Proposed Plan/Draft Remedial Action Plan for Operable Unit 1A Former MCAS Tustin

August 2003 Tustin, California

Hydraulic Containment with Hot Spot Removal Proposed for Groundwater Cleanup at IRP Site 13 South

PROPOSED PLAN SUMMARY

The Marine Corps is requesting comments from the public on cleanup alternatives for Installation Restoration Program (IRP) Site 13 South (IRP-13S) at Former Marine Corps Air Station (MCAS) Tustin. This Proposed Plan/Draft Remedial Action Plan (referred to as the Proposed Plan) summarizes the Marine Corps' preferred remedy for the site and provides the supporting information for this cleanup recommendation. The Proposed Plan also notifies the public of opportunities to review and comment on these alternatives and provides an overview of the environmental investigation results for the site.

The IRP is a comprehensive environmental investigation and cleanup program to identify, investigate, and clean up chemical contamination that resulted from past operations that at one time were acceptable practices (see page 17). IRP-13S, also known as Operable Unit 1A (OU-1A), consists of impacted groundwater at and downgradient of the site (see map on page 3). The Marine Corps' cleanup recommendation for OU-1A is based on the results of extensive field investigations, laboratory analysis, examination of current and future conditions, and a thorough assessment of potential human health risks.

Cleanup is recommended for OU-1A because **volatile organic compounds*** (VOCs), principally from industrial solvents, were found in **groundwater** at concentrations that could result in adverse effects to human health if this water were extracted from the ground and directly used for domestic purposes such as drinking or bathing (groundwater at OU-1A is not currently used for such purposes). The remedial action objectives for groundwater cleanup are to: reduce concentrations of VOCs in groundwater to levels consistent with **site remediation goals** or until the plume has stabilized; control VOC migration; and prevent domestic use of groundwater containing VOCs above water quality standards until site remediation goals are achieved.

Nine alternatives were developed and evaluated for the cleanup of contaminated groundwater at OU-1A. Based on the studies conducted, the Marine Corps proposes its preferred remedy: Hydraulic Containment with **Hot Spot** Removal for OU-1A (see page 14). The MCAS Tustin Base Realignment and Closure (BRAC) Cleanup Team (BCT), made up of representatives from the Marine Corps, U.S. Environmental Protection Agency (U.S. EPA), and California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) and Regional Water Quality Control Board Santa Ana Region (RWQCB), have carefully evaluated the investigation results and concurs with the Marine Corps' preferred remedy. See page 9 for descriptions of the alternatives evaluated and the preferred remedy for OU-1A.

KEY ITEMS INSIDE

30-Day Public Comment Period and Public Meeting

30-Day Public Comment Period – August 8 to September 8, 2003

We encourage you to comment on this Proposed Plan and supporting documents during the 30-day public comment period. Comments may be submitted orally or in writing at the August 21, 2003 public meeting, or via mail, fax or e-mail. Please see page 16 on how to submit public comments.

Public Meeting – Thursday, August 21, 2003 6:00-7:30 p.m.
Location: Clifton Miller Conference Center, 300 Centennial Way, Tustin

You are invited to this community meeting to discuss the information presented in this Proposed Plan for the OU-1A Site 13S. Marine Corps representatives will provide visual displays and information on the environmental investigations and the cleanup alternatives evaluated. You will have an opportunity to ask questions and formally comment on the cleanup alternatives summarized in this Proposed Plan and the information presented in the Remedial Investigation and Feasibility Study Reports for OU-1A.

Technical terms are highlighted in* **bold *the first time they appear and are defined on page 5.*

Overview of Environmental Investigation Results

The Former MCAS Tustin site that is the focus of this Proposed Plan is IRP-13S (see Figure 1 on page 3), also known as OU-1A. Operable Units or OUs are areas or sites where similar contamination exists and similar cleanup activities can be implemented (see page 17). An overview of the environmental investigation results is presented below.

HISTORY OF FORMER MCAS TUSTIN

Former MCAS Tustin (the Station) previously encompassed about 1,600 acres within central Orange County, California, and is located approximately 40 miles south of downtown Los Angeles. Most of the Station lies within the city of Tustin. Portions of the Station border the cities of Santa Ana and Irvine.

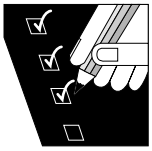
MCAS Tustin was commissioned in late 1942. During its operational life, the Station served as a major center for U.S. Marine Corps blimp and helicopter aviation on the Pacific Coast. The Station provided operational training facilities, helicopter landing sites, an air traffic control facility, and operational, logistics, and administrative support. Physical improvements installed over the years to support the mission of MCAS Tustin included more than 200 buildings and structures, a 3,000-foot-long runway, aircraft parking aprons, and numerous aircraft maintenance shops.

All military units were transferred from MCAS Tustin to other Marine Corps installations effective November 1998. MCAS Tustin ceased active military operations in July 1999 and is being closed in accordance with the federal BRAC Act of 1991 and 1993.

