2-methylphenol	2600	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06B	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06C	SW8260B	NORM	Acetone	9	ug/kg	16040	SOIL	10UJ	26-Sep-01	X	X
1E1	B-06	1E1B-06C	SW8260B	NORM	TBA	21	ug/kg	16040	SOIL	R	26-Sep-01	X	X
1E1	B-06	1E1B-06C	SW8270C	NORM	Benzoic acid	3600	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06C	SW8270C	NORM	4,6-Dinitro-2-methylphenol	2700	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	B-06	1E1B-06C	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	16040	SOIL	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	TBA	10	ug/L	16041	Water	R	26-Sep-01	X	X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	Acetone	50	ug/L	16041	Water	UJ	26-Sep-01	X	X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Acetone	50	ug/L	16041	Water	UJ	26-Sep-01	X	X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Bromoform	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Bromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Carbon Disulfide	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Dibromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	1,1,1,2-Tetrachloroethane	0.3	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	Bromoform	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	Bromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	Carbon Disulfide	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	Dibromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	1,1,1,2-Tetrachloroethane	0.3	ug/L	16041	Water	UJ	26-Sep-01		X

Table F5-3 Impact of Calibration on Data Qualification
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date	ICAL	CCAL
1E1	Trip Blank	1E1-TB2	SW8260B	NORM	TBA	10	ug/L	16041	Water	R	26-Sep-01	X	X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Acetone	50	ug/L	16041	Water	UJ	26-Sep-01	X	X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Bromoform	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Bromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Carbon Disulfide	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Dibromomethane	0.5	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	1,1,1,2-Tetrachloroethane	0.3	ug/L	16041	Water	UJ	26-Sep-01		X
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	TBA	10	ug/L	16041	Water	R	26-Sep-01	X	X
1E1	B-02	1E1B-02B	SW8260B	NORM	Acetone	9.9	ug/kg	16041	SOIL	R	26-Sep-01	X	X
1E1	B-02	1E1B-02B	SW8260B	NORM	TBA	20	ug/kg	16041	SOIL	R	26-Sep-01	X	X
1E1	B-02	1E1B-02C	SW8260B	NORM	Acetone	5	ug/kg	16041	SOIL	9.8UJ	26-Sep-01	X	X
1E1	B-02	1E1B-02C	SW8260B	NORM	TBA	20	ug/kg	16041	SOIL	R	26-Sep-01	X	X
1E1	B-02	1E1B-02C	SW8270C	NORM	2,4-Dinitrophenol	2900	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-02	1E1B-02C	SW8270C	NORM	Hexachlorocyclopentadiene	800	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07A	SW8270C	NORM	2,4-Dinitrophenol	3200	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07A	SW8270C	NORM	Hexachlorocyclopentadiene	900	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07B	SW8260B	NORM	Acetone	11	ug/kg	16041	SOIL	UJ	26-Sep-01	X	X
1E1	B-07	1E1B-07B	SW8260B	NORM	TBA	20	ug/kg	16041	SOIL	R	26-Sep-01	X	X
1E1	B-07	1E1B-07B	SW8270C	NORM	2,4-Dinitrophenol	2600	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07B	SW8270C	NORM	Hexachlorocyclopentadiene	740	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07C	SW8260B	NORM	Acetone	8	ug/kg	16041	SOIL	11UJ	26-Sep-01	X	X
1E1	B-07	1E1B-07C	SW8260B	NORM	TBA	22	ug/kg	16041	SOIL	R	26-Sep-01	X	X
1E1	B-07	1E1B-07C	SW8270C	NORM	2,4-Dinitrophenol	2700	ug/kg	16041	SOIL	UJ	26-Sep-01		X
1E1	B-07	1E1B-07C	SW8270C	NORM	Hexachlorocyclopentadiene	760	ug/kg	16041	SOIL	UJ	26-Sep-01		X

Table F5-4 Impact of MSD licate Precision Violations
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	F09	1D-F09-A(1 TO 3)	6010B	NORM	Lead	63.6	mg/kg	15560	SOIL	J	28-Aug-01
30	G06	30-G06-C(1 TO 3)	6010B	NORM	Lead	697	mg/kg	15746	SOIL	J	11-Sep-01
30	G03	30-G03-A(1 TO 3)	6010B	NORM	Lead	4	mg/kg	15747	SOIL	J	11-Sep-01
1D	F02	1D-F02-B(1 TO 3)	6010B	NORM	Potassium	2180	mg/kg	15752	SOIL	J	27-Aug-01
30	A06	30-A06-A(1 TO 3)	6010B	NORM	Lead	5.1	mg/kg	15772	SOIL	J	12-Sep-01
30	C08	30-C08-C(1 TO 3)	6010B	NORM	Lead	14.6	mg/kg	15799	SOIL	J	13-Sep-01
30	F03	30-F03-A1	6010B	NORM	Lead	3.6	mg/kg	15931	SOIL	J	20-Sep-01
30	F13	30-F13-B1	6010B	NORM	Lead	12.4	mg/kg	15933	SOIL	J	20-Sep-01
30	F08	30-F08-C1	6010B	NORM	Lead	19.5	mg/kg	15932	SOIL	J	20-Sep-01
1H	B-02	1HSB-02A	6010B	NORM	Barium	239	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Manganese	906	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Molybdenum	1.6	mg/kg	16448	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Nickel	13.4	mg/kg	16448	SOIL	J	15-Oct-01
1E1	B-01	1E1B-01B	6010B	NORM	Cobalt	50.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Zinc	78.5	mg/kg	16040	SOIL	R	26-Sep-01
30	D04	30-D04-A1	6010B	NORM	Aluminum	21100	mg/kg	16461	SOIL	J	21-Sep-01
30	D04	30-D04-A1	6010B	NORM	Arsenic	3.9	mg/kg	16461	SOIL	J	21-Sep-01
30	D04	30-D04-A1	6010B	NORM	Manganese	538	mg/kg	16461	SOIL	J	21-Sep-01
30	D04	30-D04-A1	6010B	NORM	Nickel	17.7	mg/kg	16461	SOIL	J	21-Sep-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	ANTIMONY	12.9	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	CALCIUM	7760	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	CHROMIUM	32.4	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	COPPER	850	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	IRON	48000	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	LEAD	741	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	MOLYBDENUM	1.5	mg/kg	16460	SOIL	UJ	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	NICKEL	31.9	mg/kg	16460	SOIL	J	31-Aug-01

Table F5-5 Impact of Qualification Based on MS/MSD Recovery
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1H	B-02	1HSB-02A	6010B	NORM	Barium	239	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Zinc	69.9	mg/kg	16448	SOIL	J	15-Oct-01
1E1	B-01	1E1B-01B	6010B	NORM	Barium	216	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Cobalt	50.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Thallium	0.53	mg/kg	16040	SOIL	UJ	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Zinc	78.5	mg/kg	16040	SOIL	R	26-Sep-01
30	D04	30-D04-A1	6010B	NORM	Sodium	570	mg/kg	16461	SOIL	UJ	21-Sep-01
30	D04	30-D04-A1	6010B	NORM	Thallium	2.8	mg/kg	16461	SOIL	UJ	21-Sep-01
30	D04	30-D04-A1	6010B	NORM	Zinc	96.4	mg/kg	16461	SOIL	J	21-Sep-01

Table F5-6 Impact · rogate Recoveries
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1E1	Trip Blank	1E1-TB4	SW8260B	NORM	Methylene Chloride	1	ug/L	16090	Water	J	27-Sep-01
1E1	Trip Blank	1E1-TB5	SW8260B	NORM	Methylene Chloride	1	ug/L	16090	Water	J	27-Sep-01
1E1	B-03	1E1B-03A	M8015V	NORM	Gasoline	0.01	mg/kg	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03A	M8015E	NORM	Motor Oils	10	mg/kg	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	M8015E	NORM	Diesel	3	mg/kg	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	M8015E	NORM	Motor Oils	6	mg/kg	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	4-Bromofluorobenzene	110	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	Dibromofluoromethane	123	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	1,2-Dichloroethane-d4	119	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	Toluene-d8	105	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	4-Bromofluorobenzene	110	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	Dibromofluoromethane	122	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	1,2-Dichloroethane-d4	117	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	Toluene-d8	105	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	4-Bromofluorobenzene	113	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	Dibromofluoromethane	123	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	1,2-Dichloroethane-d4	119	%REC	16090	SOIL	J	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	Toluene-d8	105	%REC	16090	SOIL	J	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	2-Butanone (MEK)	6	ug/kg	16090	SOIL	J	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	Methylene Chloride	5.7	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	4-Methyl-2-pentanone	0.9	ug/kg	16090	SOIL	J	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	2-Butanone (MEK)	6	ug/kg	16090	SOIL	J	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	Methylene Chloride	7.1	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	4-Methyl-2-pentanone	1	ug/kg	16090	SOIL	J	27-Sep-01
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	Acetone	6	ug/kg	16090	SOIL	9.8UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	Methylene Chloride	5.3	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	4-Methyl-2-pentanone	0.7	ug/kg	16090	SOIL	J	27-Sep-01
1E1	Trip Blank	1E1-TB1	SW8260B	NORM	Toluene	0.5	ug/L	16041	Water	J	26-Sep-01
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Methylene Chloride	0.4	ug/L	16041	Water	5UJ	26-Sep-01

Table F5-7 Impact of Out-Of-Control LCS Recoveries
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date
1E1	B-08	1E1B-08A	8280A	NORM	2,3,4,6,7,8-HxCDF	0.05	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08A	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.06	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08A	8280A	NORM	1,2,3,7,8,9-HxCDF	0.05	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04C	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.08	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04A	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.07	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04A	8280A	NORM	2,3,4,6,7,8-HxCDF	0.06	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04A	8280A	NORM	1,2,3,7,8,9-HxCDF	0.06	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04C	8280A	NORM	2,3,4,6,7,8-HxCDF	0.08	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04C	8280A	NORM	1,2,3,7,8,9-HxCDF	0.07	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04B	8280A	NORM	2,3,4,6,7,8-HxCDF	0.07	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04B	8280A	NORM	1,2,3,7,8,9-HxCDF	0.07	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-04	1E1B-04B	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.08	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	2,3,4,6,7,8-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	1,2,3,7,8,9-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08C	8280A	NORM	2,3,4,6,7,8-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08C	8280A	NORM	1,2,3,7,8,9-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08C	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	2,3,4,6,7,8-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	1,2,3,7,8,9-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08B	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08B	8280A	NORM	2,3,4,6,7,8-HxCDF	0.03	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08	1E1B-08B	8280A	NORM	1,2,3,7,8,9-HxCDF	0.02	ppb	55583B	SOIL	R	27-Sep-01

Table F5-8 Impact of Internal Standard Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Value	Units	SDG	Matrix	VQ	Sample Date
1D	C08	ID-C08-C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	200	pg/g	55321	SOIL	J	06-Sep-01
1D	C06	ID-C06-C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	844	pg/g	55321	SOIL	J	06-Sep-01
1D	C06	ID-C06-C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	311	pg/g	55321	SOIL	J	06-Sep-01
1D	C08	ID-C08-C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	751	pg/g	55321	SOIL	J	06-Sep-01
1D	I07	ID-I07-C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	115	pg/g	55321	SOIL	J	07-Sep-01
1D	I07	ID-I07-C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	1090	pg/g	55321	SOIL	J	07-Sep-01
1D	G03	ID-G03-B	8290	NORM	1,2,3,4,6,7,8,9-OCDF	137	pg/g	55321	SOIL	J	30-Aug-01
1D	G03	ID-G03-B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	277	pg/g	55321	SOIL	J	30-Aug-01
1D	G09	ID-G09-C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	11.3	pg/g	55321	SOIL	J	29-Aug-01
1D	G09	ID-G09-C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	217	pg/g	55321	SOIL	J	29-Aug-01
1D	G07 Dup	ID-G07-D	8290	NORM	1,2,3,4,6,7,8,9-OCDF	29.6	pg/g	55321	SOIL	J	29-Aug-01
1D	G07 Dup	ID-G07-D	8290	NORM	1,2,3,4,6,7,8,9-OCDD	99	pg/g	55321	SOIL	J	29-Aug-01
1D	G07	ID-G07-B	8290	NORM	1,2,3,4,6,7,8,9-OCDF	23.5	pg/g	55321	SOIL	J	29-Aug-01
1D	G07	ID-G07-B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	69.7	pg/g	55321	SOIL	J	29-Aug-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.03	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	Total HpCDF	0.03	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	1,2,3,4,6,7,8-HpCDD	0.01	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	Total HpCDD	0.01	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.04	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	1,2,3,4,7,8,9-HpCDF	0.04	ppb	55583B	SOIL	R	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	Total HpCDF	0.04	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	1,2,3,4,6,7,8-HpCDD	0.01	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	Total HpCDD	0.01	ppb	55583B	SOIL	UJ	27-Sep-01
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	1.3	pg/g	56607	SOIL	R	27-Sep-01
1E1	B-03	E1B-03A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	1.6	pg/g	56607	SOIL	R	27-Sep-01
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	2.9	pg/g	56607	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8,9-OCDF	1.5	pg/g	56607	SOIL	R	26-Sep-01

