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MCAS EL TORO
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MARINE CORPS AIR STATION EL TORO
EL TORO, CALIFORNIA
INSTALLATION RESTORATION PROGRAM
FINAL SAMPLING AND ANALYSIS PLAN

Revision 0

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Quality Assurance Project Plan (QAPP)

APPENDIX B

Health and Safety Plan (HSP)

LIST OF ACRONYMS

%D	percent difference
%RSD	percent relative standard deviation
bgs	below ground surface
B&C	Brown and Caldwell
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CLEAN	Comprehensive Long-term Environmental Action Navy
CLP	Contract Laboratory Program
CTO	Contract Task Order
DOD	Department of Defense
DPDO	Defense Property Disposal Office
DQO	data quality objective
DRMO	Defense Reutilization, and Marketing Office
EBS	Environmental Baseline Survey
EO	Environmental Office
EPA	U.S. Environmental Protection Agency
FMD	Facilities Management Department
ft/day	feet per day
GAC	granular activated carbon
HSP	Health and Safety Plan
IAS	initial assessment study
MCAS	Marine Corps Air Station
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
NFESC	Naval Facilities Engineering Services Center
NDDB	Natural Diversity Data Base

NIST	National Institute of Standards and Technology
OCWD	Orange County Water District
OVA	organic vapor analyzer
OWS	oil/water separator
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PRGs	preliminary remediation goals
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SSM	site sample manager
TAFDS	tactical airfield fuel dispensing system
TDS	total dissolved solids
TSDF	treatment, storage, or disposal facility
ug/kg	microgram per kilograms
ug/L	microgram per liter
USMC	U.S. Marine Corps
VOC	volatile organic compound

RESPONSE TO COMMENTS DRAFT SAMPLING AND ANALYSIS PLAN (SAP) CONFIRMATION SAMPLING PROGRAM MARINE CORPS AIR STATION EL TORO EL TORO, CALIFORNIA	
Comment	**Response**
Comments By: U.S. Environmental Protection Agency (EPA) Response By: U.S. Navy	
EPA Comments Dated 16 November 1994: The Navy anticipates taking several samples in the area of the I-5 (Bake Parkway) extension. EPA understands that Cal-Trans took samples for this area, and the sampling results are probably available for use by the BCT. To avoid duplication of existing work and to save base closure funds, EPA recommends that these results be consulted and that a decision be reached based on these samples if possible before additional samples are taken.	The samples referred to by EPA were collected near the southwest border of CP-16. The analytical results for these samples were unavailable at the publication time of this Final SAP. In addition, these samples were probably not located in the low-lying areas targeted by this confirmation sampling effort. Therefore, the number of borings and samples specified for CP-16 has not been changed. If available, the analytical results for the CALTRANS samples will be considered in the evaluation of sample results collected for the confirmation sampling program at CP-16.
EPA Comments Dated 29 November 1994: After further consultation with EPA regional toxicologists, we would like to make the following change to the workplan. For Parcels CP-15, CP-16, CP-17, the agricultural fields which have a history of recent tilling, please sample and analyze at 1 and 4 foot depths at your proposed locations.	For parcels CP-15, CP-16, and CP-17, the SAP has been revised to specify that samples from these parcels will be collected and analyzed at 1 and 4 feet below ground surface (bgs) with the following exception: at CP-16, one boring is located outside of the tilled area at a pesticide handling area; therefore, samples will be collected at the surface level, 2 feet bgs, and 4 feet bgs at this boring.
Comments By: Cal-EPA, Department of Toxic Substances Control (DTSC) Response By: U.S. Navy	
The Department of Toxic Substances Control (Department) has completed its review of the subject document. Based on this review, the Department concurs with the sampling approach to be undertaken.	No response necessary.

EXECUTIVE SUMMARY

At closing military installations, the U.S. Environmental Protection Agency (EPA) Region IX has requested that confirmation sampling be conducted at agricultural fields prior to the designation of these fields as uncontaminated and available for early transfer under the Community Environmental Response Facilitation Act of 1993. EPA has based this request on the premise that pesticides and herbicides were routinely applied at agricultural areas and could potentially be above recommended preliminary remediation goals (PRGs) established by EPA Region IX for pesticides and herbicides.

This document is a Sampling and Analysis Plan (SAP) for a confirmation sampling program proposed by the Navy as part of ongoing base closure efforts at the Marine Corps Air Station (MCAS) El Toro (or Station). The objective of this program is to provide confirmation data, as required by EPA, for a future designation of various areas (or parcels) within the Station as being uncontaminated and available for early transfer. These parcels include areas of land that have been used as agricultural fields or have been impacted by the application of pesticides and herbicides.

The Navy proposes to implement the confirmation sampling program at MCAS El Toro in December 1994 in a proactive effort to maintain a fast-track schedule for base closure activities. By conducting the sampling effort in December 1994 and obtaining 2-week turnaround time for laboratory analyses, the Navy will be able to incorporate the results of the confirmation sampling into the following submittals to Navy headquarters:

- First revision of the Base Realignment and Closure (BRAC) Cleanup Plan (BCP), which is due at Navy headquarters on or before 03 March 1995

- Final Environmental Baseline Survey (EBS) Report, which is due to the BRAC Cleanup Team (BCT) and Navy headquarters on or before 01 April 1995

Some key assumptions and limitations involved in the sampling effort described in this SAP are presented below. The SAP is being issued to the BCT during the review period for the Draft EBS Report. The environmental condition of property and potential uncontaminated parcels are identified and described in detail in the Draft EBS Report. While it is not anticipated that the type and boundaries of the areas/parcels proposed for confirmation sampling would be likely to change significantly after BCT review of the Draft EBS (to be completed by 10 February 1995), the potential impacts are discussed below.

Confirmation Sampling Strategy

- Only soil sampling at shallow depth (no deeper than 5 feet) is required. The number, location, and frequency of the samples will be based on judgmental selection. No liquid or air samples will be collected.

- The contaminants of concern are pesticides and herbicides.

- Analytical results will be compared to PRG values established by EPA Region IX.

- Preference is given to collecting soil samples from low-lying areas (where drainage may result in accumulation of pesticide/herbicide residue) and at any known pesticide/herbicide handling locations.

Parcels Proposed for Confirmation Sampling

- Past and present agricultural areas will be sampled. A total of eight parcels (approximately 875 acres) will be investigated.

- The Station's golf course and recreational areas will also be sampled. These areas are likely to have experienced routine pesticide/herbicide application. A total of four parcels (approximately 424 acres) will be investigated.

Relationship of Confirmation Sampling Program and EBS Conclusions

- A basewide EBS for the Station is currently being performed. The EBS provides the basis for the Navy to designate parcels as being uncontaminated and suitable for early transfer. At this time, the draft version of the EBS is being reviewed by the BCT. The BCT's review will be completed on or before 10 February 1995. The Final EBS will be submitted to Navy headquarters on 01 April 1995.

- In the Draft EBS Report, 20 parcels are identified as being uncontaminated. At the Navy's direction, 12 of the 20 parcels are recommended for confirmation sampling in this SAP to facilitate their possible designation as available for early transfer.

BCT Review and Concurrence

- The Navy recognizes that the parcels proposed for this confirmation sampling effort are preliminary and yet to be finalized with input from other members of the BCT. **Therefore, BCT concurrence with the parcel boundaries is not requested at this time.** It is anticipated that parcel boundaries will be discussed and reviewed on an ongoing basis by the BCT throughout the base closure process.

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1.0 INTRODUCTION

1.1 Background Information on Base Closure

This Sampling and Analysis Plan (SAP) for confirmation sampling has been prepared as part of the base closure activities being conducted at the Marine Corps Air Station (MCAS) El Toro (or Station). The preparation and implementation of this SAP is being conducted under the Southwest Division, Naval Facilities Engineering Command Comprehensive Long-term Environmental Action Navy (CLEAN) Program, Contract Task Order (CTO) No. 0284.

In March 1993, MCAS El Toro was placed on the proposed Base Realignment and Closure (BRAC) III list of military facilities considered for base closure. The Station was selected for closure in September 1993. It is planned that Station tenants will be relocated to other bases and that base closure will be completed by mid-1999.

In October 1992, Congress passed the Community Environmental Response Facilitation Act (CERFA) to facilitate transfer of property at installations undergoing realignment or closure. CERFA (Public Law 102-425) amends Section 120(h) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 (42 U.S.C. Section 9620[h]). It provides a mechanism for identifying and documenting uncontaminated real property, or parcels thereof, that are suitable for transfer or reuse.

According to the Department of Defense (DOD) guidance for the implementation of CERFA, entitled *Implementation of the Community Environmental Response Facilitation Act (CERFA)*, a basewide environmental baseline survey (EBS) must be performed for military installations being closed. The purpose of the EBS is to determine the environmental condition of real property at the installation and identify "uncontaminated" parcels, which are potentially available for early transfer.

The Draft EBS Report for MCAS El Toro was submitted to the BRAC Cleanup Team (BCT) on 11 November 1994 (Jacobs, 1994a). Comments from the BCT are scheduled to be

submitted by 10 February 1995, corresponding to a 90-day review period. The final version of the EBS Report will be submitted to Navy headquarters on 01 April 1995.

1.2 Objectives of Confirmation Sampling

For closing bases, the U.S. Environmental Protection Agency (EPA) Region IX has requested (Reference: EPA memorandum, *Military Base Closures: Guidance on EPA Concurrence in the Identification of Uncontaminated Parcels under CERCLA Section 120(h)(4)*, April 1994) that confirmation sampling be performed at agricultural fields and other potentially uncontaminated areas where pesticides and herbicides may have been routinely applied. The request for confirmation sampling is based on the potential for this type of area to have residual pesticides and herbicides above recommended preliminary remediation goals (PRGs) established by EPA Region IX for these compounds.

The Draft EBS Report identifies 20 parcels at the Station as being potentially uncontaminated. Of these 20 parcels, 12 are proposed by the Navy for confirmation sampling in this SAP. Some characteristics of the 12 parcels proposed for confirmation sampling include the following:

- Parcel includes current agricultural land use (e.g., row crops, citrus groves), with routine application of pesticides and herbicides.

- Parcel includes current recreational land use (e.g., golf course, sports fields, horse stables/riding areas), with routine application of pesticides and herbicides.

- Parcel includes past agricultural land use with probable routine application of pesticides and herbicides. (Past agricultural land use was determined from aerial photographs of the Station.)

This SAP describes the recommended sampling and analysis procedures proposed for the confirmation sampling program at the 12 parcels specifically identified in the Draft EBS

Report as being potentially uncontaminated. Since these parcels are preliminary, it is not requested that the BCT concur with the parcels and their precise boundaries at this time.

1.3 Report Organization

This SAP is organized in the following sections:

- Section 1.0 presents background information on base closure and objectives of the proposed confirmation sampling program.
- Section 2.0 presents background information on the Station.
- Section 3.0 presents rationale for sampling locations, number of samples, and recommended analytical parameters.
- Section 4.0 presents a description of the field methods and procedures to be followed for the sampling program.
- Section 5.0 describes the analytical parameters for the samples collected.
- Section 6.0 is a list of references.

A Quality Assurance Project Plan (QAPP) is provided as Appendix A. A Health and Safety Plan (HSP) for the field sampling activities is presented as Appendix B.

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2.0 BACKGROUND INFORMATION

2.1 Historical Description of MCAS El Toro

In July 1942, construction of a U.S. Marine Corps (USMC) pilots' fleet operational training facility began on approximately 2,320 acres in Orange County, California. On 17 March 1943, that facility was commissioned as MCAS El Toro. In 1950, MCAS El Toro was selected for development as a master jet air station and permanent center for Marine aviation on the West Coast to support the operations and combat readiness of Fleet Marine Forces, Pacific. Between 1944 and 1988, additional land was acquired to bring MCAS El Toro to its present size of approximately 4,740 acres.

The mission of MCAS El Toro is to maintain and operate facilities and provide services and material to support the operation of aviation activities and units of the operating forces of the USMC, Navy, and other activities as designated by the Commandant of the Marine Corps, in coordination with the Chief of Naval Operations.

2.2 Site Location

MCAS El Toro is located in Southern California in Orange County, about 3.5 miles east of MCAS Tustin and 12 miles inland (north-northeast) of the coastal City of Newport Beach, as shown in Figure 2-1. The exact location of MCAS El Toro is 33 degrees 38 minutes to 33 degrees 41 minutes north latitude, 117 degrees 41 minutes to 117 degrees to 45 minutes west longitude, T 6S/R 8W (Sections 2-5, 7-11, 16-17, 20-21) and T 5S/R 8W (Sections 32-33, 35).

Historically, the land use around MCAS El Toro has been largely agricultural. To the south, southeast, and southwest, however, the land has recently been developed as commercial, light industrial, and some residential usage. The commercial and light industrial usage is directly adjacent to the southwest and southeast borders of the Station. Nearby off-Station residences are located about 3/4 mile from the Station.

A map showing the Station's boundaries and location with respect to local freeways is presented in Figure 2-2.

2.3 History of Base Closure Activities

In March 1993, MCAS El Toro was placed on the proposed BRAC III list of military facilities considered for base closure. MCAS El Toro was formally selected for closure in September 1993. Closure of the Station is planned to be completed by 1999.

A BRAC Cleanup Plan (BCP) for MCAS El Toro was submitted on 21 March 1994 (Jacobs, 1994b). The purpose of the BCP is to summarize the status of MCAS El Toro's environmental restoration and compliance programs and to provide a comprehensive strategy for addressing environmental restoration and restoration-related compliance activities. In addition, the BCP provides schedules of restoration activities in support of base closure. The BCP is a dynamic planning document that will be updated regularly. The first revision of the MCAS El Toro BCP will be completed by 01 March 1995.

According to DOD guidance on implementation of CERFA, a basewide EBS must be performed for military installations being closed. The purpose of the EBS is to evaluate the environmental condition of real property at the Station. An EBS focuses on the review and evaluation of existing environmental data related to storage, release, treatment, or disposal of hazardous substances or petroleum products at an installation's property. Based on this information, individual locations of environmental concern are identified and classified according to site characteristics and status. From this evaluation, properties can be identified that are considered clean and potentially available for early transfer.

A draft version of the MCAS El Toro EBS Report was submitted to the BCT on 11 November 1994 (Jacobs, 1994a). Over 800 locations of concern (LOCs) have been identified through the EBS process at MCAS El Toro. Based on the locations and characteristics of the locations of environmental concern, 20 parcels have been preliminarily identified as being "uncontaminated."

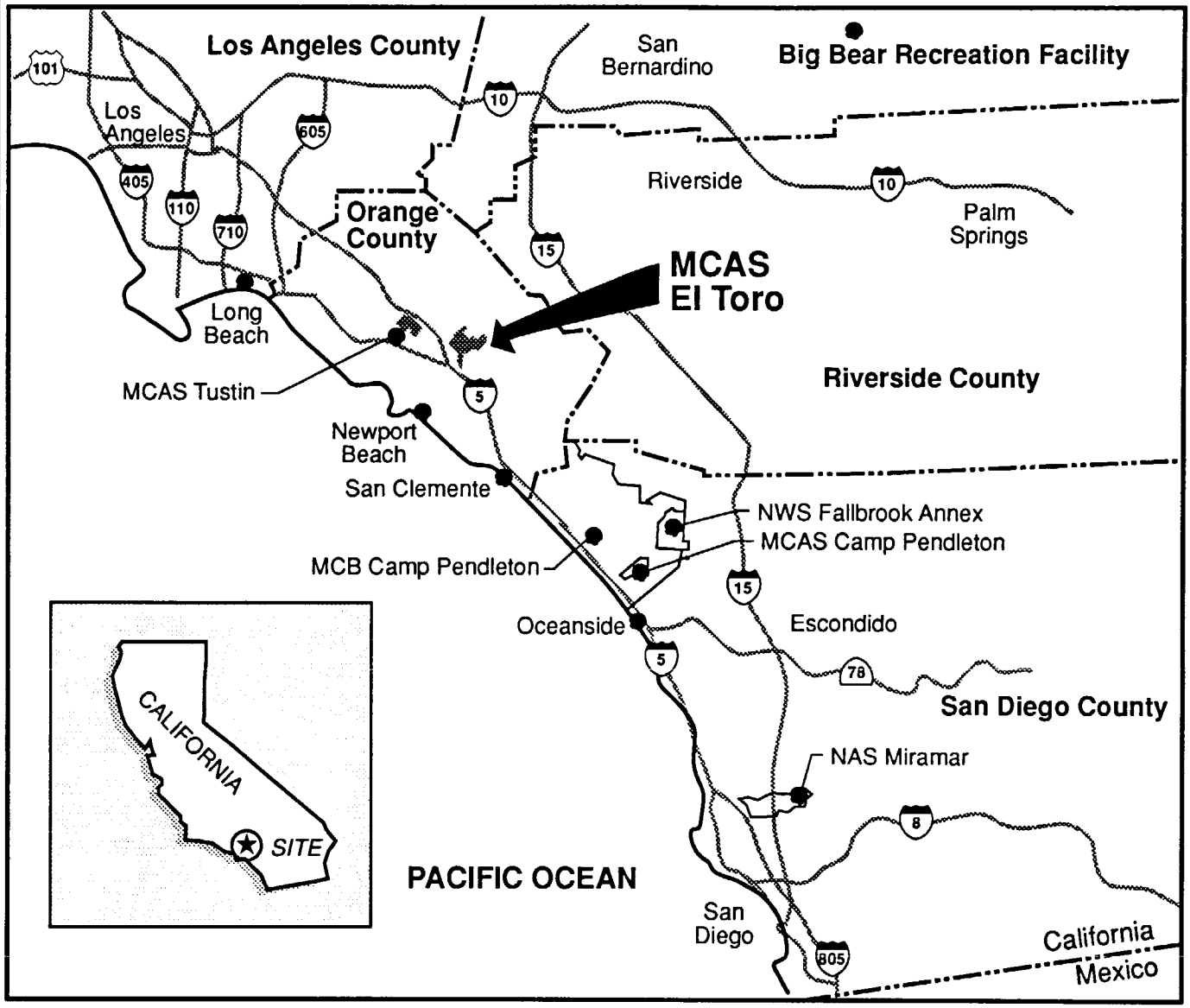
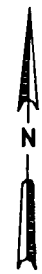


FIGURE 2-1
MCAS EL TORO LOCATION MAP



not to scale

Source: MCAS El Toro Master Plan, 1991.

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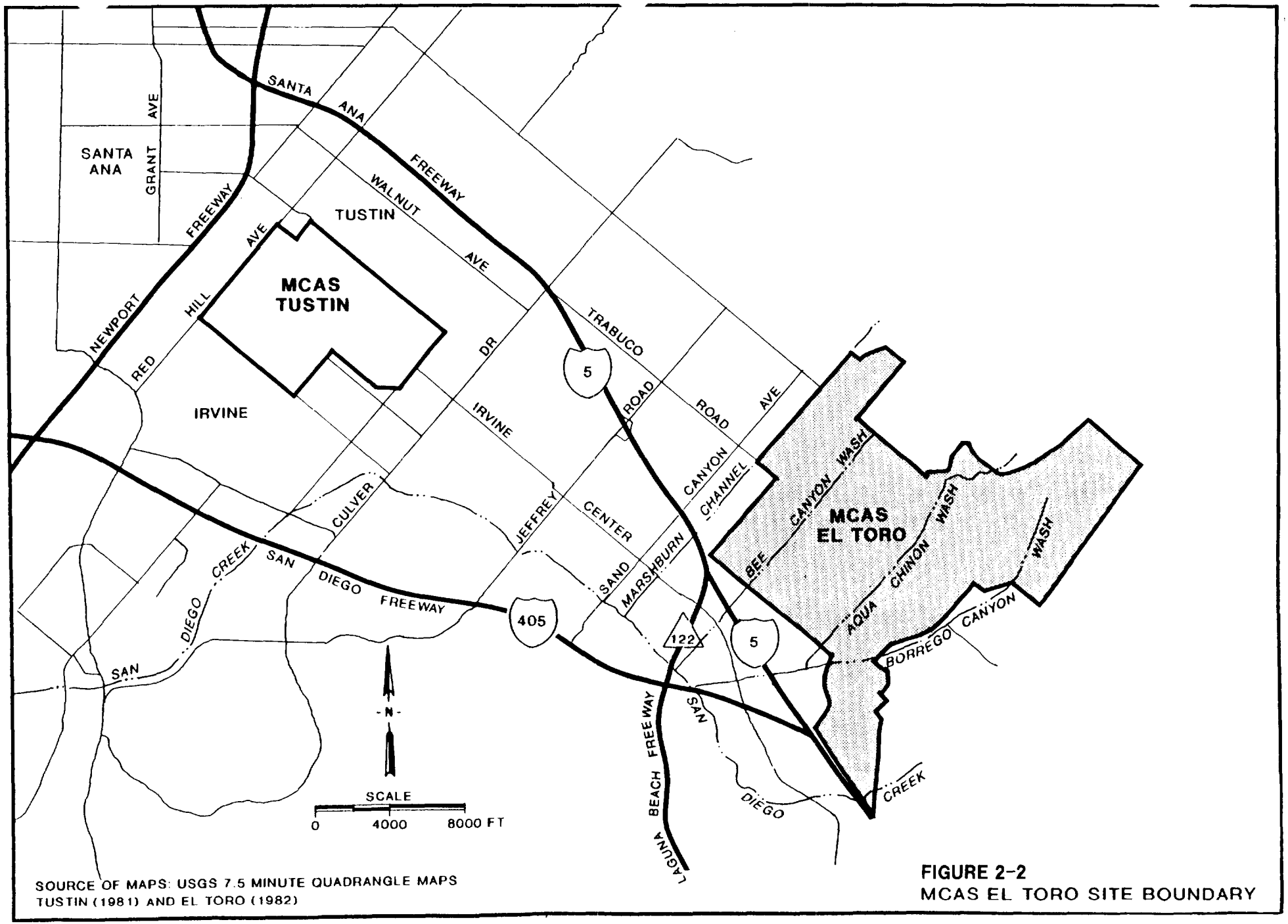

SOURCE OF MAPS: USGS 7.5 MINUTE QUADRANGLE MAPS
TUSTIN (1981) AND EL TORO (1982)

FIGURE 2-2
MCAS EL TORO SITE BOUNDARY

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2.4 Environmental Setting

This subsection summarizes the environmental setting at MCAS El Toro, including topography, surface water, climate, geology, hydrogeology, groundwater chemistry, and ecology.

2.4.1 Topography

MCAS El Toro is situated on the edge of the Tustin Plain, a gently sloping surface comprised of alluvial fan deposits derived mainly from the Santa Ana Mountains. The Tustin Plain is the southernmost extension of the Coastal Plain of Los Angeles, a structural basin located in the Peninsular Ranges Geologic Province (Yerkes et al, 1965). The Tustin Plain is bounded by the Santa Ana Mountains to the north and the San Joaquin Hills to the south.

The MCAS El Toro boundaries extend across the Tustin Plain into the Santa Ana Mountains. Elevations range from about 215 feet above mean sea level (msl) in the southwest corner of the Station on the Tustin Plain to about 800 feet above msl in the northeast corner in the foothills of the Santa Ana Mountains.

2.4.2 Surface Water

Surface drainage in the vicinity of MCAS El Toro flows generally to the southwest, following the slope of the land perpendicular to the trend of the Santa Ana Mountains. Off-Station drainage from the hills to the northeast and from upgradient irrigated farmlands combines with on-Station runoff generated from the extensive paved surfaces at MCAS El Toro and flows into four main drainage channels (see Figure 2-2). Three of these drainage channels (i.e., Borrego Canyon Wash, Agua Chinon Wash, and Bee Canyon Wash) are continuous with natural washes that originate in the Santa Ana Mountains. The southernmost of these washes is Borrego Canyon Wash, which is lined and flows along the southeast boundary of MCAS El Toro. Borrego Canyon Wash crosses the

southern corner of the MCAS El Toro and joins Agua Chinon Wash about 1/4 mile from the Station boundary.

Agua Chinon Wash and Bee Canyon Wash transect the central portion of the Station and receive runoff mainly from storm sewers. Their flow is contained within culverts along nearly all their pathway across MCAS El Toro. Agua Chinon Wash flows into San Diego Creek just east of the intersection of the San Diego and Laguna Freeways, about 1 mile downstream of its confluence with Borrego Canyon Wash. Bee Canyon Wash flows into San Diego Creek about 1,500 feet north of Agua Chinon Wash.

Marshburn Channel is a lined drainage channel that runs along the northwestern boundary of MCAS El Toro and receives runoff from the western part of the Station. The wash flows into San Diego Creek about 3/4 mile northwest of Bee Canyon Wash. San Diego Creek flows into Upper Newport Bay about 7 miles downstream from this intersection with Marshburn Channel.

2.4.3 Climate

The climate at MCAS El Toro is typical of what is sometimes referred to as a Mediterranean climate (i.e., cool, moist winters and warm, dry summers). Temperatures in the winter seldom drop below 37°F. Summer temperatures rarely exceed 100°F.

Average annual precipitation is about 12 inches and occurs primarily in the winter. Early morning light fogs and low clouds are common in the late spring and early summer. Dry winds, known as *Santa Anas*, with velocities up to 70 miles per hour occur for short periods during the late fall and early winter (B&C, 1986).

2.4.4 Geology

MCAS El Toro lies on alluvial fan deposits derived mainly from the Santa Ana Mountains. These Holocene materials consist of isolated coarse-grained stream channel deposits contained within a matrix of fine-grained overbank deposits that range in thickness up to a maximum of 300 feet (Herndon and Reilly, 1989).

The Holocene alluvial materials conformably overlie Pleistocene Age sediments predominantly composed of interlayered fine-grained lagoonal and near-shore marine deposits. These materials become increasingly mixed with beach sands, terrace, and stream channel deposits in the eastern portion of the Tustin Plain and along the basin margins. Thus, the Quaternary deposits form a heterogeneous mixture of silts and clays with interbedded sands and fine gravels that range in thickness up to 500 feet in the western portion of the Tustin Plain (Singer, 1973).

The deeper Quaternary sediments may be equivalent to the lower Pleistocene San Pedro Formation, which consist of semiconsolidated silts, clays, and sands with interbedded limestone. These lagoonal and shallow marine deposits are considered to be a major water-bearing unit in the region, but probably do not extend beneath MCAS El Toro (B&C, 1986).

The Pleistocene deposits nonconformably overlie older semiconsolidated marine sandstones, siltstones, and conglomerates of late Miocene to late Pliocene age. These units comprise the Fernando, Capistrano, and Niguel Formations. The lower Pliocene Fernando Formation, considered to be the major aquifer in the Irvine area, is the base of the water-bearing units (Herndon and Reilly, 1989). This formation probably interfingers with clayey and sandy siltstones of the Capistrano and Niguel Formations west of MCAS El Toro and together range up to 1,500 feet in thickness (JMM, 1988).

Beneath the semiconsolidated rocks lies a very thick sequence of interbedded marine and nonmarine sedimentary rocks and volcanic rocks of the Monterey,

Puente, Vaqueros, and Sespe Formations. These units, which are deposited on a basement of crystalline metamorphic and igneous rocks, have been considered to be nonwater bearing in previous studies (JMM, 1990).

2.4.5 Hydrogeology

MCAS El Toro is situated over the Irvine Subbasin in the Main Orange County Basin. Although the aquifers beneath the Tustin Plain are in hydraulic contact with the Main Orange County Groundwater Basin, it is difficult to make correlations among specific aquifer zones. In the Irvine area, aquifers are much thinner and separated by thicker sequences of fine-grained materials (Banks, 1984). Aquifers tend to be composed of lenticular clayey and silty sands and fine gravels contained within a complex assemblage of sandy clays and sandy silts. Thus, rather than identifiable aquifers that may be correlated from place to place, the groundwater may be considered to flow in a single, large-scale heterogeneous system (Herndon and Reilly, 1989).