In November 1993, the Marine Corps organized the BCT to manage and coordinate environmental cleanup and closure activities which will ultimately lead to transferring the land to various stakeholders. The city of Tustin's Reuse Plan for the Station includes development of commercial and residential areas, schools, child care facilities, parks, and other recreational facilities. Future land uses, including residential development, were key considerations in conducting human-health risk assessments for IRP-13S and developing and analyzing OU-1A remedial alternatives.

In 2001, OU-1 was separated into OU-1A (IRP-13S) and OU-1B (IRP-3 and IRP-12). This was done to maintain the cleanup schedule at OU-1B and evaluate a time-critical removal action at OU-1A. See page 3 for a description of the time-critical removal action underway at IRP-13S.

STUDIES CONDUCTED



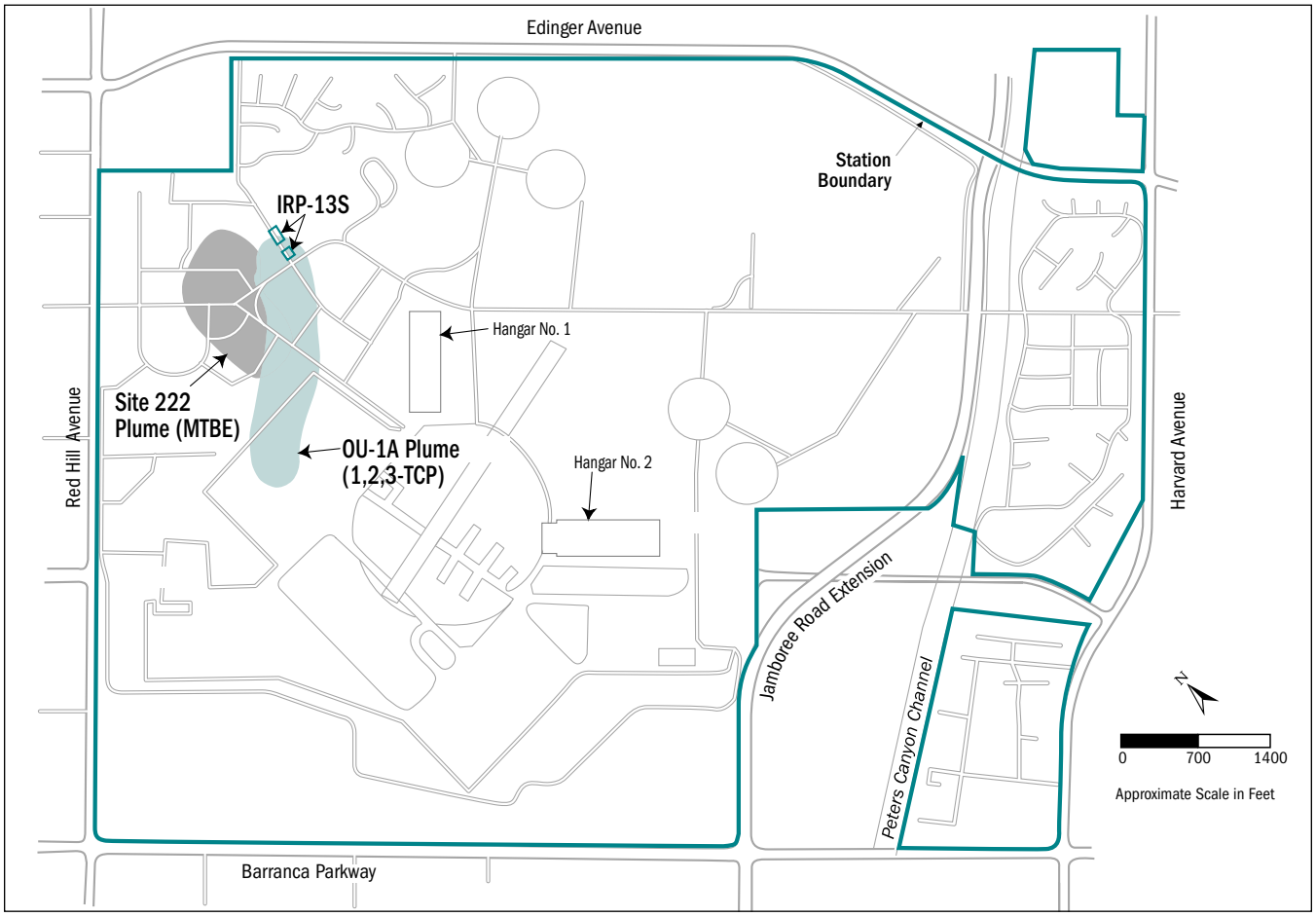
The Remedial Investigation (RI) Report for MCAS Tustin OU-1 was issued in November 1997. RI field activities primarily involved sampling and analysis of soil and groundwater. The RI Report included a detailed evaluation of the nature and extent of potential soil, surface water, and groundwater contamination at several IRP sites.

Elevated concentrations of VOCs were identified in a groundwater plume originating at IRP-13S (see Figure 1 on page 3). The groundwater **plume** formed when VOCs in soil migrated downward into the groundwater beneath the site. Shallow soils and groundwater beneath the site are divided into three **water-bearing zones (WBZs)**. A detailed description of IRP-13S is presented on pages 4 and 5 and in Figure 2 on page 4.