Table F5-9 Impact of ICP Seri tion Violations on Project Data
MCB Cai endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	SODIUM	12500	ug/L	16460	SOIL	J	05-Sep-01
1D	C02	1D-C02-C(1 TO 3)	6010B	NORM	Lead	1.3	mg/kg	16119	SOIL	J	28-Sep-01
1D	E01	1D-E01-C(1 TO 3)	6010B	NORM	Lead	2.1	mg/kg	15508	SOIL	J	27-Aug-01
1D	E01	1D-E01-B(1 TO 3)	6010B	NORM	Lead	1.9	mg/kg	15508	SOIL	J	27-Aug-01
1D	E01	1D-E01-A(1 TO 3)	6010B	NORM	Lead	20.4	mg/kg	15508	SOIL	J	27-Aug-01
1D	B09	1D-B09-C(1 TO 3)	6010B	NORM	Lead	5	mg/kg	16016	SOIL	J	25-Sep-01
1D	B09	1D-B09-B(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	16016	SOIL	J	25-Sep-01
1D	B09	1D-B09-A(1 TO 3)	6010B	NORM	Lead	12.8	mg/kg	16016	SOIL	J	25-Sep-01
1D	B08	1D-B08-C(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	16016	SOIL	J	25-Sep-01
1D	B08	1D-B08-B(1 TO 3)	6010B	NORM	Lead	3.1	mg/kg	16016	SOIL	J	25-Sep-01
1D	B08	1D-B08-A(1 TO 3)	6010B	NORM	Lead	7.4	mg/kg	16016	SOIL	J	25-Sep-01
1D	B07 Dup	1D-B07-D(1 TO 3)	6010B	NORM	Lead	10.3	mg/kg	16016	SOIL	J	25-Sep-01
1D	B07	1D-B07-C(1 TO 3)	6010B	NORM	Lead	4.3	mg/kg	16016	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	NORM	Lead	0.89	mg/kg	16016	SOIL	UJ	25-Sep-01
1D	E02	1D-E02-B(1 TO 3)	6010B	NORM	Lead	2.4	mg/kg	15508	SOIL	J	27-Aug-01
1D	A08	1D-A08-A(1 TO 3)	6010B	NORM	Lead	13.5	mg/kg	16016	SOIL	J	25-Sep-01
1D	I07	1D-I07-B(1 TO 3)	6010B	NORM	Lead	79.1	mg/kg	15695	SOIL	J	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	Lead	69.9	mg/kg	15695	SOIL	J	07-Sep-01
1D	J06	1D-J06-A(1 TO 3)	6010B	NORM	Lead	56.1	mg/kg	15695	SOIL	J	07-Sep-01
1D	J06	1D-J06-B(1 TO 3)	6010B	NORM	Lead	2.3	mg/kg	15695	SOIL	J	07-Sep-01
1D	J06	1D-J06-C(1 TO 3)	6010B	NORM	Lead	2.1	mg/kg	15695	SOIL	J	07-Sep-01
1D	A07	1D-A07-A(1 TO 3)	6010B	NORM	Lead	29.6	mg/kg	16016	SOIL	J	25-Sep-01
1D	A07 Dup	1D-A07-D(1 TO 3)	6010B	NORM	Lead	14.3	mg/kg	16016	SOIL	J	25-Sep-01
1D	B07	1D-B07-B(1 TO 3)	6010B	NORM	Lead	4	mg/kg	16016	SOIL	J	25-Sep-01
1D	A08	1D-A08-B(1 TO 3)	6010B	NORM	Lead	5.5	mg/kg	16016	SOIL	J	25-Sep-01
1D	A08	1D-A08-C2	6010B	NORM	Lead	2.7	mg/kg	16016	SOIL	J	25-Sep-01
1D	B06	1D-B06-A(1 TO 3)	6010B	NORM	Lead	12.7	mg/kg	16016	SOIL	J	25-Sep-01
1D	E11	1D-E11-C(1 TO 3)	6010B	NORM	Lead	6	mg/kg	15560	SOIL	J	28-Aug-01
1D	B06	1D-B06-C(1 TO 3)	6010B	NORM	Lead	2.3	mg/kg	16016	SOIL	J	25-Sep-01
1D	E02	1D-E02-C(1 TO 3)	6010B	NORM	Lead	13.4	mg/kg	15508	SOIL	J	27-Aug-01
1D	A07	1D-A07-C(1 TO 3)	6010B	NORM	Lead	2.4	mg/kg	16016	SOIL	J	25-Sep-01
1D	F01	1D-F01-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15508	SOIL	UJ	27-Aug-01
1D	C02	1D-C02-B(1 TO 3)	6010B	NORM	Lead	1.3	mg/kg	16119	SOIL	J	28-Sep-01
1D	C02	1D-C02-A(1 TO 3)	6010B	NORM	Lead	12.6	mg/kg	16119	SOIL	J	28-Sep-01
1D	B04	1D-B04-C(1 TO 3)	6010B	NORM	Lead	1.2	mg/kg	16119	SOIL	J	28-Sep-01
1D	B04	1D-B04-B(1 TO 3)	6010B	NORM	Lead	2.3	mg/kg	16119	SOIL	J	28-Sep-01
1D	B04	1D-B04-A(1 TO 3)	6010B	NORM	Lead	14.6	mg/kg	16119	SOIL	J	28-Sep-01
1D	B03	1D-B03-C(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	16119	SOIL	J	28-Sep-01
1D	B03	1D-B03-B(1 TO 3)	6010B	NORM	Lead	1.4	mg/kg	16119	SOIL	J	28-Sep-01
1D	B03	1D-B03-A(1 TO 3)	6010B	NORM	Lead	9.3	mg/kg	16119	SOIL	J	28-Sep-01
1D	B02	1D-B02-C(1 TO 3)	6010B	NORM	Lead	1.4	mg/kg	16119	SOIL	J	28-Sep-01
1D	B02	1D-B02-B(1 TO 3)	6010B	NORM	Lead	2.1	mg/kg	16119	SOIL	J	28-Sep-01

Table F5-9 Impact of ICP Serial Dilution Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	B02	1D-B02-A(1 TO 3)	6010B	NORM	Lead	8.4	mg/kg	16119	SOIL	J	28-Sep-01
1D	B01 Dup	1D-B01-D(1 TO 3)	6010B	NORM	Lead	2	mg/kg	16119	SOIL	J	28-Sep-01
1D	B01	1D-B01-C(1 TO 3)	6010B	NORM	Lead	1.3	mg/kg	16119	SOIL	J	28-Sep-01
1D	E02	1D-E02-A(1 TO 3)	6010B	NORM	Lead	10.9	mg/kg	15508	SOIL	J	27-Aug-01
1D	E05	1D-E05-A(1 TO 3)	6010B	NORM	Lead	19.5	mg/kg	15508	SOIL	J	27-Aug-01
1D	E03	1D-E03-A(1 TO 3)	6010B	NORM	Lead	31.6	mg/kg	15508	SOIL	J	27-Aug-01
1D	E03	1D-E03-B(1 TO 3)	6010B	NORM	Lead	2.8	mg/kg	15508	SOIL	J	27-Aug-01
1D	E03	1D-E03-C(1 TO 3)	6010B	NORM	Lead	3.1	mg/kg	15508	SOIL	J	27-Aug-01
1D	E03 Dup	1D-E03-D(1 TO 3)	6010B	NORM	Lead	3.6	mg/kg	15508	SOIL	J	27-Aug-01
1D	E04	1D-E04-A(1 TO 3)	6010B	NORM	Lead	15.8	mg/kg	15508	SOIL	J	27-Aug-01
1D	B01	1D-B01-B(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	16119	SOIL	J	28-Sep-01
1D	E04	1D-E04-C(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	15508	SOIL	J	27-Aug-01
1D	B01	1D-B01-A(1 TO 3)	6010B	NORM	Lead	15.4	mg/kg	16119	SOIL	J	28-Sep-01
1D	E05	1D-E05-B(1 TO 3)	6010B	NORM	Lead	6	mg/kg	15508	SOIL	J	27-Aug-01
1D	E05	1D-E05-C(1 TO 3)	6010B	NORM	Lead	0.58	mg/kg	15508	SOIL	UJ	27-Aug-01
1D	E05 Dup	1D-E05-D(1 TO 3)	6010B	NORM	Lead	16	mg/kg	15508	SOIL	J	27-Aug-01
1D	F01	1D-F01-A(1 TO 3)	6010B	NORM	Lead	8.8	mg/kg	15508	SOIL	J	27-Aug-01
1D	F01	1D-F01-B(1 TO 3)	6010B	NORM	Lead	1.4	mg/kg	15508	SOIL	J	27-Aug-01
1D	H04	1D-H04-B(1 TO 3)	6010B	NORM	Lead	232	mg/kg	15695	SOIL	J	07-Sep-01
1D	E04	1D-E04-B(1 TO 3)	6010B	NORM	Lead	1.9	mg/kg	15508	SOIL	J	27-Aug-01
1D	F11	1D-F11-A(1 TO 3)	6010B	NORM	Lead	688	mg/kg	15560	SOIL	J	28-Aug-01
1D	L07	1D-L07-A(1 TO 3)	6010B	NORM	Lead	2.7	mg/kg	15650	SOIL	J	05-Sep-01
1D	L06 Dup	1D-L06-D(1 TO 3)	6010B	NORM	Lead	3.5	mg/kg	15650	SOIL	J	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	NORM	Lead	4.9	mg/kg	15650	SOIL	J	05-Sep-01
1D	L06	1D-L06-B(1 TO 3)	6010B	NORM	Lead	7.5	mg/kg	15650	SOIL	J	05-Sep-01
1D	L06	1D-L06-A(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15650	SOIL	J	05-Sep-01
1D	L05	1D-L05-C(1 TO 3)	6010B	NORM	Lead	0.82	mg/kg	15650	SOIL	UJ	05-Sep-01
1D	L05	1D-L05-B(1 TO 3)	6010B	NORM	Lead	5.7	mg/kg	15650	SOIL	J	05-Sep-01
1D	L05	1D-L05-A(1 TO 3)	6010B	NORM	Lead	4.5	mg/kg	15650	SOIL	J	05-Sep-01
1D	C04	1D-C04-A(1 TO 3)	6010B	NORM	Lead	1550	mg/kg	15650	SOIL	J	05-Sep-01
1D	C03 Dup	1D-C03-D(1 TO 3)	6010B	NORM	Lead	375	mg/kg	15650	SOIL	J	05-Sep-01
1D	C03	1D-C03-C(1 TO 3)	6010B	NORM	Lead	14.1	mg/kg	15650	SOIL	J	05-Sep-01
1D	C03	1D-C03-B(1 TO 3)	6010B	NORM	Lead	78.6	mg/kg	15650	SOIL	J	05-Sep-01
1D	C03	1D-C03-A(1 TO 3)	6010B	NORM	Lead	606	mg/kg	15650	SOIL	J	05-Sep-01
1D	I07	1D-I07-A(1 TO 3)	6010B	NORM	Lead	247	mg/kg	15695	SOIL	J	07-Sep-01
1D	F07	1D-F07-C(1 TO 3)	6010B	NORM	Lead	2.7	mg/kg	15560	SOIL	J	28-Aug-01
1D	F08	1D-F08-B(1 TO 3)	6010B	NORM	Lead	3.1	mg/kg	15560	SOIL	J	28-Aug-01
1D	F08	1D-F08-C(1 TO 3)	6010B	NORM	Lead	7.8	mg/kg	15560	SOIL	J	28-Aug-01
1D	F06	1D-F06-A(1 TO 3)	6010B	NORM	Lead	60.6	mg/kg	15560	SOIL	J	28-Aug-01
1D	F06	1D-F06-B(1 TO 3)	6010B	NORM	Lead	0.9	mg/kg	15560	SOIL	UJ	28-Aug-01
1D	F06	1D-F06-C(1 TO 3)	6010B	NORM	Lead	1	mg/kg	15560	SOIL	UJ	28-Aug-01
1D	F11	1D-F11-C(1 TO 3)	6010B	NORM	Lead	405	mg/kg	15560	SOIL	J	28-Aug-01
1D	F07	1D-F07-B(1 TO 3)	6010B	NORM	Lead	1.4	mg/kg	15560	SOIL	J	28-Aug-01
1D	F11	1D-F11-B(1 TO 3)	6010B	NORM	Lead	155	mg/kg	15560	SOIL	J	28-Aug-01