The groundwater system beneath the Irvine Subbasin has been divided into a forebay area and a pressure area. The forebay area lies along the margin of the basin where relatively shallow and coarse-grained sediments overlie semiconsolidated rock. Groundwater is thought to occur under unconfined conditions in this area. Recharge to the regional system takes place in the forebay area, primarily along washes that exit the Santa Ana Mountains. The pressure area lies in the central portion of the basin, where sediments are thicker and relatively finer grained. Productive aquifers in this area are present mainly in deeper zones that become increasingly confined with depth. The groundwater has historically been discharged through irrigation wells or has moved westward to the Main Orange County Basin (Banks, 1984).

In 1989, along the southwest perimeter of the facility, the depth to groundwater ranged from 82 to 122 feet bgs (JMM, 1990). Reduced pumping and increased water imports in the past 20 years have allowed groundwater levels to rise as

much as 100 feet (Herndon and Reilly, 1989). Groundwater within the foothills, where it occurs, is reported to be within 50 feet of the ground surface (JMM, 1988). Information gathered during Phase I RI drilling shows that depth to groundwater is generally consistent with those stated above. Groundwater is most shallow in the foothills, where it lies about 45 to 60 feet beneath the washes.

According to 1989 water levels, the direction of flow along the southwest boundary of MCAS El Toro was northwest at a gradient of 0.0066. Regional flow has been west and northwest since the 1940s and has been controlled locally by large pumping depressions. Phase I RI data indicate that regional groundwater flow is still toward the northwest, with an average groundwater gradient of about 0.008.

The average linear groundwater flow velocities in the uppermost aquifer across the Station are in the range of 0.02 to 1.9 feet per day (ft/day). Average linear groundwater flow velocities in localized areas in the deeper coarse-grained portion of the aquifer that supplies groundwater to production wells are likely to be higher than that in the uppermost aquifer. An average linear groundwater velocity of 1.5 ft/day was calculated based on a hydraulic conductivity of 56.8 ft/day (estimated from a 24-hour pumping test completed by Orange County Water District [OCWD]), an average hydraulic gradient of 0.008, and a porosity of 0.3.

2.4.6 Ecology

Approximately 75 percent of the native habitats at MCAS El Toro have been cleared for agriculture, housing, and Station operations. Native vegetation and animal species are primarily condensed in an approximately 1,100-acre area located in the northeast portion of the Station. Native habitat consists primarily of a mixture of native grasslands and coastal sage scrub. This area is known to support one threatened or endangered specie, the California Gnatcatcher, as well as 14 category one and two species of concern.

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3.0 RATIONALE FOR SAMPLING PROGRAM

This section describes the preliminary field activities, sampling strategy, and analytical parameters for the proposed confirmation sampling program at MCAS El Toro. Sampling will be conducted at 12 of the parcels at the Station that have been preliminarily identified as uncontaminated. The location of these parcels is shown in Figure 3-1. The parcels are designated with the letters "CP," followed by the parcel number. Over 800 locations of potential environmental concern, as identified in the Draft EBS (Jacobs, 1994a), are shown in Figure 3-1, along with a buffer zone. Table 3-1 provides a description of each of the parcels.

The following subsections provide discussions of the preliminary field activities for the confirmation sampling program, and describe the rationale for proposed sampling locations and analytical parameters.

3.1 Preliminary Activities

Prior to initiating field work for the confirmation sampling visit, several preliminary activities will be conducted. These activities include establishing the exact boring locations and procuring an analytical laboratory, data validation company, and field equipment.

3.1.1 Establish Boring Locations

Prior to the start of field sampling, exact boring locations will be identified and marked in the field. Field maps showing a minimum of two measurements from two separate stationary objects (e.g., roads, fences, buildings) will be developed in order to document each boring location. This method of documenting each boring location is sufficient for project objectives.

To avoid known subsurface utilities, limited utility clearance will be performed. For parcels located within the secured fenceline of the Station, Station utility maps will

be referenced to determine the exact boring locations. Underground Service Alert will be contacted for underground utility clearance of borings located outside of the Station's secured fenceline. Additional field utility clearance efforts (e.g., geophysical surveys) are not planned because borings will be shallow (maximum depth of 5 feet) and the drilling will be done by hand auger.

3.1.2 Procure Subcontractors and Field Equipment

Before the initiation of the confirmation sampling program field work, subcontracts for the analytical services, data validation, and field equipment must be procured. The analytical laboratories and data validation company will be procured via CLEAN indefinite quantity subcontracting mechanism. Necessary field equipment for sampling and health and safety activities will be rented (or purchased) prior to implementing the field work.

3.2 Confirmation Sampling Program

The objective of this confirmation sampling program is to determine levels of pesticides and herbicides in shallow soil at parcels of land (such as past and present agricultural fields) that the Navy desires to designate as uncontaminated and available for early transfer in the base closure process. The EPA Region IX has requested that pesticide and herbicide concentrations obtained from soil samples be compared to the EPA's PRGs established for these compounds before they concur with the Navy's designation.

Confirmation sampling is proposed at 12 parcels at the Station that have received pesticide/herbicide application but have no other known environmental concerns. Figure 3-1 shows the locations of the parcels and proposed boring locations. Descriptions of the 12 parcels proposed for confirmation sampling, including information on the size and former and current land use, are provided in Table 3-1. This table also summarizes the number of borings proposed at each parcel.

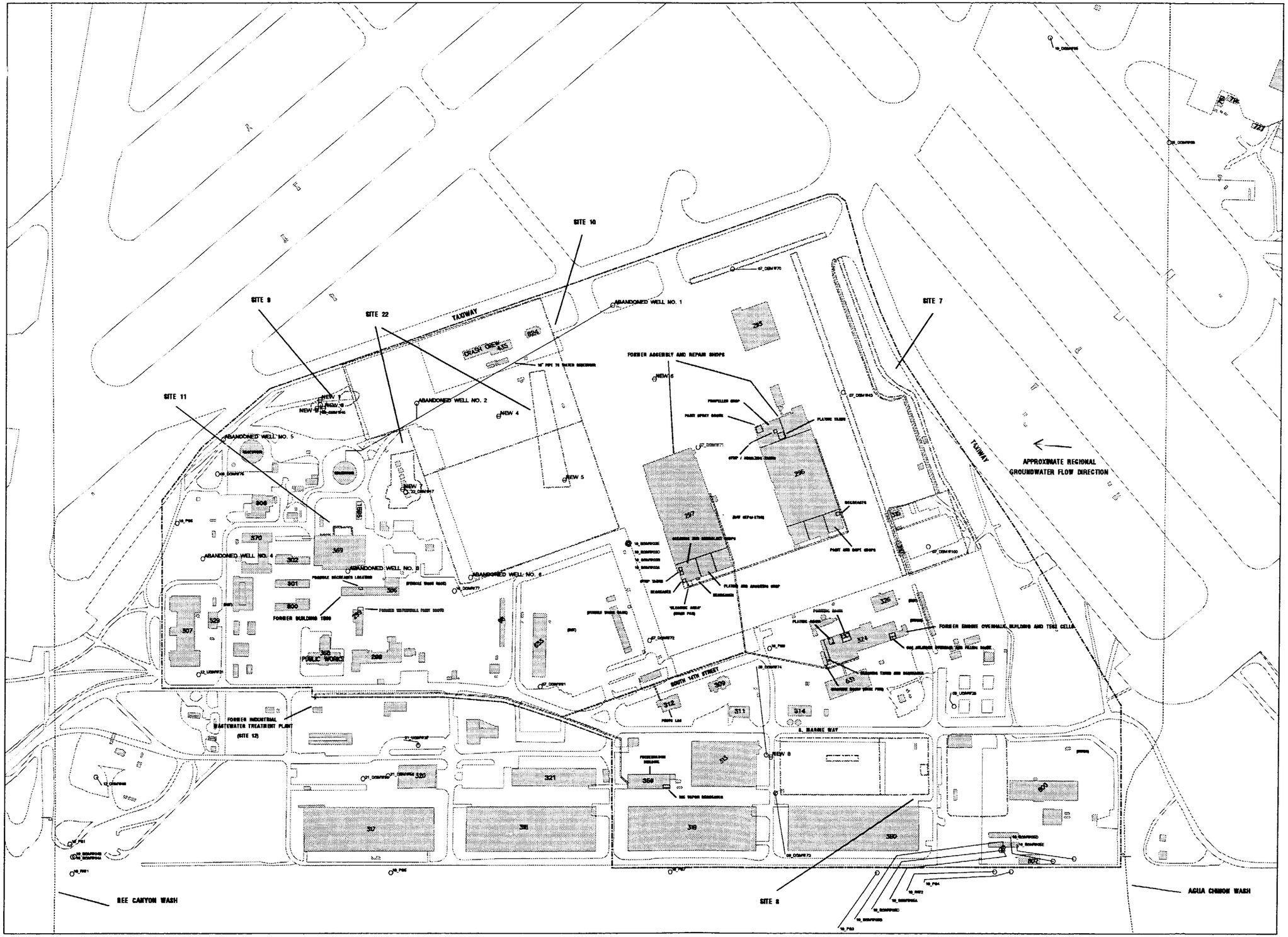

FIGURE E-24a

SITE 24 (POSSIBLE VOC SOURCE AREA): SITE LAYOUT

MCAS EL TORO
BCP

Table 3-1
Parcel Descriptions
MCAS El Toro Confirmation Sampling Program SAP

Page 1 of 4

Parcel I.D.	Size (acres)	Location (a)	Current Land Use	Previous Land Use	Proposed Boring Locations
CP-3	30	Land area generally bounded by Trabuco Rd., Marshburn Wash, N. 4th St., and "C" St.	Commissary Asphalt Parking Lot	Agriculture until about 1965.	1) Grassy area near aircraft display area. 2) Main Commissary parking area. 3) NW parking area.
CP-4	34	Land area generally bounded by N. 6th St., Perimeter Rd., N. 9th St., and "G" St.	Station Housing (BEQs)	Agriculture until about 1950.	1) Unpaved area at corner of N. 6th St. and "C" St. 2) Asphalt parking area SW of Bldg 666. 3) Asphalt parking area SW of Bldg 732.
CP-5	126	Land area generally bounded by N. 9th St., Marshburn Channel, Irvine Blvd., Bee Canyon Wash, and SW boundary of Runway End Zone area for Runways 16L and 16R	Recreational Fields Runway End Zone	Recreational fields were constructed around 1970. Prior to this time, this area was used for agriculture. The Runway End Zone has been undeveloped since the Station opened.	1) Unpaved area south of Baseball Field #2. 2) Unpaved parking area SE of picnic area. 3) Runway End Zone area north of Runway 16-R.
CP-6	195	Northern Flight Corridor area located north of Irvine Blvd. and east of Marshburn Channel.	Ornamental Plants Nursery (Bordiers Nursery)	This area has been used for agriculture/nursery purposes since before the Station began operations.	1) Drainage collection area near SW corner of the parcel. 2) Pesticide mixing area. 3) Near the southern-most corner of the parcel. 4) Near the northwestern-most corner of the parcel.
CP-7	109	Land area generally bounded by N. 8th St., Bee Canyon Wash, Irvine Blvd., and "P" St.	Horse Stables Grammar School	The stable area was constructed about 1963 and the grammar school was constructed about 1965. Prior to these dates, the area was undeveloped.	1) Within drainage ditch that bisects the pasture area. 2) Within corral area. 3) Unpaved area north of Bldg. 290.

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Table 3-1
Parcel Descriptions
MCAS El Toro Confirmation Sampling Program SAP

Parcel I.D.	Size (acres)	Location (a)	Current Land Use	Previous Land Use	Proposed Boring Locations
CP-10	548	Parcel of land including: Family Housing area NE of Inchon Dr.; undeveloped area east of this housing area and west of Magazine Rd. and IRP Sites 1 and 2; and orange grove area east of Irvine Blvd. and between IRP Sites 2 and 17.	Station Housing Agriculture (Orange Groves) Undeveloped Land	Much of this area has been undeveloped since before the Station began operations. Other portions of this parcel include Family Housing located in the NW corner of the parcel and a small orange grove located in the SW corner of the parcel.	Boring locations within CP-10 will be placed within the orange grove area located in the SW portion of this parcel. Four borings will be located at the following areas: 1) SW fenceline where surface drainage flows into drainage ditch adjacent to Irvine Blvd. 2) Pesticide handling area adjacent to Magazine Rd. and the NE boundary of the orange grove. 3) Western-most corner of the orange grove in a low lying area. 4) Low lying area approximately 300 ft. SE of the pesticide loading area.
CP-12	161	Parcel of land between the east side of Magazine Rd. and IRP Sites 1 and 2 and the furthest northeast boundaries of the Station.	Agriculture (Row Crops and Orange Groves) Runway End Zone (Open Land)	This parcel has included agricultural and undeveloped areas since the Station was comissioned. Prior to that time, this area was used only for agricultural purposes.	1) Pesticide handling area near the corner of Magazine Rd. and Perimeter Rd. 2) Drainage ditch located downgradient of orange groves and NE of Perimeter Rd. 3) Drainage collection area located downgradient corner of southern agricultural field near Gate 3. 4) Drainage collection area located between the two northern strawberry fields. 5) Runway End Zone area located east of Runway 25-L.
CP-13	166	Land area generally bounded by "Z" St., El Toro Blvd., Borrego Canyon Wash, and the 13th Hole of the Station Golf Course.	Station Golf Course	The Station Golf Course was constructed about 1950. Prior to 1950, this area was undeveloped. The two holes located NE of El Toro Blvd opened about 1960. This area was previously undeveloped prior to that year.	1) Low-lying area that bisects the fairway for Hole #8. 2) Within sand trap located adjacent the putting green for Hole #17. 3) Low-lying area located within the fairway for Hole #18.

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Table 3-1
Parcel Descriptions
MCAS El Toro Confirmation Sampling Program SAP

Page 3 of 4

Parcel I.D.	Size (acres)	Location (a)	Current Land Use	Previous Land Use	Proposed Boring Locations
CP-14	23	Triangular shaped parcel of land located east of Runway 34R, south of the 13th Hole of the Station's Golf Course, and west of Borrego Canyon Wash.	Station Golf Course	The Station Golf Course was constructed about 1950. Prior to 1950, this area was undeveloped.	1) Within sand trap located adjacent to the putting green for Hole #12. 2) Low-lying area that bisects the fairway for the Hole #11. 3) Low-lying area located between the 11th hole putting green and the 12th hole tee box.
CP-15	36	Parcel of land located south of Borrego Canyon Wash, southwest of the Station's property line, and northeast of the Southern Pacific railroad tracks.	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.	1) Low-lying area near the SE corner of the parcel. 2) Low-lying area located near the SW corner of the parcel. 3) Within agricultural field located near the eastern-most corner of the parcel.
CP-16	385	Southern Flight Corridor located southwest of the Southern Pacific railroad tracks and northeast of Interstate 5 freeway.	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.	1) Within agricultural field located near the northern most corner of the parcel. 2) Within agricultural field located near the southern most corner of the parcel. 3) Within agricultural field located near the eastern boundary of the parcel. 4) Within agricultural field located near the western most corner of the parcel.
CP-17	3	Small parcel of the Southern Flight Corridor located southwest of the Southern Pacific railroad tracks, north of Borrego Canyon Wash, and southeast of the Station's property boundary	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.	1) Low-lying area near southern most corner of the parcel. 2) Low-lying area near western boundary of the parcel. 3) Within agricultural field near the northeastern most corner of the parcel.

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Table 3-1
Parcel Descriptions
MCAS El Toro Confirmation Sampling Program SAP

Page 4 of 4

Parcel I.D.	Size (acres)	Location (a)	Current Land Use	Previous Land Use	Proposed Boring Locations

Notes:
(a) Boundary descriptions indicate general location for reference purposes only. Refer to Attachment 6 of the Preliminary Draft CERFA dated 01 August 1994 for more detailed descriptions of the parcel boundaries.

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3.2.1 Sampling Strategy

Confirmation sampling is proposed for parcels that are believed to be uncontaminated, but have received routine application of pesticides and herbicides. The objective of the sampling effort is to demonstrate whether pesticides and herbicides may be present in soil within these parcels at levels above PRGs. As agreed upon in discussions between the Navy and EPA, only a limited sampling program is required for this screening effort at potentially uncontaminated parcels. The sampling strategy for the confirmation sampling program is based on the following:

- Shallow soil (less than 5 feet bgs) is the medium of concern for assessing pesticide and herbicide residue that may be present in soil at a parcel based on routine application of these compounds. Shallow soil was selected as the medium to be sampled to assess the levels of pesticides and herbicides at the parcels for the following reasons:

  - Pesticides and herbicides are applied directly to the ground surface.

  - Pesticides and herbicides are nonvolatile compounds that tend to stay in the surface soil rather than evaporate into the atmosphere.

  - Pesticides and herbicides are relatively immobile compounds in the subsurface. Therefore, their presence at the site will tend to remain in the shallow soil because they are not likely to migrate to deeper soil.

- Samples will be collected by means of drilling shallow borings (5-foot maximum depth) with a hand auger.

- Three (3) borings are proposed at each parcel, except where there are reasons to include an additional boring.

- In various conversations between the Navy and EPA, the following areas within a parcel were recommended for sampling:

  - Low-lying points within a parcel that would receive surface runoff from irrigation or rain. These low points within a parcel could potentially have high pesticide and herbicide concentrations. One boring will be placed at each significant low-lying point identified at a parcel.

  - Known pesticide/herbicide handling areas within a parcel. One boring will be placed at this type of location, if present at a parcel.

  - Sand traps at the Station's Golf Course. Pesticides and herbicides may have been applied more frequently at sand traps than other areas of the golf course to restrict weed growth and rodent burrowing in the sand traps. For this reason, one boring will be placed in one sand trap at each of the two parcels that encompass the golf course (CP-13 and CP-14).

- Other than specific areas desired for sampling (i.e., low-lying areas, pesticide/herbicide handling areas, and sand traps at the golf course), sample locations will be spread out to provide reasonable spatial coverage of the parcel. In addition, because the boundaries of parcels have not yet been agreed upon by the BCT, sample locations will not be placed adjacent to the parcel boundaries.

- o A summary of the proposed soil sampling and analysis for each parcel is presented in Table 3-2. The following strategy has been implemented in selection of sampling depths in each shallow boring and selection of samples within a boring that are proposed for analysis:

  - For most borings, soil samples will be collected at depths of 0 to 6 inches (surface), 2 feet, and 4 feet bgs. All of the surface and 2-foot samples are proposed for analysis and will have a 14-day turnaround time. The 4-foot samples from these borings will undergo extraction within specified holding times, but will only be held for potential future analysis pending results of the shallower samples in the boring. If pesticide or herbicide concentrations in the shallower samples in a boring exceed PRGs, then the 4-foot sample from the boring will also be analyzed.

  - Where recent tilling has occurred (i.e., at Parcels CP-15, 16, and 17), the 0 to 6 inch sample is eliminated and samples will be collected at depths of 1 and 4 feet bgs. Both the 1-foot and 4-foot samples from these borings are proposed for analysis. These analyses will be performed on a 14-day turnaround basis.

3.2.2 Drilling and Sampling Requirements

A total of 43 shallow soil borings will be drilled during the confirmation soil sampling program. The soil borings will be drilled using a hand auger. The boreholes will be backfilled and tamped with the cuttings. Borings located in asphalt-paved areas will be topped with asphalt (cold patch) upon completion of sampling. At this time, no borings will be located on concrete-paved areas. Boring locations at the golf course will be returned to their original condition (i.e., replaced sod in grassy areas and sand in sand traps) upon completion of

sampling. A detailed description of the field methods and procedures is presented in Section 5.0.

Table 3-2
Summary of Sampling
MCAS El Toro Confirmation Sampling Program SAP

Page 1 of 2

Parcel	No. of Borings[a]	Sample Depths (feet bgs)	Laboratory Instructions[b]
CP-3	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-4	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-5	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-6	4	Surface 2 4	Analyze Analyze Extract/Hold
CP-7	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-10	4	Surface 2 4	Analyze Analyze Extract/Hold
CP-12	5	Surface 2 4	Analyze Analyze Extract/Hold
CP-13	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-14	3	Surface 2 4	Analyze Analyze Extract/Hold
CP-15	3	1 4	Analyze Analyze

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Table 3-2
Summary of Sampling
MCAS El Toro Confirmation Sampling Program SAP

Page 2 of 2

Parcel	No. of Borings[a]	Sample Depths (feet bgs)	Laboratory Instructions[b]
CP-16	3	1 4	Analyze Analyze
	1[c]	Surface 2 4	Analyze Analyze Extract/Hold
CP-17	4	1 4	Analyze Analyze

Notes:
[a]Boring locations are shown in Figure 3-1.
[b]Samples will be extracted by the laboratory and held pending the results of the shallower samples.
[c]For the boring located at the pesticide handling area at CP-16, soil samples will be collected at the surface, 2 feet, and 4 feet bgs.

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4.0 FIELD METHODS AND PROCEDURES

The confirmation soil sampling for base closure activities at MCAS El Toro is limited to the collection of shallow soil samples in the vadose zone. This section describes standard operating procedures to be followed while performing the sampling activities. These procedures are consistent with the following Jacob's standard operating procedures (SOPs):

- Number 10 - Personnel Decontamination
- Number 11 - Field Logbook/Photographs/Field Data Sheets/Corrections
- Number 15 - Field Measurement of Organic Vapors
- Number 20 - Sample Collection, Soils
- Number 28 - Sample Preservation and Analyses Methods
- Number 29 - CLP Container Requirements
- Number 30 - Sample Identification Labels/Custody Seals/Chain-of-Custody Records
- Number 31 - Sample Packaging and Shipment

This section also describes quality control (QC) measures that will be taken with regard to sample collection. A discussion of data quality objectives, sample and laboratory QC, custody, data quality management, and quality assurance (QA) oversight is provided in the QAPP (Appendix A).

4.1 Hand Augering

4.1.1 Soil Boring Logging

Sampling is limited to a maximum depth of 5 feet bgs. Therefore, the borings will not be logged on standard Unified Soil Classification System log forms. General observations of soil conditions such as color, texture, and moisture content will be noted by the field teams in field notebooks.

4.2 Sample Collection

4.2.1 Soil Samples

Soil borings will be drilled by hand auger. Soil will be collected using 3.25-inch auger buckets and transferred directly to the appropriate sample containers using a stainless-steel spoon. All samples will be marked with the sample number, date, time, sampler, method number, class name, and other appropriate information, and immediately stored in coolers at approximately 4° Celsius. Sampling information will be recorded in chain-of-custody forms and the field notebook maintained by the onsite supervisor (see Figures 4-1 and 4-2).

4.2.2 Organic Vapor Monitoring and Soil Vapor Headspace Analysis

During hand augering, organic vapor analyzer(s) (OVAs) (flame ionization detectors) or HNu meters (photoionization detectors) will be used to monitor organic vapor concentrations in the work place. These measurements will be recorded in field notebooks.

Workplace concentrations will be monitored at various times during drilling/ sampling activities. Monitoring will be accomplished by holding the analyzer inlet probe in the breathing zone (4 to 5 feet aboveground near the highest emission source). The breathing zone will be monitored for a minimum period of 10 seconds. Results will be compared to background concentrations measured upwind from the work area. (Refer to the HSP [Appendix B] for additional information.)

The OVA or HNu meter will be calibrated at the beginning and end of each day using supplied calibration gas. The analyzer(s) will also be checked for performance at the end of each working day and any significant drift in the precision or accuracy of the instrument will be recorded.

SAMPLING METHOD: _____

JOB NUMBER: _____
CLIENT: _____
LOCATION: _____
SAMPLED BY: _____
DATE: _____ Page _____ of _____

BORING NO.	SAMPLE NO./ID	DATE/ TIME	LOCATION	DEPTH	DESCRIPTION/ CLASSIFICATION	CONTAINER TYPE AND STORAGE	COMMENTS

FIGURE 4-1
SAMPLE COLLECTION LOG

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CH2M HILL CHAIN OF CUSTODY RECORD

PROJECT NUMBER	PROJECT NAME
CLIENT NAME	
REPORT TO	COPY TO
REQUESTED COMPLETION DATE	LABORATORY

ANALYSES REQUESTED

STA NO	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION	NUMBER OF CONTAINERS											

FOR LAB USE ONLY

LAB # _____

PROJ # _____

ACK _____ VERIFIED _____

DATE INVOICED _____

NO OF SAMPLES _____ PG _____ of _____

DISPOSITION D R _____ DATE

REMARKS

SAMPLED BY AND TITLE (SIGNATURE)	DATE/TIME	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	DATE/TIME
1		2		3	

RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY (SIGNATURE)	DATE/TIME	RELINQUISHED BY (SIGNATURE)	DATE/TIME	RECEIVED BY LAB (SIGNATURE)	DATE/TIME
4		5		6		7	

REMARKS _____

SAMPLING PROGRAM: SDWA [ ] NPDES [ ] RCRA [ ] OTHER _____ (SPECIFY)

SAMPLE SHIPPED VIA: [ ] UPS [ ] BUS [ ] FED EX [ ] HAND OTHER _____

AIR BUS BILL NUMBER

DISTRIBUTION WHITE – ORIGINAL ACCOMPANIES SHIPMENT PINK – COPY TO COORDINATOR FIELD FILES YELLOW – CLIENT

REV 6/87 FORM 340

FIGURE 4-2
CHAIN-OF-CUSTODY RECORD

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4.3 Disposal of Waste Materials

This section describes the general approach that will be followed when disposing of waste materials generated during the confirmation sampling activities at MCAS El Toro. Because the objective of the confirmation sampling program is to verify that the parcels are "uncontaminated," it is not expected that hazardous substances will be encountered. Therefore, soil cuttings generated during hand augering and sampling activities will be placed back into the borehole. Some borings will be located in asphalt-paved areas and, therefore, asphalt repair will be required. It is not anticipated that borings will be located on concrete-paved areas.

Two types of waste materials will be generated during field activities: 1) Decontamination rinsate, and 2) Discarded personal protective equipment (PPE).

4.3.1 Decontamination Rinsate

Rinsate water generated from hand augering and sampling decontamination activities will be collected in 55-gallon drums at the sampling locations. Each drum will be labeled with the following information: date, content (decontamination water), and sample locations. At the end of each day of sampling, the decontamination rinsate will be poured into the aboveground holding tank located at the on-Station environmental restoration program storage yard. From the holding tank, the water is passed through a granular activated carbon unit and used as irrigation water at the Station.

4.3.2 Disposable Protective Equipment

Disposable PPE generated during the performance field work will be contained in 55-gallon drums. The drums will be sealed and labeled to indicate the drilling or sampling location. If laboratory analytical results indicate that the soil samples are hazardous, the PPE will be disposed of as hazardous waste. Otherwise, the PPE will be disposed of at a Class III landfill.

4.4 Equipment Decontamination

4.4.1 Hand Augering and Soil Sampling Equipment

Hand augering and soil sampling equipment will be decontaminated at the individual sampling locations. Prior to sampling, the auger bucket and other sampling equipment will be scrubbed clean with a trisodium phosphate solution using a stiff, long-bristle scrub brush. After the detergent scrub, the equipment will be rinsed over a rinsate tub with clean tap water. The sampling equipment will then be spray-rinsed as follows:

- Distilled water
- Methanol
- Distilled water (twice)
- High Performance Liquid Chromatography (HPLC) grade water

After each spray, the equipment will be placed in a clean area and allowed to air dry before using.

4.5 Sample Containers, Preservation, Packaging, and Shipping

4.5.1 Sample Preservation

Table 4-1 presents the appropriate methods of sample preservation for analyses planned. Table 4-1 also shows the methods of sample packaging and shipping criteria.

Table 4-2 provides the allowable holding times for samples to be collected during the sampling at MCAS El Toro.