As part of the RI, a baseline risk assessment was conducted to evaluate risks to human health from exposure to soil and groundwater at IRP-13S. The baseline risk assessment concluded that the groundwater contamination represented a potential human-health concern if the shallow groundwater underlying OU-1A were to be used as a source of drinking water. However, the RI Report concluded that direct human contact with VOC-affected soil at IRP-13S did not pose a health risk. Therefore, the RI Report recommended that remedial (cleanup) actions be initiated to only address groundwater contamination associated with IRP-13S.

In May 2002, a majority of the Former MCAS Tustin property that was eligible for transfer was conveyed to the city of Tustin. Additional property within the former housing areas at MCAS Tustin was transferred in March 2003 through public sale. Station property with contamination that has yet to be addressed, or is currently under further investigation, is not yet eligible for transfer under the IRP. The IRP requires that before property transfer can occur, cleanup of contamination must have been completed or a selected remedy must be in-place and operating successfully.

Figure 1 Former MCAS Tustin –
Location of OU-1A Site IRP-13S and Groundwater Plumes



LEGEND

IRP Site | Groundwater Plumes | Roads | Station Boundary

Acronyms/Abbreviations

IRP – Installation Restoration Program

Note: The hangars are shown as reference points and are not associated with IRP-13S.

Time-Critical Removal Action at IRP-13S

Groundwater investigations at IRP-13S and at a former gas station (Site 222) indicated that the 1,2,3-TCP plume overlaps with a plume of methyl tert-butyl ether (MTBE) (a gasoline additive) originating from Site 222 (see Figure 1). A time-critical removal action (TCRA) was initiated in March 2001 at IRP-13S in order to prevent further migration of the 1,2,3-TCP plume and to coordinate efforts with the cleanup activities for MTBE. Cleanup action for the MTBE plume is being conducted under the Petroleum Corrective Action Program.

The TCRA consists of seven extraction wells located along the central portion of the 1,2,3-TCP plume. Extracted groundwater is treated using a Granular Activated Carbon (GAC) treatment system and is discharged to a nearby storm drain. The TCRA system began operation in January 2002 and will continue to operate until the final remedy is implemented.

As part of the **Feasibility Study (FS)**, a second baseline risk assessment was performed that expanded upon the risk assessment performed during the RI. This assessment included data from investigations performed under the Resource Conservation and Recovery Act (RCRA) at two **Areas of Concern (AOCs)** Temporary Storage Area No. 72 (ST-72) and Miscellaneous Wash Area No. 18 (MWA-18) located within the boundaries of IRP-13S (see Figure 3 on page 5 for specific locations). The RCRA program, a parallel program to the IRP, focuses on compliance with environmental laws and regulations and the management of hazardous wastes from "cradle to grave," including tracking, monitoring, disposal, and any necessary environmental investigation and cleanup of chemicals or substances used for industrial-type activities. The FS risk assessment was performed to estimate the total risk to human health

from exposure to all affected environmental media (soil and groundwater) within OU-1A, including the two AOCs. The FS risk assessment concluded that risks to human health would arise primarily from potential exposure to shallow groundwater and that inhalation of groundwater vapors (e.g., exposure during showering) would be the dominant pathway for exposure. For additional information on the FS risk assessment, see page 6.

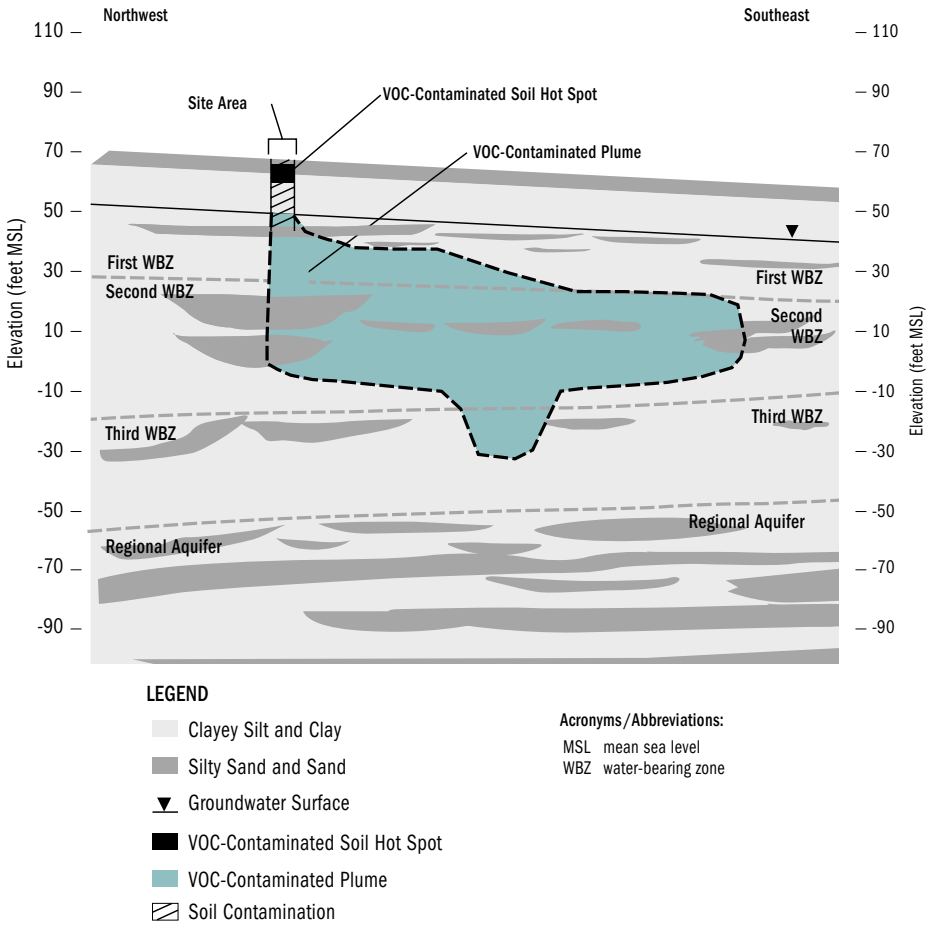
The key component of the FS is the development and evaluation of remedial action alternatives to mitigate risks to human health and the environment. The alternatives for OU-1A are comprised of combinations of cleanup technologies that prevent migration or use of contaminated groundwater, reduce concentrations of VOCs in groundwater and remediate contaminated soil that acts as a continuing source of groundwater contamination. The remedial action alternatives are summarized on pages 9 through 11.