Table F5-9 Impact of ICP Seri[illegible]tion Violations on Project Data
MCB Car[illegible]endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	F08	1D-F08-A(1 TO 3)	6010B	NORM	Lead	11.3	mg/kg	15560	SOIL	J	28-Aug-01
1D	F09	1D-F09-A(1 TO 3)	6010B	NORM	Lead	63.6	mg/kg	15560	SOIL	J	28-Aug-01
1D	F09	1D-F09-B(1 TO 3)	6010B	NORM	Lead	12.9	mg/kg	15560	SOIL	J	28-Aug-01
1D	F09	1D-F09-C(1 TO 3)	6010B	NORM	Lead	7.1	mg/kg	15560	SOIL	J	28-Aug-01
1D	F09 Dup	1D-F09-D(1 TO 3)	6010B	NORM	Lead	228	mg/kg	15560	SOIL	J	28-Aug-01
1D	C06	1D-C06-A(1 TO 3)	6010B	NORM	Lead	936	mg/kg	15677	SOIL	J	06-Sep-01
1D	F07	1D-F07-A(1 TO 3)	6010B	NORM	Lead	18.5	mg/kg	15560	SOIL	J	28-Aug-01
1D	F10	1D-F10-B(1 TO 3)	6010B	NORM	Lead	1.8	mg/kg	15695	SOIL	J	07-Sep-01
1D	L07	1D-L07-B(1 TO 3)	6010B	NORM	Lead	1.2	mg/kg	15650	SOIL	J	05-Sep-01
1D	D11 Dup	1D-D11-D(1 TO 3)	6010B	NORM	Lead	11.3	mg/kg	15677	SOIL	J	06-Sep-01
1D	E10	1D-E10-A(1 TO 3)	6010B	NORM	Lead	1.8	mg/kg	15677	SOIL	J	06-Sep-01
1D	E10	1D-E10-B(1 TO 3)	6010B	NORM	Lead	0.47	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	E10	1D-E10-C(1 TO 3)	6010B	NORM	Lead	0.45	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	D11	1D-D11-B(1 TO 3)	6010B	NORM	Lead	3.7	mg/kg	15677	SOIL	J	06-Sep-01
1D	F10	1D-F10-A(1 TO 3)	6010B	NORM	Lead	2.9	mg/kg	15695	SOIL	J	07-Sep-01
1D	D11	1D-D11-A(1 TO 3)	6010B	NORM	Lead	21.4	mg/kg	15677	SOIL	J	06-Sep-01
1D	F10	1D-F10-C(1 TO 3)	6010B	NORM	Lead	3.4	mg/kg	15695	SOIL	J	07-Sep-01
1D	G06	1D-G06-A(1 TO 3)	6010B	NORM	Lead	345	mg/kg	15695	SOIL	J	07-Sep-01
1D	G06	1D-G06-B(1 TO 3)	6010B	NORM	Lead	170	mg/kg	15695	SOIL	J	07-Sep-01
1D	G06	1D-G06-C(1 TO 3)	6010B	NORM	Lead	0.82	mg/kg	15695	SOIL	UJ	07-Sep-01
1D	H04	1D-H04-A(1 TO 3)	6010B	NORM	Lead	259	mg/kg	15695	SOIL	J	07-Sep-01
1D	B07	1D-B07-A(1 TO 3)	6010B	NORM	Lead	12.1	mg/kg	16016	SOIL	J	25-Sep-01
1D	E10 Dup	1D-E10-D(1 TO 3)	6010B	NORM	Lead	0.41	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	C08	1D-C08-A(1 TO 3)	6010B	NORM	Lead	408	mg/kg	15677	SOIL	J	06-Sep-01
1D	H04	1D-H04-C(1 TO 3)	6010B	NORM	Lead	175	mg/kg	15695	SOIL	J	07-Sep-01
1D	C06	1D-C06-B(1 TO 3)	6010B	NORM	Lead	331	mg/kg	15677	SOIL	J	06-Sep-01
1D	C06	1D-C06-C(1 TO 3)	6010B	NORM	Lead	319	mg/kg	15677	SOIL	J	06-Sep-01
1D	C07	1D-C07-A(1 TO 3)	6010B	NORM	Lead	4200	mg/kg	15677	SOIL	J	06-Sep-01
1D	C07	1D-C07-B(1 TO 3)	6010B	NORM	Lead	1150	mg/kg	15677	SOIL	J	06-Sep-01
1D	D11	1D-D11-C(1 TO 3)	6010B	NORM	Lead	3.7	mg/kg	15677	SOIL	J	06-Sep-01
1D	C07 Dup	1D-C07-D(1 TO 3)	6010B	NORM	Lead	1310	mg/kg	15677	SOIL	J	06-Sep-01
1D	L07	1D-L07-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15650	SOIL	UJ	05-Sep-01
1D	C08	1D-C08-B(1 TO 3)	6010B	NORM	Lead	310	mg/kg	15677	SOIL	J	06-Sep-01
1D	C08	1D-C08-C(1 TO 3)	6010B	NORM	Lead	316	mg/kg	15677	SOIL	J	06-Sep-01
1D	C09	1D-C09-A(1 TO 3)	6010B	NORM	Lead	24	mg/kg	15677	SOIL	J	06-Sep-01
1D	C09	1D-C09-B(1 TO 3)	6010B	NORM	Lead	7.5	mg/kg	15677	SOIL	J	06-Sep-01
1D	C09	1D-C09-C(1 TO 3)	6010B	NORM	Lead	2	mg/kg	15677	SOIL	J	06-Sep-01
1D	C09 Dup	1D-C09-D(1 TO 3)	6010B	NORM	Lead	1.9	mg/kg	15677	SOIL	J	06-Sep-01
1D	C07	1D-C07-C(1 TO 3)	6010B	NORM	Lead	692	mg/kg	15677	SOIL	J	06-Sep-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	CALCIUM	7760	mg/kg	16460	SOIL	J	31-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	NICKEL	25.9	ug/L	16460	SOIL	J	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	ALUMINUM	3100	ug/L	16460	SOIL	J	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	NICKEL	19.8	ug/L	16460	SOIL	J	29-Aug-01

Table F5-9 Impact of ICP Serial Dilution Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	SODIUM	11700	ug/L	16460	SOIL	J	29-Aug-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	CALCIUM	3430	mg/kg	16460	SOIL	J	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	POTASSIUM	1080	mg/kg	16460	SOIL	J	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	ALUMINUM	1220	ug/L	16460	SOIL	J	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	NICKEL	41.6	ug/L	16460	SOIL	J	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	ALUMINUM	2410	ug/L	16460	SOIL	J	07-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	NICKEL	9.2	ug/L	16460	SOIL	J	05-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	SODIUM	10700	ug/L	16460	SOIL	J	07-Sep-01
1D	H08	1D-H08-C(1 TO 3)	6010B	NORM	CALCIUM	617	mg/kg	16460	SOIL	J	29-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	POTASSIUM	1680	mg/kg	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	TCLP	ALUMINUM	1890	ug/L	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	TCLP	NICKEL	52.6	ug/L	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	ALUMINUM	588	ug/L	16460	SOIL	J	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	SODIUM	14900	ug/L	16460	SOIL	J	31-Aug-01
1D	L06	1D-L06-C(1 TO 3)	6010B	NORM	POTASSIUM	2730	mg/kg	16460	SOIL	J	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	ALUMINUM	2560	ug/L	16460	SOIL	J	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	NICKEL	11.3	ug/L	16460	SOIL	J	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	ALUMINUM	2680	ug/L	16460	SOIL	J	05-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	NICKEL	6.5	ug/L	16460	SOIL	J	07-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	24-Sep-01
1D	B06	1D-B06-B(1 TO 3)	6010B	NORM	Lead	2.5	mg/kg	16016	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	NORM	CALCIUM	2210	mg/kg	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	NORM	POTASSIUM	1810	mg/kg	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	ALUMINUM	483	ug/L	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	NICKEL	15.2	ug/L	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	ALUMINUM	3450	ug/L	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	NICKEL	19.3	ug/L	16460	SOIL	J	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	SODIUM	13200	ug/L	16460	SOIL	J	25-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	NORM	CALCIUM	9320	mg/kg	16460	SOIL	J	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	NORM	POTASSIUM	5820	mg/kg	16460	SOIL	J	24-Sep-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	ALUMINUM	868	ug/L	16460	SOIL	J	29-Aug-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	NICKEL	14.3	ug/L	16460	SOIL	J	24-Sep-01
1D	H08	1D-H08-C(1 TO 3)	6010B	NORM	POTASSIUM	672	mg/kg	16460	SOIL	J	29-Aug-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	ALUMINUM	4690	ug/L	16460	SOIL	J	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	NICKEL	6.7	ug/L	16460	SOIL	J	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	SODIUM	19500	ug/L	16460	SOIL	J	24-Sep-01
1D	G02	1D-G02-B(1 TO 3)	6010B	NORM	CALCIUM	1640	mg/kg	16460	SOIL	J	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	NORM	POTASSIUM	2270	mg/kg	16460	SOIL	J	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	ALUMINUM	566	ug/L	16460	SOIL	J	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	NICKEL	22.7	ug/L	16460	SOIL	J	30-Aug-01

Table F5-9 Impact of ICP Seri tion Violations on Project Data
MCB Car endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	SODIUM	4000	ug/L	16460	SOIL	UJ	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	ALUMINUM	285	ug/L	16460	SOIL	J	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	NICKEL	1.6	ug/L	16460	SOIL	J	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	SODIUM	6470	ug/L	16460	SOIL	J	30-Aug-01
1D	L06	1D-L06-C(1 TO 3)	6010B	NORM	CALCIUM	670	mg/kg	16460	SOIL	J	05-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	ALUMINUM	3190	ug/L	16460	SOIL	J	24-Sep-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	NICKEL	3.9	ug/L	16460	SOIL	J	31-Aug-01
1E1	B-02	1E1B-02A	6010B	NORM	Chromium	8.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Lead	1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Cobalt	3.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Barium	39.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Zinc	26.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Zinc	58.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Nickel	6.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Lead	3.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Cobalt	5.6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Chromium	12.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Barium	72.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Zinc	24.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Nickel	5.6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Nickel	3.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Cobalt	2.7	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Chromium	8.7	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Barium	72.9	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Zinc	78.5	mg/kg	16040	SOIL	R	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Nickel	15.9	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Lead	2.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Cobalt	50.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Chromium	24.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Barium	216	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Lead	14.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Cobalt	5.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Chromium	12.9	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Barium	59.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Barium	134	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Lead	4.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Chromium	9.5	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Cobalt	4.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Zinc	20.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Barium	35.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-01	1E1B-01A	6010B	NORM	Nickel	6.6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Nickel	6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Lead	1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Cobalt	3.5	mg/kg	16040	SOIL	J	26-Sep-01