The project team will pack all samples obtained during the field investigations in the following manner:

Table 4-1
Sample Quantities, Bottles, Preservatives, and Packing for Samples
MCAS El Toro Confirmation Sampling Program SAP

Analysis	Containers	Sample Volume	Preservation	Shipping	Packaging
Chlorinated Pesticides (CLP)	(1) 8 oz wide-mouth jar (clear)	Fill full	Iced to 4° Celcius	Priority 1 (if medium or high hazard, include certificate for restricted articles)	Wrapped in bubble wrap and placed in individual sealable plastic bags
Organophosphorus Pesticides (EPA Method 8140)	(1) 8 oz wide-mouth jar (clear)	Fill full	Iced to 4° Celcius	Priority 1 (if medium or high hazard, include certificate for restricted articles)	Wrapped in bubble wrap and placed in individual sealable plastic bags
Chlorinated Herbicides (EPA Method 8150)	(1) 8 oz wide-mouth jar (clear)	Fill full	Iced to 4° Celcius	Priority 1 (if medium or high hazard, include certificate for restricted articles)	Wrapped in bubble wrap and placed in individual sealable plastic bags

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Table 4-2
Holding Times for Soil Samples
MCAS El Toro Confirmation Sampling Program SAP

Analysis	Analytical Holding Times
Organochlorine Pesticides	
Extraction	5
Analysis after extraction	40
Organophosphorus Pesticides	
Extraction	5
Analysis after extraction	40
Chlorinated Herbicides	
Extraction	5
Analysis after extraction	40

Notes:

[a]Contract turn-around time for samples identified in this SAP for analysis is 14 days. For these samples, the analytical holding times for analysis after extraction are not applicable. Most of the 4-foot samples, however, are planned to be held by the laboratory and analyzed only if the results of shallower samples indicate the presence of pesticides/herbicides above the PRGs. For these 4-foot samples, extraction must be performed in accordance with the applicable 5-day holding time.

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1. Each container will be packaged and sealed in a separate sealable plastic bag. Figure 4-3 shows the process for packaging soil samples.

2. Both the inside and outside of cooler drains will be taped.

3. Coolers will be lined with plastic bags and a layer of bubble wrap or styrofoam peanuts will be placed at the bottom of each cooler.

4. The sample containers and frozen Blue-Ice packages (or ice) in sealable plastic bags will be placed on end in the cooler and arranged so they do not touch, and the voids will be filled with plastic bubble wrap.

5. The large plastic bags will be taped closed and custody sealed.

6. A custody seal will be placed on each sample container.

7. A mailing label with the laboratory address will be placed on top of each cooler.

8. "THIS SIDE UP" labels will be attached on all four sides of each cooler. "FRAGILE" labels will be attached on at least two sides of each cooler.

9. Shipper's address will be written on the outside of the cooler. If address is stenciled on, "SHIPPER" will be written above it.

4.5.2 Shipping

Field personal responsible for shipping samples must be certified in the Procedures for Shipping Dangerous Goods in conformance with 49 CFR 172. Copies of their training certificates will be maintained by the Site Manager during the field effort. All sample shipments will be packaged and shipped in accordance with 49 CFR 172.

All samples will be shipped to a CLP laboratory by overnight carrier. All samples will be shipped in the following manner:

1. A completed chain-of-custody record indicating the time and date shipment was relinquished to the shipping agent will be reviewed.

2. The chain-of-custody record going to the laboratory will be placed in a sealable plastic bag. The bag will be custody sealed and taped to the inside of the cooler lid.

3. The lid will be closed and the cooler taped shut with strapping tape.

4. A shipping bill will be completed and attached to the cooler.

5. At least two signed custody seals will be affixed over lid openings (front right and back left of cooler).

4.5.3 Sample and Shipping Containers

Table 4-1 presents the types of sample containers and sample quantities for each sample to be collected during the confirmation sampling event at MCAS El Toro.

Shipping containers will be plastic or metal-clad ice chests, in good condition, capable of retaining fluids should a sample loss occur.

4.6 Sample Custody and Sample Labeling

Because of the potential evidentiary nature of samples, the possession of samples must be traceable from the time the samples are collected until they are analyzed at a laboratory. Chain-of-custody procedures are used to maintain and document sample possession. The principal documents used to identify samples and to document possessions are:

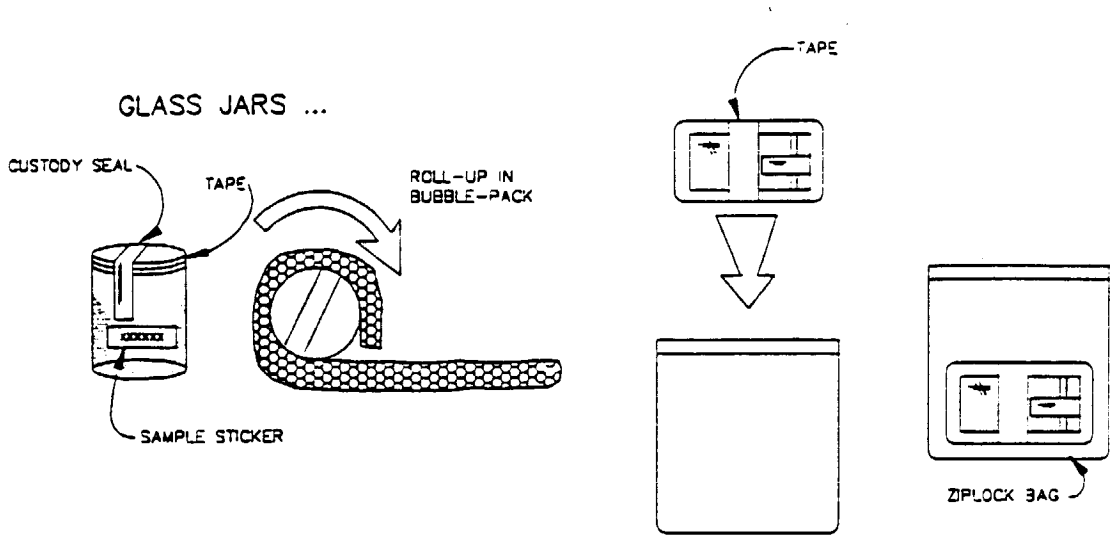

FIGURE 4-3
SOIL SAMPLE PACKAGING

FIG38.DWG

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- Chain-of-custody records
- Air bills or shipping records (e.g., Federal Express, Purolator, etc.)
- Field notebooks
- Master Sample Log Sheet

The site sample manager (SSM) will maintain a supply of field documents, including sample custody seals and chain-of-custody records. The SSM is responsible for inventory of serialized documents and assignment of these documents to specific tasks. All unused field documents are returned to the SSM at the end of the field sampling work. The SSM notes the return of these documents in the serialized document logbook.

A sample numbering system will be used to identify each sample and associated duplicates and other QA/QC samples for chemical analysis. A sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information, and provide anonymity for the samples at the laboratory. A list of the sample identification numbers will be maintained in the field notebook. The anticipated numbering system for the MCAS El Toro project is described in Subsection 4.7.

4.6.1 Chain-of-Custody

Because samples collected during any investigation could be used as evidence, their possession must be traceable from the time the samples are collected until they are analyzed. To document sample possession, chain-of-custody procedures are followed.

A sample is under custody if one or more of the following criteria is met:

- It is in your possession
- It is in your view after being in your possession
- It was in your possession and then you locked it up to prevent tampering
- It is in a designated secure area

4.6.2 Sample Labels

All samples will be labeled with information identifying the sample location, date and time of sample collection, sampler, method number, class name, and other relevant data, as appropriate. All samples will be assigned a unique identification number that will be written on the sample label, and affixed as a separate printed label.

All labels will be filled out using indelible ink and affixed to the sample containers by the adhesive backing. Wide, clear plastic tape will then be placed over the label to protect it and to further secure the label to the sample container. An example of the sample label to be used is given in Figure 4-4.

4.6.3 Chain-of-Custody Record

A chain-of-custody record will be filled out for each sample shipment container. All samples within a container must be accounted for on the chain-of-custody record. An example of the chain-of-custody record is given in Figure 4-2.

4.6.4 Transfer of Custody and Shipment

Samples are accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving the samples sign, date, and note the time on the record. This record documents sample custody transfer from the sampler at the site, to the analyst at the laboratory, including all intermediate persons who may have held custody of the samples.

Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate chain-of-custody record accompanying each shipping container. Shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, courier name(s), sample identification number, and other pertinent information are entered

JE

Environmental Lab
2218 Railroad Avenue
Redding, CA 96001

Client _____

Sample Description _____

Location _____

Analysis _____

Preservative _____

Date/TIME _____ By _____

CUSTODY SEAL

Date _____

Signature _____

FIGURE 4-4
SAMPLE LABEL & CUSTODY SEAL

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in the "Remarks" section of the chain-of-custody record. An example of the custody record is given in Figure 4-2.

4.7 Sample Documentation

4.7.1 Sample Identification

Each sample will be assigned a unique alpha-numeric number consisting of three fields separated by dashes. The sample number will be determined as follows:

- The first field identifies the parcel number.
- The second field identifies the boring number.
- The last field identifies the sample depth (0 = surface sample; 1 = 1 foot bgs; 2 = 2 feet bgs; and 3 = 4 feet bgs) and whether the sample is an original (indicated by a "0"), duplicate (indicated by a "1"), or rinsate sample (indicated by a "2").

For example, the sample identifier, **CP5-B2-31**, is assigned to parcel number 5 ("CP5"), second boring ("B2"), sample from 4 feet bgs ("3"), duplicate sample ("1").

A Master Sample Log (Figure 4-5) will be maintained by the SSM. The Master Sample Log will consist of a bound notebook maintained at the field trailer located on-Station. All samples numbers, COC serial numbers, sample container manufacturer lot numbers, sample dates, shipment dates, airbill numbers, shipper's name, and other relevant information will be logged in the master sample log on a regular basis.

The master sample log will be reviewed and copied weekly (minimum) by the SSM.

4.7.2 Field Record Keeping

In addition to completion of the chain-of-custody record, master sample log, and other preprinted data forms, sampling teams will be assigned bound field logbooks in which significant events, observations, and measurements will be recorded on a daily basis. Each field logbook will be assigned a unique, sequential identification number. Members of the field team will use this notebook to record the measurements taken during sampling, including the following: person sampling; sample designation with adhesive label; date; time; location; field parameters; weather conditions; sample containers used and analyses to be performed; decontamination procedures; and sampling procedures.

These notebooks are to be filled out in ink as permanent records. It will be the responsibility of each field member to copy notebook pages weekly, to serve as a backup in case the original notebook is lost or destroyed. Notebook copies will be maintained in CH2M HILL office files.

4.7.3 Corrections to Documentation

All original data recorded in field notebooks, the master sample log, sample identification tags, and chain-of-custody records must be written in waterproof ink. None of these accountable serialized documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on an accountable document, the responsible individual may make corrections simply by crossing a line through the error, entering the correct information, and initialing the change. The erroneous information should not be obliterated. Any subsequent error discovered on an accountable document should be corrected by the person who made the entry. All subsequent corrections must be initialed and dated.

Figure 4-5
Master Sample Log Sheet
Confirmation Sampling Visit
MCAS El Toro

Project Name: _____ **Sample Control Manager:** _____

Project Number: _____

Sample Labels (Numbers) Generated	Chain of Custody Serial Number	Sample Numbers on Chain of Custody	Sample Container Manufacturer Lot Number	Date Sampled	Date Shipped	Airbill Number	Shipper Name	Comments

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4.8 Field Quality Control Samples

Additional samples will be analyzed as part of a QC program for the confirmation sampling program at MCAS El Toro. Table 4-3 provides a summary of field and laboratory QC procedures and collection frequencies.

4.8.1 Field Quality Control Sampling

4.8.1.1 Field Duplicate Samples

Field duplicate samples will be collected at a rate of 10 percent of the total samples collected. For shallow soils collected by auger buckets, duplicate samples will be collected by splitting samples, provided that sufficient sample volume can be collected.

4.8.1.2 Rinsate Samples

Rinsate samples will be collected at a rate of 5 percent of the total number samples collected. Naval Facilities Engineering Services Center (NFESC) guidance specifies collection of rinsate samples on a daily basis, however, no daily requirements are proposed for the following reasons:

- Given the short duration of fieldwork, analytical results will not be available until after the completion of fieldwork. Therefore, corrective actions to decontamination procedures that may be necessary (as indicated by rinsate results) could not be implemented.

- The type of drilling method to be used in this sampling event (i.e., hand augering) will not have a high sample production rate versus typical production from a drill rig operation. Daily collection of rinsate samples would result in an excessively high number of rinsate samples.

A total of 43 sample locations are proposed for the 12 parcels preliminarily identified as uncontaminated. Samples will be collected at 1 foot and 4 feet bgs, or at the surface level, 2 feet, and 4 feet bgs. Thus, a minimum of 119 samples will be collected. Based on this number of samples, a total of six rinsate samples will be collected. Rinsate samples will be collected by retaining the final HPLC rinse water following decontamination of the soil sampling equipment (auger bucket).

4.8.1.3 Trip Blanks

Because volatile organic compounds (VOCs) are not being analyzed as part of the confirmation sampling program, trip blanks do not need to be sent with the sample coolers.

4.8.2 Laboratory Quality Control Sampling

Laboratory QC Samples will be collected at a rate of 5 percent of the total samples collected (include duplicates). This sample will be used by the laboratory for duplicate and matrix spike analysis. Samples suspected of moderate contamination will be chosen for the laboratory QC sample, if possible. The sample will be identified and denoted as "Lab QC Sample" on the sample bottle, and the chain-of-custody record.

Table 4-3
Summary of Quality Control Procedures
MCAS El Toro Confirmation Sampling Program SAP

Field Quality Control			
Sample Type	**Target Frequency**	**Daily Minimum[a]**	**Comment**
Duplicate (soil)	10%	None	If sufficient volume
Trip Blank	Not applicable	Not applicable	No VOCs analysis
Rinsate Sample	5%	None	--
Laboratory Quality Control			
Sample Type	**Target Frequency**	**Daily Minimum[b]**	
Duplicate	5%	1/analysis method	
Blank	5%	1/analysis method	
MS/MSD	5%	1/analysis method	
Surrogate spike	(method specific)	(method specific)	
Control	5%	1/analysis method	

[a]During sampling activities for soil
[b]During analysis for specific methods

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5.0 REQUEST FOR ANALYSIS

A wide variety of pesticides and herbicides may have historically been applied to the 12 parcels being evaluated in the confirmation soil sampling program at MCAS El Toro. For this reason, the analytical program for the confirmation sampling program has been designed to assess that presence of a wide variety of pesticides/herbicides in soil samples. Thus, it is proposed that soil samples be analyzed the primary groups of pesticides and herbicides, which include organochlorine pesticides, organophosphorus pesticides, and chlorinated herbicides.

For the Phase I RI and Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) performed at the Station, sample analyses were done per EPA Contract Laboratory Program (CLP) procedures. CLP methods consist of standard, reproducible procedures that result in data of known quality. To obtain data of comparable quality to that produced during the Phase I RI and RFA, CLP methods will be used, as applicable, for the confirmation sampling program.

Of the three analyses proposed for the confirmation sampling program, CLP methods only exist to organochlorine pesticides. Organochlorine pesticides will be analyzed per CLP procedures (CLP pesticides/polychlorinated biphenyls [PCBs]). The target compound list for this analysis will be limited to organochlorine pesticides and will exclude PCBs. Table 5-1 lists the target compounds for the organochlorine pesticides analysis.

CLP methods do not exist for organophosphorus pesticides and chlorinated herbicides. Analytical procedures for these analyses will, therefore, be based on EPA methods specified in SW-846 (EPA, 1986). These analyses include parameter-specific QC procedures. The following subsections provide detailed procedures for the non-CLP analyses to be performed for the confirmation sampling program.

5.1 Analysis of Organophosphorus Pesticides

5.1.1 Analytes

Analytes include organophosphorus pesticides.

5.1.2 Sample Matrices

Sample matrices to be analyzed include water and soil.

5.1.3 Analytical Procedure and Quantitation Limits

The laboratory shall follow the procedure described in the EPA Method 8140. Compound identifications must be confirmed by at least one additional analytical technique such as gas chromatography (GC) using a second column or by GS/mass spectrometry (MS). The following detection limits are required (based on practical quantitation limits in SW-846 for groundwater and low-level soil factors):

Compound	Water	Soil
Azinphos methyl	15.0 ug/L	1,005 ug/kg
Bolstar	1.5 ug/L	100.5 ug/kg
Chlorpyrifos	3.0 ug/L	201 ug/kg
Coumaphos	15.0 ug/L	1,005 ug/kg
Demeton-O	2.5 ug/L	167.5 ug/kg
Demeton-S	2.5 ug/L	167.5 ug/kg
Diazinon	6.0 ug/L	402 ug/kg
Dichlorvos	1.0 ug/L	67 ug/kg
Disulfoton	2.0 ug/L	134 ug/kg
Ethoprop	2.5 ug/L	167.5 ug/kg
Fensulfothion	15.0 ug/L	1,005 ug/kg
Fenthion	1.0 ug/L	67 ug/kg
Merphos	2.5 ug/L	167.5 ug/kg
Mevinphos	3.0 ug/L	201 ug/kg
Naled	1.0 ug/L	67 ug/kg
Parathion methyl	0.3 ug/L	20.1 ug/kg
Phorate	1.5 ug/L	100.5 ug/kg
Ronnel	3.0 ug/L	201 ug/kg
Stirophos	50 ug/L	3,350 ug/kg
Tokuthion (Prothiofos)	5.0 ug/L	335 ug/kg
Trichloronate	1.5 ug/L	100.5 ug/kg

Table 5-1
Organochlorine Pesticides
MCAS El Toro Confirmation Sampling Program SAP

Parameter		CAS Number
1.	alpha-BHC	319-84-6
2.	beta-BHC	319-85-7
3.	delta-BHC	319-86-8
4.	gamma-BHC (Lindane)	58-89-9
5.	Heptachlor	76-44-8
6.	Aldrin	309-00-2
7.	Heptachlor epoxide	1024-57-3
8.	Endosulfan I	959-98-8
9.	Dieldrin	60-57-1
10.	4,4'-DDE	72-55-9
11.	Endrin	72-20-8
12.	Endosulfan II	33213-65-9
13.	4,4'-DDD	72-54-8
14.	Endosulfan sulfate	1031-07-8
15.	4,4'-DDT	50-29-3
16.	Methoxychlor	72-43-5
17.	Endrin ketone	53494-70-5
18.	alpha-Chlordane	5103-71-9
19.	gamma-Chlordane	5103-74-2
20.	Toxaphene	8001-35-2

Notes:
[a]Chemical Abstract Service (CAS) registry number.

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The following must be considered by the laboratory for EPA Method 8140 (organophosphorus pesticides):

1. A laboratory blank is to be analyzed after the analysis of an unusually concentrated sample to check for contamination by carry-over. Any sample with organophosphorus pesticides present at a concentration two times (2X) the calibration range is considered an unusually concentrated sample.

5.1.4 Contract Holding Times

The maximum holding time for extraction is 5 days from the date of sample collection and for analysis is 40 days from the date of extraction.

For this confirmation sampling program, a 14-day turnaround time is specified for those samples identified for analysis. Samples identified in this plan to be held for potential future analysis will each require extraction whether or not they are eventually analyzed by the laboratory. (See Section 3.0 for details on the confirmation sampling strategies.)

5.1.5 Calibration Procedure and Criteria

The laboratory shall follow the calibration procedure specified for EPA Method 8140, Sections 5.5 and 7.3 of SW-846, as well as the following:

1. Prepare a minimum of five standards using the method outlined in EPA Method 8140 Sections 5.2 and 5.3 of SW-846. One standard must have concentrations at or below the quantitation limit.

2. Analyze initial and continuing calibration standards according to EPA Method 8140. Perform one or more mid-level calibration standard each day.

3. Less than 10 percent relative standard deviation (%RSD) in calibration factors (RF) for initial calibration standards and less that +/-15 percent difference (%D) in RF for daily calibrations are required.

4. When calibration verification standard measurements exceed the QC requirements for the initial calibration and the continuing calibrations, the analysis must be terminated, the problem corrected, the instrument recalibrated, and the calibration reverified.

5. Obtain calibration standards by one or more of the following means:

- Purchase from the National Institute of Standards and Technology (NIST).
- Prepare internally using standards that are certified by or directly traceable to NIST.
- Purchase from a commercial supplier who has more than 5 years' experience in the preparation and certification of organophosphorus pesticides standards.

5.1.6 Internal Quality Control Checks, Control Limits and Corrective Actions

For sample analysis, the laboratory shall follow the QC requirements specified below and in Section 8 of EPA Method 8140.

1. Analyze method blanks at a frequency of one per group of 20 or fewer samples. The method blanks must be free of organophosphorus pesticides at or above the detection limits and free of any interfering peaks.

2. An organophosphorus pesticide surrogate (e.g., pesticides that are not expected to be present in the samples) must be spiked into the standards, samples, method blanks and QC samples. The amount of surrogate added must be at least 10 times the instrument detection limit. Recoveries of 75 to 125 percent are required.

3. Second column confirmation is required for all positive results reported.

4. Sample extracts containing one or more analytes at concentrations above the initial calibration range are to be diluted and analyzed. Report the results and documentation for both analyses.

5. Analyze matrix spikes and matrix spike duplicates (MS/MSDs) at the frequency of one per group of 20 or fewer samples. Concentration of the matrix spike solution should be such that the final extracts contain amounts at the mid-range of the calibration curve. Percent recoveries (%R) of 75-125 percent and relative percent differences (%RPD) of less than 20 percent are required.

If the above control limits are exceeded, take appropriate actions to correct the problem and reanalyze the affected samples.

5.1.7 Data Calculations and Reporting Units

The laboratory shall calculate results as specified by EPA Method 8140. Sample results are to be reported in micrograms per liter (ug/L) for water samples, and micrograms per kilogram (ug/kg) on a dry-weight basis for soil samples. Report results less than 10 parts per billion (ppb) to one significant figure and above 10 ppb to two significant figures.

5.1.8 Documentation and Deliverables

The laboratory shall report results of blanks, samples, calibration and check standards, spikes, and surrogate recoveries. All raw data and sample calculations must be included for both primary and confirmation analyses. Indicate all extraction and analysis dates. The data package must be systematically organized with all pages sequentially numbered.

5.2 Analysis of Chlorinated Herbicides

5.2.1 Analytes

Analytes include chlorinated herbicides.

5.2.2 Sample Matrices

Sample matrices to be analyzed include water and soil.

5.2.3 Analytical Procedure and Quantitation Limits

The laboratory will follow the procedure described in the EPA Method 8150. Compound identifications must be confirmed by at least one additional analytical technique such as GC using a second column or by GC/MS. The following detection limits are required (based on practical quantitation limits in SW-846 for groundwater and low-level soil factors):

Compound	Water	Soil
2,4-D	12 ug/L	804 ug/kg
2,4-DB	9.1 ug/L	609.7 ug/kg
2,4,5-T	2.0 ug/L	134 ug/kg
2,4,5-TP	1.7 ug/L	113.9 ug/kg
Dalapon	58 ug/L	3,886 ug/kg
Dicamba	2.7 ug/L	180.9 ug/kg
Dichloroprop	6.5 ug/L	435.5 ug/kg

Dinoseb	0.7 ug/L	46.9 ug/kg
MCPA	2,490 ug/L	20,000 ug/kg
MCPP	200 ug/L	39,000 ug/kg

The following items must be considered by the laboratory for EPA Method 8150 (chlorinated herbicides):

1. The herbicides are strong organic acids, and may be lost during analysis if exposed to alkaline substances. Therefore, it is critical that glassware and glass wool be acid-rinsed and sodium sulfate be acidified prior to use.

2. Diaxomethanol is explosive and carcinogenic. It should be handled by experienced analysts only.

3. The drying step is very critical to ensuring complete esterification. Sufficient sodium sulfate must be added to ensure recovery of the herbicides.

4. If concentration and esterification are not to be performed immediately, the sample must be stored in a refrigerator.

5. Once methylated, extracts should be analyzed immediately to minimize transesterification and other potential reactions.

5.2.4 Contract Holding Times

Samples must be extracted within 5 days of collection; extracts must be analyzed within 40 days of extraction.

For this confirmation sampling program, a 14-day turnaround time is specified for those samples identified for analysis. Samples identified in this plan to be held for potential future analysis will each require extraction whether or not they are

eventually analyzed by the laboratory. (See Section 3.0 for details on the confirmation sampling strategies.)

5.2.5 Calibration Procedure and Criteria

1. Calibrate the GC using at least five concentration levels, one of which should be at or near, but above, the method detection limit. The other four concentrations should correspond to the expected range of sample concentrations. Replace calibration standard solutions every 6 months or sooner.

2. Analyze a mid-level check standard after every 10 samples in the analysis sequence. The check standard must be 85 to 115 percent recovered, otherwise, re-establish the calibration curve.

5.2.6 Internal Quality Control Checks, Control Limits and Corrective Actions

1. One or two surrogate standards must be added to all blanks, calibration standards, and samples. These surrogates must be chosen so that their retention times encompass the temperature program employed. Surrogate recoveries must meet the limits specified by the method.

2. Analyze an MS/MSD per 20 or fewer samples.

3. Initially analyze at least four replicates consisting of reagent water spiked with each compound to be analyzed using a quality control check sample concentrate. The results obtained should be compared with the precision and accuracy data given in the method.

4. Analyze a blank per analytical batch of 20 or fewer samples. No target compounds must be present at the detection limit or at higher concentrations.

5. If sample cleanup is employed, a series of standards must be processed through the cleanup procedure to evaluate elution patterns and verify absence of interferences.

6. If control limits are not met, check instrument performance, calculations, and standards. Recalculate and/or re-evaluate extracts where necessary. If no problems are apparent, re-extract and reanalyze affected samples.

5.2.7 Data Calculations and Reporting Units

Calculate results as specified in the method. Sample results are to be reported in ug/L for water samples, and ug/kg on a dry-weight basis for soil samples. Report results less than 10 ppb to one significant figure and above 10 ppb to two significant figures.

5.2.8 Documentation and Deliverables

Report results of blanks, samples, calibration and check standards, spikes, and surrogate recoveries. All raw data and sample calculations must be included for both primary and confirmation analyses. Indicate all extraction and analysis dates. The data package must be systematically organized with all pages sequentially numbered.

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Appendix A

QUALITY ASSURANCE PROJECT PLAN

MARINE CORPS AIR STATION EL TORO
EL TORO, CALIFORNIA
INSTALLATION RESTORATION PROGRAM
FINAL QUALITY ASSURANCE PROJECT PLAN

01 December 1994

Revision 0

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LIST OF ACRONYMS

CLP	Contract Laboratory Program
DQOs	Data Quality Objectives
EPA	U.S. Environmental Protection Agency
FTL	Field Team Leader
IDL	instrument detection level
MCAS	Marine Corps Air Station
MS/MSDs	matrix spike/matrix spike duplicate
NIST	National Institute for Standards
OVAs	organic vapor analyzers
PjM	Project Manager
ppb	parts per billion
QA	Quality Assurance
QAM	Quality Assurance Manager
QC	Quality Control
RCM	Resource Center Manager
RPD	relative percent difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
TR	Technical Reviewer
ug/L	micrograms per liter
ug/kg	micrograms per kilogram

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1.0 PROJECT DESCRIPTION

This Quality Assurance Project Plan (QAPP) incorporates the requirements of the Navy CLEAN I Program Quality Assurance Management Plan, 31 March 1994.

Project objectives and background information are presented in Sections 1.0 and 2.0 of the Sampling and Analysis Plan (SAP).

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2.0 DATA QUALITY OBJECTIVES

The quality assurance (QA) objectives of this project are to develop and implement procedures to provide data of known and appropriate quality. Data quality is assessed by representativeness, comparability, accuracy, precision, and completeness. Definitions of these parameters, the applicable procedures, and level of effort are described below.

The applicable quality control (QC) procedures, quantitative target limits, and levels of effort for assessing data quality are dictated by intended data usage and the nature of analytical methods. For this project, the parameter analyses are designed toward investigation of the nature and extent of pesticides and herbicides in surface and shallow soil at the Marine Corps Air Station (MCAS) El Toro as described in greater detail in Sections 1.0 and 3.0 of the SAP.