SITE DESCRIPTIONS/EXTENT OF CONTAMINATION

IRP-13S occupies approximately 0.7 acres located adjacent to Severyns Road in the northwest corner of Former MCAS Tustin. It consists of two distinct areas, Temporary Storage Area No. 72 (ST-72) and Miscellaneous Wash Area No. 18 (MWA-18) shown in Figure 3 on page 5.

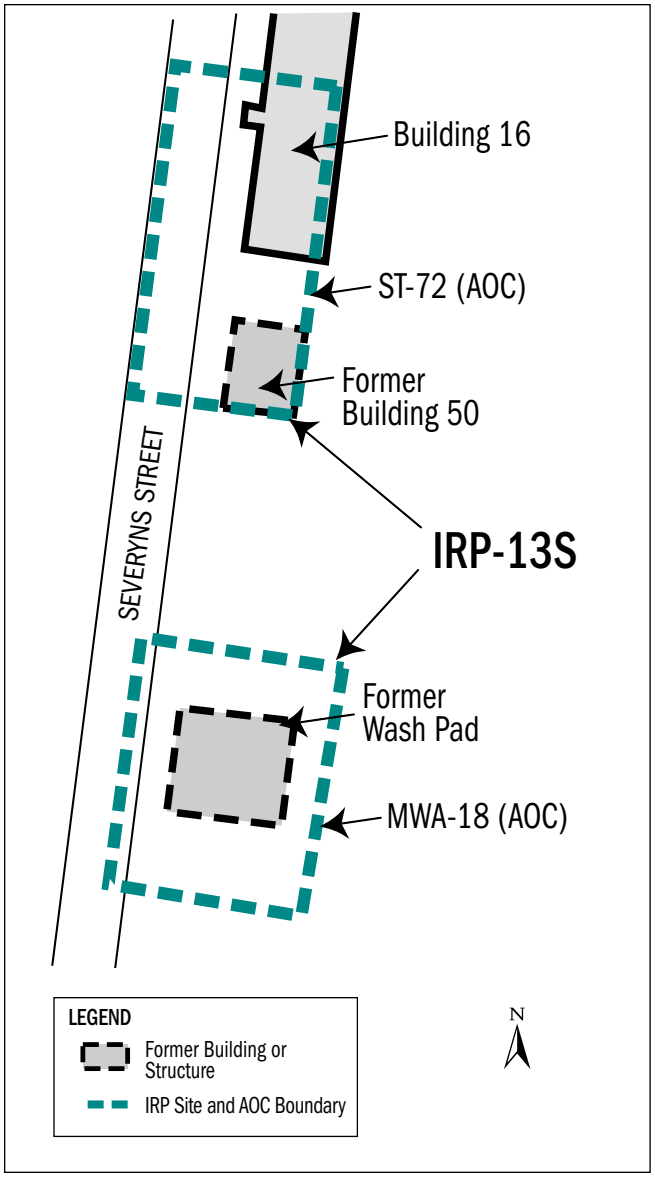
AOC ST-72 includes Buildings 16 and 50 used for vehicle maintenance. Building 16 was operated as a Ground Support Equipment maintenance garage from 1942 through 1993. Prior to 1985, cleaning solvents were reportedly used to wash down floors in the building, and waste solvent was likely released to storm drains, or to the ground outside the building. Building 50 was used as a vehicle lubrication facility from the mid-1960s through the mid-1970s. In 1982, Building 50 was demolished, and the area was

Figure 2 Underground View of the OU-1A VOC Groundwater Plumes



Shallow groundwater beneath MCAS Tustin is divided into three water-bearing zones (WBZs), rather than one vertically continuous aquifer. The first and second WBZs are hydraulically interconnected. The third WBZ appears to be hydraulically separated from the second WBZ by clayey silt and clay layers across most of the Station. VOCs have been reported in low concentrations in only one localized area in the third WBZ at OU-1A. The third WBZ is also an apparent transition zone between the shallow aquifer and the underlying regional aquifer. This figure shows the link between the VOC-contaminated soil and contaminated groundwater at OU-1A, the WBZs, and the underlying deeper regional aquifer.