Table F5-9 Impact of ICP Serial Dilution Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1E1	B-06	1E1B-06B	6010B	NORM	Chromium	5.9	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Barium	188	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Zinc	81.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Nickel	11.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Lead	2.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Cobalt	8.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Chromium	34.1	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Lead	13.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06 Dup	1E1B-06D	6010B	NORM	Lead	1.3	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-07	1E1B-07C	6010B	NORM	Lead	4.1	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-07	1E1B-07B	6010B	NORM	Lead	3.2	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Zinc	43.8	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-07	1E1B-07A	6010B	NORM	Lead	4.4	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Nickel	2.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02C	6010B	NORM	Lead	5	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-02	1E1B-02B	6010B	NORM	Lead	3	mg/kg	16041	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Nickel	6.7	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Lead	1.4	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Cobalt	9.3	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Chromium	10.6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Zinc	34.6	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Zinc	19.2	mg/kg	16040	SOIL	J	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Barium	87.6	mg/kg	16040	SOIL	J	26-Sep-01
1H	B-04	1HSB-04B	6010B	NORM	Copper	36.9	mg/kg	16344	SOIL	J	11-Oct-01
1H	B-06	1HSB-06C	6010B	NORM	Potassium	1820	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-07	1HSB-07A	6010B	NORM	Potassium	1560	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-07	1HSB-07B	6010B	NORM	Potassium	7060	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-04	1HSB-04A	6010B	NORM	Copper	7.9	mg/kg	16344	SOIL	J	11-Oct-01
1H	B-02	1HSB-02C	6010B	NORM	Potassium	2700	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-03	1HSB-03B	6010B	NORM	Copper	5310	mg/kg	16344	SOIL	J	11-Oct-01
1H	B-04 Dup	1HSB-04D	6010B	NORM	Copper	8.8	mg/kg	16344	SOIL	J	11-Oct-01
1H	B-06	1HSB-06B	6010B	NORM	Potassium	1970	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-03	1HSB-03A	6010B	NORM	Copper	4.6	mg/kg	16344	SOIL	J	11-Oct-01
1H	B-01	1HSB-01C	6010B	NORM	Potassium	3690	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-06	1HSB-06A	6010B	NORM	Potassium	1990	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02E	6010B	NORM	Potassium	1940	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-01	1HSB-01B	6010B	NORM	Potassium	3580	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-01	1HSB-01D	6010B	NORM	Potassium	5150	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-01	1HSB-01E	6010B	NORM	Potassium	2060	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-01 Dup	1HSB-01F	6010B	NORM	Potassium	1520	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Potassium	1630	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02D	6010B	NORM	Potassium	1330	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02 Dup	1HSB-02F	6010B	NORM	Potassium	1530	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-05	1HSB-05A	6010B	NORM	Potassium	2440	mg/kg	16448	SOIL	J	15-Oct-01

Table F5-9 Impact of ICP Seri tion Violations on Project Data
MCB Can., endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1H	B-05	1HSB-05C	6010B	NORM	Potassium	1670	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Potassium	3090	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-01	1HSB-01A	6010B	NORM	Potassium	1650	mg/kg	16448	SOIL	J	15-Oct-01
1H	B-05	1HSB-05B	6010B	NORM	Potassium	2650	mg/kg	16448	SOIL	J	15-Oct-01
30	G05	30-G05-C(1 TO 3)	6010B	NORM	Lead	7450	mg/kg	15747	SOIL	J	11-Sep-01
30	D06	30-D06-B(1 TO 3)	6010B	NORM	Lead	284	mg/kg	15798	SOIL	J	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	NORM	Lead	18100	mg/kg	15798	SOIL	J	13-Sep-01
30	C07 Dup	30-C07-D(1 TO 3)	6010B	NORM	Lead	550	mg/kg	15798	SOIL	J	13-Sep-01
30	C07	30-C07-C(1 TO 3)	6010B	NORM	Lead	9.7	mg/kg	15798	SOIL	J	13-Sep-01
30	C07	30-C07-A(1 TO 3)	6010B	NORM	Lead	11300	mg/kg	15798	SOIL	J	13-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	NORM	Lead	15600	mg/kg	15747	SOIL	J	11-Sep-01
30	D06	30-D06-C(1 TO 3)	6010B	NORM	Lead	717	mg/kg	15798	SOIL	J	13-Sep-01
30	A06	30-A06-A(1 TO 3)	6010B	NORM	Lead	5.1	mg/kg	15772	SOIL	J	12-Sep-01
30	C07	30-C07-B(1 TO 3)	6010B	NORM	Lead	360	mg/kg	15798	SOIL	J	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	NORM	Lead	14500	mg/kg	15798	SOIL	J	13-Sep-01
30	D08	30-D08-B(1 TO 3)	6010B	NORM	Lead	13.7	mg/kg	15798	SOIL	J	13-Sep-01
30	D08	30-D08-C(1 TO 3)	6010B	NORM	Lead	29.9	mg/kg	15798	SOIL	J	13-Sep-01
30	D08 Dup	30-D08-D(1 TO 3)	6010B	NORM	Lead	8880	mg/kg	15798	SOIL	J	13-Sep-01
30	D09	30-D09-A(1 TO 3)	6010B	NORM	Lead	6	mg/kg	15798	SOIL	J	13-Sep-01
30	G05	30-G05-A(1 TO 3)	6010B	NORM	Lead	1610	mg/kg	15747	SOIL	J	11-Sep-01
30	D09	30-D09-C(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15798	SOIL	J	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	NORM	Calcium	2190	mg/kg	16461	SOIL	J	13-Sep-01
30	A06	30-A06-B(1 TO 3)	6010B	NORM	Lead	8.1	mg/kg	15772	SOIL	J	12-Sep-01
30	A06	30-A06-C(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15772	SOIL	J	12-Sep-01
30	A07	30-A07-A(1 TO 3)	6010B	NORM	Lead	2.1	mg/kg	15772	SOIL	J	12-Sep-01
30	D09	30-D09-B(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15798	SOIL	J	13-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	NORM	Calcium	1380	mg/kg	16461	SOIL	J	10-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	NORM	Calcium	7560	mg/kg	16461	SOIL	J	17-Sep-01
30	A07	30-A07-B(1 TO 3)	6010B	NORM	Lead	4.6	mg/kg	15772	SOIL	J	12-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	NORM	Calcium	6130	mg/kg	16461	SOIL	J	17-Sep-01
30	D18	30-D18-A(1 TO 3)	6010B	NORM	Lead	7.5	mg/kg	15901	SOIL	J	19-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	NORM	Calcium	2920	mg/kg	16461	SOIL	J	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	NORM	Calcium	3620	mg/kg	16461	SOIL	J	14-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	NORM	Calcium	20900	mg/kg	16461	SOIL	J	18-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	NORM	Calcium	7320	mg/kg	16461	SOIL	J	11-Sep-01
30	D17	30-D17-B(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15747	SOIL	J	11-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	NORM	Calcium	2460	mg/kg	16461	SOIL	J	10-Sep-01
30	G04 Dup	30-G04-D(1 TO 3)	6010B	NORM	Lead	4.6	mg/kg	15747	SOIL	J	11-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	NORM	Calcium	2050	mg/kg	16461	SOIL	J	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	NORM	Calcium	3770	mg/kg	16461	SOIL	J	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	NORM	Calcium	2300	mg/kg	16461	SOIL	J	13-Sep-01
30	D17	30-D17-A(1 TO 3)	6010B	NORM	Lead	8.3	mg/kg	15747	SOIL	J	11-Sep-01
30	D17	30-D17-C(1 TO 3)	6010B	NORM	Lead	6.3	mg/kg	15747	SOIL	J	11-Sep-01
30	G03	30-G03-A(1 TO 3)	6010B	NORM	Lead	4	mg/kg	15747	SOIL	J	11-Sep-01

Table F5-9 Impact of ICP Serial Dilution Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	G03	30-G03-B(1 TO 3)	6010B	NORM	Lead	2.5	mg/kg	15747	SOIL	J	11-Sep-01
30	G03	30-G03-C(1 TO 3)	6010B	NORM	Lead	3.7	mg/kg	15747	SOIL	J	11-Sep-01
30	G04	30-G04-C(1 TO 3)	6010B	NORM	Lead	3.1	mg/kg	15747	SOIL	J	11-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	NORM	Calcium	7390	mg/kg	16461	SOIL	J	19-Sep-01
30	G15	30-G15-A(1 TO 3)	6010B	NORM	Lead	7.3	mg/kg	15899	SOIL	J	19-Sep-01
30	F12	30-F12-B1	6010B	NORM	Lead	132	mg/kg	15933	SOIL	J	20-Sep-01
30	F12	30-F12-A1	6010B	NORM	Lead	8390	mg/kg	15933	SOIL	J	20-Sep-01
30	F10	30-F10-C1	6010B	NORM	Lead	11.1	mg/kg	15933	SOIL	J	20-Sep-01
30	F10	30-F10-B1	6010B	NORM	Lead	10.2	mg/kg	15933	SOIL	J	20-Sep-01
30	F10	30-F10-A1	6010B	NORM	Lead	444	mg/kg	15933	SOIL	J	20-Sep-01
30	G16 Dup	30-G16-D(1 TO 3)	6010B	NORM	Lead	6.6	mg/kg	15899	SOIL	J	19-Sep-01
30	G16	30-G16-C(1 TO 3)	6010B	NORM	Lead	4.2	mg/kg	15899	SOIL	J	19-Sep-01
30	G16	30-G16-B(1 TO 3)	6010B	NORM	Lead	5.7	mg/kg	15899	SOIL	J	19-Sep-01
30	G16	30-G16-A(1 TO 3)	6010B	NORM	Lead	7.1	mg/kg	15899	SOIL	J	19-Sep-01
30	C17	30-C17-C(1 TO 3)	6010B	NORM	Lead	4	mg/kg	15901	SOIL	J	19-Sep-01
30	G15	30-G15-B(1 TO 3)	6010B	NORM	Lead	4.5	mg/kg	15899	SOIL	J	19-Sep-01
30	F13	30-F13-B1	6010B	NORM	Lead	12.4	mg/kg	15933	SOIL	J	20-Sep-01
30	F17	30-F17-B(1 TO 3)	6010B	NORM	Lead	2.6	mg/kg	15899	SOIL	J	19-Sep-01
30	F17	30-F17-A(1 TO 3)	6010B	NORM	Lead	8.1	mg/kg	15899	SOIL	J	19-Sep-01
30	F16	30-F16-C(1 TO 3)	6010B	NORM	Lead	4.8	mg/kg	15899	SOIL	J	19-Sep-01
30	F16	30-F16-B(1 TO 3)	6010B	NORM	Lead	5.5	mg/kg	15899	SOIL	J	19-Sep-01
30	F16	30-F16-A(1 TO 3)	6010B	NORM	Lead	6.4	mg/kg	15899	SOIL	J	19-Sep-01
30	G01 Dup	30-G01-D(1 TO 3)	6010B	NORM	Lead	8.2	mg/kg	15901	SOIL	J	19-Sep-01
30	G01	30-G01-C(1 TO 3)	6010B	NORM	Lead	6.2	mg/kg	15901	SOIL	J	19-Sep-01
30	G01	30-G01-B(1 TO 3)	6010B	NORM	Lead	8.4	mg/kg	15901	SOIL	J	19-Sep-01
30	G01	30-G01-A(1 TO 3)	6010B	NORM	Lead	16.5	mg/kg	15901	SOIL	J	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	NORM	Lead	7.1	mg/kg	15901	SOIL	J	19-Sep-01
30	G15	30-G15-C(1 TO 3)	6010B	NORM	Lead	4.6	mg/kg	15899	SOIL	J	19-Sep-01
30	F07	30-F07-C1	6010B	NORM	Lead	10.6	mg/kg	15932	SOIL	J	20-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	NORM	Calcium	10500	mg/kg	16461	SOIL	J	13-Sep-01
30	D04	30-D04-A1	6010B	NORM	Calcium	5530	mg/kg	16461	SOIL	J	21-Sep-01
30	F11	30-F11-C1	6010B	NORM	Lead	25.6	mg/kg	15932	SOIL	J	20-Sep-01
30	F11	30-F11-B1	6010B	NORM	Lead	3.7	mg/kg	15932	SOIL	J	20-Sep-01
30	F11	30-F11-A1	6010B	NORM	Lead	25600	mg/kg	15932	SOIL	J	20-Sep-01
30	F09	30-F09-C1	6010B	NORM	Lead	49.8	mg/kg	15932	SOIL	J	20-Sep-01
30	F09	30-F09-B1	6010B	NORM	Lead	190	mg/kg	15932	SOIL	J	20-Sep-01
30	F09	30-F09-A1	6010B	NORM	Lead	540	mg/kg	15932	SOIL	J	20-Sep-01
30	F08 Dup	30-F08-D1	6010B	NORM	Lead	11.1	mg/kg	15932	SOIL	J	20-Sep-01
30	F08	30-F08-C1	6010B	NORM	Lead	19.5	mg/kg	15932	SOIL	J	20-Sep-01
30	F12	30-F12-C1	6010B	NORM	Lead	14.6	mg/kg	15933	SOIL	J	20-Sep-01
30	F08	30-F08-A1	6010B	NORM	Lead	11.9	mg/kg	15932	SOIL	J	20-Sep-01
30	F13	30-F13-A1	6010B	NORM	Lead	14.9	mg/kg	15933	SOIL	J	20-Sep-01
30	F07	30-F07-B1	6010B	NORM	Lead	7.5	mg/kg	15932	SOIL	J	20-Sep-01
30	F07	30-F07-A1	6010B	NORM	Lead	495	mg/kg	15932	SOIL	J	20-Sep-01