Specific data quality objectives (DQOs) for each of the analytical parameters are selected by consideration of specific uses/decisions, users and regulatory requirements (U.S. EPA Region IX Guidance for Preparing Quality Assurance Project Plans, Document Control No. 9QA-03-89, September 1989). The rationale for the selection and usage of the analytical parameters is described in the SAP. Table 2-1 lists project-specific analytical parameters, uses/decisions, users, regulatory detection limit requirements, appropriate detection limit requirements, and appropriate detection limits. Appropriate detection limits are identified based on regulatory, as well as analytical method

limitations, as further described below and listed in Table 2-1. For parameters where there are no regulatory limitations, standard U.S. Environmental Protection Agency (EPA) method detection limits will be identified as appropriate.

The quantitative DQOs based on Table 2-1 are summarized in Table 2-2. Table 2-2 lists the specific analytical method, target detection limit, accuracy, precision, and completeness for each parameter. Analytical methodology and QC are discussed in Section 6.0. Following is a description of the data quality parameters.

Representativeness is a measure of how closely the measured results reflect the actual concentration or distribution of the chemical compounds in the soil sampled. Sampling plan design, sampling techniques, and sample handling protocols (e.g., storage, preservation, and transportation) have been developed and are discussed in subsequent sections of this document. Proposed documentation will establish that protocols have been followed and sample identification and integrity assured.

Rinsate samples (obtained at a minimum 5 percent) and field duplicates (obtained at a minimum 10 percent) will be used to assess field contamination and method variation.

NEESA guidance specifies collection of rinsate samples on a daily basis, however, no daily requirements are proposed for the following reasons:

Table 2-1
Data Quality Objectives
MCAS El Toro Confirmation Sampling Program QAPP

Sheet 1 of 3

Parameters	Uses/Decisions	Applicable Regulatory Criteria (ug/kg)	Appropriate Detection Limits (ug/kg)
Organochlorine Pesticides (CLP Method)	Compare data to regulatory risk criteria	U.S. EPA Region IX Preliminary Remediation Goals[a]	CLP Method Quantitation Limits
alpha-BHC		6,300	1.7
beta-BHC		1,800	1.7
delta-BHC		No PRG	1.7
gamma-BHC (Lindane)		1,300	1.7
Heptachlor		4,500	1.7
Aldrin		17,000	1.7
Heptachlor expoxide		9,100	1.7
Endosulfan I		3,300[c]	1.7
Dieldrin		16,000	3.3
4,4'-DDE		340	3.3
Endrin		No PRG	3.3
Endosulfan II		3,300[c]	3.3
4,4-DDD		240	3.3
Endosulfan sulfate		3,300[c]	3.3
4,4'-DDT		340	3.3
Methoxychlor		330,000	17
Endrin ketone		No PRG	3.3
alpha-Chlordane		1,300	1.7
gamma-Chlordane		1,300	1.7
Toxaphene		1,100	170

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Table 2-1
Data Quality Objectives
MCAS El Toro Confirmation Sampling Program QAPP

Sheet 2 of 3

Parameters	Uses/Decisions	Applicable Regulatory Criteria (ug/kg)	Appropriate Detection Limits (ug/kg)
Organophosphorus Pesticides (EPA Method 8140)	Compare data to regulatory risk criteria	U.S. EPA Region IX Preliminary Remediation Goals[a]	Practical Quantitation Limits for Low-Level Soils[b]
Azinphos methyl		No PRG	1,005
Bolstar		No PRG	100.5
Chlorpyrifos		120,000	201
Coumaphos		No PRG	1,005
Demeton-O		1,600 (total)	167.5
Demeton-P		1,600 (total)	167.5
Diazinon		35,000	402
Dichlorvos		2,900	67
Disulfoton		1,600	134
Ethoprop		No PRG	167.5
Fensulfothion		No PRG	1,005
Fenthion		No PRG	67
Merphos		1,200	167.5
Mevinphos		No PRG	201
Naled		78,000	67
Parathion methyl		230,000	20.1
Phorate		7,800	100.5
Ronnel		2,000,000	201
Stirophos		35,000	3,350
Tokuthion (Prothiofos)		No PRG	335
Trichloronate		No PRG	100.5

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Table 2-1
Data Quality Objectives
MCAS El Toro Confirmation Sampling Program QAPP

Sheet 3 of 3

Parameters	Uses/Decisions	Applicable Regulatory Criteria (ug/kg)	Appropriate Detection Limits (ug/kg)
Chlorinated Herbicides (EPA Method 8150)	Compare data to regulatory risk criteria	U.S. EPA Region IX Preliminary Remediation Goals[a]	Practical Quantitation Limits for Low-Level Soil[b]
2,4-Dichlorophenoxyacetic acid (2,4-D)		390,000	804
4-(2,4-Dichlorophenoxy) butyric Acid (2,4-DB)		310,000	609.7
2,4,5-T		No PRG	134
2,4,5-TP (Silvex)		390,000	113.9
Dalapon		1,200,000	3,886
Dicamba		1,200,000	180.9
Dichloroprop		No PRG	435.5
Dinoseb		39,000	46.9
MCPA		20,000	20,000[d]
MCPP		39,000	39,000[d]

Notes:

[a]U.S. EPA Region IX Preliminary Remedial Goals (PRGs), Second Half 1994, August 1, 1994. Values are for Residential soils.
[b]Practical Quantitation Limits (PQLs) are for low-level soils, wet-weight basis.
[c]PRG value is for Endosufan.
[d]PRGs for these compounds are below method PQLs, and represent the Appropriate Detection Limits.

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Table 2-2
Quality Assurance Objectives for Soil Analyses
MCAS El Toro Confirmation Sampling QAPP

Parameter	Method	Target Detection Limit	Accuracy % Recovery	Precision (Relative Percent Deviation)	Completeness %
Organochlorine Pesticides	CLP[b]	CLP[b]	CLP[b]	CLP[b]	90
Organophosphorus Pesticides	8140[c]	SW-846 PQLs[d]	75-125%	<20%	90
Chlorinated Herbicides	8150[c]	SW-846 PQLs[d]	85-115%	<20%	90

Notes:
[a]These are target values; actual limits depend on nature of specific matrix and will be reported.
[b]Contract Laboratory Program (CLP) procedures and quality control limits are defined in EPA contracts IFBS WA-85-J664/J680 and WP-85-J838/J839 or the latest contracts. Accuracy and precision values are given in Attachment 1 (QAPP).
[c]Procedure given in Section 5.0 (SAP) and Attachment 2.
[d]For soil, Practical Quantitation Limits (PQLs) are for low-level soils.

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- Given the short duration of fieldwork, analytical results will not be available until after the completion of fieldwork. Therefore, correction actions to decontamination procedures that may be necessary (as indicated by rinsate results) could not be implemented.

- The type of drilling proposed (i.e., hand augers) will not have a high sample production rate (as would be the case with a drill rig). Daily collection of rinsate samples would result in an excessively high number of rinsate samples.

Laboratory sample retrieval, storage, and handling procedures have also been developed and are discussed in subsequent sections of this document. Laboratory method blanks will be run at the minimum frequency of 5 percent or one-per-set to assess laboratory contamination.

Comparability of the data will be maintained by using EPA-defined procedures where available; if EPA procedures are not available, the procedures have been defined or referenced in this document. Data comparability will be maintained by use of consistent methods and consistent units. Table 2-2 lists specific analyses parameters and applicable methods. Section 6.0 of this document and Section 4.0 of the SAP further describe the analytical procedures and the QC procedures.

Accuracy is an assessment of the closeness of the measured value to the true value. Accuracy of chemical test results is assessed by spiking samples with known standards and establishing the average recovery. In general, for organics, two types of recoveries

are measured: matrix spike recoveries and surrogate spike recoveries. For a matrix spike, known amounts of standard compounds identical to the compounds present in the sample of interest are added to the sample. For a surrogate spike, the standards are chemically similar but not identical to the compounds in the fraction being analyzed. The purpose of the surrogate spike is to provide QC on every sample by constantly monitoring for unusual matrix effects and gross sample processing errors. For inorganics, only matrix spikes are measured in general. A quantitative definition of average recovery is given in Section 7.0. Accuracy measurements will be carried out at a minimum frequency of 1 in 20 or 1 per set. Target quantitative accuracy objectives are listed, as applicable, in Table 2-2.

Precision of the data is a measure of the data spread when more than one measurement is taken on the same sample. For duplicate measurements, precision can be expressed as the relative percent difference. A quantitative definition of the relative percent difference is given in Section 7.0. The level of effort for precision measurements will be at a minimum of 1 in 20 or 1 per set. Target quantitative precision objectives are listed, as applicable, in Table 2-2.

Completeness is a measure of the amount of valid data obtained from the analytical measurement system. The quantitative definition of completeness is given in Section 7.0. The target completeness objective will be 90 percent; the actual completeness may vary depending on the intrinsic nature of the samples. The completeness of the data will be assessed during QC reviews.

Audits, internal QC checks, preventive maintenance, and corrective action, as described in other sections of the document, will be implemented toward maintaining the above QA objectives.

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3.0 PROJECT ORGANIZATION

The general project organization is shown in Figure 3-1. The personnel responsibilities/authority and lines of communication are summarized in Table 3-1. Primary responsibility for the project quality review rests with the Project Manager (PjM) and the Resource Center Manager (RCM). Independent QA review is provided by the Quality Assurance Manager (QAM) and QA auditors.

The PjM will frequently review the financial, schedule, and technical status of the work assignment. The key people involved in interfacing with the PjM are the Navy Remedial Project Manager (RPM), the RCM, and the Technical Reviewer (TR).

The TR and the QA Review Team review all project deliverables. The TR and the PjM monitor the quality and delivery of the reviews and works with the RCM to mediate any differences between the PjM and the QA Reviewers.

Where QA problems or deficiencies requiring special action are uncovered, the PjM, RCM, and QAM will identify the appropriate corrective action to be initiated by the PjM.

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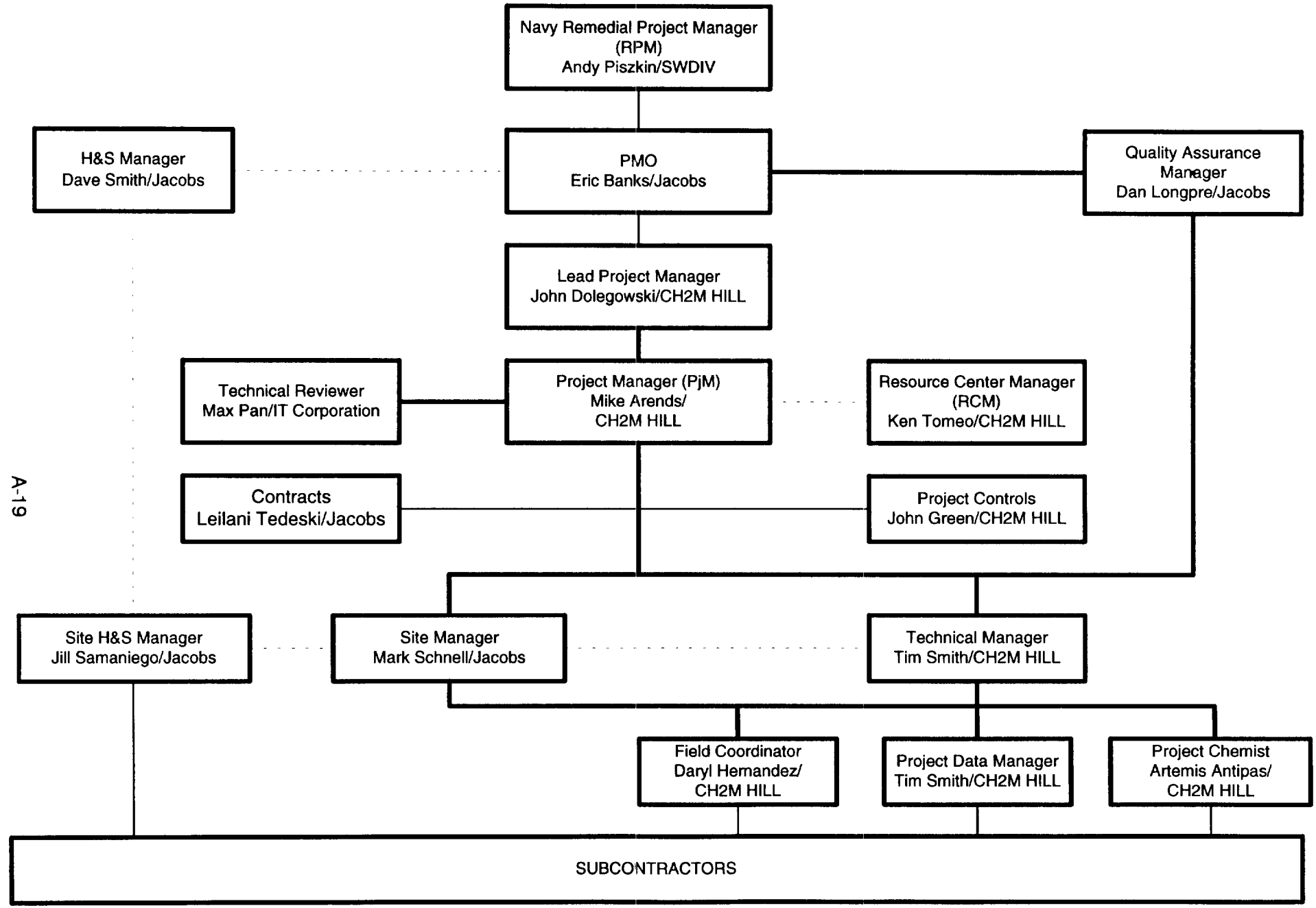

Functional and Organizational Lines of Responsibility
Direct Line of Reporting for CLEAN Project
Quality Assurance Pathway

Figure 3-1
Project Organization

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication MCAS El Toro Confirmation Sampling Program QAPP
Page 1 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Remedial Project Manager Andy Piszkin	Code 0181 Navy SW Division	• Project Management from client perspective • Fulfills scope of work • Oversight of cost and schedule • Is lead interface with Agencies	• Direct to Code 0181 Navy SW Division • Direct to PjM • Direct to Agencies
Environmental Health and Safety Manager Dave Smith	Corporate Director Environmental Health and Safety Terry Briggs	• Monitors implementation of Corporate Health and Safety Program • Provides Health and Safety direction guidance and training to the PjM, PMO, and Site Health and Safety Managers • Assigns Site Health and Safety Managers • Approves project Health and Safety Plans • Performs program and project health and safety audits and approves corrective actions	• Direct to PM • Direct to QAM • Direct to Corporate, Director Environmental Health and Safety • Direct to Project Managers • Direct to Site Health and Safety Manager
Quality Assurance Manager Dan Longpre	QA Director Kris Barrett	• Implements the QAMP and actions to document and correct any situation that negatively affects the quality of data or documentation • Stops work, if necessary • Provides QA direction, guidance, and training to the PM, PMO, and auditors • Fosters TQM atmosphere • Develops and maintains QAMP • Reviews and approves CTO QAPPs and CQAPPs • Interfaces with Program Manager, PMO, and Navy on status of the QAMP, quality issues, and corrective action • Reviews and approves modification of SOPs to meet Program needs • Performs Program and project QA audits and approves corrective action plans • Maintains QA audit database and disseminates lessons learned	• Direct to PM • Direct to QA Director • Direct to Navy Quality Management • Direct DPMs • Direct to MTPQC • Direct to Project Managers

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication
Page 2 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Lead Project Manager John Dolegowski	Deputy Program Manager - Operations Raoul Portillo	• Implements QAMP, QAPP, and CQAPP and other planning document specifications • Attends Lead Project Manager and other PMO meetings to assist in development of Program goals, mechanisms to accomplish goals, and to disseminate lessons learned from all Program work • Acts as focal point with Base Command for all CTO work activities on a Base • Serves as a CTO Project Manager on at least one CTO on Base • Ensures lessons learned are disseminated and consistency of approach amongst all CTOs on a Base • Monitors status of all work conducted and assists CTO Project Managers in resolving problems and ensuring that quality, cost and schedule objectives are met	• Direct to Navy RPM • Direct to DPM Operations • Direct to DPM Project Services • Direct to QAM • Direct to MTPQC
CTO Project Manager Mike Arends	Deputy Program Manager - Operations Raoul Portillo	• Executes all phases of a specific project and efficiently applies the full resources of the CLEAN I Team • Manages all technical, quality, financial and administrative aspects of the project • Fosters a TQM environment among project personnel • Ensures all technical and administrative SOPs are identified and implemented for consistent completion of work tasks • Identifies and completes planning documents appropriate to work assignments • Approves and maintains qualification records for all project personnel • Orients and trains all project personnel, as required, to complete work assignments • Ensures and verifies that the project team completes all work tasks and QA/QC requirements of planning documents • Logs all variances to planning documents and ensures timely follow-up and approval by the Navy • Ensures that regular QC inspection of work activities is assigned and documented in the Quality Control Inspection Report • Maintains appropriate logbooks to provide complete documentation and defensibility of all project work	• Direct to Lead Project Manager • Direct to Navy RPM • Direct to DPM Operations • Direct to DPM Project Services • Direct to QAM • Direct to MTPQC

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication
Page 3 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Review Team Leader/ Technical Reviewer Max Pan	Manager Technical Planning and Quality Control Anu Sood	• Leads and coordinates other personnel, and performs technical review of deliverables • Interfaces with MTPQC, project team, and Navy technical branch on technical requirements and coordinates with PjM to implement appropriate actions • Verifies deliverables meet SOW, consistency, agency requirements, sound content, and state-of-the-art technology • Approves and signs deliverables for distribution • Monitors the results of peer, independent, and Navy review of deliverables and comments on project technical performance to asses trends and identify corrective actions	• Direct to MTPQC • Direct to CTO Project Manager • Direct to Navy Remedial Technical Manager • Direct to Project Technical Manager
Contract Administration Manager Leilani Tedeski	Deputy Program Manager Project Services Margaret Bell	• Provides Project Manager with Federal Contracts (FAR) guidance • Solicits, selects, and awards subcontracts • Administers subcontracts • Coordinates invoice approval and payment	• Direct to DPM Project Services • Direct to Contracts Manager • Direct to CTO Project Manager • Direct to Subcontractors
Project Controls Manager John Green	Manager Project Controls Bob Michell	• Provides Project Manager with cost/schedule guidance • Conducts project tracking • Monitors and schedules reports on cost/schedule status • Conducts estimating and trending • Prepares monthly progress reports to Navy • Assigns Site Managers • Performs Project Site Management Audits and approves corrective actions	• Direct to DPM Project Services • Direct to Manager Project Controls • Direct to CTO Project Manager
Site Health and Safety Manager Jill Samaniego	Environmental Health and Safety Manager Dave Smith	• Provides Project Manager with Health and Safety guidance • Prepares Health and Safety Plans • Conducts personnel Health and Safety training and guidance to subcontractors • Reviews and audits field activities to ensure compliance	• Direct to Environmental Health and Safety Manager • Direct to CTO Project Manager • Direct to Technical Manager • Direct to Site Manager • Direct to Subcontractors

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication
Page 4 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Site Manager Mark Schnell	Remedial Services Manager Mike McClure	• Organizes and maintains field office, supporting guidance/planning materials, SOPs, records/filing system and control of logbooks • Implements field activities and coordinates field personnel • Coordinates with the Project Manager on the assignment and implementation of "first level" QC inspection of field work activities • Reviews and approves "first level" Quality Control Inspection Reports and conducts regular spot inspections of work activities • Acts as focal point with Technical Manager for coordinating audits by the QAM and reviewing, evaluating, and resolving non-conforming items and other quality issues • Monitors subcontractor performance • Develops and monitors the execution of detailed work schedules • Supervises work and personnel to comply with Jacobs, federal, state and local regulations • Implements all relevant Health and Safety requirements • Coordinates emergency procedure training • Oversees Government property in the field • Maintains client relations and reports	• Direct to Remedial Services Manager • Direct to CTO Project Manager • Direct with client at field level (RPM, ROICC) • Direct with QAM • Direct to H&S Manager • Direct to Technical Manager
Technical Manager Tim Smith	CTO Project Manager TBD Raoul Portillo	• Acts as focal point for all technical issues on the project • Coordinates the development of the technical approach and design parameters of the project based on the Navy Scope of Work • Identifies project technical staff qualifications and skill level requirements; selects team • Orients and trains project technical personnel in their assigned work tasks • Oversees development of project planning documents to implement the Scope of Work and technical approach • Identifies subcontractor requirements and conducts or coordinates with Contracts Management Group the technical evaluation of bidder capabilities for award of project services • Ensures that all Standard Operating Procedures appropriate to work tasks are used by project personnel • Coordinates with Site Manager on the implementation of planning documents and monitors performance	• Direct to Lead Project Manager • Direct to Navy RPM • Direct to DPM Operations • Direct to DPM Project Services • Direct to QAM • Direct to MTPQC

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication
Page 5 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Technical Manager Smith (Continued)	CTO Project Manager TBD	• Coordinates with Project Manager on the assignment and implementation of "first level" QC inspection of office work • Reviews and approves office "first level" Quality Control Inspection Reports and conducts regular spot inspections of work • Acts as focal point with Site Manager to coordinate audits by the QAM and to review, evaluate, and resolve nonconforming items and other quality issues • Reviews and evaluates project documentation for completeness and defensibility of work • Monitors laboratory analysis data reduction and data management processes to ensure valid, useful data are provided to meet project objectives • Oversees interpretation and reporting of data in deliverables to meet project objectives	
Field Coordinator Daryl Hernandez	Technical Manager and Site Manager TBD	• Supervises the field teams or leads a field team in implementing planning document work tasks assigned by Technical and Site Managers • Ensures that all appropriate logbooks, equipment, and supplies are checked out, calibrated, maintained, accounted, and returned to proper storage, as applicable • Ensures that schedule is maintained to accomplish work assignments • Ensures that standard operating procedures are followed by field team • Supervises subcontractors on technical issues • Ensures that schedule is maintained to accomplish work assignments • Conducts or coordinates "first level" QC inspection as assigned by Technical and Sites Manager • Implements C inspection and /or audit corrective actions • Oversees the maintenance or conducts project logbook documentation of work activities to ensure that documentation is clear, complete, and defensible • Ensures work sites are clean and restored, as appropriate, at end of work • Provides status report to Technical and Site managers on work progress and field team and subcontractor time, equipment, and supplies used and/or expended • Ensures that Site Manager receives all project logbook documentation of work activities for inclusion in project files	• Direct to Technical Manager • Direct to Site Manager • Direct to Construction Supervisor • Direct to Site Health and Safety Manager • Direct to Field Subcontractors

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Table 3-1

Personnel Responsibilities/ Authority and Lines of Communication
Page 6 of 6

Position/Key Personal	Line Manager	Primary Responsibilities/Authority	Principal Lines of Communication
Project Data Manager Tim Smith	Technical Manager TBD	• Coordinates submission of electronic data with the Project Chemist and subcontract laboratories • Coordinates all field and laboratory data deliverables • Develops project's main database infrastructure and manages the database • Analyzes, designs, and implements the project's field sample data tracking system • Directs and verifies the technical quality of field sample data entry procedures, electronic chain-of-custody forms and sample label generation, and field database exports to other software packages • Conducts in-house training in software environments tools • Implements data security and archival procedures for both paper and electronic data forms	• Direct to Technical Manager • Direct to Project Chemist • Direct to Laboratory and Validation Subcontractors
Project Chemist Artemis Antipas	Technical Manager TBD	• Coordinates certification of analytical results from laboratory with the Project Data Manager • Acts as technical resource to resolve questions concerning analytical results • Verifies that laboratory analysis requests are consistent with project requirements • Evaluates and verifies that all Sample Delivery Groups meet project requirements	• Direct to Technical Manager • Direct to Project Data Manager • Direct to Laboratory and Validation Subcontractors
Laboratory Subcontractors TBD	Project Data Manager and Project Chemist TBD	• Provides sample collection preservation and storage guidance • Provides sample collection containers • Conducts soil and groundwater sample analysis and reports results	• Direct to Project Data Manager • Direct to Project Chemist • Direct to Technical Manager • Direct to Contracts Manager

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4.0 SAMPLE COLLECTION AND QUALITY CONTROL

The rationale for sample locations, numbers of samples and analytical parameters are provided in Section 3.0 of the SAP. Field methods and procedures are detailed in Section 4.0 of the SAP. This section includes procedures for sample collection, surface and subsurface soil sampling, decontamination of equipment, sample handling and shipping, and field documentation. Section 5.0 of the SAP lists the analyses requested, sample container requirements, sample preservation methods, and holding times.

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5.0 SAMPLE CUSTODY

A sample is physical evidence collected from a hazardous waste site, immediate environment, or another source. Because of the potential evidentiary nature of samples, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in enforcement proceedings.

Chain-of-custody procedures are used to maintain and document sample possession for enforcement purposes. The principal documents used to identify samples and to document possessions are:

- Chain-of-custody records
- Air bills or shipping records (e.g., Federal Express, Purolator,)
- Field notebooks
- Photographs of the investigation

These documents may be introduced as evidence should a site investigation result in legal action.

The Field Team Leader (FTL) will maintain a supply of field documents, including sample custody seals and chain-of-custody records. The FTL is responsible for inventory of serialized documents and assignment of these documents to specific tasks. All unused

field documents are returned to the FTL at the end of the field sampling work. The FTL notes the return of these documents in the serialized document logbook.

A sample numbering system will be used to identify each collected sample and associated duplicates for chemical analysis. This system will provide a tracking number to allow retrieval and cross-referencing of sample information, and provide anonymity for the field QC samples at the laboratory. A listing of the sample identification numbers will be maintained in the field notebook. The anticipated numbering system for the project will identify the parcel number, boring number, sample depth, and contain information on whether the sample is an original, duplicate, or blank. Refer to Subsection 4.7.1 of the SAP for an example of sample identification.

5.1 Chain-of-Custody

Because samples collected during any investigation could be used as evidence, their possession must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. To document sample possession, chain-of-custody procedures are followed.

5.1.1 Definition of Custody

A sample is under custody if one or more of the following criteria is met:

- It is in your possession.

- It is in your view, after being in your possession.
- It was in your possession and then you locked it up to prevent tampering.
- It is in a designated secure area.

5.1.2 Field Custody

- In collecting samples for evidence, only a sufficient number of samples is collected to provide a good representation of the media being sampled. To the extent possible, the quantity and types of samples and sample locations are determined before the actual field work is conducted. As few people as possible should handle samples.

- The field sampler is personally responsible for the care and custody of the samples collected until they are transferred or dispatched properly.

- The site manager determines whether proper custody procedures were followed during the field work and decides if additional samples are required.

5.1.3 Transfer of Custody and Shipment

- Samples are accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the record. This record documents sample custody

transfer from the sampler, often through another person, to the analyst at the laboratory.

- Samples are packaged properly for shipment and dispatched to the appropriate laboratory for analysis, with a separate chain-of-custody record accompanying each shipping container. Shipping containers will be sealed with custody seals for shipment to the laboratory. The method of shipment, courier name(s), and other pertinent information are entered in the Remarks section of the chain-of-custody record.

- Although not planned for this project, the following procedures apply to split sampling. Whenever samples are split with a source or government agency, it is noted in the Remarks section of the chain-of-custody record. The note indicates with whom the samples are being split and is signed by both the sampler and recipient. If the split is refused, this will be noted and signed by both parties. If a representative is unavailable or refuses to sign, this is noted in the Remarks section of the chain-of-custody record. When appropriate, as in the case where the representative is unavailable, the chain-of-custody record should contain a statement that the samples were delivered to the designated location at the designated time.

- All shipments are accompanied by the chain-of-custody record identifying its contents.

- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Air freight shipments are sent collect. Freight bills, postal service receipts, and bills of lading are retained as part of the permanent documentation. Documents will be distributed as follows:

  - Ship with samples:
    - Chain-of-Custody Form (original)

  - Send to PjM or site manager:
    - Field logbooks (at completion of field work)

  - Return to project files:
    - Chain-of-Custody Form (pink copy)
    - Shipping records

  - Send to Navy Project Management:
    - Chain-of-Custody Form (yellow copy)

5.1.4 Laboratory Custody Procedures

- A designated sample custodian accepts custody of the shipped samples and verifies that the samples received match those on the chain-of-custody records. Pertinent information as to shipment, pickup, and courier is

entered in the Remarks section. The custodian then enters the sample numbers into a logbook.