Figure 3 AOCs within IRP-13S



subsequently used as a parking lot prior to operational closure. The chemical 1,2,3-trichloropropane (1,2,3-TCP), a cleaning agent and solvent, has been identified as the main **chemical of concern (COC)** at ST-72.

AOC MWA-18 includes an inactive wash pad formerly used for cleaning small generators and other field equipment, and an excavated area surrounding the former pad. It was installed in the 1940s and consists of a concrete pad sloped to a drain. Solvents were used in this area and may have been released to the subsurface through cracks in the concrete pad. Trichloroethelyne (TCE), an industrial solvent, has been identified as the main COC at MWA-18.

Glossary of Technical Terms

Aquifer: A particular zone or layer of rock or soil below the earth's surface through which groundwater moves in sufficient quantity to serve as a source of water.

Area of Concern (AOC): A particular area or site where military or industrial activities were conducted that are the responsibility of MCAS Tustin's Environmental Compliance Program, a parallel program to the Installation Restoration Program. Investigation and cleanup of AOCs generally falls under the federal Resource Conservation and Recovery Act (RCRA).

Chemical of Concern (COC): A chemical present at a site in soil, groundwater, or surface water, at concentrations that may potentially pose a threat to human health or the environment.

Extraction Wells: Wells used to pump groundwater to the surface for subsequent treatment or for use.

Feasibility Study (FS): An analysis of proposed remedial alternatives to evaluate their effectiveness and to facilitate selection of a preferred alternative.

Groundwater: Water in the subsurface that fills pores in soil or openings in rocks.

Hot Spots: Areas of soil or groundwater contamination that are characterized by the highest concentrations of chemicals. Hot spots at OU-1A contain volatile organic compounds.

Institutional Controls: Non-engineered mechanisms established to limit human exposure to contaminated waste, soil, or groundwater.

Monitoring Well: Wells drilled at specific locations either on or near a hazardous waste site, for the purpose of determining directions of groundwater flow, types and concentrations of contaminants present, and vertical or horizontal extent of contamination.

Petroleum Corrective Action Program (PCAP): A program that specifically addresses petroleum contamination caused by former underground storage tanks, aboveground storage tanks, and related piping.

Plume: A localized zone of contaminated groundwater that generally moves in the direction of (and with) groundwater flow.

Remedial Investigation (RI): One of the two major studies that must be completed before a decision can be made about how to clean up a site (the FS is the second study). The RI is designed to determine the nature and extent of contamination at a site.

Response Action: A general term used to describe technologies or actions implemented to contain, collect, or treat hazardous wastes to protect human health and the environment. Examples include groundwater extraction wells operating with treatment systems.

Site Remediation Goals: Cleanup levels for groundwater are established based on a comparison and evaluation of various health-based criteria and are implemented to reduce risk and protect human health and the environment.

Time-Critical Removal Action (TCRA): A fast-track removal action undertaken at a site where it is necessary to contain and/or cleanup contamination as quickly as possible.

Volatile Organic Compound (VOC): An organic (carbon containing) compound that evaporates readily at room temperature. VOCs are found in industrial solvents commonly used in dry cleaning, metal plating, and machinery degreasing operations.

Water-Bearing Zone: A distinct underground stratum in which water fills the pores in soil or openings in rocks. The boundary among water bearing zones (WBZs) at Former MCAS Tustin varies from location to location.

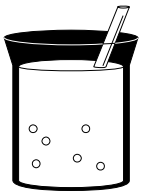
Human-Health Risk Assessment

The Marine Corps conducted human health risk assessments for OU-1A (IRP-13S and two associated AOCs) in accordance with federal and state guidelines. The human-health risk assessments conducted as part of the FS for OU-1A estimated the likelihood of health problems occurring under current conditions (if no cleanup actions were taken) and under future conditions (at the conclusion of remedial actions). The Marine Corps completed a four-step process to estimate human-health risks:

- **Step 1: Analyze Contamination**
- **Step 2: Estimate Exposure**
- **Step 3: Assess Potential Health Risks**
- **Step 4: Characterize Site Risks**

ANALYZE CONTAMINATION

IN STEP 1, the Marine Corps studied chemicals and associated concentrations found at the site. Information on the types and quantities of chemicals present in the soil and groundwater at the IRP site was collected during the RI. A subsequent RCRA investigation provided further information on chemicals present in the soil at the two associated AOCs.



ESTIMATE EXPOSURE

IN STEP 2, the Marine Corps considered different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of their exposure. To support possible future land uses at OU-1A, three residential exposure risk scenarios were evaluated: current conditions with beneficial use of groundwater, current conditions with non-beneficial use of groundwater, and future conditions with beneficial use of groundwater. Beneficial use of groundwater means that groundwater would be used for activities such as drinking, washing dishes, bathing, and other domestic uses. Non-beneficial use of groundwater means that water from a local municipal water district would be provided for these domestic uses (i.e., no shallow groundwater use).