Table F5-9 Impact of ICP Seri 'tion Violations on Project Data
MCB Ca. endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	F05	30-F05-C1	6010B	NORM	Lead	5	mg/kg	15932	SOIL	J	20-Sep-01
30	D05	30-D05-A4	6010B	NORM	Lead	5.6	mg/kg	15932	SOIL	J	20-Sep-01
30	F14	30-F14-C1	6010B	NORM	Lead	5.8	mg/kg	15933	SOIL	J	20-Sep-01
30	F14	30-F14-B1	6010B	NORM	Lead	5.4	mg/kg	15933	SOIL	J	20-Sep-01
30	F14	30-F14-A1	6010B	NORM	Lead	9.6	mg/kg	15933	SOIL	J	20-Sep-01
30	F13 Dup	30-F13-D1	6010B	NORM	Lead	33.3	mg/kg	15933	SOIL	J	20-Sep-01
30	F13	30-F13-C1	6010B	NORM	Lead	6.8	mg/kg	15933	SOIL	J	20-Sep-01
30	E18	30-E18-A(1 TO 3)	6010B	NORM	Lead	6	mg/kg	15901	SOIL	J	19-Sep-01
30	F08	30-F08-B1	6010B	NORM	Lead	11	mg/kg	15932	SOIL	J	20-Sep-01
30	E05	30-E05-B(1 TO 3)	6010B	NORM	Lead	14.7	mg/kg	15772	SOIL	J	12-Sep-01
30	E18	30-E18-C(1 TO 3)	6010B	NORM	Lead	4.1	mg/kg	15901	SOIL	J	19-Sep-01
30	G10	30-G10-B(1 TO 3)	6010B	NORM	Lead	14.8	mg/kg	15870	SOIL	J	18-Sep-01
30	G10	30-G10-A(1 TO 3)	6010B	NORM	Lead	170	mg/kg	15870	SOIL	J	18-Sep-01
30	G09 Dup	30-G09-D(1 TO 3)	6010B	NORM	Lead	1070	mg/kg	15870	SOIL	J	18-Sep-01
30	H04	30-H04-C(1 TO 3)	6010B	NORM	Lead	22	mg/kg	15798	SOIL	J	13-Sep-01
30	H04	30-H04-B(1 TO 3)	6010B	NORM	Lead	12.8	mg/kg	15798	SOIL	J	13-Sep-01
30	H04	30-H04-A(1 TO 3)	6010B	NORM	Lead	309	mg/kg	15798	SOIL	J	13-Sep-01
30	C06	30-C06-C(1 TO 3)	6010B	NORM	Lead	9.4	mg/kg	15798	SOIL	J	13-Sep-01
30	C06	30-C06-B(1 TO 3)	6010B	NORM	Lead	4.8	mg/kg	15798	SOIL	J	13-Sep-01
30	C06	30-C06-A(1 TO 3)	6010B	NORM	Lead	40.7	mg/kg	15798	SOIL	J	13-Sep-01
30	G11	30-G11-A(1 TO 3)	6010B	NORM	Lead	934	mg/kg	15870	SOIL	J	18-Sep-01
30	E05	30-E05-C(1 TO 3)	6010B	NORM	Lead	6.6	mg/kg	15772	SOIL	J	12-Sep-01
30	G11	30-G11-B(1 TO 3)	6010B	NORM	Lead	71	mg/kg	15870	SOIL	J	18-Sep-01
30	E05	30-E05-A(1 TO 3)	6010B	NORM	Lead	123	mg/kg	15772	SOIL	J	12-Sep-01
30	D05 Dup	30-D05-D(1 TO 3)	6010B	NORM	Lead	4.8	mg/kg	15772	SOIL	J	12-Sep-01
30	D05	30-D05-C(1 TO 3)	6010B	NORM	Lead	4.8	mg/kg	15772	SOIL	J	12-Sep-01
30	D05	30-D05-B(1 TO 3)	6010B	NORM	Lead	4.7	mg/kg	15772	SOIL	J	12-Sep-01
30	D05	30-D05-A(1 TO 3)	6010B	NORM	Lead	14.8	mg/kg	15772	SOIL	J	12-Sep-01
30	B07 Dup	30-B07-D(1 TO 3)	6010B	NORM	Lead	5.7	mg/kg	15772	SOIL	J	12-Sep-01
30	B07	30-B07-C(1 TO 3)	6010B	NORM	Lead	6.3	mg/kg	15772	SOIL	J	12-Sep-01
30	B07	30-B07-B(1 TO 3)	6010B	NORM	Lead	4.8	mg/kg	15772	SOIL	J	12-Sep-01
30	B07	30-B07-A(1 TO 3)	6010B	NORM	Lead	6.7	mg/kg	15772	SOIL	J	12-Sep-01
30	A07 Dup	30-A07-D(1 TO 3)	6010B	NORM	Lead	3.1	mg/kg	15772	SOIL	J	12-Sep-01
30	E05 Dup	30-E05-D(1 TO 3)	6010B	NORM	Lead	6.9	mg/kg	15772	SOIL	J	12-Sep-01
30	F15	30-F15-A(1 TO 3)	6010B	NORM	Lead	5.1	mg/kg	15899	SOIL	J	19-Sep-01
30	A07	30-A07-C(1 TO 3)	6010B	NORM	Lead	4.4	mg/kg	15772	SOIL	J	12-Sep-01
30	E17	30-E17-C(1 TO 3)	6010B	NORM	Lead	3.8	mg/kg	15901	SOIL	J	19-Sep-01
30	E17	30-E17-B(1 TO 3)	6010B	NORM	Lead	5.1	mg/kg	15901	SOIL	J	19-Sep-01
30	E17	30-E17-A(1 TO 3)	6010B	NORM	Lead	3.5	mg/kg	15901	SOIL	J	19-Sep-01
30	D18 Dup	30-D18-D(1 TO 3)	6010B	NORM	Lead	5.3	mg/kg	15901	SOIL	J	19-Sep-01
30	D18	30-D18-C(1 TO 3)	6010B	NORM	Lead	5.9	mg/kg	15901	SOIL	J	19-Sep-01
30	D18	30-D18-B(1 TO 3)	6010B	NORM	Lead	4.1	mg/kg	15901	SOIL	J	19-Sep-01
30	C17 Dup	30-C17-D(1 TO 3)	6010B	NORM	Lead	3.3	mg/kg	15901	SOIL	J	19-Sep-01
30	C17	30-C17-B(1 TO 3)	6010B	NORM	Lead	4.4	mg/kg	15901	SOIL	J	19-Sep-01

Table F5-9 Impact of ICP Serial Dilution Violations on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	C17	30-C17-A(1 TO 3)	6010B	NORM	Lead	12.8	mg/kg	15901	SOIL	J	19-Sep-01
30	G10	30-G10-C(1 TO 3)	6010B	NORM	Lead	98.9	mg/kg	15870	SOIL	J	18-Sep-01
30	F15	30-F15-B(1 TO 3)	6010B	NORM	Lead	4	mg/kg	15899	SOIL	J	19-Sep-01
30	E18	30-E18-B(1 TO 3)	6010B	NORM	Lead	4.2	mg/kg	15901	SOIL	J	19-Sep-01
30	G14	30-G14-C(1 TO 3)	6010B	NORM	Lead	4.2	mg/kg	15870	SOIL	J	18-Sep-01
30	G14	30-G14-B(1 TO 3)	6010B	NORM	Lead	3.5	mg/kg	15870	SOIL	J	18-Sep-01
30	G14	30-G14-A(1 TO 3)	6010B	NORM	Lead	8.5	mg/kg	15870	SOIL	J	18-Sep-01
30	G13	30-G13-C(1 TO 3)	6010B	NORM	Lead	7.3	mg/kg	15870	SOIL	J	18-Sep-01
30	G13	30-G13-B(1 TO 3)	6010B	NORM	Lead	4.2	mg/kg	15870	SOIL	J	18-Sep-01
30	G13	30-G13-A(1 TO 3)	6010B	NORM	Lead	35.5	mg/kg	15870	SOIL	J	18-Sep-01
30	G12	30-G12-C(1 TO 3)	6010B	NORM	Lead	3.3	mg/kg	15870	SOIL	J	18-Sep-01
30	G12	30-G12-B(1 TO 3)	6010B	NORM	Lead	4	mg/kg	15870	SOIL	J	18-Sep-01
30	G12	30-G12-A(1 TO 3)	6010B	NORM	Lead	18.8	mg/kg	15870	SOIL	J	18-Sep-01
30	G11	30-G11-C(1 TO 3)	6010B	NORM	Lead	16.1	mg/kg	15870	SOIL	J	18-Sep-01
30	F15	30-F15-C(1 TO 3)	6010B	NORM	Lead	4.1	mg/kg	15899	SOIL	J	19-Sep-01