The laboratory custodian uses the sample identification label number or assigns a special laboratory number to each sample, and is responsible for seeing that all samples are transferred to the proper analyst or stored in the appropriate secure area.

- The custodian distributes samples to the appropriate analysts. Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted or returned to the custodian. The data of sample analysis are recorded on the laboratory report form.

- When sample analyses and necessary QA checks have been completed in the laboratory, the unused portion of the sample must be disposed properly. All identifying stickers, data sheets, and laboratory records are retained as part of the permanent documentation. Sample containers and remaining sample material are disposed appropriately.

5.2 Custody Seals

When samples are shipped to the laboratory, they must be placed in padlocked containers or containers sealed with custody seals. Two seals must be placed on each shipping container (cooler), one at the front and one at the back.

5.3 Sample Labels

Sample labels will be filled out in indelible ink and will provide the following information:

- Sample identification number
- Date and time of sample collection
- Sampler's initials
- Analysis(es) requested

5.4 Field Notebooks

In addition to chain-of-custody records, a bound field notebook must be maintained by the sampling team leader to provide a daily record of significant events, observations, and measurements during field investigations. All entries should be signed and dated. All members of the field investigation should use this notebook. It should be kept as a permanent record.

These notebooks are intended to provide sufficient data and observations to enable participants to reconstruct events that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. In a legal proceeding, notes, if referred to, are subject to cross-examination and are admissible as evidence.

5.5 Corrections to Documentation

Unless prohibited by weather conditions, all original data recorded in field notebooks, sample identification tags, and chain-of-custody records are written in waterproof ink. None of these accountable serialized documents is to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on an accountable document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the correct information. The erroneous information should not be obliterated. Any subsequent error discovered on an accountable document should be corrected by the person who made the entry. All subsequent corrections must be initialed and dated.

6.0 ANALYTICAL AND QUALITY CONTROL PROCEDURES

6.1 Analytical Procedures

Parameters of analyses, analytical methods, and detection limits are listed in Table 2-2. The EPA Contract Laboratory Program (CLP) and standard EPA methods have been selected where applicable. For non-CLP analyses, the following analytical information has been given for each specific parameter in the SAP (Section 5.0) and Attachment 2:

- Analytical procedure and detection or quantitation limits
- Calibration procedure and criteria
- Internal QC checks and corrective action
- Data calculations and reporting units
- Documentation and deliverables

The analytical and QC methodology for non-CLP parameters follows EPA Region IX guidance. Preventive maintenance of analytical equipment is discussed in Subsections 6.2.1 and 6.4; in addition, laboratories will have standard operating procedures for preventive maintenance.

6.2 Calibration Procedures

6.2.1 Field Calibration Procedures

Field equipment requiring calibration are organic vapor analyzers (OVAs) and HNu meters. Field equipment must be calibrated prior to and at the completion of each day's work, and after four hours of inactivity. Calibrated equipment will be specially identified by using either the manufacturer's serial number or other means. A label with the identification number and the date when the next calibration is due will be physically attached to the equipment. If this is not possible, records traceable to the equipment will be readily available for reference. In addition, the results of calibrations and records of repairs will be recorded in a logbook.

Scheduled periodic calibration of testing equipment does not relieve field personnel of the responsibility of employing properly functioning equipment. If an individual suspects an equipment malfunction, the device shall be removed from service, tagged so that it is not inadvertently used, and the appropriate personnel notified so that a recalibration can be performed or a substitute piece of equipment can be obtained.

Equipment that fails calibration or becomes inoperable during use will be removed from service and either segregated to prevent inadvertent use, or tagged to

indicate it is out of calibration. Such equipment will be repaired and satisfactorily recalibrated. Equipment that cannot be repaired will be replaced.

Results of activities performed using equipment that has failed recalibration will be evaluated. If the activity results are adversely affected, the results of the evaluation will be documented and the appropriate personnel notified.

6.2.2 Laboratory Calibration Procedures

Laboratory calibration procedures are specified in the specific methods for each parameter (SAP Section 5.0 and QAPP Attachment 2). Where there are no specifications, the calibration procedures will be as follows:

- Initial and final calibration for all methods will include a three-point calibration before and after a run.

- Continuing calibration for all methods will include midrange calibration standard after every tenth sample.

6.3 Quality Control Procedures

6.3.1 Field Quality Control Procedures

Field sampling QC procedures will include field duplicates, as discussed in Section 4.0 of the SAP. These QC samples will be submitted blind to the laboratory.

Field measurement QC procedures will include calibration requirements described in Subsection 6.2.

6.3.2 Laboratory Quality Control Procedures

Laboratory QC procedures will include the following:

- Instrument calibrations and standards as defined in the SAP (Section 5.0) and Attachment 2, and EPA CLP Statement of Work

- Analytical methodology per methods listed in Table 2-2 and the SAP (Section 5.0)

- Laboratory blank measurements at a minimum 10 percent or one-per-batch frequency

- Accuracy and precision measurements as defined in Section 2.0, at a minimum of one in 20 or one per set

- Data reduction and reporting per specific methods listed in Table 2-2 and the SAP (Section 5.0)

6.3.3 Chain-of-Custody Procedures

- Chain-of-custody procedures are defined in Section 4.0

6.4 Preventive Maintenance

Instrument maintenance logbooks are maintained in laboratories at all times. In general, the logbooks contain a schedule of maintenance, as well as a complete history of past routine and nonroutine maintenance.

Preventive maintenance is performed according to the procedures delineated in the manufacturer's instrument manuals, including lubrication, source cleaning, detector cleaning, and the frequency of such maintenance. Chromatographic carrier gas purification traps, injector liners, and injector septa are cleaned or replaced on a regular basis. Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Maintenance will be performed when an instrument begins to degrade, as evidenced by the degradation of

peak resolution, shift in calibration curves, decrease in sensitivity, or failure to meet one or another of the QC criteria.

Instrument downtime is minimized by keeping adequate supplies of all expendable items, expendable meaning an expected lifetime of less than 1 year. These items include gas tanks, gasoline filters, syringes, septa, GC columns and packing, ferrules, printer paper and ribbons, pump oil, jet separators, open-split interfaces, and matrix spike filaments.

For field equipment (OVA/HNu meter) preventive maintenance will be carried out in accordance with procedures and schedules outlined in the particular model's handbook. Additional preventative maintenance includes the following:

- Daily wipedown with a soap impregnated paper towel
- Check connectors and cables for wear
- Check hydrogen tank pressure (OVA only)

To minimize down time, extra meters will accompany the field equipment.

7.0 DATA QUALITY MANAGEMENT

7.1 Data Reduction, Validation, and Reporting

Data for all parameters will undergo two levels of review and validation: laboratory and outside the laboratory.

Initial data reduction, validation, and reporting at the laboratory will be carried out as described in specific methods listed in the SAP (Section 5.0) and Attachment 2. Quality control data per procedures described in this document will also be reported by the laboratory at the defined level of effort.

Documentation for CLP pesticides (i.e., organophosphorus pesticides) will consist of NEESA Level D. For analyses not covered under CLP (i.e., EPA Methods 8140 and 8150), documentation will be NEESA Level C.

Data will also be reviewed outside the laboratory by staff chemists not assigned to the laboratory. Analytical data will be validated using the current revision of the following guidance documents:

- For CLP pesticides analysis: *EPA, Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses.* 01 February 1988.

- NEESA, *Sampling and Chemical Analysis Quality Assurance Requirements for the Navy Installation Restoration Program.* NEESA 20.2-047B. June 1988.

Ten percent of data will undergo full validation per EPA functional guidelines outside the laboratory. The remaining data will be reviewed for QC data only.

The review process includes flagging data with qualifiers. Commonly used qualifiers include:

J = Estimated; usable for limited purposes. The data are qualitatively, but not quantitatively, acceptable.

R = Rejected; unusable. The data are qualitatively and quantitatively unacceptable.

U = Undetected. The result is undetected at the instrument detection level (IDL). The data are acceptable.

No qualifier means data are acceptable.

Field data validation will be based on field logbooks and field audits with regard to proper calibration and procedures.

7.2 Data Assessment Procedures

Data assessment will follow the data review and validation described in the preceding section. An assessment report will summarize the findings of the data review/validation as relevant to project usage. This assessment report will include a statement (i.e., table) of the precision, accuracy, representativeness, completeness, and comparability (PARCC) Following is the quantitative definition of accuracy, precision, and completeness.

7.2.1 Accuracy

For measurements where matrix spikes are used, the recovery (R) can be defined as a measure of accuracy as follows:

$$\%R = 100\% \times \frac{S - U}{C_{sa}}$$

where

%R	=	percent recovery
S	=	measured concentration in spiked aliquot
U	=	measured concentration in unspiked aliquot
C_{sa}	=	actual concentration of spike added

7.2.2 Precision

This subsection provides the basis for the quantitative limits used to control data precision. The primary measurement of data precision will be the relative percent difference (RPD) between a duplicate pair of data points:

$$RPD = \frac{X_2 - X_1}{(X_1 + X_2)/2} \times 100$$

where:

X_1 = first duplicate point value

X_2 = second duplicate point value

7.2.3 Completeness

Measurement completeness (C) can be described as the ratio of acceptable measurements obtained to the total number of planned measurements for an activity. Percent completeness can be defined as:

$$C = \frac{\text{(Number of acceptable data per target quality control limits)}}{\text{(Total number of data points)}} \times 100$$

8.0 QUALITY ASSURANCE OVERSIGHT

8.1 Performance and System Audits

The QAM will monitor and audit the performance of the QA procedures. When necessary, the QAM will conduct field audits as described in Attachment 3. Audits may be scheduled to evaluate the execution of sample identification, sample control, chain-of-custody procedures, field notebooks, sampling procedures, and field measurements.

The laboratories will be audited, as necessary, by a staff chemist not assigned to the laboratory who also will coordinate data validation activities. The external onsite laboratory audits will be carried out to cover analytical methodology QC procedures and level of effort specific to this project.

Verification of computer models and software will be conducted periodically by entry of known data sets or programs by a computer expert not assigned to the project. Electronic and paper-based data sets will be verified by double entry, cross checking, and range checking against the known programs and models to check for correctness, reasonableness, and user competence. Verification of model and software performance will be documented in the QA/QC portion of the specific reports.

8.2 Corrective Action

If QC audits result in detection of unacceptable conditions or data, the PjM will be responsible for developing and initiating corrective action. The Navy and QAM will be notified if nonconformance is of program significance or requires special expertise not normally available to the project team. Corrective action may include:

- Reanalyzing samples if holding time criteria permit
- Resampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting data acknowledging level of uncertainty

8.3 Quality Assurance Reports

The QAM will provide an audit report to the PjM. This report may include:

- Assessment of measurement data accuracy, precision, and completeness
- Results of performance audits
- Results of systems audits
- Significant QA problems and recommended solutions

Following input from the PjM, the audit report will be provided to the Navy.

Attachment 1

CLP

Accuracy and Precision Limits

SOIL PESTICIDE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: _____ Contract: _____

Lab Code: _____ Case No.: _____ SAS No.: _____ SDG No.: _____

Matrix Spike - EPA Sample No.: _____

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONCENTRATION (ug/Kg)	MS CONCENTRATION (ug/Kg)	MS % REC #	QC. LIMITS REC.
gamma-BHC (Lindane)					46-127
Heptachlor					35-130
Aldrin					34-132
Dieldrin					31-134
Endrin					42-139
4,4'-DDT					23-134

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONCENTRATION (ug/Kg)	MSD % REC #	% RPD #	QC LIMITS RPD	QC LIMITS REC.
gamma-BHC (Lindane)					50	46-127
Heptachlor					31	35-130
Aldrin					43	34-132
Dieldrin					38	31-134
Endrin					45	42-139
4,4'-DDT					50	23-134

Column to be used to flag recovery and RPD values with an asterisk

* Values outside of QC limits

RPD: _____ out of _____ outside limits
Spike Recovery: _____ out of _____ outside limits

COMMENTS: _____

FORM III PEST-2 3/90

Attachment 2

Non-CLP Parameters

Analytical and Quality Control Procedures

Analytical Procedure and Detection or Quantitation Limits

Calibration Procedure and Criteria

Internal Quality Control Checks and Corrective Action

Data Calculations and Reporting Units

Documentation and Deliverables

1.0 REQUEST FOR ANALYSIS

The following procedures are based on standard EPA procedures and include parameter-specific QC procedures. Following the procedure sheets are analyses request sheets to facilitate and track proper sample handling from field to laboratory.

1.1 Analysis of Organophosphorus Pesticides by EPA Method 8140

1.1.1 Analytes

Analytes include organophosphorus pesticides.

1.1.2 Sample Matrices

Sample matrices to be analyzed include water and soil.

1.1.3 Analytical Procedure and Quantitation Limits

The laboratory shall follow the procedure described in the EPA Method 8140. Compound identifications must be confirmed by at least one additional analytical technique such as gas chromatography (GC) using a second column or by GS/mass spectrometry (MS). The following detection limits are required (based

on practical quantitation limits in SW-846 for groundwater and low-level soil factors):

Compound	Water	Soil
Azinphos methyl	15.0 ug/L	1,005 ug/kg
Bolstar	1.5 ug/L	100.5 ug/kg
Chlorpyrifos	3.0 ug/L	201 ug/kg
Coumaphos	15.0 ug/L	1,005 ug/kg
Demeton-O	2.5 ug/L	167.5 ug/kg
Demeton-S	2.5 ug/L	167.5 ug/kg
Diazinon	6.0 ug/L	402 ug/kg
Dichlorvos	1.0 ug/L	67 ug/kg
Disulfoton	2.0 ug/L	134 ug/kg
Ethoprop	2.5 ug/L	167.5 ug/kg
Fensulfothion	15.0 ug/L	1,005 ug/kg
Fenthion	1.0 ug/L	67 ug/kg
Merphos	2.5 ug/L	167.5 ug/kg
Mevinphos	3.0 ug/L	201 ug/kg
Naled	1.0 ug/L	67 ug/kg
Parathion methyl	0.3 ug/L	20.1 ug/kg
Phorate	1.5 ug/L	100.5 ug/kg
Ronnel	3.0 ug/L	201 ug/kg
Stirophos	50 ug/L	3,350 ug/kg
Tokuthion (Prothiofos)	5.0 ug/L	335 ug/kg
Trichloronate	1.5 ug/L	100.5 ug/kg

The following must be considered by the laboratory for EPA Method 8140 (organophosphorus pesticides):

1. A laboratory blank is to be analyzed after the analysis of an unusually concentrated sample to check for contamination by carry-over. Any sample with organophosphorus pesticides present at a concentration two times (2X) the calibration range is considered an unusually concentrated sample.

1.1.4 Contract Holding Times

The maximum holding time for extraction is 5 days from the date of sample collection and for analysis is 40 days from the date of extraction.

The sampling program requires 14-day turnaround time for most of the samples. However, some samples must be extracted only and the extract held pending the results of the samples with 14-day turnaround times. The chain-of-custody forms will specify the samples to be extracted only. The extracts will be held by the laboratory until such time when the Jacobs Team notifies the laboratory to complete the analyses or dispose of the extracts. If the analyses is to be performed, the laboratory shall provide analytical results to the Jacobs Team within 10 days (corresponding to a 14-day turnaround time) unless otherwise specified by the Jacobs Team.

1.1.5 Calibration Procedure and Criteria

The laboratory shall follow the calibration procedure specified for EPA Method 8140, Sections 5.5 and 7.3 of SW-846, as well as the following:

1. Prepare a minimum of five standards using the method outlined in EPA Method 8140 Sections 5.2 and 5.3 of SW-846. One standard must have concentrations at or below the quantitation limit.

2. Analyze initial and continuing calibration standards according to EPA Method 8140. Perform one or more mid-level calibration standard each day.

3. Less than 10 percent relative standard deviation (%RSD) in calibration factors (RF) for initial calibration standards and less that +/-15 percent difference (%D) in RF for daily calibrations are required.

4. When calibration verification standard measurements exceed the quality control (QC) requirements for the initial calibration and the continuing calibrations, the analysis must be terminated, the problem corrected, the instrument recalibrated, and the calibration reverified.

5. Obtain calibration standards by one or more of the following means:

   - Purchase from the National Institute of Standards and Technology (NIST).

   - Prepare internally using standards that are certified by or directly traceable to NIST.

   - Purchase from a commercial supplier who has more than 5 years experience in the preparation and certification of organophosphorus pesticides standards.

1.1.6 Internal Quality Control Checks, Control Limits and Corrective Actions

For sample analysis, the laboratory shall follow the QC requirements specified below and in Section 8 of EPA Method 8140.

1. Analyze method blanks at a frequency of one per group of 20 or fewer samples. The method blanks must be free of organophosphorus pesticides at or above the detection limits and free of any interfering peaks.

2. An organophosphorus pesticide surrogate (e.g., pesticides that are not expected to be present in the samples) must be spiked into the standards, samples, method blanks and QC samples. The amount of surrogate added must be at least 10 times the instrument detection limit. Recoveries of 75 to 125 percent are required.

3. Second column confirmation is required for all positive results reported.

4. Sample extracts containing one or more analytes at concentrations above the initial calibration range are to be diluted and analyzed. Report the results and documentation for both analyses.

5. Analyze matrix spikes and matrix spike duplicates (MS/MSDs) at the frequency of one per group of 20 or fewer samples. Concentration of the matrix spike solution should be such that the final extracts contain amounts at the mid-range of the calibration curve. Percent recoveries (%R) of 75-125 percent and relative percent differences (%RPD) of less than 20 percent are required.

If the above control limits are exceeded, take appropriate actions to correct the problem and reanalyze the affected samples.

1.1.7 Data Calculations and Reporting Units

The laboratory shall calculate results as specified by EPA Method 8140. Sample results are to be reported in micrograms per liter (ug/L) for water samples, and micrograms per kilogram (ug/kg) on a dry weight basis for soil samples. Report results less than 10 parts per billion (ppb) to one significant figure and above 10 ppb to two significant figures.

1.1.8 Documentation and Deliverables

The laboratory shall report results of blanks, samples, calibration and check standards, spikes and surrogate recoveries. All raw data and sample calculations must be included for both primary and confirmation analyses. Indicate all extraction and analysis dates. The data package must be systematically organized with all pages sequentially numbered.

1.2 Analysis of Chlorinated Herbicides

1.2.1 Analytes

Analytes include chlorinated herbicides.

1.2.2 Sample Matrices

Sample matrices to be analyzed include water and soil.

1.2.3 Analytical Procedure and Quantitation Limits

The laboratory will follow the procedure described in the EPA Method 8150. Compound identifications must be confirmed by at least one additional analytical technique such as GC using a second column or by GC/MS. The following detection limits are required (based on practical quantitation limits in SW-846 for groundwater and low-level soil factors):

Compound	Water	Soil
2,4-D	12 ug/L	804 ug/kg
2,4-DB	9.1 ug/L	609.7 ug/kg
2,4,5-T	2.0 ug/L	134 ug/kg
2,4,5-TP	1.7 ug/L	113.9 ug/kg
Dalapon	58 ug/L	3,886 ug/kg
Dicamba	2.7 ug/L	180.9 ug/kg
Dichloroprop	6.5 ug/L	435.5 ug/kg
Dinoseb	0.7 ug/L	46.9 ug/kg
MCPA	2,490 ug/L	20,000 ug/kg
MCPP	200 ug/L	39,000 ug/kg

The following items must be considered by the laboratory for EPA Method 8150 (organochlorine herbicides):

1. The herbicides are strong organic acids, and may be lost during analysis if exposed to alkaline substances. Therefore, it is critical that glassware and glass wool be acid-rinsed and sodium sulfate be acidified prior to use.

2. Diaxomethanol is explosive and carcinogenic. It should be handled by experienced analysts only.

3. The drying step is very critical to ensuring complete esterification. Sufficient sodium sulfate must be added to ensure recovery of the herbicides.

4. If concentration and esterification are not to be performed immediately, the sample must be stored in a refrigerator.

5. Once methylated, extracts should be analyzed immediately to minimize transesterification and other potential reactions.

1.2.4 Contract Holding Times

Samples must be extracted within 5 days of collection; extracts must be analyzed within 40 days of extraction.

The sampling program requires 14-day turnaround time for most of the samples. However, some samples must be extracted only and the extract held pending the results of the samples with 14-day turnaround times. The chain-of-custody forms will specify the samples to be extracted only. The extracts will be held by the laboratory until such time when the Jacobs Team notifies the laboratory to complete the analyses or dispose of the extracts. If the analyses is to be performed, the laboratory shall provide analytical results to the Jacobs Team within 10 days (corresponding to a 14-day turnaround time) unless otherwise specified by the Jacobs Team.

1.2.5 Calibration Procedure and Criteria

1. Calibrate the GC using at least five concentration levels, one of which should be at or near, but above, the method detection limit. The other four concentrations should correspond to the expected range of sample concentrations. Replace calibration standard solutions every six months or sooner.

2. Analyze a mid-level check standard after every 10 samples in the analysis sequence. The check standard must be 85 to 115 percent recovered, otherwise, re-establish the calibration curve.

1.2.6 Internal Quality Control Checks, Control Limits and Corrective Actions

1. One or two surrogate standards must be added to all blanks, calibration standards, and samples. These surrogates must be chosen so that their retention times encompass the temperature program employed. Surrogate recoveries must meet the limits specified by the method.

2. Analyze a MS/MSD per 20 or fewer samples.

3. Initially analyze at least four replicates consisting of reagent water spiked with each compound to be analyzed using a quality control check sample concentrate. The results obtained should be compared with the precision and accuracy data given in the method.

4. Analyze a blank per analytical batch of 20 or fewer samples. No target compounds must be present at the detection limit or at higher concentrations.

5. If sample cleanup is employed, a series of standards must be processed through the cleanup procedure to evaluate elution patterns and verify absence of interferences.

6. If control limits are not met, check instrument performance, calculations, and standards. Recalculate and/or re-evaluate extracts where necessary. If no problems are apparent, re-extract and reanalyze affected samples.

1.2.7 Data Calculations and Reporting Units

Calculate results as specified in the method. Sample results are to be reported in ug/L for water samples, and (ug/kg) on a dry-weight basis for soil samples. Report results less than 10 ppb to one significant figure and above 10 ppb to two significant figures.

1.2.8 Documentation and Deliverables

Report results of blanks, samples, calibration and check standards, spikes and surrogate recoveries. All raw data and sample calculations must be included for both primary and confirmation analyses. Indicate all extraction and analysis dates. The data package must be systematically organized with all pages sequentially numbered.

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Attachment 3

Field Audit Procedures

SCOPE AND PURPOSE

The purpose of this section is to provide guidance to persons conducting project audits.

All information produced or obtained in the course of enforcement inspections, investigations, and evaluations is potential evidence. As such, the information must be reliable, gathered with constitutional safeguards, and maintained with integrity. The potential evidence may take any of several forms, including such items as a Field Notebook, film, computer tape, a Traffic Report, or a degradable sample. Typically, a case preparation investigation may generate large volumes of file material, samples, data tabulations, and reports. Security and accountability (chain-of-custody) must be maintained even while the evidence is in shipment.

Uniform sample control, chain of custody, and document control procedures, using EPA's procedures as a model have been adopted for this project.

These procedures ensure the integrity of the data and related information and its security while awaiting, during, and after any litigation takes place.

AUDIT PROCEDURES

The QAM may schedule audits of field activities at various times to evaluate the execution of sample identification, sample control, chain-of-custody procedures, field documentation, and sampling operations. The evaluation is based on the extent to which the applicable standard operating procedures (SOPs), specifications in planning documents, Program requirements, good practices, etc. are being followed.

The person conducting the audit is normally a senior technical reviewer who is familiar with the technical and procedural requirements of field sampling and with the applicable SOPs. The auditor keeps a record of his evaluation using field notes and checklists. An example of a checklist that the QAM may use is included in this appendix. Following the audit, he reviews its preliminary results with the person in charge of the sampling. The auditor also prepares an audit report containing the results of his evaluation and recommendations for any necessary corrective actions.

Audits are scheduled with the SM and the person in charge of the field sampling.

DOCUMENT CONTROL

Once a project has been completed, the individual files must be assembled, organized, and securely stored. The QAM may schedule audits of project files.

The document control audit consists of checking each document submitted for accountability. All documents used for field investigations are checked against the list of field

documents issued to the SPM or his designated person. Written explanations must be present for any documents unaccounted for. Documents other than those issued are reviewed to ensure that they all appear on an inventory and that all documents listed on the inventory are accounted for. The auditor checks the documents for an appropriate numbering system.

The documents are examined to determine that all necessary items such as signatures, dates, and project codes are included.

The auditor examines any classified documents and determines if they are handled and stored in the proper manner.

FIELD AUDIT CHECKLIST
Briefing With SM

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Was a QA Project Plan and a Site Health and Safety Plan prepared? If yes, what items are addressed in the plan?
Comments:

Yes __ No __ N/A __ 2. Was a briefing held with project participants?
Comments:

Yes __ No __ N/A __ 3. Were additional instructions given to project participants (i.e., changes in project plan)?
Comments:

Yes __ No __ N/A __ 4. Is there a written list of sampling locations and descriptions?
Comments:

Yes __ No __ N/A __ 5. Is there a map of sampling locations?
Comments:

Yes __ No __ N/A __ 6. Does the sampling team follow a system of accountable documents? If yes, what documents are accountable?
Comments:

Yes __ No __ N/A __ 7. Is there a list of accountable field documents checked out to the SM or designated person? If yes, who checked them out?
Comments:

Yes __ No __ N/A __ 8. Is the transfer of field documents (Traffic Reports, chain-of-custody records, logbooks, etc.) from the SM to the field participants documented in a logbook?
Comments:

FIELD AUDIT CHECKLIST
Field Observations

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Was permission granted to enter and inspect the facility?
Comments:

Yes __ No __ N/A __ 2. Is permission to enter the facility documented?
Comments:

Yes __ No __ N/A __ 3. Were split samples offered to the facility? If yes, was the offer accepted or declined?
Comments:

Yes __ No __ N/A __ 4. If the offer to split samples was accepted, were the split samples collected?
Comments:

Yes __ No __ N/A __ 5. Is the offering of split samples recorded?
Comments:

Yes __ No __ N/A __ 6. If split samples were collected, are they documented? If yes, where are they documented?
Comments:

Yes __ No __ N/A __ 7. Are the number, frequency, and types of field measurements and observations taken as specified in the project plan or as directed by the SM?
Comments:

Yes __ No __ N/A __ 8. Are field measurements recorded (pH, temperature, conductivity, etc.)? Where?
Comments:

Yes __ No __ N/A __ 9. Are samples collected in the types of containers specified in the project plan or as directed by the SM?
Comments:

Yes __ No __ N/A __ 10. Are samples preserved as specified in the Project Plan or as directed by the SM?
Comments:

Yes __ No __ N/A __ 11. Are the number, frequency, and types of samples collected as specified in the Project Plan or as directed by the SM?
Comments:

Yes __ No __ N/A __ 12. Are samples packed for preservation as specified in the Project Plan (i.e., packed in ice, etc.)?
Comments:

Yes __ No __ N/A __ 13. Is sample custody maintained at all times?
Comments:

FIELD AUDIT CHECKLIST
Document Control

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Have all unused and voided accountable documents been returned to the SM by the team members?
Comments:

Yes __ No __ N/A __ 2. Have document numbers of all lost or destroyed accountable documents been recorded in the SM's logbook?
Comments:

Yes __ No __ N/A __ 3. Are all samples collected listed on a chain-of-custody record? If yes, describe the type of chain-of-custody record used.
Comments:

Yes __ No __ N/A __ 4. Do the chain-of-custody records indicate the method of sample shipment?
Comments:

Yes __ No __ N/A __ 5. Is a chain-of-custody record included with the samples in the shipping container?
Comments:

Yes __ No __ N/A __ 6. If used, are blank samples identified?
Comments:

Yes __ No __ N/A __ 7. If collected, are duplicate samples identified on chain-of-custody records?
Comments:

Yes __ No __ N/A __ 8. If used, are spiked samples identified?
Comments:

Yes __ No __ N/A __ 9. Are Field Notebooks signed by the individual who checked out the notebook from the SM?
Comments:

Yes __ No __ N/A __ 10. Are Field Notebooks dated upon receipt from the SM?
Comments:

Yes __ No __ N/A __ 11. Are Field Notebooks project-specific (by notebook or by page)?
Comments:

Yes __ No __ N/A __ 12. Are Field Notebook entries dated and identified by author?
Comments:

Yes __ No __ N/A __ 13. Is the facility's approval or disapproval to take photographs noted in a Field Notebook?
Comments:

Yes __ No __ N/A __ 14. Are photographs documented in Field Notebooks (e.g., time, date, description of subject, photographer, etc.)?
Comments:

Yes __ No __ N/A __ 15. If a Polaroid camera is used, are photographs matched with Field Notebook documentation?
Comments:

Yes __ No __ N/A __ 16. Are Traffic Report numbers recorded in the SM logbook?
Comments:

Yes __ No __ N/A __ 17. Are Quality Control checks documented (i.e., calibration of pH meters, conductivity meters, etc.)?
Comments:

Yes __ No __ N/A __ 18. Are amendments to the Project Plan documented (on the Project Plan itself, in a project logbook, elsewhere)?
Comments:

blank page

FIELD AUDIT CHECKLIST
Debriefing with SM or Field Sampling Team Leader

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Was a debriefing held with project participants after the audit was completed?
Comments:

Yes __ No __ N/A __ 2. Were any recommendations made to project participants during the debriefing?
If yes, briefly describe what recommendations were made.
Comments:

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DOCUMENT AUDIT CHECKLIST
Closed Files

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Have individual files been assembled (field investigation, laboratory, other)?
Comments:

Yes __ No __ N/A __ 2. Is each file inventoried?
Comments:

Yes __ No __ N/A __ 3. Is a document numbering system used?
Comments:

Yes __ No __ N/A __ 4. Has each document been assigned a document control number?
Comments:

Yes __ No __ N/A __ 5. Are all documents listed on the inventory accounted for?
Comments:

Yes __ No __ N/A __ 6. Are there any documents in the file that are not on the inventory?
Comments:

Yes __ No __ N/A __ 7. Is the file stored in a secure area?
Comments:

Yes __ No __ N/A __ 8. Are there any project documents that have been declared enforcement sensitive?
Comments:

DOCUMENT AUDIT CHECKLIST
Enforcement Sensitive Documents

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Are Enforcement Sensitive documents stored in a secure area separate from other project documents?
Comments:

Yes __ No __ N/A __ 2. Are Enforcement Sensitive documents listed in the project file?