The residential scenario with beneficial use of groundwater under current conditions estimated risks for potential residents that would be exposed daily (for 30 years) to chemicals in soil and groundwater at the site through ingestion (drinking the water, children eating soil), indoor inhalation of VOC vapors (from steam during showering, washing dishes), dust (breathing), and direct skin contact with soil or groundwater (touching). The assumption that contaminated groundwater would serve as a source of water for domestic use is considered conservative because shallow groundwater is not currently used for domestic purposes and water supplied by local municipal water districts is readily available.

Administrative Record and Information Repository–Investigation Reports and Risk Assessment Results Available for Review and Comment

The collection of reports and historical documents used by the Marine Corps in the selection of cleanup or environmental management alternatives is the Administrative Record (AR). The AR file provides a record of decisions and actions by the Marine Corps for the IRP site discussed in this Proposed Plan. The AR includes the final Remedial Investigation Report for Operable Units 1 and 2 and the final Feasibility Study Report for OU-1A, the key documents that form the basis for the recommendation made regarding these sites. Other supporting documents and data pertaining to these sites are also contained in the AR file.

Administrative Record File Location:
The complete AR file index and a site-specific index for the OU-1A IRP site are available for public review at MCAS El Toro. To arrange a time to review documents during the public comment period (August 8 to September 8, 2003), contact Ms. Marge Flesch at (949) 726-5398.

Information Repository Location:
Community members can also find key supporting documents that pertain to IRP-13S, and a complete index of all MCAS Tustin AR documents, at the Information Repository located at the University of California at Irvine Main Library, Government Publications Department. The telephone numbers are (949) 824-7362 or (949) 824-6836.

A second residential scenario with non-beneficial use of groundwater under current conditions was conducted to evaluate the effect of institutional controls (restrictions prohibiting the use of shallow groundwater) on potential risks at the site. This assumption is considered to be more realistic since shallow groundwater at the site is not currently used for domestic purposes. Major risks from this scenario are inhalation of soil vapors and direct contact with soil.

A third residential scenario with beneficial use of groundwater was conducted to estimate risks under future conditions (in 30 years), after groundwater and soil had been cleaned up in accordance with Alternative 7, Hydraulic Containment With Hot Spot Removal. This scenario assumed that shallow groundwater at the site would be used for domestic purposes.

ASSESS POTENTIAL HEALTH RISKS

IN STEP 3, the Marine Corps used the information from Step 2 combined with information on the toxicity of each chemical to assess potential health risks. U.S. EPA considers two types of risk: cancer risk and non-cancer risk.

The likelihood of any kind of cancer resulting from exposure to chemicals at a site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance" (numerical equivalent is $1x10^{-4}$). In other words, for every 10,000 people that could be exposed, one additional cancer case may occur as a result of exposure to site contaminants. One additional cancer case means that one more person could get cancer from chemicals present at a site than would normally be expected to get cancer from all other causes.

For non-cancer health effects, U.S. EPA calculates a "hazard index." A hazard index of 1 or greater indicates that a lifetime of exposure to the chemical(s) may have potential for causing adverse health effects (e.g., respiratory or kidney problems) and should be evaluated further.

Risk assessments indicate potential risks, they do not provide measurements of actual risks. Assumptions made during the risk assessment process are designed to lead to a reasonable maximum estimate of potential risk and provide a margin of safety to protect public health and the environment. Actual human exposures and associated risks are likely to be less than those calculated for the risk assessment.

CHARACTERIZE SITE RISKS

IN STEP 4, the Marine Corps and regulatory agencies determine whether site risks are great enough to cause health problems for people at these sites. The results from the three previous steps are combined, evaluated, and summarized.

The National Oil and Hazardous Substances Contingency Plan (NCP), the regulation established for assessing hazardous waste sites, provides guidelines to be used to assess the types of chemicals, degrees of exposure to the chemicals, and potential toxic effects of the chemicals of concern or COCs. To assist with the characterization of risks, federally established risk ranges have been developed to protect human health. These ranges are presented in Table 1 below.

RISK ASSESSMENT RESULTS

The risk assessments performed during the FS evaluated the total risk to human health from exposure to all affected media including groundwater and soil within the boundaries of OU-1A and the associated AOCs under current and future conditions. Estimates of cancer risks and the non-cancer risks (hazard indexes) were based on available data from the RI, RCRA investigation, and routine quarterly groundwater monitoring. Risks from inhalation of volatile (gas) emissions from soil and groundwater into indoor air were also evaluated and included in the

Table 1 Risk Ranges to Protect Human Health

Health Risks	Unacceptable Risks	Risk Management Range/ Generally Allowable Risks	Allowable Risks
Cancer	More than 1 additional cancer case case in a population of 10,000 (greater than $1x10^{-4}$)	1 additional cancer case in a population of 10,000 to 1 additional cancer case in a population of 1,000,000 ($1x10^{-4}$ through $1x10^{-6}$)	Less than 1 additional cancer case in a population of 1,000,000 (less than or equal to $1x10^{-6}$)
Non-cancer	A hazard index greater than 1 should be evaluated further.	———	A hazard index less than 1

risk estimates. Table 2 below shows risk assessment results for the residential scenarios. The results are based on U.S. EPA criteria for COCs, which are comparable to Cal/EPA criteria for assessing exposure risk to these chemicals.