Table F5-10 Impact of Blan amination on Project Data
MCB Car. ndleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	E08	1D-E08-B(1 TO 3)	6010B	NORM	Lead	0.75	mg/kg	15559	SOIL	U	28-Aug-01
1D	E08	1D-E08-C(1 TO 3)	6010B	NORM	Lead	0.99	mg/kg	15559	SOIL	U	28-Aug-01
1D	F06	1D-F06-B(1 TO 3)	6010B	NORM	Lead	0.9	mg/kg	15560	SOIL	UJ	28-Aug-01
1D	F06	1D-F06-C(1 TO 3)	6010B	NORM	Lead	1	mg/kg	15560	SOIL	UJ	28-Aug-01
1D	H09	1D-H09-C(1 TO 3)	6010B	NORM	Lead	0.17	mg/kg	15569	SOIL	U	29-Aug-01
1D	G01	ID-G01-A(1 TO 3)	6010B	NORM	Lead	2.4	mg/kg	15621	SOIL	U	31-Aug-01
1D	I02	ID-I02-B(1 TO 3)	6010B	NORM	Lead	1.6	mg/kg	15621	SOIL	U	31-Aug-01
1D	I02	ID-I02-C(1 TO 3)	6010B	NORM	Lead	2	mg/kg	15621	SOIL	U	31-Aug-01
1D	I03	ID-I03-B(1 TO 3)	6010B	NORM	Lead	0.59	mg/kg	15621	SOIL	U	31-Aug-01
1D	I03	ID-I03-C(1 TO 3)	6010B	NORM	Lead	0.82	mg/kg	15621	SOIL	U	31-Aug-01
1D	I03 Dup	ID-I03-D(1 TO 3)	6010B	NORM	Lead	1.6	mg/kg	15621	SOIL	U	31-Aug-01
1D	I09	1D-I09-B(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	15631	SOIL	U	04-Sep-01
1D	I09	1D-I09-C(1 TO 3)	6010B	NORM	Lead	2.7	mg/kg	15631	SOIL	U	04-Sep-01
1D	L08	1D-L08-B(1 TO 3)	6010B	NORM	Lead	1.5	mg/kg	15631	SOIL	U	04-Sep-01
1D	L08	1D-L08-C(1 TO 3)	6010B	NORM	Lead	1.3	mg/kg	15631	SOIL	U	04-Sep-01
1D	K05	1D-K05-B(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15630	SOIL	U	04-Sep-01
1D	K05	1D-K05-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15630	SOIL	U	04-Sep-01
1D	K05 Dup	1D-K05-D(1 TO 3)	6010B	NORM	Lead	0.75	mg/kg	15630	SOIL	U	04-Sep-01
1D	K06	1D-K06-B(1 TO 3)	6010B	NORM	Lead	0.86	mg/kg	15630	SOIL	U	04-Sep-01
1D	K06	1D-K06-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15630	SOIL	U	04-Sep-01
1D	K07	1D-K07-A(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15630	SOIL	U	04-Sep-01
1D	K07	1D-K07-B(1 TO 3)	6010B	NORM	Lead	0.89	mg/kg	15630	SOIL	U	04-Sep-01
1D	K07	1D-K07-C(1 TO 3)	6010B	NORM	Lead	0.93	mg/kg	15630	SOIL	U	04-Sep-01
1D	K08	1D-K08-A(1 TO 3)	6010B	NORM	Lead	1.2	mg/kg	15630	SOIL	U	04-Sep-01
1D	K08	1D-K08-B(1 TO 3)	6010B	NORM	Lead	1.2	mg/kg	15630	SOIL	U	04-Sep-01
1D	K08	1D-K08-C(1 TO 3)	6010B	NORM	Lead	1.5	mg/kg	15630	SOIL	U	04-Sep-01
1D	L05	1D-L05-C(1 TO 3)	6010B	NORM	Lead	0.82	mg/kg	15650	SOIL	UJ	05-Sep-01
1D	L07	1D-L07-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15650	SOIL	UJ	05-Sep-01
1D	D09	1D-D09-C(1 TO 3)	6010B	NORM	Lead	1	mg/kg	15676	SOIL	U	06-Sep-01
1D	D10	1D-D10-B(1 TO 3)	6010B	NORM	Lead	0.83	mg/kg	15676	SOIL	U	06-Sep-01
1D	G01	1D-G01-B(1 TO 3)	6010B	NORM	Lead	1.5	mg/kg	15622	SOIL	U	31-Aug-01
1D	J07	1D-J07-B(1 TO 3)	6010B	NORM	Lead	0.67	mg/kg	15622	SOIL	U	31-Aug-01
1D	J07	1D-J07-C(1 TO 3)	6010B	NORM	Lead	0.93	mg/kg	15622	SOIL	U	31-Aug-01
1D	G01	1D-G01-C(1 TO 3)	6010B	NORM	Lead	1	mg/kg	15622	SOIL	U	31-Aug-01
1D	J08	1D-J08-A(1 TO 3)	6010B	NORM	Lead	1.9	mg/kg	15622	SOIL	U	31-Aug-01
1D	J08	1D-J08-B(1 TO 3)	6010B	NORM	Lead	1.7	mg/kg	15622	SOIL	U	31-Aug-01
1D	J08	1D-J08-C(1 TO 3)	6010B	NORM	Lead	1	mg/kg	15622	SOIL	U	31-Aug-01
1D	J09	1D-J09-A(1 TO 3)	6010B	NORM	Lead	2.1	mg/kg	15622	SOIL	U	31-Aug-01
1D	J09	1D-J09-B(1 TO 3)	6010B	NORM	Lead	0.84	mg/kg	15622	SOIL	U	31-Aug-01
1D	J09	1D-J09-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15622	SOIL	U	31-Aug-01
1D	E10	1D-E10-B(1 TO 3)	6010B	NORM	Lead	0.47	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	E10	1D-E10-C(1 TO 3)	6010B	NORM	Lead	0.45	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	E10 Dup	1D-E10-D(1 TO 3)	6010B	NORM	Lead	0.41	mg/kg	15677	SOIL	UJ	06-Sep-01
1D	G06	1D-G06-C(1 TO 3)	6010B	NORM	Lead	0.82	mg/kg	15695	SOIL	UJ	07-Sep-01
1D	F02	1D-F02-B(1 TO 3)	6010B	SPLP	Molybdenum	3.5	ug/L	15752	SOIL	U	27-Aug-01
1D	F02	1D-F02-B(1 TO 3)	6010B	SPLP	Silver	1.4	ug/L	15752	SOIL	U	27-Aug-01
1D	F02	1D-F02-B(1 TO 3)	6010B	SPLP	Cadmium	1.4	ug/L	15752	SOIL	U	27-Aug-01
1D	G07	1D-G07-A(1 TO 3)	6010B	NORM	Selenium	0.46	mg/kg	15924	SOIL	U	29-Aug-01
1D	G07	1D-G07-A(1 TO 3)	6010B	TCLP	Cobalt	2.9	ug/L	15924	SOIL	U	29-Aug-01
1D	G07	1D-G07-A(1 TO 3)	6010B	TCLP	Selenium	11.9	ug/L	15924	SOIL	U	29-Aug-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	G07	1D-G07-A(1 TO 3)	6010B	TCLP	Thallium	1.2	ug/L	15924	SOIL	U	29-Aug-01
1D	G07	1D-G07-A(1 TO 3)	6010B	SPLP	Nickel	3.5	ug/L	15924	SOIL	U	29-Aug-01
1D	G07	1D-G07-A(1 TO 3)	6010B	SPLP	Thallium	0.47	ug/L	15924	SOIL	U	29-Aug-01
1D	G10	1D-G10-B(1 TO 3)	6010B	TCLP	Selenium	9.5	ug/L	15924	SOIL	U	29-Aug-01
1D	G10	1D-G10-B(1 TO 3)	6010B	TCLP	Thallium	2.3	ug/L	15924	SOIL	U	29-Aug-01
1D	G10	1D-G10-B(1 TO 3)	6010B	SPLP	Antimony	3.8	ug/L	15924	SOIL	U	29-Aug-01
1D	G10	1D-G10-B(1 TO 3)	6010B	SPLP	Selenium	3.7	ug/L	15924	SOIL	U	29-Aug-01
1D	G11	1D-G11-A(1 TO 3)	6010B	TCLP	Selenium	7.9	ug/L	15924	SOIL	U	29-Aug-01
1D	G11	1D-G11-A(1 TO 3)	6010B	TCLP	Thallium	2.6	ug/L	15924	SOIL	U	29-Aug-01
1D	G11	1D-G11-A(1 TO 3)	6010B	SPLP	Arsenic	11.2	ug/L	15924	SOIL	U	29-Aug-01
1D	A07	1D-A07-B(1 TO 3)	6010B	NORM	Lead	0.89	mg/kg	16016	SOIL	UJ	25-Sep-01
1D	E05	1D-E05-C(1 TO 3)	6010B	NORM	Lead	0.58	mg/kg	15508	SOIL	UJ	27-Aug-01
1D	F01	1D-F01-C(1 TO 3)	6010B	NORM	Lead	1.1	mg/kg	15508	SOIL	UJ	27-Aug-01
1D	C03	1D-C03-A(1 TO 3)	6010B	NORM	Selenium	0.61	mg/kg	15858	SOIL	U	05-Sep-01
1D	D06 Dup	1D-D06-D(1 TO 3)	6010B	NORM	Selenium	0.51	mg/kg	15858	SOIL	U	06-Sep-01
1E1	B-03	1E1B-03A	6010B	NORM	Beryllium	0.22	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03A	6010B	NORM	Copper	8.6	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	NORM	Molybdenum	1.7	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	TCLP	Beryllium	0.23	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	TCLP	Cobalt	1.6	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	TCLP	Molybdenum	0.85	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	TCLP	Thallium	3.4	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	SPLP	Arsenic	4.4	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	SPLP	Beryllium	0.12	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	SPLP	Cobalt	5.3	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	SPLP	Molybdenum	7.8	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	6010B	SPLP	Selenium	2.3	ug/L	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	Acetone	18	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-03	1E1B-03B	SW8260B	NORM	Methylene Chloride	4.8	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-03	1E1B-03C	6010B	NORM	Antimony	0.43	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03C	6010B	NORM	Molybdenum	1.7	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	Acetone	15	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-03	1E1B-03C	SW8260B	NORM	Methylene Chloride	4.7	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-03 Dup	1E1B-03D	6010B	NORM	Molybdenum	0.84	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	Acetone	18	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-03 Dup	1E1B-03D	SW8260B	NORM	Methylene Chloride	4.3	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-04	1E1B-04A	6010B	NORM	Beryllium	0.69	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04A	6010B	NORM	Cobalt	2.8	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04A	6010B	NORM	Copper	5.3	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04B	SW8260B	NORM	Acetone	11	ug/kg	16090	SOIL	12UJ	27-Sep-01
1E1	B-04	1E1B-04B	SW8260B	NORM	Methylene Chloride	6.3	ug/kg	16090	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04C	6010B	NORM	Molybdenum	0.55	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-04	1E1B-04C	SW8260B	NORM	Methylene Chloride	5.7	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08	1E1B-08A	6010B	NORM	Beryllium	0.13	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08A	6010B	NORM	Copper	4.2	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08B	6010B	NORM	Molybdenum	1.9	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08B	6010B	NORM	Selenium	0.47	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	Acetone	14	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08	1E1B-08B	SW8260B	NORM	Methylene Chloride	7.1	ug/kg	16090	SOIL	UJ	27-Sep-01
1E1	B-08	1E1B-08C	6010B	NORM	Antimony	0.14	mg/kg	16090	SOIL	U	27-Sep-01

Table F5-10 Impact of Blar ‘amination on Project Data
MCB Ca. ..ndleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1E1	B-08	1E1B-08C	SW8260B	NORM	Acetone	8	ug/kg	16090	SOIL	11UJ	27-Sep-01
1E1	B-08	1E1B-08C	SW8260B	NORM	Methylene Chloride	5.1	ug/kg	16090	SOIL	U	27-Sep-01
1E1	B-08 Dup	1E1B-08D	6010B	NORM	Beryllium	0.052	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08 Dup	1E1B-08D	6010B	NORM	Molybdenum	1	mg/kg	16090	SOIL	U	27-Sep-01
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	Acetone	6	ug/kg	16090	SOIL	9.8UJ	27-Sep-01
1E1	B-08 Dup	1E1B-08D	SW8260B	NORM	Methylene Chloride	5.3	ug/kg	16090	SOIL	UJ	27-Sep-01
1H	B-01	1HSB-01A	6010B	NORM	Antimony	0.48	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01A	6010B	NORM	Molybdenum	0.59	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01A	6010B	NORM	Selenium	0.64	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01A	6010B	NORM	Silver	0.075	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01A	6010B	NORM	Sodium	79.1	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01B	6010B	NORM	Molybdenum	1.9	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01B	6010B	NORM	Sodium	140	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01B	6010B	NORM	Thallium	1.5	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	NORM	Sodium	477	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	NORM	Thallium	2.3	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	TCLP	Arsenic	7.3	ug/L	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	TCLP	Antimony	33.2	ug/L	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	TCLP	Cobalt	8	ug/L	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	SPLP	Arsenic	1.9	ug/L	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01C	6010B	SPLP	Cobalt	1.7	ug/L	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01D	6010B	NORM	Molybdenum	0.43	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01E	6010B	NORM	Antimony	0.49	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01E	6010B	NORM	Molybdenum	0.45	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01	1HSB-01E	6010B	NORM	Thallium	0.35	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01 Dup	1HSB-01F	6010B	NORM	Antimony	2.2	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01 Dup	1HSB-01F	6010B	NORM	Molybdenum	0.82	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-01 Dup	1HSB-01F	6010B	NORM	Sodium	95	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Antimony	0.62	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Beryllium	0.24	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Molybdenum	1.6	mg/kg	16448	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02A	6010B	NORM	Selenium	0.96	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Beryllium	0.28	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Molybdenum	2.3	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Selenium	1.3	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Silver	0.1	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02B	6010B	NORM	Sodium	370	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02C	6010B	NORM	Antimony	0.49	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02C	6010B	NORM	Molybdenum	0.48	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	NORM	Antimony	0.79	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	NORM	Molybdenum	0.71	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	NORM	Sodium	83.3	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	TCLP	Cadmium	3.8	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	TCLP	Cobalt	0.87	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	SPLP	Arsenic	1.8	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	SPLP	Cobalt	1.2	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	SPLP	Copper	19.8	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02D	6010B	SPLP	Lead	12.4	ug/L	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02E	6010B	NORM	Antimony	0.48	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02E	6010B	NORM	Molybdenum	0.97	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-02	1HSB-02E	6010B	NORM	Selenium	0.55	mg/kg	16448	SOIL	U	15-Oct-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1H	B-02 Dup	1HSB-02F	6010B	NORM	Selenium	0.62	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05A	6010B	NORM	Antimony	1.2	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05A	6010B	NORM	Molybdenum	0.77	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05A	6010B	NORM	Selenium	0.5	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05B	6010B	NORM	Antimony	0.65	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05B	6010B	NORM	Molybdenum	0.25	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05B	6010B	NORM	Selenium	0.65	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05C	6010B	NORM	Antimony	0.78	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-05	1HSB-05C	6010B	NORM	Selenium	0.83	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06A	6010B	NORM	Sodium	305	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06B	6010B	NORM	Antimony	0.45	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06B	6010B	NORM	Beryllium	0.27	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06C	6010B	NORM	Beryllium	0.28	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06C	6010B	NORM	Molybdenum	0.27	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-06	1HSB-06C	6010B	NORM	Selenium	0.56	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07A	6010B	NORM	Beryllium	0.13	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07A	6010B	NORM	Molybdenum	1.4	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07A	6010B	NORM	Selenium	0.49	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07B	6010B	NORM	Selenium	1.1	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07B	6010B	NORM	Thallium	0.55	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-07	1HSB-07C	6010B	NORM	Thallium	0.72	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08A	6010B	NORM	Antimony	0.48	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08A	6010B	NORM	Molybdenum	0.71	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08A	6010B	NORM	Selenium	0.55	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08B	6010B	NORM	Antimony	1.9	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08B	6010B	NORM	Molybdenum	1	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08B	6010B	NORM	Selenium	0.5	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08C	6010B	NORM	Sodium	383	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-08	1HSB-08C	6010B	NORM	Thallium	1.8	mg/kg	16448	SOIL	U	15-Oct-01
1H	B-04	1HSB-04A	6010B	NORM	Sodium	70.2	mg/kg	16344	SOIL	U	11-Oct-01
1H	B-03	1HSB-03A	6010B	NORM	Antimony	0.36	mg/kg	16344	SOIL	U	11-Oct-01
1H	B-04	1HSB-04B	6010B	NORM	Molybdenum	0.49	mg/kg	16344	SOIL	U	11-Oct-01
1H	B-04 Dup	1HSB-04D	6010B	NORM	Sodium	84.8	mg/kg	16344	SOIL	U	11-Oct-01
1E1	B-01	1E1B-01A	6010B	NORM	Antimony	0.43	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Molybdenum	0.19	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	NORM	Selenium	0.73	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	SW8260B	NORM	Acetone	13	ug/kg	16040	SOIL	UJ	26-Sep-01
1E1	B-01	1E1B-01B	SW8260B	NORM	2-Hexanone	0.8	ug/kg	16040	SOIL	11U	26-Sep-01
1E1	B-01	1E1B-01B	SW8260B	NORM	Methylene Chloride	4.6	ug/kg	16040	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Antimony	0.19	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02A	6010B	NORM	Selenium	0.14	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05A	6010B	NORM	Selenium	0.52	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05B	6010B	NORM	Selenium	0.2	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05B	SW8260B	NORM	Acetone	12	ug/kg	16040	SOIL	UJ	26-Sep-01
1E1	B-05	1E1B-05B	SW8260B	NORM	2-Hexanone	0.8	ug/kg	16040	SOIL	9.4U	26-Sep-01
1E1	B-05	1E1B-05B	SW8260B	NORM	Methylene Chloride	4	ug/kg	16040	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05C	6010B	NORM	Molybdenum	0.34	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05C	SW8260B	NORM	Methylene Chloride	4	ug/kg	16040	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Antimony	0.19	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06A	6010B	NORM	Selenium	0.48	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06B	6010B	NORM	Selenium	0.15	mg/kg	16040	SOIL	U	26-Sep-01