Comments:

Yes __ No __ N/A __ 3. Is access to Enforcement Sensitive files restricted?
Comments:

Yes __ No __ N/A __ 4. Have classified documents been marked or stamped "Enforcement Sensitive?"
Comments:

Yes __ No __ N/A __ 5. Is classified information inventoried?
Comments:

Yes __ No __ N/A __ 6. Is classified information numbered for document control?
Comments:

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DOCUMENT AUDIT CHECKLIST
Active Project Files

PROJECT NO. DATE OF AUDIT

PROJECT MANAGER SIGNATURE OF AUDITOR

OFFICE LOCATION

Yes __ No __ N/A __ 1. Are project notebooks being maintained in accordance with policies?
Comments:

Yes __ No __ N/A __ 2. Are project activities logbooks being kept up to date?
Comments:

Yes __ No __ N/A __ 3. Is each entry in the project activities logbook identified by date and author, if made by persons not originally assigned to the book?
Comments:

Yes __ No __ N/A __ 4. Are entries legible, factual, and made in ink?
Comments:

Yes __ No __ N/A __ 5. Are modifications to the project work plan noted in the project activities logbook or elsewhere?
Comments:

Yes __ No __ N/A __ 6. Is an inventory of serialized field documents (chain-of-custody records, etc.) in the RDCO's inventory logbook?
Comments:

Yes __ No __ N/A __ 7. Does the Field Notebook contain adequate information about each sample including the Traffic Report number, date, location, and information necessary to reconstruct the sample?

Comments:

Yes __ No __ N/A __ 8. Are entries to the Field Notebook made in ink?
Comments:

Yes __ No __ N/A __ 9. Are corrections properly executed with one line through the error in all project logbooks and Field Notebooks?
Comments:

Yes __ No __ N/A __ 10. Are all project notebooks and logbooks properly labeled with the project number, EPA site number, and title?
Comments:

DOCUMENT AUDIT CHECKLIST
Regional Document Control Officer

OFFICE LOCATION
DATE OF AUDIT
SIGNATURE OF AUDITOR

Yes __ No __ N/A __ 1. Is an inventory of serialized field documents (chain-of-custody records, etc.) in the RDCO's inventory logbook?
Comments:

Yes __ No __ N/A __ 2. Are project materials secured during other than working hours unless they are in use?
Comments:

Yes __ No __ N/A __ 3. Is Enforcement Sensitive material maintained in a secured area with a check-out log at all times?
Comments:

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Appendix B

HEALTH AND SAFETY PLAN

MARINE CORPS AIR STATION EL TORO
EL TORO, CALIFORNIA
INSTALLATION RESTORATION PROGRAM
FINAL HEALTH AND SAFETY PLAN

01 December 1994

Revision 0

PREPARED BY:
Southwest Division, Naval Facilities
Engineering Command
1220 Pacific Highway
San Diego, California 92132-5190

THROUGH:
CONTRACT #N68711-89-D-9296
CTO #284
DOCUMENT CONTROL NO:
CLE-C01-01F284-B4-0002

WITH:
Jacobs Engineering Group Inc.
401 West A Street, Suite 1905
San Diego, California 92101

In association with:
International Technology Corporation
CH2M HILL

COMMUNITY ENVIRONMENTAL RESPONSE FACILITATION ACT (CERFA) CONFIRMATION SAMPLING VISIT U.S. MARINE CORPS AIR STATION EL TORO

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HEALTH AND SAFETY PLAN
COMMUNITY ENVIRONMENTAL RESPONSE FACILITATION ACT (CERFA) CONFIRMATION SAMPLING VISIT
U.S. MARINE CORPS AIR STATION (MCAS) EL TORO

This Health and Safety Plan (HSP) pertains to field work activities that will be conducted during the CERFA confirmation sampling visit at MCAS El Toro according to the *Final Sampling Visit Work Plan (SAP, 01 November 1994)*. This HSP applies only to CH2M HILL employees and to CH2M HILL subcontractor employees. It does not authorize any health and safety responsibility for non-CH2M HILL employees, nor for any other firm or entity not acting as a subcontractor to CH2M HILL. This HSP is for the specific site conditions, purposes, dates, and personnel indicated and must be amended and approved to reflect changes. It shall be kept onsite during field activities.

This HSP adopts the following by reference:

- Applicable *General Industry and Construction Safety Orders* in *Title 8 of the California Code of Regulations (8 CCR)*
- The standards of practice (SOPs) contained in the *CH2M HILL Corporate Health and Safety Program - Program and Training Manual*
- Other applicable CH2M HILL SOPs as appropriate

1.0 GENERAL PROJECT/SITE INFORMATION

CLIENT OR OWNER: United States Navy

PROJECT NO: CTO No. 284 / SCE70257.PM

PROJECT MANAGER: Mike Arends **OFFICE:** Santa Ana, California

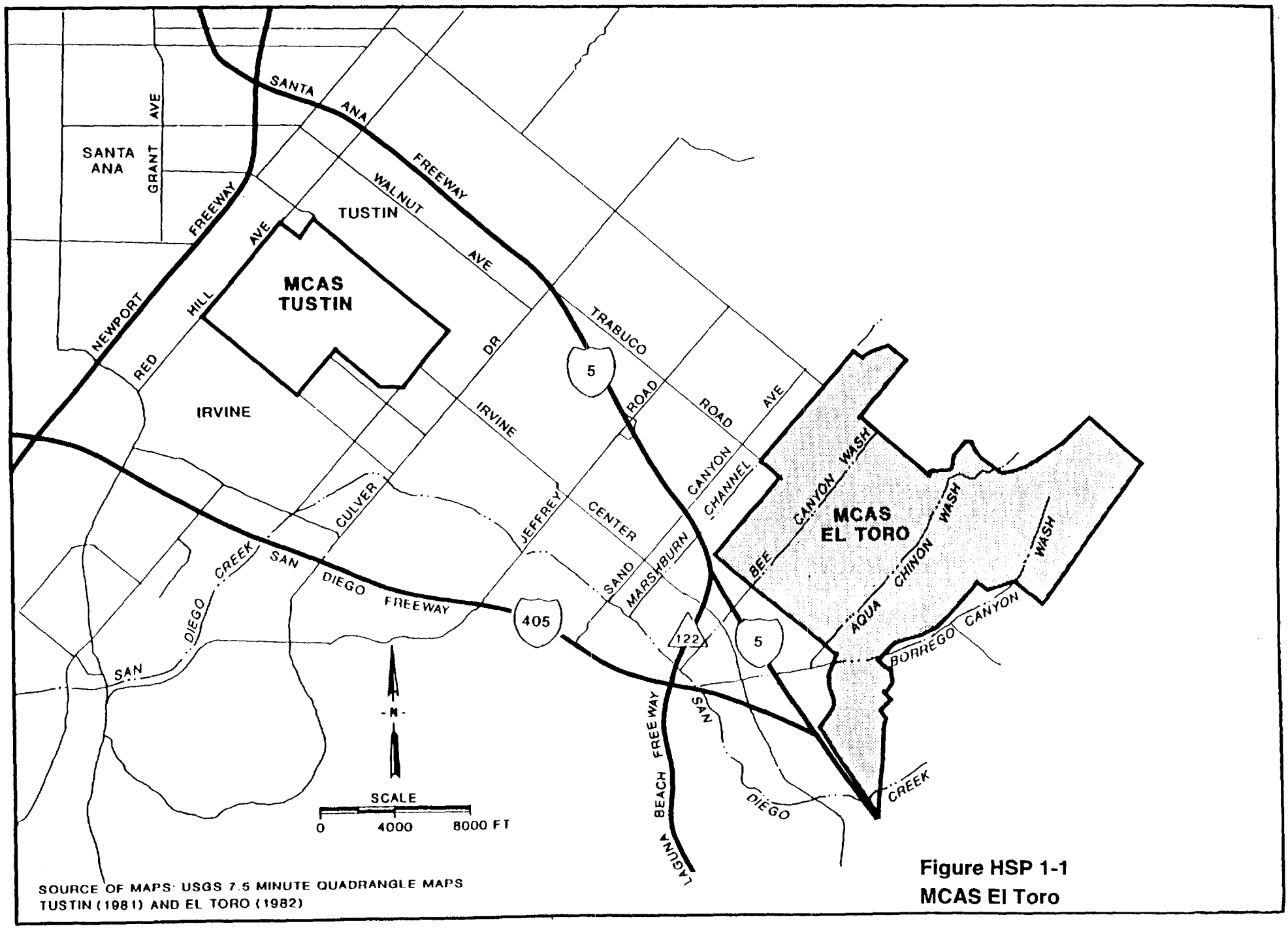
SITE NAME: U.S. Marine Corps Air Station (MCAS) El Toro

SITE LOCATION: El Toro, California (Figure HSP 1-1)

DATE HEALTH AND SAFETY PLAN PREPARED: October 1994

DATE(S) OF INITIAL VISIT: February 1991

DATE(S) OF SITE WORK: December 1994 to January 1995



SOURCE OF MAPS: USGS 7.5 MINUTE QUADRANGLE MAPS
TUSTIN (1981) AND EL TORO (1982)

Figure HSP 1-1
MCAS El Toro

1.1 OBJECTIVE

A Draft Community Environmental Response Facilitation Act (CERFA) report was prepared on 11 November 1994. The purpose of the CERFA report is to obtain concurrence from the members of the BRAC Cleanup Team (BCT) on the Navy's determination of "uncontaminated" parcels of real property at the Station. In this report, the Navy identified 12 parcels of Station land as being "uncontaminated".

The proposed confirmation sampling program is presented in the SAP, dated 01 November 1994. The purpose of this confirmation sampling visit is to collect shallow soil samples from the 12 parcels identified in the CERFA report and verify that these parcels are "uncontaminated".

1.2 STATION DESCRIPTION

The Station is a U.S. military reservation that contains a large, active air station operated by the USMC. The Station covers approximately 4,740 acres of land located in Orange County, California, approximately 8 miles southeast of the City of Santa Ana and 12 miles inland (north-northeast) of the coastal City of Laguna Beach (Figure HSP 1-1). The Station entrance is located at the intersection of the Santa Ana Freeway (I-5) and Sand Canyon Avenue in El Toro, Orange County, California.

The local climate is typified by mild winters and dry summers. Average annual temperature in the area is 63.3°F. Temperature extremes range from lows in the 30s during winter months to 110°F during the summer months. Average annual precipitation is 12.5 inches. The prevailing winds are from the west, but occasional moderate to strong northeast winds, called Santanas, occur typically during the fall, winter, and early spring.

The primary mission of the Station is to maintain and operate facilities and provide services and materials to support the operation of aviation activities. The mission involves operation and lower-echelon maintenance of a relatively large number of military aircraft and ground support equipment. The Station includes support areas such as aircraft and maintenance shops, office spaces, housing facilities, and large areas of undeveloped land that serve as buffer zones between the Station and surrounding property.

1.3 RELEVANT SITE HISTORY

In March 1993, MCAS El Toro was placed on the proposed Base Realignment and Closure (BRAC) III list of military facilities considered for base closure. MCAS El Toro was formally selected for closure in September 1993. Closure of the Station is planned to be completed by 1999. In response to being listed for closure, the Station has prepared several closure reports.

A BRAC Cleanup Plan (BCP) for MCAS El Toro was submitted on 21 March 1994. The purpose of the BCP is to summarize the status of MCAS El Toro's environmental restoration and compliance programs and to provide a comprehensive strategy for addressing environmental restoration and restoration-related compliance activities. In addition, the BCP provides schedules of restoration activities in support of base closure.

A Station-wide environmental baseline survey (EBS) is currently being prepared for the Station. Preliminary results for the EBS are presented in the Draft EBS Report dated 11 November 1994. The purpose of the EBS is to evaluate the environmental condition of real property at the Station. The EBS report focuses on the review and evaluation of existing environmental data related to storage, release, treatment, or disposal of hazardous substances or petroleum products on Station property.

Based on this information, locations of environmental concern, referred to as LOCs, were identified at the Station and classified according to characteristics related to hazardous substances and petroleum products. Over 800 LOCs were identified at the Station. Based on the locations and characteristics of the LOCs, approximately 2,500 acres of Station property were preliminarily identified as being "uncontaminated". These land areas, referred to as CERFA-eligible, are defined as property "on which no hazardous substances and no petroleum products or their derivatives were stored for one year or more, known to have been released, or disposed of."

A Draft CERFA Report was prepared on 11 November 1994. The purpose of the CERFA Report is to obtain concurrence from the members of the BRAC Cleanup Team (BCT) on the Navy's determination of "uncontaminated" parcels of real property at the Station, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 120(h)(4), as amended by CERFA. A total of 20 parcels have been determined to be "uncontaminated" and/or CERFA-eligible. Of these, the Navy is requesting concurrence from the members of the BCT for 12 parcels.

1.4 SAMPLING SITE DESCRIPTIONS

The scope of this HSP is to include confirmation sampling activities at the 12 parcels that the Navy has identified as "uncontaminated" in the CERFA report dated, 01 August 1994. Table 1.4.1 on the following page provides a site description of each parcel. A site map showing the parcel locations is provided in the SAP dated 01 November 1994.

1.5 DESCRIPTION OF FIELD ACTIVITIES

Field activities will include setup/cleanup at each sampling location. Sampling activities will include hand augering to a depth of 4 feet below ground surface and collection of soil samples at surface level or 1-foot and 2-feet and 4-feet below ground surface. Further sampling details are provided in the *SAP, 01 November 1994.*

Table 1.4.1
Descriptions of Proposed "Uncontaminated" Parcels
MCAS El Toro

Parcel I.D.	Size (acres)	Location [1]	Current Land Use	Previous Land Use
CP-3	30	Land area generally bounded by Trabuco Rd., Marshburn Wash, N. 4th St., and "C" St.	Commissary Asphalt Parking Lot	Agriculture until about 1965.
CP-4	34	Land area generally bounded by N. 6th St., Perimeter Rd., N. 9th St., and "G" St.	Station Housing (BEQs)	Agriculture until about 1950.
CP-5	126	Land area generally bounded by N. 9th St., Marshburn Channel, Irvine Blvd., Bee Canyon Wash, and SW boundary of Runway End Zone area for Runways 16L and 16R	Recreational Fields Runway End Zone	Recreational fields were constructed around 1970. Prior to this time, this area was used for agriculture. The Runway End Zone has been undeveloped since the Station was commissioned.
CP-6	195	Northern Flight Corridor area located north of Irvine Blvd. and east of Marshburn Channel.	Ornamental Plants Nursery (Bordiers Nursery)	This area has been used for agriculture/nursery purposed since before the Station began operations.
CP-7	109	Land area generally bounded by N. 8th St., Bee Canyon Wash, Irvine Blvd., and "P" St.	Horse Stables Grammar School	The stable area was constructed about 1963 and the grammar school was constructed about 1965. Prior to these dates, the area was undeveloped.
CP-10	548	Parcel of land including: Family Housing area NE of Inchon Dr.; undeveloped area east of this housing area and west of Magazine Rd. and IRP Sites 1 and 2; and orange grove area east of Irvine Blvd. and between IRP Sites 2 and 17.	Station Housing Agriculture (Orange Groves) Undeveloped Land	Much of this area has been undeveloped since before the Station began operations. Other portions of this parcel include Family Housing located in the NW corner of the parcel and a small orange grove located in the SW corner of the parcel.
CP-12	161	Parcel of land between the east side of Magazine Rd. and IRP Sites 1 and 2 and the furthest northeast boundaries of the Station.	Agriculture (Row Crops and Orange Groves) Runway End Zone (Open Land)	The Runway End Zone area has remained undeveloped since the Station was commissioned. Prior to that date, this area was used for agricultural purposes.
CP-13	166	Land area generally bounded by "Z" St., El Toro Blvd., Borrego Canyon Wash, and the 13th Hole of the Station Golf Course.	Station Golf Course	The Station Golf Course was constructed about 1950. Prior to 1950, this area was undeveloped. The two holes located NE of El Toro Blvd opened about 1960. This area was previously undeveloped prior to that year.
CP-14	23	Triangular shaped parcel of land located east of Runway 34R, south of the 13th Hole of the Station's Golf Course, and west of Borrego Canyon Wash.	Station Golf Course	The Station Golf Course was constructed about 1950. Prior to 1950, this area was undeveloped.
CP-15	36	Parcel of land located south of Borrego Canyon Wash, southwest of the Station's property line, and northeast of the Southern Pacific railroad tracks.	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.
CP-16	385	Southern Flight Corridor located southwest of the Southern Pacific railroad tracks and northeast of Interstate 5 freeway.	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.

Table 1.4.1
Descriptions of Proposed "Uncontaminated" Parcels
MCAS El Toro

Parcel I.D.	Size (acres)	Location [1]	Current Land Use	Previous Land Use
CP-17	3	Small parcel of the Southern Flight Corridor located southwest of the Southern Pacific railroad tracks, north of Borrego Canyon Wash, and southeast of the Station's property boundary	Agriculture (Row Crops) (Magarro Farms)	This area has been used for agricultural purposes since before the Station began operations.

Notes:
(1) Boundary descriptions indicate general location for reference purposes only. Refer to Attachment 6 of the Preliminary Draft CERFA dated 01 August 1994 for more detailed descriptions of the parcel boundaries.

2.0 FIELD OPERATIONS ADMINISTRATION

2.1 MULTI-EMPLOYER INFORMATION

The work of this project is part of the base closure activities being conducted under the U.S. Navy Comprehensive Long-Term Environmental Action, Navy (CLEAN) Program. Jacobs Engineering Group Inc. (JEG), is the prime contractor for the Phase 1 CLEAN contract. CH2M HILL and other companies (as indicated below) are subcontracted to JEG to perform the work of this project.

Employer Name	Field Team Supervision Name/Title	Health & Safety Supervision Name/Title
JEG	To be determined/Project Manager	David Smith/CLEAN Program Health & Safety Manager

2.2 PROJECT ORGANIZATION

Project Manager (PjM):	Mike Arends/CH2M HILL, SCO
Resource Center Manager (RCM):	Ken Tomeo/CH2M HILL, SCO
Field Team Leader (FTL):	Daryl Hernandez/CH2M HILL, SCO
Project Health and Safety Officer (PHSO):	Bob Nash/CH2M HILL, SCO Lisa Martin/CH2M HILL/SCO
Field Team Personnel:	Refer to Subsection 2.3

2.3 CH2M HILL PERSONNEL INFORMATION

2.3.1 MEDICAL SURVEILLANCE AND TRAINING (REFERENCE CH2M HILL SOP HS-01 AND 02)

The PHSO, or designee, shall authorize individuals to access areas where site control is established for purposes of conducting field work in accordance with this HSP only if current certification of their medical fitness, training, and respirator fit are in accordance with *Sections 5144 and 5192 of Title 8 CCR.*

Employees listed below have received 40-hour initial training, 3-day on-the-job experience, and (as appropriate) 8-hour annual refresher training. Employees designated "SHSR" have received an additional 8 hours of supervisor and 8 hours of instrument training, and are qualified to act as Site Health and Safety Representative (SHSR) for work conducted at the level of personal protection indicated below and specified under Section 6.0. Employees designated "FA-CPR" are currently

certified by the American Red Cross, or equivalent, in first aid and CPR. There shall be at least one SHSR and one FA-CPR designated employee present at each sampling location during any task performed onsite with the potential for exposure of CH2M HILL personnel to safety and health hazards.

Employee Name	Office	Responsibility	SHSR	FA-CPR
Daryl Hernandez	SCO	Field Team Leader (FTL)	LEVEL C	FA-CPR
To Be Determined	SCO	SHSR	LEVEL__	
Tim Smith	SCO	Assistant FTL	LEVEL D	FA-CPR
Larry Anderson	SCO	Field Team Member	LEVEL D	FA
To Be Determined	SCO	Field Team Member		
To Be Determined	SCO	Field Team Member		

2.3.2 RESPONSIBILITIES

2.3.2.1 PROJECT PERSONNEL

Project Manager (PjM)

- Manages project; responsible for overall planning, execution, and supervision of field work.

Field Team Leader (FTL)

- Plans and supervises technical and administrative aspects of field work.
- Authorizes field team members to initiate field work.

Project Health and Safety Officer (PHSO)

On behalf of CH2M HILL only:

- Administers this HSP during field operations included in the scope of this project.
- Interfaces with CH2M HILL, JEG, and subcontractors' supervisory and management personnel concerning project-related health and safety matters.
- Provides support to SHSRs to facilitate health and safety aspects of site-specific operations.
- Verifies current certifications of individuals' medical fitness, training, and respirator fit per Subsection 2.3.1, prior to authorizing access to areas where site control is established.
- Verifies that onsite and offsite emergency communication systems are operational.

- Conducts employee health and safety communications per Subsection 2.4.

Site Health and Safety Representative (SHSR)

On behalf of CH2M HILL only:

- Administers this HSP as it pertains to specific sampling sites and activities where assigned.
- Interfaces with PHSO concerning site specific, multi-employer health and safety matters.
- Interfaces with PHSO concerning other site specific health and safety matters as needed.

Field Team Members

- Perform the work of this plan as directed by the FTL and SHSR.

2.3.2.2 LINE MANAGEMENT (RCM, Division or Department Manager [DM], Regional Office Manager [ROM])

- Provides PjM with resources to execute work.
- Assures work is performed in accordance with applicable policies and procedures.

2.3.2.3 STAFF HEALTH AND SAFETY PROFESSIONALS

Regional Health and Safety Coordinator (RHSC)

In support of Southern California regional operations:

- As requested, provides project and field team personnel with technical guidance for conducting field work in a safe and healthful manner.
- Reviews and approves site-specific HSPs.
- Conducts field audits as necessary and in accordance with applicable policies and procedures.

District Health and Safety Manager (DHSM)

- In support of CH2M HILL Southwest District operations, has same responsibilities as RHSC at the district level.

Corporate Health and Safety Director (CHSD)

- Develops and implements CH2M HILL corporate and discipline health and safety program through the DHSM and RHSC.

CH2M HILL Occupational Medical Consultant (OMC)

- Prescribes and interprets results of medical examination protocols and testing for CH2M HILL employees who participate in the CH2M HILL Occupational Medical Program.

2.4 COMMUNICATIONS

- Health and safety concerns in the field shall be brought to the attention of the SHSR first.
- Health and safety concerns in the field that the SHSR is unable to address satisfactorily shall be brought to the attention of the PHSO. When the PHSO is unavailable, contact the RHSC or DHSM.
- **In the event of an accidental incident or emergency, notify responsible personnel per Subsection 7.6.**

2.4.1 HAZARD COMMUNICATION

The PHSO shall provide a copy of this HSP to each individual authorized to access sites where site control is established according to this HSP. To satisfy the training and hazard communication requirements of *Sections 1509 and 5194 of 8 CCR*, each individual shall agree to abide by this HSP by signing Attachment 1, "Employee Signoff."

2.4.2 EMPLOYEE HEALTH AND SAFETY BRIEFING

The PHSO shall conduct a health and safety briefing prior to authorizing individuals access to areas where site control is established. The PHSO shall document attendance and the topics discussed, including at least the following:

- Work plan and individual assignments
- Potential hazards of the work to be performed (Section 3.0 and Attachments 2, "Generic Chemical Hazard Profiles," and 3, "Detailed Biological and Physical [Safety] Hazards and Controls")
- Site controls and air monitoring action levels that will be in effect onsite
- Personal protective equipment to be used
- Communication procedures, including evacuation/emergency signals
- Emergency response/contingency plan and rescue operations

2.4.3 TAILGATE MEETINGS

The PHSO, or designee, shall conduct health and safety tailgate meetings with field team members whenever new processes, procedures, or equipment are introduced, or at least weekly. The attendance and topics discussed shall be documented, including at least the following:

- Newly identified hazards associated with the work to be performed not discussed previously
- Health and safety concerns or problems that have arisen since the previous tailgate meeting

3.0 HAZARD EVALUATION AND CONTROL (REFERENCE CH2M HILL SOP HS-03 AND HS-04)

3.1 CHEMICAL HAZARDS AND CONTROL

Table 3.1.2 lists all chemicals on the Target Compound List for which soil samples will be analyzed. However, it should be noted that these contaminants have not been previously identified in the "uncontaminated" parcels under investigation, and elevated levels of these contaminants in soil are not anticipated.

3.1.1 HAZARDS POSED BY CHEMICALS BROUGHT ONSITE

Refer to the CH2M HILL Hazard Communication Program Manual which is available from the Corporate Human Resources Department in Denver. The Project Manager is to request Material Safety Data Sheets (MSDSs) from the client, or subcontractors for chemicals that CH2M HILL employees are potentially exposed to, before they arrive on site. Chemicals that CH2M HILL will be bringing onsite are listed below:

Chemical	Location
Alconox	Decontamination area
Isobutylene	Calibration gas for HNu
Methane	Calibration gas for FID OVA-128

3.2 BIOLOGICAL HAZARDS AND CONTROLS

Since most of the work of this HSP will occur outdoors, there is potential for hazards such as bites from insects, snakes, and rodents. More detailed information concerning relevant biological hazards and controls are provided in Attachment 3. Personal protective equipment (PPE) shall be used in accordance with specifications provided in Section 6.0 of this HSP.

Potential exposure to bloodborne pathogens during administration of first aid or CPR shall be controlled by the use of protective equipment items available in the Bloodborne Pathogens Protection Kit. The Kit contains the following items: gloves, masks, CPR protectors, biohazard disposal bags, antiseptic cleanser, splash-proof goggles, towels, wipes, and absorbent powder to clean up spills (Reference CH2M HILL SOP HS-36).