Current Conditions with Beneficial Use (Before Cleanup Actions Taken) — Risk estimates were made for hypothetical residents living at the site for 30 years assuming no cleanup actions are conducted. Under these conditions, with beneficial use of groundwater, total cancer risks exceed the generally allowable cancer risk range and non-cancer risks exceed the hazard index of 1. The majority of cancer risks are associated with 1,2,3-TCP in shallow groundwater. Non-cancer risks are primarily associated with 1,2,3-TCP and selenium in groundwater. However, selenium concentrations in groundwater do not exceed background concentrations, therefore, risks are related to selenium as a naturally occurring chemical at OU-1A. Inhalation of groundwater vapors is the dominant risk pathway. Under the conservative residential risk assessment approach, current human health risks at OU-1A warrant remedial action to reduce concentrations of 1,2,3-TCP in groundwater.

Current Conditions with Non-Beneficial Use (No Cleanup Actions Taken) Groundwater Use Prohibited) — Risk estimates for current conditions with non-beneficial use of groundwater also used the hypothetical resident living on the site for 30 years, assuming no cleanup actions are conducted. The non-beneficial use scenario, which is considered to be a more realistic risk assessment approach, was evaluated to determine if **institutional controls** and/or restrictions would be required for indoor occupancy of existing and newly constructed buildings at the site. The results indicate that with institutional controls (to prevent domestic use of groundwater) in place, cancer risks fall within the generally allowable risk range for cancer risk. The majority of the cancer risk is associated with exposure to TCE and 1,2,3-TCP through inhalation of soil vapor. The non-cancer risks do not exceed the hazard index of 1. Based on the results of this risk assessment, institutional controls would be effective in protecting human health and allow for reuse of existing and newly constructed buildings.

Future Conditions (30 Years After Remedy Implementation)—Estimates of future risks with beneficial use of groundwater were made for hypothetical residents living at the site for 30 years after the Marine Corps' preferred alternative developed in the FS has been implemented. Under these conditions, if the preferred alternative is implemented at OU-1A, total cancer risks would be reduced approximately 92 percent from current conditions, but would still exceed the generally allowable risk range (10^{-6} to 10^{-4}). The principal chemical contributing to the cancer risk is 1,2,3-TCP in groundwater. This future conditions scenario represents an approximate 49 percent reduction in non-cancer risks at current conditions with beneficial use. Non-cancer risks, however, would still exceed the hazard index threshold value of 1. The majority of non-cancer risk is associated with 1,2,3-TCP and selenium in groundwater and manganese, a naturally occurring metal in soil.

It should be noted that the current and future risk assessment results were based on groundwater modeling using conservative assumptions. The actual risks posed to residents under future conditions are expected to be less than predicted based on the effectiveness of institutional controls and the implemented remedy.

Table 2
Risk Assessment Results — Under Current and Future Conditions[a] for Residential Exposure Scenarios

Residential Scenario	Total Cancer Risk[b]	Hazard Index/ Total Non-Cancer Risk[c]
Current Conditions—Beneficial Use of Groundwater	4.8 additional cases in 1,000 (4.8×10^{-3})	7.3
Current Conditions—Non-Beneficial Use of Groundwater	1 additional case in 100,000 (1.0×10^{-5})	1.0
Future Conditions—Beneficial Use of Groundwater	4 additional cases in 10,000 (4.0×10^{-4})	3.7

Notes: Risk assessment results are based on U.S. EPA criteria, which are comparable to Cal/EPA criteria for assessing exposure risk to certain chemicals.

a — Future risks were estimated at 30 years after the implementation of Alternative 7, Hydraulic Containment with Hot Spot Removal. Alternatives 4, 4A, 6, and 6A are expected to achieve similar risk reductions. Reductions in risk achieved under Alternatives 2, 3, and 5 are expected to be less but should lower the overall risk over time. Please see page 11 for a summary of the OU-1A remedial action alternatives evaluated in the FS.

b — Total cancer risk is calculated for an adult resident, which is more conservative than for a child resident. Adult exposure was assumed for a total of 30 years, 6 years as a child plus 24 years as an adult. Child exposure was assumed to be 6 years.

c — Hazard index/non-cancer risk is calculated for a child resident, which is more conservative than for an adult resident.

Summary of Groundwater Cleanup Objectives and Alternatives

The Marine Corps' remedial action objectives identified in the FS for OU-1A are to:

- *Reduce the concentrations of VOCs in groundwater to levels consistent with site cleanup goals or until the plume has stabilized, and prevent or limit VOC migration beyond current OU-1A plume boundaries.*
- *Protect human health by preventing extraction of VOC-impacted shallow groundwater for domestic use until site cleanup goals are achieved.*
- *Protect potential ecological receptors in Barranca Channel by preventing the off-Station migration of groundwater containing VOCs at concentrations exceeding site cleanup goals.*
- *Implement appropriate remedial actions as necessary to facilitate transfer and reuse of those portions of the Former MCAS Tustin property actually or potentially affected by the OU-1A plume.*

These objectives shaped the development of several remedial (cleanup) alternatives that prevent exposure to contaminated groundwater, minimize further migration of already-contaminated groundwater, and reduce the concentrations of VOCs in groundwater.