Table F5-10 Impact of Blanl ɜmination on Proiect Data
MCB Can ɹdleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1E1	B-06	1E1B-06B	SW8260B	NORM	Acetone	7	ug/kg	16040	SOIL	9.2UJ	26-Sep-01
1E1	B-06	1E1B-06B	SW8260B	NORM	2-Hexanone	0.7	ug/kg	16040	SOIL	9.2U	26-Sep-01
1E1	B-06	1E1B-06B	SW8260B	NORM	Methylene Chloride	3.9	ug/kg	16040	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06C	6010B	NORM	Selenium	0.76	mg/kg	16040	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06C	SW8260B	NORM	Acetone	9	ug/kg	16040	SOIL	10UJ	26-Sep-01
1E1	B-06	1E1B-06C	SW8260B	NORM	Methylene Chloride	3	ug/kg	16040	SOIL	U	26-Sep-01
1E1	Trip Blank	1E1-TB3	SW8260B	NORM	Methylene Chloride	0.4	ug/L	16041	Water	5UJ	26-Sep-01
1E1	B-02	1E1B-02B	6010B	NORM	Molybdenum	0.2	mg/kg	16041	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02B	SW8260B	NORM	Methylene Chloride	3	ug/kg	16041	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02C	6010B	NORM	Selenium	0.22	mg/kg	16041	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02C	SW8260B	NORM	Acetone	5	ug/kg	16041	SOIL	9.8UJ	26-Sep-01
1E1	B-02	1E1B-02C	SW8260B	NORM	Methylene Chloride	4.1	ug/kg	16041	SOIL	U	26-Sep-01
1E1	B-06 Dup	1E1B-06D	6010B	NORM	Selenium	0.19	mg/kg	16041	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07A	6010B	NORM	Antimony	0.1	mg/kg	16041	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07B	6010B	NORM	Selenium	0.37	mg/kg	16041	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07B	SW8260B	NORM	Acetone	11	ug/kg	16041	SOIL	UJ	26-Sep-01
1E1	B-07	1E1B-07B	SW8260B	NORM	Methylene Chloride	7	ug/kg	16041	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07C	SW8260B	NORM	Acetone	8	ug/kg	16041	SOIL	11UJ	26-Sep-01
1E1	B-07	1E1B-07C	SW8260B	NORM	2-Hexanone	0.9	ug/kg	16041	SOIL	11U	26-Sep-01
1E1	B-07	1E1B-07C	SW8260B	NORM	Methylene Chloride	6	ug/kg	16041	SOIL	U	26-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	NORM	Antimony	0.45	mg/kg	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	NORM	Molybdenum	0.21	mg/kg	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	NORM	Selenium	1.2	mg/kg	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	NORM	Sodium	412	mg/kg	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Chromium	4.8	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Copper	12.6	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Nickel	5.7	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Selenium	11.7	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Silver	0.6	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	TCLP	Zinc	41.2	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	SPLP	Antimony	4.8	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	SPLP	Cobalt	1	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	SPLP	Molybdenum	3.5	ug/L	16461	SOIL	U	13-Sep-01
30	B06	30-B06-C(1 TO 3)	6010B	SPLP	Selenium	3.4	ug/L	16461	SOIL	U	13-Sep-01
30	D04	30-D04-A1	6010B	NORM	Selenium	0.72	mg/kg	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Antimony	2.9	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Chromium	3.8	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Copper	8.5	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Lead	3.2	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Nickel	9	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Selenium	17.5	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Silver	0.87	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	TCLP	Zinc	38.4	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	SPLP	Arsenic	8.1	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	SPLP	Beryllium	1.4	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	SPLP	Molybdenum	1.5	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	SPLP	Selenium	2.3	ug/L	16461	SOIL	U	21-Sep-01
30	D04	30-D04-A1	6010B	SPLP	Thallium	1.4	ug/L	16461	SOIL	U	21-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	NORM	Selenium	1.1	mg/kg	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Cadmium	1.5	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Chromium	10.6	ug/L	16461	SOIL	U	13-Sep-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Cobalt	28.7	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Nickel	27.1	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Selenium	12.4	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	TCLP	Thallium	3.3	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	SPLP	Arsenic	2.9	ug/L	16461	SOIL	U	13-Sep-01
30	D06	30-D06-A(1 TO 3)	6010B	SPLP	Molybdenum	1.3	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	NORM	Selenium	0.78	mg/kg	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Cadmium	0.61	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Chromium	6.7	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Cobalt	42	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Nickel	32.2	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Selenium	9.6	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	TCLP	Thallium	11	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	SPLP	Arsenic	6.7	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	SPLP	Beryllium	0.35	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	SPLP	Molybdenum	3.1	ug/L	16461	SOIL	U	13-Sep-01
30	D08	30-D08-A(1 TO 3)	6010B	SPLP	Selenium	4.4	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	NORM	Molybdenum	0.14	mg/kg	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	NORM	Sodium	362	mg/kg	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	TCLP	Chromium	4.7	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	TCLP	Cobalt	4.1	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	TCLP	Copper	27.2	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	TCLP	Nickel	8.7	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	TCLP	Selenium	16.1	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	SPLP	Cobalt	2.7	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	SPLP	Molybdenum	1.5	ug/L	16461	SOIL	U	13-Sep-01
30	E06	30-E06-B(1 TO 3)	6010B	SPLP	Selenium	1.9	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	NORM	Selenium	0.88	mg/kg	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	NORM	Sodium	161	mg/kg	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Cadmium	0.56	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Chromium	4.5	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Cobalt	30.3	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Nickel	25	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Selenium	7.9	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	TCLP	Thallium	2.5	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	SPLP	Arsenic	3	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	SPLP	Beryllium	0.16	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	SPLP	Molybdenum	4.6	ug/L	16461	SOIL	U	13-Sep-01
30	E07	30-E07-A(1 TO 3)	6010B	SPLP	Selenium	2.2	ug/L	16461	SOIL	U	13-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	NORM	Molybdenum	0.48	mg/kg	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	NORM	Sodium	219	mg/kg	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	TCLP	Chromium	2.2	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	TCLP	Cobalt	12.2	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	TCLP	Copper	33.3	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	TCLP	Nickel	14.9	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	TCLP	Selenium	11.8	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	SPLP	Arsenic	1.8	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	SPLP	Molybdenum	2.5	ug/L	16461	SOIL	U	10-Sep-01
30	E10	30-E10-C(1 TO 3)	6010B	SPLP	Selenium	4.8	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	NORM	Antimony	1.7	mg/kg	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	NORM	Molybdenum	0.54	mg/kg	16461	SOIL	U	10-Sep-01

Table F5-10 Impact of Bla tamination on Project Data
MCB Ca. endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Antimony	3.6	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Chromium	7.4	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Cobalt	3.2	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Copper	15.4	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Lead	9.2	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Molybdenum	2.8	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Nickel	14.4	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Selenium	10	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	TCLP	Silver	0.73	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Antimony	3.2	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Arsenic	1.6	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Cobalt	1.7	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Copper	11.7	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Molybdenum	1.8	ug/L	16461	SOIL	U	10-Sep-01
30	E11	30-E11-A(1 TO 3)	6010B	SPLP	Selenium	1.9	ug/L	16461	SOIL	U	10-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	NORM	Selenium	0.89	mg/kg	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Chromium	2.1	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Cobalt	21.6	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Copper	7	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Lead	3.4	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Nickel	18.4	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	TCLP	Selenium	11	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	SPLP	Antimony	2.8	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	SPLP	Cobalt	0.95	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	SPLP	Copper	7.5	ug/L	16461	SOIL	U	19-Sep-01
30	F17	30-F17-C(1 TO 3)	6010B	SPLP	Thallium	1.3	ug/L	16461	SOIL	U	19-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	TCLP	Chromium	2.3	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	TCLP	Copper	9.5	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	TCLP	Nickel	4.5	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	TCLP	Selenium	8.1	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	TCLP	Zinc	35.5	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	SPLP	Cobalt	0.9	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	SPLP	Copper	6.6	ug/L	16461	SOIL	U	11-Sep-01
30	G05	30-G05-B(1 TO 3)	6010B	SPLP	Selenium	2.7	ug/L	16461	SOIL	U	11-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	NORM	Antimony	1.4	mg/kg	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	NORM	Selenium	0.57	mg/kg	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Antimony	18.3	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Chromium	6.3	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Cobalt	1.6	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Copper	21.2	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Nickel	17.1	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Selenium	11.6	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	TCLP	Zinc	37	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	SPLP	Antimony	10	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	SPLP	Arsenic	2	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	SPLP	Molybdenum	3.3	ug/L	16461	SOIL	U	18-Sep-01
30	G09	30-G09-A(1 TO 3)	6010B	SPLP	Selenium	2.6	ug/L	16461	SOIL	U	18-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	NORM	Selenium	0.75	mg/kg	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	TCLP	Cadmium	0.9	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	TCLP	Chromium	4.5	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	TCLP	Cobalt	13.4	ug/L	16461	SOIL	U	14-Sep-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
30	H05	30-H05-C(1 TO 3)	6010B	TCLP	Nickel	23.3	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	TCLP	Selenium	10.1	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	SPLP	Arsenic	6.9	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	SPLP	Beryllium	0.84	ug/L	16461	SOIL	U	14-Sep-01
30	H05	30-H05-C(1 TO 3)	6010B	SPLP	Molybdenum	0.83	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	NORM	Selenium	0.8	mg/kg	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Cadmium	1.5	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Chromium	5.3	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Cobalt	40.4	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Nickel	33	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Selenium	13	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	TCLP	Thallium	9.7	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	SPLP	Beryllium	0.46	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	SPLP	Molybdenum	3.4	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	SPLP	Selenium	4	ug/L	16461	SOIL	U	14-Sep-01
30	H06	30-H06-A(1 TO 3)	6010B	SPLP	Thallium	2.8	ug/L	16461	SOIL	U	14-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	NORM	Antimony	0.58	mg/kg	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	NORM	Selenium	1.4	mg/kg	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	TCLP	Antimony	7.2	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	TCLP	Cobalt	7.8	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	TCLP	Copper	30.9	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	TCLP	Nickel	12.4	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	TCLP	Selenium	5.8	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	SPLP	Antimony	5.1	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	SPLP	Arsenic	3.9	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	SPLP	Beryllium	0.65	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	SPLP	Molybdenum	0.81	ug/L	16461	SOIL	U	17-Sep-01
30	H11	30-H11-A(1 TO 3)	6010B	SPLP	Selenium	4	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	NORM	Selenium	0.44	mg/kg	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Chromium	3.8	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Cobalt	1.8	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Copper	10.2	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Lead	9.8	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Nickel	7.5	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	TCLP	Selenium	10.7	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	SPLP	Antimony	9.2	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	SPLP	Arsenic	6.9	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	SPLP	Beryllium	0.19	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	SPLP	Molybdenum	5.5	ug/L	16461	SOIL	U	17-Sep-01
30	I08	30-I08-B(1 TO 3)	6010B	SPLP	Selenium	5	ug/L	16461	SOIL	U	17-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	COBALT	2.5	ug/L	16460	SOIL	U	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	COPPER	10.2	ug/L	16460	SOIL	U	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	TCLP	SELENIUM	11.9	ug/L	16460	SOIL	U	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	ANTIMONY	2.6	ug/L	16460	SOIL	U	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	MOLYBDENUM	3.6	ug/L	16460	SOIL	U	25-Sep-01
1D	A07	1D-A07-B(1 TO 3)	6010B	SPLP	SELENIUM	4.6	ug/L	16460	SOIL	U	25-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	NORM	SELENIUM	0.68	mg/kg	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	ARSENIC	4.7	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	COBALT	1.6	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	COPPER	16.5	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	LEAD	4.4	ug/L	16460	SOIL	U	24-Sep-01