3.1.2 HAZARDOUS CHEMICAL SUBSTANCES OF OCCUPATIONAL CONCERN

Itemized below are chemical substances that may pose an occupational health threat. For each chemical substance itemized the following information is summarized for quick reference:

- Applicable exposure limits
- Air levels when Immediately Dangerous to Life and Health (IDLH)
- Health hazards if exposed above limits
- Ionization Potential (IP)

CHEMICAL	EXPOSURE LIMIT	IDLH	HEALTH HAZARD	IP
alpha-BHC	NE[1]	NE	No information found in reference materials	NL[2]
beta-BHC	NE	NE	No information found in reference materials	NL
delta-BHC	NE	NE	No information found in reference materials	NL
gamma-BHC (Lindane)	0.5 mg/m^3 (skin)	1000 mg/m^3	Irritation of the eyes, nose and throat; headache; nausea; respiratory difficulty; skin irritation; muscle spasms	NL
Heptachlor	0.5 mg/m^3	700 mg/m^3	Carcinogen; liver damage	NL
Aldrin	0.25 mg/m^3	100 mg/m^3	Carcinogen; headache; dizziness; nausea; vomiting; convulsions; jerks of limbs	NL
Heptachlor epoxide	NE	NE	No information found in reference materials	NL
Endosulfan I	NE	NE	No information found in reference materials	NL
Dieldrin	0.25 mg/m^3	450 mg/m^3	Headache, dizziness, nausea, vomiting, malaise, sweat, myoclonic limb jerks, clonic, tonic convulsions, coma, carcinogen	NL
4,4'-DDE	NE	NE	No information found in reference materials	NL
Endrin	0.1 mg/m^3 (skin)	2000 mg/m^3	Convulsions; stupor; headache; dizziness; nausea; vomiting; insomnia; aggressiveness; confusion; lethargy	NL
Endosulfan II	NE	NE	No information found in reference materials	NL
4,4'-DDD	NE	NE	No information found in reference materials	NL
Endosulfan sulfate	NE	NE	No information found in reference materials	NL

CHEMICAL	EXPOSURE LIMIT	IDLH	HEALTH HAZARD	IP
4',4'-DDT, (Dichlorodiphenyl-trichloroethane)	1 mg/m^3	NE	Carcinogen; paresthesia of tongue, lips, face; tremor, apprehension, dizziness, confusion, malaise, headache, fatigue, convulsions, paresis hands, vomiting, irritation of eyes-skin	NL
Methoxychlor	10 mg/m^3	NL	Carcinogen; in animals: convulsions, trembling, kidney and liver damage	NL
Endrin ketone	NE	NE	No information found in reference materials	NL
alpha-Chlordane	0.5 mg/m^3	500 mg/m^3	Carcinogen; blurred vision; confusion; delirium; cough; abdominal pain; nausea; vomiting; diarrhea; tremors; convulsions	NL
gamma-Chlordane	NE	NE	No information found in reference materials	NL
MCPA, 2-methyl-4-chlorophenoxy acetic acid, (GW) 3490	NE	NE	Toxic and irritant to eyes and mucous membranes	NL
MCPP, 2-(2-methyl-4-chlorophenoxy propionic acid, (GW) 3530	NE	NE	Highly toxic by ingestion, inhalation; irritation of skin, eyes	NL
Toxaphene	0.5 mg/m^3	200 mg/m^3	Carcinogen; nausea; confusion; agitation; tremors; convulsions; dry, red skin	NL
Aroclor 1016	NE	NE	Suspected human carcinogen; experimental reproductive effects; chloracne; liver damage	NL
Aroclor 1221	NE	NE	Suspect human carcinogen; experimental reproductive effects; chloracne; liver damage	NL
Aroclor 1232	NE	NE	Moderately toxic by skin contact; suspected human carcinogen; chloracne; liver damage	
Aroclor 1242 (Polychlorinated biphenyl 1242)	1 mg/m^3	10 mg/m^3	Carcinogen; irritation of the eyes; chloracne; liver damage	NL
Arochlor 124B	NE	NE	No information found in reference materials	NL
Aroclor 1254 (Polychlorinated biphenyl 1254)	0.5 mg/m^3	5 mg/m^3	Irritation of eyes, skin; acne-form dermatitis, carcinogen	NL

CHEMICAL	EXPOSURE LIMIT	IDLH	HEALTH HAZARD	IP
Arochlor 126D	NE	NE	No information found in reference materials	NL
Azinphos-methyl	0.2 mg/m^3 (skin)	20 mg/m^3	Aching eyes; blurred vision; runny nose; headache; tight chest; wheezing;	NL
Bolstar	NE	NE	No information found in reference materials	NL
Chlorpyrifos	NE	NE	No information found in reference materials	NL
Coumaphos	NE	NE	Poison by ingestion; skin contact, and inhalation; possible mutagen	NL
Demeton (O and S)	0.1 mg/m^3 (skin)	20 mg/m^3	Aching eyes, nose and head; chest tightness, wheezing; nausea; vomiting; diarrhea; local sweat; weakness; confusion; convulsions; irritation of the eyes and skin	NL
Diazinon	0.1 mg/m^3 (skin)	NE	In animals: cholinesterase inhibition	NL
Dichlorvos	0.9 mg/m^3 (skin)	200 mg/m^3	Aching eyes; rhinitis; headache; tight chest;wheezing; cyanosis; nausea; vomiting; diarrhea; sweating; muscle spasms; convulsions; cardiac irregularities; irritation of the eyes and skin	NL
Disulfoton	0.1 mg/m^3	NE	No information found in reference materials	NL
Ethoprop	NE	NE	No information found in reference materials	NL
Fensulfothion	0.1 mg/m^3	NE	No information found in reference materials	NL
Fenthion	0.2 mg/m^3 (skin)	NE	An experimental tumorigen and teratogen; a suspected carcinogen; experimental reproductive effects	NL
Merphos	NE	NE	No information found in reference materials	NL
Mevinphos	0.01 ppm 0.03 ppm (STEL)	4 ppm	Miosis; rhinitis; headache; tight chest; wheezing; anorexia; nausea; vomiting; diarrhea; convulsions; low BP; cardiac irregularities; irritation of the eyes and skin	NL
Naled	3 mg/m^3 (skin)	NE	No information found in reference materials	NL

CHEMICAL	EXPOSURE LIMIT	IDLH	HEALTH HAZARD	IP
Parathion methyl	0.1 mg/m^3 (skin)	20 mg/m^3	Miosis; rhinitis; headache; tight chest; wheezing; laryngeal spasm; anorexia; nausea; vomiting; diarrhea; sweating; weakness; confusion; convulsions; low BP; cardiac irregularities; skin and eye irritation	NL
Phorate	0.05 mg/m^3 (skin)	NE	Poison by ingestion and skin contact; a cholinesterase inhibitor; experimental reproductive effects	NL
Ronnel	10 mg/m^3	5,000 mg/m^3	In animals: cholinesterase inhibition; eye irritation; liver and kidney damage	NL
Stirophos (tetrachlorvinphos)	NE	NE	An experimental carcinogen, neoplastigen and tumorigen; experimental reproductive effects	NL
Tokuthion (Prothiofos)	NE	NE	No information found in reference materials	NL
Trichloronate	NE	NE	No information found in reference materials	NL
2,4-Dichlorophenoxy-acetic acid (2,4-D)	10 mg/m^3	500 mg/m^3	Weakness; stupor; muscle twitching; convulsions; dermatitis; in animals: liver and kidney damage	NL
4-(2,4-Dichlorophenoxy)butyric acid (2,4-DB)	NE	NE	Moderately toxic by ingestion and skin contact. An experimental teratogen; mutagenic data	NL
2,4,5-T	10 mg/m^3	NE	In animals: ataxia, skin irritation, and acne-like rash	NL
2,4,5-TP (Silvex)	NE	NE	No information found in reference materials	NL
Dalapon (2,2-Dichloropropionic acid)	5.8 mg/m^3	NE	Corrosive; a skin irritant; mutagenic data	NL
Dicamba	NE	NE	No information found in reference materials	NL
Dichloroprop	NE	NE	No information found in reference materials	NL
Dinoseb	NE	NE	No information found in reference materials	NL

Note 1: NE = None Established by the Occupational Safety and Health Administration (OSHA) or the American Conference of Governmental Industrial Hygienists (ACGIH)
Note 2: NL = None listed in reference materials

3.3 PHYSICAL (SAFETY) HAZARDS AND CONTROLS (REFERENCE CH2M HILL SOP HS-03)

The following are safety hazards and controls both specific to this project and general to most any field work. Refer to the *Construction and General Industry Safety Orders* in *8 CCR* and to Attachment 3, "Detailed Biological and Physical (Safety) Hazards and Controls," for more detailed information concerning safety hazards and controls.

Hazard	Engineering or Administrative Controls
Back injury	Use proper lifting techniques or mechanical lifting aids.
Buildup of static electricity	No spark sources are permitted within 50 feet of an excavation, heavy equipment, or UST removal. Ground as appropriate.
Electrical shock	Make certain equipment is properly grounded. Do not modify electrical wiring unless qualified to do so.
Flying debris/objects	Provide shielding and PPE.
Gas cylinders	Make certain gas cylinders are properly anchored and chained. Keep cylinders away from ignition sources.
High-pressure hose rupture	Check that fitting and pressurized lines are in good repair before using. Secure all lines to prevent whipping.
Moving vehicles	Backup alarm is required for heavy equipment. Observer remains in contact with operator and signals safe backup. Personnel to wear high-visibility vests and remain outside of turning radius.
Muddy work areas	Use wood pallets or similar devices in muddy work areas.
Noise > 85 dBA	Noise protection and monitoring are required.
Protruding objects	Flag and/or pad visible objects.
Steep terrain or unstable surface	Brace and shore equipment.
Sunburn	Protect skin with clothing and/or sunscreen. Provide shaded areas for breaks
Suspended loads	Work is not permitted under suspended loads.

3.4 HEAT AND COLD STRESS (REFERENCE CH2M HILL SOP HS-09)

3.4.1 GUIDELINES FOR WORKING IN TEMPERATURE EXTREMES

PULSE CRITERIA. Take resting radial (wrist) pulse at start of work day; record it. Measure radial pulse for 30 seconds as rest period begins. Pulse is not to exceed 110 beats per minute (bpm), or 20 bpm above resting pulse. If pulse exceeds these criteria, reduce work load and/or shorten the work cycle by one third, and observe for signs of heat stress. No team member is to return to work until his/her pulse has returned to <110 bpm, or resting pulse +20 bpm.

Temperature	Work Cycle	Rest Cycle	Control Measures
<32° F or <55° F and raining	2 hrs	15 min	Review cold stress in safety meeting. Rest in a warm area. Drink at least 8 ounces of warm noncaffeinated, nonalcoholic beverage at each rest break. Schedule a mid-day lunch break of at least 30 minutes in a warm area to begin not later than 5 hours after startup.
72° to 77° F	2 hrs	5 min	Review heat stress in safety meeting. Take resting pulse rate before beginning work. Drink 8 ounces of cool water before beginning work, and 4 ounces at rest break. Have ice available.
77° to 82° F	2 hrs	5 min	As above, but seated rest break. Monitor pulse rate. (See below.)
82° to 87° F	60 min	15 min	As above, but rest area to be shaded.
87° to 90° F	30 min	15 min	As above. Try to provide a shaded work area.
>90° F	15 min	15 min	As above. Provide a shaded area with seats in the work area for team members to use as needed. Try to reschedule work to avoid mid-day heat.

3.4.2 SYMPTOMS AND TREATMENT OF HEAT AND COLD STRESS

Heat Stroke	Heat Exhaustion	Frostbite	Hypothermia
Red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; high body temperature.	Pale, clammy, moist skin; profuse sweating; weakness; normal temperature; headache; dizzy; vomiting.	Blanched, white, waxy skin, but tissue resilient; tissue cold and pale.	Shivering, apathy, sleepiness; rapid drop in body temperature; glassy stare; slow pulse; slow respiration.
Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. Get medical attention immediately!!	Remove victim to a cool, air conditioned place. Loosen clothing, place in head low position. Have victim drink cool (not cold) water.	Remove victim to a warm place. Rewarm area quickly in warm (not hot) water. Give the victim warm fluids–not coffee or alcohol. Do not break any blisters. Elevate the injured area and get medical attention.	Remove victim to a warm place. Have victim drink warm fluids–not coffee or alcohol. Get medical attention.

3.5 RADIOLOGICAL HAZARDS AND CONTROLS

No radiological hazards are expected. However, if field conditions change, notify the SSC and contact Frank Petelka/ORO. Refer to the *CH2M HILL Corporate Health and Safety Program - Program and Training Manual* for standards of practice for operating in contaminated areas.

4.0 SITE CONTROL

The SHSR is responsible for site control at sampling locations where assigned. Responsibility for implementation of the following site control measures may be delegated at the discretion of the SHSR. In the event that any unforeseen hazards become apparent in the field necessitating greater precautions than what is specified in this HSP, the SHSR shall notify the PHSO immediately. It may be necessary for the SHSR or PHSO to suspend field operations until this HSP has been revised and approved accordingly.

4.1 SITE CONTROL MEASURES

- Limit access to the sampling location(s) and maintain the site entry log (Attachment 3).
- Maintain a copy of this HSP readily available to employees who may be exposed during this site work.
- Post CAL/OSHA job site poster (Attachment 4) centrally and conspicuously near the sampling location.
- Site work is to be performed during daylight hours only.
- Establish onsite communications, for example:
  - Line of sight/hand signals,
  - Auto horn, or
  - Two-way radio or cellular phone
- Establish offsite communications.
- Underground/buried utilities in areas where drilling or digging is intended shall be located and secured by non-CH2M HILL personnel prior to initiation of any drilling or digging activity.
- Set a wind indicator to readily determine wind direction.
- Establish and delineate contiguous work zones (exclusion [EZ], contamination reduction [CRZ], and support [SZ]). The latter two zones should be upwind of the EZ unless obstacles make this unfeasible.
- Designate areas for eating, drinking, smoking.
- Dust-suppression methods shall be implemented to minimize unwanted emissions.
- Establish decontamination and waste disposal procedures.
- If toilet facilities are not located within a 3-minute walk from the decontamination area, either provide a chemical toilet and hand washing facilities, or have a vehicle available (not the emergency vehicle) for transport to nearby facilities.

4.2 WORK PRACTICES

- The "buddy system" requirements of Section 5192(d)(3) CCR are to be met at all times.
- Personnel are to position themselves upwind of sampling locations.
- Avoid visibly contaminated areas as much as possible.
- No eating, drinking, or smoking is permitted in EZs or CRZs where access is restricted.
- Drinking water, juices, and cups are to be supplied in the SZ.
  Store chemicals brought onsite in properly labeled containers and where they are unlikely to be accidentally disturbed.

4.3 DECONTAMINATION PROCEDURES (REFERENCE CH2M HILL SOP HS-13)

4.3.1 SAMPLES AND EQUIPMENT

The FTL shall verify that pieces of equipment going off-Station are properly decontaminated according to the procedures in the *SAP, 01 November 1994*, and as supplemented below. Documentation of decontamination must be made in the field log notebook that is part of the permanent project file.

- Vehicles driven within the boundaries of the Station must be washed and the interior vacuumed before returning them to the office, rental agency, or to any person not named in this HSP. A commercial carwash is adequate for this purpose. Vehicles driven in the EZ, CRZ, or used to transport contaminated personnel or supplies must be steam-cleaned inside and outside before leaving the CRZ.

4.3.2 PERSONNEL

LEVEL D (MODIFIED) PPE

Wash and rinse gloves and boots with soap and water. Remove and dispose of gloves and coveralls. Wash hands and face with soap and water. Refer to Figure HSP 4-1 for example of Level D decontamination layout schematics.

4.4 CHEMICAL SPILL CONTAINMENT PROCEDURES

Liquid materials will be handled over plastic sheeting or containers. If a spill occurs, the affected media will be removed to the extent possible and containerized until proper disposal can be arranged.

4.5 DISPOSAL OF WASTE GENERATED ONSITE

- Containerize contaminated solid trash and PPE in 55-gallon drums. Label the containers and move them to the temporary staging area specified by the Client. Containers or rolloff bins may not be transported offsite for disposal until analytical results of samples collected at the boreholes have been received and the container contents have been classified accordingly. Hazardous waste containers shall be transported by a registered hauler to a permitted treatment, storage, and disposal facility. Representatives from the MCAS El Toro must sign hazardous waste manifests.

- Solid trash, i.e., disposable PPE and items used in the work zones that are not contaminated at concentrations sufficient to be classified as hazardous waste, shall be containerized and disposed of as industrial solid waste with other trash generated at MCAS El Toro.

- Soils that are not classified as hazardous waste will be disposed of as designated by the client.

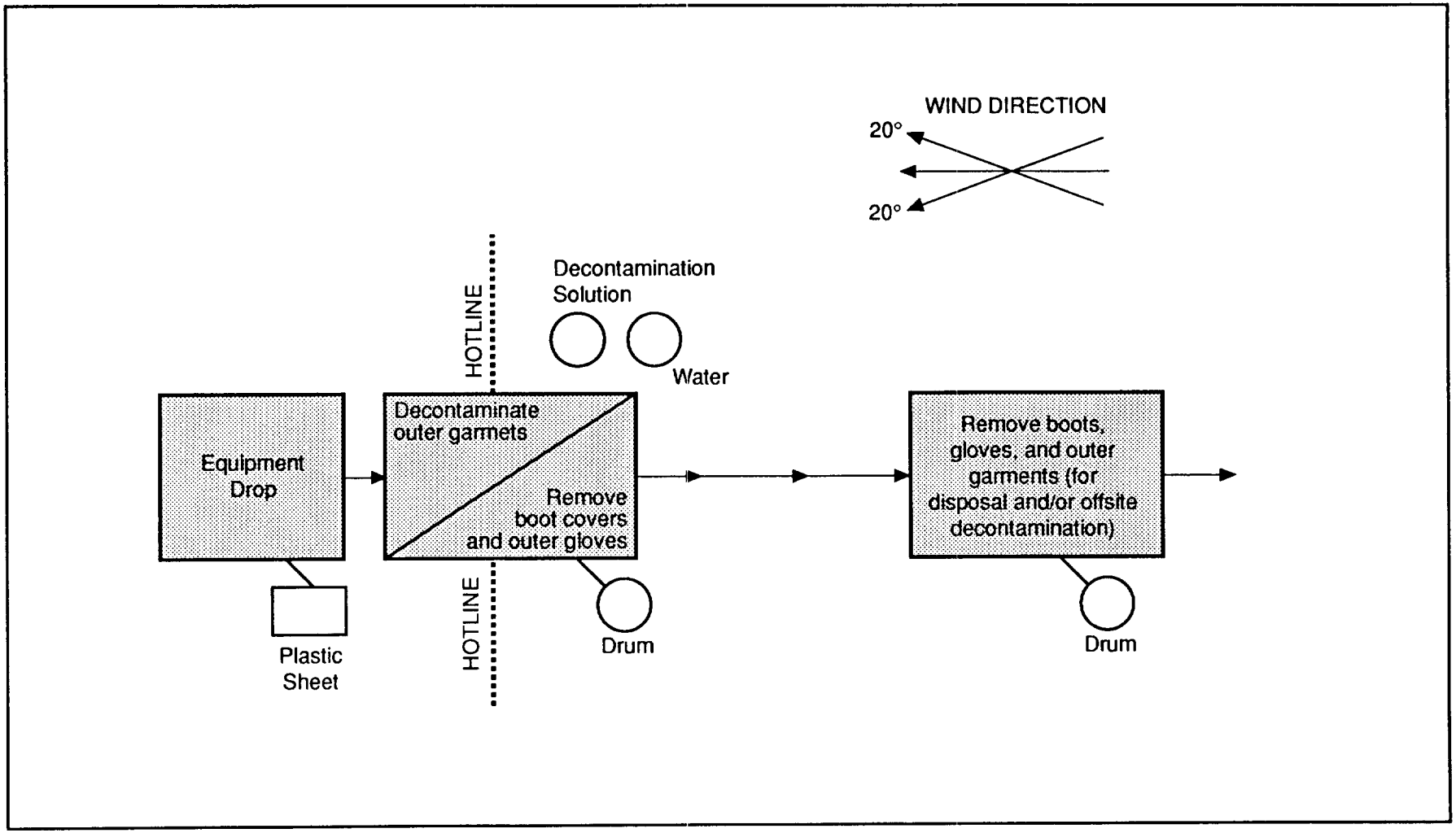


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Figure HSP 4-1
Typical Level D
Decontamination Schematic

5.0 AIR MONITORING

Although airborne contaminants are not anticipated, environmental air monitoring for organic vapors will be conducted in the breathing zone using direct reading instruments as specified in Table 5.2. Personal air sampling is not required under the scope of this HSP.

5.1 CALIBRATION SPECIFICATION

All instruments must be properly calibrated as described below, prior to use. Calibration information will be documented in the project field notebook.

Instrument	Gas	Span	Reading	Method
PID: HNu, 11.7 eV probe	100 ppm isobutylene	5.0 ± 2.0	68 ppm	1.5 l/m reg T-tubing 0.25 l/m reg direct tubing
FID: OVA-128	100 ppm methane	3.0 ± 1.5	100 ppm	1.5 l/m reg T-tubing

5.2 AIR MONITORING EQUIPMENT SPECIFICATION (REFERENCE CH2M HILL SOP HS-06)

Instrument	Tasks	Action Levels	Frequency	Calibration
Photoionization Detector (PID): 11.7 eV lamp, HNu, OVM, or equivalent	Hand augering; soil sampling	0-1 ppm[1] Level D >1 ppm[1] Stop work: re-evaluate	At the beginning of each task, and at 15 minute intervals. Record all readings.	Daily; pre and post use
Flame Ionization Detector (FID): Foxboro OVA-128	Hand augering; soil sampling (as substitute for PID)	0-1 ppm[1,2] Level D >1 ppm[1,2] Stop work: re-evaluate	At the beginning of each task, and at 15 minute intervals. Record all readings.	Daily; pre and post use

Note 1: Above background; sustained in the breathing zone for 5 minutes
Note 2: Non-methane readings

6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE) SPECIFICATION (REFERENCE CH2M HILL SOP HS-07 and HS-08)

Task	Level[1]	Body	Foot	Head[2]	Eye	Hand	Respirator
Hand augering; soil sampling	D Modified	Work clothing and tyvek coveralls	Steel-toed, steel-shanked rubber boots or steel-toed, steel-shanked leather safety boots with disposable boot covers	Hard hat Hearing protection if noise levels exceed 85 dB(A) or if conversations have to be shouted at a distance of 3 feet	Safety glasses or goggles	Inner gloves: N-Dex or latex rubber Outer gloves: Nitrile	None required

Note 1: This HSP is approved for a Level D Modified protection level maximum. If a higher level is required, work will stop and the PHSM will be contacted.
Note 2: The SSC shall specify hardhat areas.

6.1 REASONS TO UPGRADE OR DOWNGRADE LEVEL OF PROTECTION

Upgrade	Downgrade
• Request of individual performing task. • Change in work task that will increase contact or potential contact with hazardous materials. • Occurrence or likely occurrence of gas or vapor emission. • Known or suspected presence of dermal hazards. • Instrument action levels (Section 6.0) exceeded.	• New information indicating that situation is less hazardous than originally thought. • Change in site conditions that decreases the hazard. • Change in work task that will reduce contact with hazardous materials.

7.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

7.1 PRE-EMERGENCY PLANNING

The PHSO performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate.

- Verify local emergency contacts, hospital routes, evacuation routes, and assembly points.
- Confirm and post emergency telephone numbers and route to hospital.
- Post site map marked with location of emergency equipment and supplies.
- Drive route to hospital.
- Designate one vehicle as the emergency vehicle; place a copy of this HSP, including the hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment and supplies.
- Establish emergency signals, evacuation routes, and onsite and offsite assembly points.
- Review emergency procedures for personnel injury (Subsection 7.3).
- Review names of onsite personnel trained in first aid and CPR.
- Review emergency response and post-emergency notification procedures.
- Rehearse the emergency response plan once prior to site activities.
- Point out to field team members where emergency response equipment is located in the support area.
- Brief new workers on the emergency response plan.

7.2 EMERGENCY EQUIPMENT AND SUPPLIES

- Twenty-pound ABC fire extinguisher (or equivalent)
- Industrial first aid kit, including bloodborne pathogen kit
- Two-way radio(s) or cellular phone

7.3 EMERGENCY MEDICAL TREATMENT

- SHSR is to assume charge during a medical emergency until ambulance arrives, or injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR.
- Call ambulance and hospital, as appropriate. Station facilities will be the first responder in the event of a medical emergency. Dialing 911 from an onsite telephone will automatically contact the Station Fire Department. Dialing 911 from a mobil phone will contact offsite emergency facilities. Caller must state that he/she is on MCAS El Toro, so that the station Fire Department will be dispatched. If the Station Fire Department can not respond or handle the emergency, they will contact offsite emergency facilities for assistance.
- Determine if decontamination will make injury worse. If yes, seek medical treatment immediately.

7.4 EVACUATION

- Personnel are to leave the sampling location and assemble at designated assembly point upon detecting the emergency signal for evacuation.
- If emergency situation would be of concern to local Navy personnel, notify the local navy contact of emergency situation.
- If appropriate, SHSR and a "buddy" are to remain at/near sampling location after location has been evacuated to assist local responders and advise them of the nature and location of the incident.
- SHSR, or designee, is to account for field team members at the assembly point.
- SHSR is to write up incident report (per Subsection 7.6) as soon as possible after occurrence.

7.4.1 EVACUATION ROUTES AND ASSEMBLY POINTS

TO BE DESIGNATED AND DOCUMENTED BY THE SHSR DURING THE EMPLOYEE HEALTH AND SAFETY BRIEFING FOR EACH SITE.

7.5 EMERGENCY RESPONSE CONTACTS

EMERGENCIES ONLY:

Police: 911 If dialing from a mobil phone, caller must state that he/she is on MCAS El Toro)

Fire: 911 If dialing from a mobil phone, caller must state that he/she is on MCAS El Toro)

Ambulance: 911 If dialing from a mobil phone, caller must state that he/she is on MCAS El Toro)

Poison Control Center: Orange County - 800/544-4404
Los Angeles County - 800/777-6476

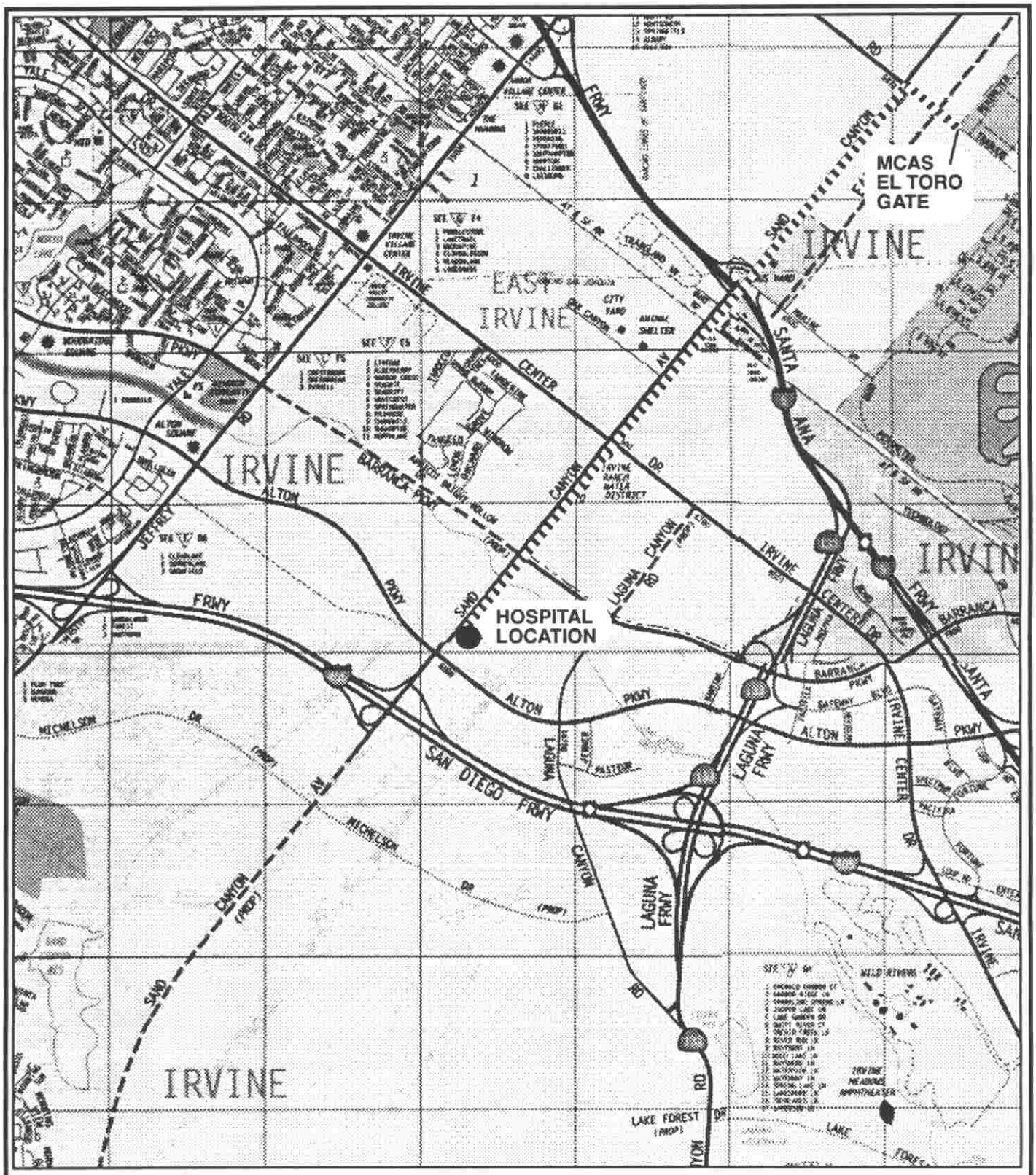
HOSPITAL: Irvine Medical Center **Phone:** 714/753-2000

Address: 16200 Sand Canyon Avenue, Irvine, CA 92718

Directions from the Station (Refer to Figure HSP 7-1, next page):

Travel Northwest out of the main gate, turn left on Sand Canyon Avenue (Southwest) for 1.5 miles, then turn right onto Alton Parkway to Irvine Medical Center.

Travel Time:	**Distance:**
Approximately 10 minutes	Approximately 2 miles



N

0 1400 2800

Scale in Feet

FIGURE HSP 7-1
EMERGENCY ROUTE TO IRVINE MEDICAL CENTER
MCAS EL TORO PHASE II RI
HEALTH AND SAFETY PLAN

m/SCE31981.SQ.20/FIG 7-1 4/94

7.6 POST-INCIDENT OR EMERGENCY NOTIFICATIONS AND RECORDKEEPING

- **As soon as possible** following an accidental incident or emergency the SHSR, or designee, is to attempt to directly notify at least one of the following individuals identified by name under Subsection 7.6.1 of this HSP:

    - RHSC or DHSM
    - PjM
    - CHSM

  Be prepared to provide the following information:

    (1) SHSR's name: Daryl Hernandez
    (2) Naval facility name and CTO number: MCAS El Toro–CTO No. 0284
    (3) Exact location of incident
    (4) Name and employer of victim(s)
    (5) Nature and extent of injuries
    (6) Whether victim(s) transported offsite for medical treatment
    (7) Telephone number where SHSR can be contacted during next 24 hours

- If at least one of these individuals cannot be contacted directly, attempt to contact the local 33s DM, RCM, or ROM (in that order) until at least one CH2M HILL person is notified directly.

- The person who is notified directly shall immediately notify (directly or indirectly) each of the following individuals (excluding self): RHSC or DHSM, PjM, CHSM.

- **Within 24 hours:** SHSR must notify Victim's Human Resources Department (VHRD). If victim is CH2M HILL employee and is admitted to hospital for emergency treatment, the OMC must be notified, preferably by the RHSC, DHSM, or CDHS. In the case of a fatality or hospital admittance of 5 or more people, Cal-OSHA must also be notified, preferably by the RHSC, DHSM, RCM, or CHSM.

- **Within 48 hours:** SHSR must complete and submit Form 308 (Attachment 7, "Accident Report") to the RHSC or DHSM, PjM, DM, and CHSM. If victim is a CH2M HILL employee, Form 308 must be submitted to CDHS and to the CH2M HILL Corporate Human Resources Department contact listed in Subsection 7.6.1.

- Appropriate personnel will conduct a follow-up investigation in accordance with applicable Jacobs Team SOP(s).

7.6.1 LIST OF CONTACTS

STAFF HEALTH AND SAFETY PROFESSIONALS

Regional Health and Safety Coordinator (RHSC)

Name: Lisa Martin/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2164

District Health and Safety Manager (DHSM)

Name: Bob Nash/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2328
Pager: 714/967-8450

Corporate Director Health and Safety (CDHS)

Name: Marty Mathamel/CH2M HILL, WDC
Phone: 703/471-1441

CH2M HILL Occupational Medical Consultant (OMC)

Dr. Elayne Theriault, Medical Director
Environmental Medicine Resources, Inc.
800/229-3674
or
404/455-0818 (after hours calls will be returned within 20 minutes)

CH2M HILL Local Medical Care Provider

Sky Park Walk-In Medical Clinic
3100 West Warner Avenue
Santa Ana, California, 92704
714/546-4233
Contact: Martha Ortiz

PROJECT PERSONNEL

Project Manager (PjM)

Name: Mike Arends/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2364

LINE MANAGEMENT

CLEAN Resource Center Manager (RCM)

Name: Ken Tomeo/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2265

Local EBL Manager

Name: Jonathan Harris/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2323

Regional Office Manager (ROM)

Name: Jerry Boyle/CH2M HILL, SCO
Phone: 714/250-0555 ext. 2203

CLEAN PROGRAM HEALTH AND SAFETY MANAGER (CHSM)

Name: David Smith/JEG
Phone: 818/568-7046

CLIENT (Local Navy Contact)

Name: Vish Parpiani
Phone: 714/726-4432

VICTIM'S HUMAN RESOURCES DEPARTMENT (VHRD)

CH2M HILL Local

Name: Jody Nakashima/SCO
Phone: 714/250-0555 ext. 2236

CH2M HILL Corporate

Name: Julie Zimmerman/DEN
Phone: 303/771-0952

CAL/OSHA

Anaheim, CA.
Phone: 714/939-0145

8.0 RECORDKEEPING

The SHSR, or designee, is required to maintain logs and reports, e.g., training logs, supplied air use logs, and daily tailgate information. On a weekly basis the SHSR will record days worked and the level(s) of protection worn by CH2M HILL field team members using Form 533. The completed form is to be submitted to the RHSC. The following forms are provided as attachments to this HSP:

Attachment 1 - Employee Signoff
Attachment 2 - Form 308 - Accident Report
Attachment 3 - Daily Site Entry Form

9.0 DOCUMENT REVIEW

9.1 Plan Approval

This HSP applies only to CH2M HILL employees and CH2M HILL subcontractor employees. It does not authorize any health and safety responsibility for non-CH2M HILL employees, nor any other firm or entity not acting as a subcontractor to CH2M HILL. This HSP is for the specific site conditions, purposes, dates, and personnel specified and must be amended if these operations or conditions change.

PLAN APPROVED BY: _____ **DATE:** 11/30/94
Robert Nash
CH2M HILL
District Health and Safety Manager

CONCURRENCE BY: M.W. Arends **DATE:** 11/30/94
Mike Arends
CH2M HILL Project Manager

CONCURRENCE BY: Bryant Wong for Ken Tomeo **DATE:** 12/1/94
Ken Tomeo
CH2M HILL CLEAN Resource Center Manager

PLAN APPROVED BY: David R. Smith **DATE:** 11/30/94
David Smith, CIH, CSP, REA, CHMM
CLEAN Program Health and Safety Manager
Jacobs Engineering Group Inc.

9.2 PLAN AMENDMENTS

DATE: **CHANGES MADE BY:**

CHANGES TO PLAN:

APPROVED: **DATE:**

9.3 PLAN ADDENDA

DATE: **CHANGES MADE BY:**

CHANGES TO PLAN:

APPROVED: **DATE:**

10.0 ATTACHMENTSTO PLAN

Attachment 1 - Employee Signoff
Attachment 2 - Form 308 - Accident Report
Attachment 3 - Daily Site Entry Log
Attachment 4 - CAL/OSHA Jobsite Poster
Attachment 5 - Detailed Biological and Physical (Safety) Hazards and Controls

ATTACHMENT 1
EMPLOYEE SIGNOFF

EMPLOYEE SIGNOFF

In accordance with Sections 1509 and 5194 of Title 8 of the CCR, the individuals listed below have read, understand, and agree to abide by the provisions of this project specific Health and Safety Plan (HSP) for the project work indicated below. These individuals acknowledge they have been advised of the hazards present for the work being performed.

PROJECT: CERFA Confirmation Sampling Visit U.S. MCAS El Toro **PROJECT NO.:** SCE70257.PM

EMPLOYEE NAME / EMPLOYER	EMPLOYEE SIGNATURE / DATE

ATTACHMENT 2
FORM 308
ACCIDENT REPORT

CH2M HILL ACCIDENT REPORT

DATE: _____

NOTE: *TO BE COMPLETED ONLY FOR REPRESENTATIVES OF CH2M HILL, INC.*

PROJECT: _____ PROJECT NO. _____

INJURED EMPLOYEE: _____ EMPLOYEE NO. _____

DATE INJURED: _____ TIME _____ A.M. P.M.

DATE REPORTED: _____ LAST DAY WORKED: _____

DID EMPLOYEE RETURN TO WORK: _____ DATE RETURNED: _____

WHERE ACCIDENT OCCURRED: _____

WITNESSES: _____

WORK PERFORMING WHEN INJURED: _____

KIND AND EXTENT OF INJURY: _____

NAME - ADDRESS OF DOCTOR - HOSPITAL: _____

DESCRIPTION OF ACCIDENT: _____

WAS THERE EQUIPMENT MALFUNCTION? ☐ YES ☐ NO

DESCRIBE DAMAGE TO EQUIPMENT OR PROPERTY: _____

UNSAFE CONDITION OR ACT CAUSING ACCIDENT: _____

ACTION TAKEN TO PREVENT SIMILAR ACCIDENT: _____

ADDITIONAL RECOMMENDATIONS OR ACTION: _____

SUPERVISOR: _____

☐ PHOTO(S) TAKEN

ATTACHMENT 3
DAILY SITE ENTRY LOG

DAILY SITE ENTRY LOG

DATE: ___/___/___ PAGE ___ OF ___

NAME	SIGNATURE	EMPLOYER	SSN#	TIME ONSITE	TIME OFFSITE	INITIAL OFFSITE

ATTACHMENT 4
CAL/OSHA JOBSITE POSTER

SAFETY AND HEALTH PROTECTION ON THE JOB

State of California
Department of Industrial Relations

California law provides job safety and health protection for workers under the Cal/OSHA program. This poster explains the basic requirements and procedures for compliance with the state's job safety and health laws and regulations. The law requires that this poster be displayed. (Failure to do so could result in a penalty of up to $7,000.)

WHAT AN EMPLOYER MUST DO:

All employers must provide work and workplaces that are safe and healthful. In other words, as an employer, you must follow state laws governing job safety and health. Failure to do so can result in a threat to the life or health of workers, and substantial monetary penalties.

You must display this poster so everyone on the job can be aware of basic rights and responsibilities.

You must have a written and effective injury and illness prevention program for your employees to follow.

You must be aware of hazards your employees face on the job and keep records showing that each employee has been trained in the hazards unique to each job assignment.

You must correct any hazardous condition that you know may result in serious injury to employees. Failure to do so could result in criminal charges, monetary penalties, and even incarceration.

You must notify the nearest Cal/OSHA office of any serious injury or fatality occurring on the job. Be sure to do this immediately after calling for emergency help to assist the injured employee.

WHAT AN EMPLOYER MUST NEVER DO:

Never permit an employee to do work that violates Cal/OSHA law.

Never permit an employee to be exposed to harmful substances without providing adequate protection.

Never allow an untrained employee to perform hazardous work.

EMPLOYEES HAVE CERTAIN RIGHTS IN WORKPLACE SAFETY & HEALTH:

As an employee, you (or someone acting for you) have the right to file a complaint and request an inspection of your workplace if conditions there are unsafe or unhealthful. This is done by contacting the local district office of the Division of Occupational Safety and Health (see list of offices). Your name is not revealed by Cal/OSHA, unless you request otherwise.

You also have the right to bring unsafe or unhealthful conditions to the attention of the Cal/OSHA investigator making an inspection of your workplace. Upon request, Cal/OSHA will withhold the names of employees who submit or make statements during an inspection or investigation.

Any employee has the right to refuse to perform work that would violate a Cal/OSHA or any occupational safety or health standard or order where such violation would create a real and apparent hazard to the employee or other employees.

You may not be fired or punished in any way for filing a complaint about unsafe or unhealthful working conditions, or using any other right given to you by Cal/OSHA law. If you feel that you have been fired or punished for exercising your rights, you may file a complaint about this type of discrimination by contacting the nearest office of the Department of Industrial Relations, Division of Labor Standards Enforcement (State Labor Commissioner) or the San Francisco office of the U.S. Department of Labor, Occupational Safety and Health Administration. (Employees of state or local government agencies may only file these complaints with the State Labor Commissioner.) Consult your local telephone directory for the office nearest you.

EMPLOYEES ALSO HAVE RESPONSIBILITIES:

To keep the workplace and your co-workers safe, you should tell your employer about any hazard that could result in an injury or illness to people on the job.

While working, you must always obey state job safety and health laws.

SPECIAL RULES APPLY IN WORK AROUND HAZARDOUS SUBSTANCES:

Employers who use any substance listed as a hazardous substance in Section 339 of Title 8 of the California Code of Regulations, or subject to the Federal Hazard Communications Standard (20 CFR 1910.1200), must provide employees with information on the contents on Material Safety Data Sheets (MSDS), or equivalent information about the substance that trains employees to use the substance safely.

Employers shall make available on a timely and reasonable basis a Material Safety Data Sheet on each hazardous substance in the workplace upon request of an employee, an employee collective bargaining representative, or an employee's physician.

Employees have the right to see and copy their medical records and records of exposure to potentially toxic materials or harmful physical agents.

Employers must allow access by employees or their representatives to accurate records of employee exposures to potentially toxic materials or harmful physical agents, and notify employees of any exposures in concentration or levels exceeding the exposure limits allowed by Cal/OSHA standards.

Any employee has the right to observe monitoring or measuring of employee exposure to hazards conducted pursuant to Cal/OSHA regulations.

WHEN CAL/OSHA COMES TO THE WORKPLACE:

A trained Cal/OSHA safety engineer or industrial hygienist may periodically visit the workplace to make sure your company is obeying job safety and health laws.

An inspection will also be conducted when a legitimate complaint is filed by an employee with the Division of Occupational Safety and Health.

Cal/OSHA also goes to the workplace to investigate a serious injury or fatality.

When an inspection begins, the Cal/OSHA investigator will show official identification from the Division of Occupational Safety and Health.

The employer, or someone the employer chooses, will be given an opportunity to accompany the investigator during the inspection. A representative of the employees will be given the same opportunity. Where there is no authorized employee representative, the investigator will talk to a reasonable number of employees about safety and health conditions at the workplace.

VIOLATIONS, CITATIONS & PENALTIES:

If the investigation shows that the employer has violated a safety and health standard or order, then the Division of Occupational Safety and Health issues a citation. Each citation specifies a date by which the violation must be abated. A notice, which carries no monetary penalty, may be issued in lieu of a citation for certain non-serious violations.

Citations carry penalties of up to $7,000 for each regulatory, general or serious violation. Additional penalties of up to $7,000 per day may be proposed for each failure to correct a violation by the abatement date shown on the citation. A penalty of not less than $5,000 nor more than $70,000 may be assessed an employer who willfully violates any occupational safety and health standard or order. The maximum civil penalty that can be assessed for each repeat violation is $70,000. A willful violation that causes death or permanent impairment of the body of any employee results, upon conviction, in a fine of not more than $70,000, or imprisonment of not more than six months, or both.

While governmental entities may be cited on the same basis as other employers, and abatement dates set, civil penalties will not be assessed.

The law provides that employers may appeal citations within 15 working days of receipt to the Occupational Safety and Health Appeals Board.

An employer who receives a citation, Order to Take Special Action, or Special Order must post it prominently at or near the place of the violation for three working days, or until the unsafe condition is corrected, whichever is longer, to warn employees of danger that may exist there. Any employee may protest the time allowed for correction of the violation to the Division of Occupational Safety and Health or the Occupational Safety and Health Appeals Board.

HELP IS AVAILABLE:

To learn more about job safety rules you may contact the Cal/OSHA Consultation Service for free information, required forms and publications. You can also contact a local district office of the Division of Occupational Safety and Health. If you prefer, you may retain a competent private consultant, or ask your workers' compensation insurance carrier for guidance in obtaining information.

OFFICES OF THE DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

HEADQUARTERS: 455 Golden Gate Ave.–Room 5202, San Francisco CA 94102 — Telephone (415) 703-4341

District & Field Offices

Anaheim	2100 East Katella Ave.–Room 140, 92806	(714) 939-0145
Bakersfield	4800 Stockdale Highway–Suite 212, 93309	(805) 395-2718
Chico	555 Rio Lindo–Suite A, 95926	(916) 895-4761
Concord	1465 Enea Circle–Bldg. E Suite 900, 94520	(510) 676-5333
Covina	1123 South Parkview–Suite 100, 91724	(818) 966-1166
Eureka	619 Second St.–Room 109, 95501	(707) 445-6611
Fresno	2550 Mariposa St.–Room 4000, 93721	(209) 445-5302
Los Angeles	3550 West Sixth St.–Room 431, 90020	(213) 736-3041
Modesto	1209 Woodrow Ave.–Suite C-4, 95350	(209) 576-6260
Oakland	7700 Edgewater Dr.–Suite 125, 94621	(510) 568-8602
Pico Rivera	9455 East Slauson Ave., 90660	(310) 949-7827
Redding	381 Hemsted Dr., 96002	(916) 224-4743
Sacramento	2424 Arden Way–Suite 165, 95825	(916) 920-6123
Salinas	1164 Monroe St.–Suite 1, 93906	(408) 443-3050
San Bernardino	242 East Airport Dr.–Suite 103, 92408	(714) 383-4321
San Diego	7807 Convoy Court–Suite 140, 92111	(619) 237-7325
San Francisco	1390 Market St.–Suite 718, 94102	(415) 557-1677
San Jose	2010 North First St.–Suite 401, 95131	(408) 452-7288
San Mateo	1900 South Norfolk St.–Suite 215, 94403	(415) 573-3812
Santa Rosa	1221 Farmers Lane–Suite 300, 95405	(707) 576-2388
Torrance	680 Knox St.–Suite 100, 90502	(310) 516-3734
Ukiah	620 Kings Court–Suite 5, 95482	(707) 463-4783
Van Nuys	6150 Van Nuys Blvd.–Suite 405, 91401	(818) 901-5403
Ventura	1655 Mesa Verde–Room 150, 93003	(805) 654-4581

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Anaheim	2100 East Katella Ave.–Room 125, 92806	(714) 939-8611
Los Angeles	3550 West Sixth St.–Suite 413, 90020	(213) 736-4911
Sacramento	2424 Arden Way–Suite 125, 95825	(916) 920-6127
San Francisco	1390 Market St.–Suite 822, 94102	(415) 557-8640

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San Diego	7827 Convoy Court–Suite 406, 92111	(619) 279-3771
San Mateo	3 Waters Park Dr.–Suite 230, 94403	(415) 573-3864
Santa Fe Springs	10350 Heritage Park Dr.–Suite 201, 90670	(310) 944-9366

Enforcement of Cal/OSHA job safety and health standards is carried out by the Division of Occupational Safety and Health, under the California Department of Industrial Relations, which has primary responsibility for administering the Cal/OSHA program. Safety and health standards are promulgated by the Occupational Safety and Health Standards Board. Anyone desiring to register a complaint alleging inadequacy in the administration of the California Occupational Safety and Health Plan may do so by contacting the San Francisco Regional Office of the Occupational Safety and Health Administration (OSHA), U.S. Department of Labor (Tel: 415/744-6670). OSHA monitors the operation of state plans to assure that continued approval is merited.

SEPTEMBER 1992

ATTACHMENT 5
DETAILED BIOLOGICAL AND PHYSICAL (SAFETY) HAZARDS AND CONTROLS

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BIOLOGICAL HAZARDS AND CONTROLS

POISONOUS INSECTS AND ANIMALS

Ants, Bees, Wasps, and Hornets

Stings of these insects are responsible for more deaths in the United states than bites and stings of all other venomous creatures. This is due to sensitization by the victim to the venom from repeated stings, which can result in anaphylactic reactions. The stinger may remain in the skin and should be removed by teasing or scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine.

Poisonous Snakes

Rattlesnakes are probably the most common poisonous snake in California. Of the North American rattlesnakes, the Mojave rattlesnake is the most poisonous, while the Sidewinder is the least poisonous. The degree of toxicity resulting from a snakebite depends on the potency of the venom, the amount of venom injected, and the general health, size, and age of the person bitten. Poisoning may also occur from absorption of venom through cuts or scratches.

Avoid walking at night or in grass and underbrush. Do not climb rocky ledges without visual inspection. Wear high-top boots and heavy pants since more than half of all bites are on the lower parts of the legs. Do not attempt to kill snakes unnecessarily; many people are bitten in such an attempt.

A snake may bite a person and not inject venom. Symptoms and signs of envenomation include the presence of fang marks, rapid and progressive swelling around the bitten area within 5 to 10 minutes, pain, weakness, faintness, weakness, nausea and vomiting, and alterations in temperature, pulse and blood pressure. Emergency treatment does not include incision through the fang marks; typically, more harm than good is done this way. Immobilize the person and the bitten part in a horizontal position, with the bitten part lower than the heart. Wash the bitten area with water but avoid manipulation of the bitten area. Do not allow the person to walk, run, or drink alcoholic beverages or stimulants such as sodas, coffee, or tea. Do not apply ice or give aspirin. Treat for shock and transport to the nearest medical facility. Death in humans can occur in less than one hour to after several days, with most deaths occurring at 18 to 32 hours.

Spiders

Almost all of the 30,000 species of spiders are venomous, but only a relatively small number have fangs long and strong enough to penetrate the human skin. Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, and in pump housings and buildings.

The black widow spider ranges in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. Although both male and female are venomous, only the latter has fangs large and strong enough to penetrate the human skin. Mature females range in body length from 10 to 18 mm. The person bitten may recall receiving a sharp, pinprick-like bite, but in some cases the bite is so minor that it goes unnoticed. Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating and weakness are common, as well as varying degrees of headache and dizziness. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the low back, thighs, or abdomen. There is no effective first-aid treatment. Treat for shock and transport to the nearest medical facility.

The brown recluse spider (or violin spider) has an abdomen that varies in color from grayish through orange and reddish-brown to dark brown. The back shell of the "violin" is brown to blackish and distinct from the pale yellow to reddish-brown background of the head and chest. This spider has 6 eyes grouped in 3 diads. Both male and female are venomous. They average 6 to 12 mm in body length. The bite of this spider produces about the same degree of pain as the sting of an ant, but sometimes the person is completely unaware of the bite. In most cases, a localized burning sensation develops that may last for 30 to 60 minutes. The area often itches, becomes red and warm, with a small blanched area around the immediate bite site. The reddened area enlarges and becomes purplish during the subsequent one to eight hours. A small blister forms at the bite site, increases in size and subsequently ruptures. The whole area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. All first aid measures should be avoided as the natural appearance of the bite is most important in determining the diagnosis. A cube of ice may be placed on the wound. Transport to the nearest medical facility.

Ticks

Ticks can carry may diseases. The transmission of Lyme disease from the tick to the person has been studied. There is evidence that the disease is not transmitted immediately, but rather after a period of time has passed. When in the field, check often for ticks. Ticks are best removed by slowly withdrawing the tick with flat-tip tweezers. Care should be taken to not leave any part of the tick in the wound, nor to crush the tick. If the tick resists or cannot be completely removed, seek medical attention. Wash your hands after removing the tick. The bite should be disinfected and dressed. Seek medical attention if the tick resists or cannot be removed completely.

Lyme disease develops a rash that looks like a "bulls-eye" with a small welt in the center, several days to weeks after the tick bite. Rocky Mountain Spotted Fever develops a rash comprising red spots under the skin, 3 to 10 days after the bite. With both diseases there are chills, fever, headache, fatigue, stiff neck and bone pain. Seek medical attention if symptoms appear.

POISONOUS PLANTS

Approximately one-half of the worker's compensation claims filed annually in California are for poison oak dermatitis. Poison ivy, poison oak, and poison sumac are identified by three or five leaves radiating from a stem. Poison ivy is a vine, while oak and sumac are bush-like. The plant tissues have an oleoresin which is active in live, dead and dried parts. The oleoresin may be carried via smoke, dust, contaminated clothing, and animal hair. Signs and symptoms include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24 hours. Crusting and scaling occur within a few days. In the absence of complications, healing is complete in about 10 days. Wash any exposed skin with a mild soap and water, but do not scrub the area.

HANTAVIRUS INFECTION

Rodents are the primary reservoir hosts of currently recognized hantaviruses. Available data strongly suggests that the deer mouse is the primary reservoir of the newly recognized hantavirus in the southwestern United States.

Human infection may occur when infective saliva or excreta are inhaled as aerosols produced directly from the infected animal. Transmission may also occur when dried materials contaminated by rodent excreta are disturbed, directly into broken skin, introduced onto the conjunctivae, or, possibly, ingested in contaminated food or water. Persons have also become infected after being bitten by rodents.

Workers should avoid coming into contact with rodents and rodent burrows, or disturbing dens (such as pack rat nests). If evidence is found of rodent droppings, nests, or dead animals, workers should notify the SSC. The SSC shall notify the Jacobs Engineering Group (JEG) Environmental Site Manager or Health and Safety Officer, who, in turn will notify the Navy. JEG and the Navy will determine the next course of action. Workers who develop febrile or respiratory illness within 45 days of the last potential exposure should immediately seek medical attention and inform the attending physician of the potential occupational risk of hantavirus infection. The physician should contact local health authorities promptly if hantavirus-associated illness is suspected.

PHYSICAL SAFETY HAZARDS AND CONTROLS

Potential physical hazards associated with field activities at the site may include any of the following discussed below. The controls specified shall be implemented during site operations. Under all circumstances, the applicable California Construction General Industry Safety Orders shall be followed.

NOISE

The main direct source of noise for his project is produced by industrial operations, vehicles, generators, etc. Hearing protection must be worn in areas where noise levels are at the permissible exposure level (PEL) of 85 dBA or greater. A good rule of thumb for knowing when hearing protection is required is when at 3 feet apart in normal conversation, voices must be raised to be heard. A Type II sound level meter should be used to measure noise onsite to verify sound levels and the need for hearing protection. Hearing protection shall be specified by the RHSC or DHSM based upon measured levels at the site.

PRECARIOUSLY POSITIONED OBJECTS

Field personnel shall become familiar with the general area and the potential physical hazards that would be associated with debris or objects (i.e., drums, boards, etc.) that may be piled or scattered around the sites. If objects are stacked in an unsafe manner, the SHSR shall notify the client site contact. Field activities shall not begin until Station personnel remove or restack the objects in a safe manner.

WALKING AND WORKING IN OPEN TERRAIN

Field personnel shall become familiar with the general terrain of the site and potential physical hazards (evaporation ponds, uneven terrain, etc.) that could be associated with accidental slips, trips, and/or falls.

- The immediate period after medium and heavy rainfall is particularly susceptible to earth movement and slides, so greater caution is prudent.
- Be attentive when walking, since wells, pits, holes, or similar hazards may be partially covered or visually obstructed.
- Be cautious around soil or terrain that recently may have been disturbed, relocated, or otherwise made less stable.
- Avoid the top edges of drop-off areas whether they have been disturbed or not.
- Travel in open terrain in the company of another person.