Table F5-10 Impact of Bla ntamination on Project Data
MCB C endleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	MOLYBDENUM	1.6	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	TCLP	SELENIUM	10.3	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	ANTIMONY	1.8	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	ARSENIC	2.9	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	COBALT	2.8	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	MOLYBDENUM	4.9	ug/L	16460	SOIL	U	24-Sep-01
1D	C13	1D-C13-B(1 TO 3)	6010B	SPLP	SELENIUM	4	ug/L	16460	SOIL	U	24-Sep-01
1D	G02	1D-G02-B(1 TO 3)	6010B	NORM	ANTIMONY	1.4	mg/kg	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	NORM	MOLYBDENUM	0.45	mg/kg	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	NORM	SELENIUM	0.39	mg/kg	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	ANTIMONY	13	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	COBALT	2.2	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	MOLYBDENUM	1.2	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	TCLP	SELENIUM	8.4	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	ANTIMONY	4.3	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	MOLYBDENUM	0.91	ug/L	16460	SOIL	U	30-Aug-01
1D	G02	1D-G02-B(1 TO 3)	6010B	SPLP	SELENIUM	2.8	ug/L	16460	SOIL	U	30-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	NORM	MOLYBDENUM	0.3	mg/kg	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	COBALT	3.8	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	COPPER	10.5	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	LEAD	1.8	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	MOLYBDENUM	1.3	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	TCLP	SELENIUM	11.1	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	ANTIMONY	1.5	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	ARSENIC	1.7	ug/L	16460	SOIL	U	29-Aug-01
1D	H08	1D-H08-C(1 TO 3)	6010B	SPLP	SELENIUM	4.3	ug/L	16460	SOIL	U	29-Aug-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	MOLYBDENUM	0.53	mg/kg	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	SELENIUM	0.49	mg/kg	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	NORM	SILVER	0.2	mg/kg	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	ANTIMONY	17.1	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	COBALT	2.2	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	TCLP	SELENIUM	14.5	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	ANTIMONY	10.5	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	COBALT	1.5	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	MOLYBDENUM	3.2	ug/L	16460	SOIL	U	07-Sep-01
1D	I07	1D-I07-C(1 TO 3)	6010B	SPLP	SELENIUM	3.6	ug/L	16460	SOIL	U	07-Sep-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	MOLYBDENUM	1.5	mg/kg	16460	SOIL	UJ	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	NORM	SELENIUM	0.87	mg/kg	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	TCLP	SELENIUM	13.2	ug/L	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	ANTIMONY	9.2	ug/L	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	BERYLLIUM	0.19	ug/L	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	COBALT	0.8	ug/L	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	MOLYBDENUM	8	ug/L	16460	SOIL	U	31-Aug-01
1D	J05	1D-J05-C(1 TO 3)	6010B	SPLP	SILVER	0.38	ug/L	16460	SOIL	U	31-Aug-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	COBALT	5.7	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	COPPER	15.7	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	LEAD	4.2	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	MOLYBDENUM	2.1	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	TCLP	SELENIUM	12.3	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	ARSENIC	3.8	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	MOLYBDENUM	3.4	ug/L	16460	SOIL	U	05-Sep-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	POTASSIUM	642	ug/L	16460	SOIL	U	05-Sep-01
1D	L06	1D-L06-C(1 TO 3)	6010B	SPLP	SELENIUM	3.7	ug/L	16460	SOIL	U	05-Sep-01
1E1	B-07	1E1B-07C	8280A	NORM	Total TCDD	2.6	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07C	8280A	NORM	Total TCDF	0.08	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-03	1E1B-03A	8280A	NORM	Total TCDF	0.07	ppb	55583A	SOIL	U	27-Sep-01
1E1	B-07	1E1B-07B	8280A	NORM	Total TCDF	0.06	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07B	8280A	NORM	Total TCDD	2.1	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-03	1E1B-03C	8280A	NORM	Total TCDD	2.5	ppb	55583A	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03A	8280A	NORM	Total TCDD	2.3	ppb	55583A	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	8280A	NORM	Total TCDD	2.3	ppb	55583A	SOIL	U	27-Sep-01
1E1	B-03	1E1B-03B	8280A	NORM	Total TCDF	0.07	ppb	55583A	SOIL	U	27-Sep-01
1E1	B-06 Dup	1E1B-06D	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06 Dup	1E1B-06D	8280A	NORM	Total TCDD	2.2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06C	8280A	NORM	Total TCDD	2.1	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06C	8280A	NORM	Total TCDF	0.06	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02A	8280A	NORM	Total TCDF	0.06	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02A	8280A	NORM	Total TCDD	2.1	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02C	8280A	NORM	Total TCDD	2.7	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-07	1E1B-07A	8280A	NORM	Total TCDD	2.3	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02B	8280A	NORM	Total TCDD	2.3	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-02	1E1B-02C	8280A	NORM	Total TCDF	0.07	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06B	8280A	NORM	Total TCDD	2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06B	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06A	8280A	NORM	Total TCDF	0.04	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-06	1E1B-06A	8280A	NORM	Total TCDD	2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05B	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05B	8280A	NORM	Total TCDD	2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05A	8280A	NORM	Total TCDD	1.9	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05A	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01A	8280A	NORM	Total TCDD	2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	8280A	NORM	Total TCDD	2	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05C	8280A	NORM	Total TCDF	0.08	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-05	1E1B-05C	8280A	NORM	Total TCDD	2.1	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01A	8280A	NORM	Total TCDF	0.05	ppb	55583A	SOIL	U	26-Sep-01
1E1	B-08	1E1B-08A	8280A	NORM	Total TCDD	2.2	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04A	8280A	NORM	Total TCDD	2.2	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04B	8280A	NORM	Total TCDD	2.4	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-04	1E1B-04C	8280A	NORM	Total TCDD	2.4	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-08 Dup	1E1B-08D	8280A	NORM	Total TCDD	2	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-03 Dup	1E1B-03D	8280A	NORM	Total TCDD	2.2	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08C	8280A	NORM	Total TCDD	2	ppb	55583B	SOIL	U	27-Sep-01
1E1	B-08	1E1B-08B	8280A	NORM	Total TCDD	1.9	ppb	55583B	SOIL	U	27-Sep-01
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,6,7,8-HxCDF	0.04	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	Total HxCDF	0.12	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02D	8280A	NORM	Total TCDF	0.05	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	Total HpCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8,9-OCDF	0.05	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	1,2,3,4,6,7,8,9-OCDD	0.11	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	Total HpCDF	0.11	ppb	56389A	SOIL	UJ	15-Oct-01

Table F5-10 Impact of Blank Contamination on Project Data
MCB Camp Pendleton
Sites 1D, 1E1, 1H and 30

Site	Location	Sample ID	Method	Prep	Parameter	Result	Units	SDG	Matrix	VQ	Sample Date
1H	B-01	1HSB-01D	8280A	NORM	Total HxCDF	0.19	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8,9-OCDF	0.08	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8,9-OCDD	0.16	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	Total TCDF	0.09	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02C	8280A	NORM	Total TCDD	2.1	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,4,6,7,8-HpCDF	0.11	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-02	1HSB-02D	8280A	NORM	Total TCDD	1.9	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	1,2,3,6,7,8-HxCDF	0.03	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	Total TCDF	0.1	ppb	56389A	SOIL	UJ	15-Oct-01
1H	B-01	1HSB-01D	8280A	NORM	Total TCDD	2.4	ppb	56389A	SOIL	UJ	15-Oct-01
1E1	B-03	E1B-03A	8290	NORM	Total TCDF	0.6	pg/g	56607	SOIL	UJ	27-Sep-01
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8,9-OCDD	2.9	pg/g	56607	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07C	8290	NORM	Total HpCDD	2	pg/g	56607	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07C	8290	NORM	Total HxCDD	1.3	pg/g	56607	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07C	8290	NORM	1,2,3,4,6,7,8-HpCDD	0.94	pg/g	56607	SOIL	UJ	26-Sep-01
1E1	B-04	E1B-04A	8290	NORM	Total HxCDF	0.64	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-04	E1B-04A	8290	NORM	1,2,3,7,8,9-HxCDF	0.25	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	0.86	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-04	E1B-04A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.26	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-07	E1B-07B	8290	NORM	Total HxCDF	1.3	pg/g	56607B	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	4.7	pg/g	56607B	SOIL	UJ	26-Sep-01
1E1	B-07	E1B-07B	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.27	pg/g	56607B	SOIL	UJ	26-Sep-01
1E1	B-08	E1B-08A	8290	NORM	1,2,3,7,8,9-HxCDF	0.25	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	3.6	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-08	E1B-08A	8290	NORM	Total HxCDF	0.81	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-08	E1B-08A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.44	pg/g	56607B	SOIL	UJ	27-Sep-01
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8,9-OCDD	2.9	pg/g	56607A	SOIL	UJ	26-Sep-01
1E1	B-02	E1B-02A	8290	NORM	1,2,3,4,6,7,8,9-OCDF	0.25	pg/g	56607A	SOIL	UJ	26-Sep-01
1E1	B-02	E1B-02A	8290	NORM	Total HxCDF	0.47	pg/g	56607A	SOIL	UJ	26-Sep-01
1E1	B-03	E1B-03B	8290	NORM	Total HxCDF	0.15	pg/g	56607A	SOIL	UJ	27-Sep-01
1E1	B-03	E1B-03B	8290	NORM	1,2,3,4,6,7,8,9-OCDD	1.8	pg/g	56607A	SOIL	UJ	27-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	BERYLLIUM	0.44	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	CHROMIUM	3.3	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	COBALT	1.3	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	COPPER	7.6	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	LEAD	1.8	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	MOLYBDENUM	6.7	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	NICKEL	8.9	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	THALLIUM	5.2	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	TCLP	VANADIUM	4.6	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	SPLP	CADMIUM	0.7	ug/L	21357	SOIL	U	26-Sep-01
1E1	B-01	1E1B-01B	6010B	SPLP	MOLYBDENUM	7.9	ug/L	21357	SOIL	U	26-Sep-01