FEASIBILITY STUDY—DEVELOPMENT OF ALTERNATIVES

Remedial alternatives are developed and evaluated by performing a feasibility study (FS). An FS for OU-1A was conducted to look at a range of possible alternatives and to determine the most effective methods for meeting the remedial action objectives. Alternatives were developed and evaluated in the draft final OU-1A FS Report, issued in January 2003.

The first step in the FS process was to identify and evaluate a wide range of potential technologies to accomplish the cleanup objectives. This evaluation included technologies to prevent or minimize the migration of contaminants in groundwater, treat the groundwater in place (*in situ* treatment), or treat the groundwater once it has been extracted to the surface (*ex situ* treatment). The Marine Corps also evaluated a variety of technologies to use or dispose of the extracted and treated groundwater. Technologies that address cleanup of contaminated soil that is a source of contamination to groundwater were also screened and evaluated. Each of these technologies was screened on the basis of its effectiveness, implementability, and cost, consistent with U.S. EPA and NCP guidance. The most effective technologies were developed into remedial alternatives and subjected to further evaluation.

Computer modeling was used to evaluate the effectiveness of the remedial alternatives. By simulating *in situ* techniques and varying the location and number of extraction wells, the model was used to compare the relative rate of contaminant removal, amount of migration of contaminants, and time to reach site cleanup goals for all the alternatives. Results of modeling are shown in Table 3 on page 11.

REMEDIAL ALTERNATIVES

The remedial alternatives developed in the FS consist of a No Action alternative and a variety of alternatives that actively treat contaminated areas. A common element of each active alternative is the use of institutional controls (see page 15) such as deed restrictions to protect the remedial equipment (extraction wells, groundwater treatment systems, thermal systems for treating soil) and prevent inadvertent use of contaminated groundwater until remediation is complete. Institutional controls also ensure that provisions exist for access by the Department of the Navy and the regulatory agencies to conduct or oversee monitoring and maintenance activities. Summarized below are the alternatives that underwent detailed evaluation in the FS. Each alternative is potentially applicable to OU-1A. The remedial alternatives developed in this FS are conceptual in nature. Design details such as the final number and location of wells, pumping rates, and area of hot spot removal will be addressed in the remedial design phase of this project. Table 3 on page 11 provides a summary comparison of the OU-1A alternatives.

Alternative 1—No Action

By law, the No Action alternative is used as a baseline against which the other alternatives are evaluated. With Alternative 1, there are no **response actions.** Such actions are conducted to collect, contain, or treat contaminated groundwater to protect human health and the environment. Also, there would be no institutional controls to prevent use of groundwater, protect equipment, or control site access.

Alternative 2—Monitored Natural Attenuation

Monitored natural attenuation would not entail any response actions to collect, contain, or treat the contaminated groundwater. Instead, this relies on natural processes occurring in the subsurface, which reduces chemical compounds over time to reach the cleanup goals. Alternative 2 also includes groundwater monitoring, and institutional controls that restrict development of new water supply wells and excavations within the groundwater plume areas. The institutional controls would be implemented to minimize the potential for human exposure to contaminated groundwater, ensure access for monitoring and maintenance, and protect the **monitoring wells.** Monitoring would be used to track VOC migration and support future evaluations of the protectiveness of the natural attenuation processes.

Alternative 3—Hydraulic Containment

Hydraulic containment would use a combination of response actions and institutional controls to limit further migration of the OU-1A groundwater plume and prevent human exposure to VOC-contaminated groundwater. **Extraction wells** would be placed along the leading edge of the plume identified in the first and second WBZs (WBZs are explained in Figure 2 on page 4). Extraction of groundwater using these wells would create a hydraulic barrier to effectively restrict further migration of VOCs within the shallow aquifer. Contaminated groundwater would be extracted and treated to remove VOCs at a facility located near IRP-13S. After treatment, the clean water would be discharged to a nearby storm drain that eventually empties into Peters Canyon Channel.

Alternatives 4 and 4A—Aggressive Groundwater Extraction

Aggressive groundwater extraction includes contaminated groundwater removal using a network of groundwater extraction wells to contain the OU-1A plume, and excavation to remove soil that is acting as a source of contamination to groundwater.

The extraction wells would be configured to control the potential for VOC migration to the third WBZ as well as remove contaminants. The purpose of the soil removal is to accelerate the rate of cleanup in the underlying permeable sand layers and improve the overall efficiency of the remedial action. Injecting treated groundwater would flush the aquifer and speed up the cleanup process. Groundwater extraction would continue until contaminant levels in the first two WBZs meet site cleanup goals or until the extraction wells are no longer effective. After the extraction systems are shut down, natural processes would continue to reduce the concentrations of VOCs to site cleanup goals. Alternatives 4 and 4A are identical except contaminated soil under Alternative 4 is disposed at a landfill, and 4A uses on-site thermal treatment for the soil.

Alternative 5—Permeable Reaction Wall

In Alternative 5, permeable reactive iron walls would be installed below ground in the shallow aquifer to remediate the OU-1A contaminant plume. Studies have shown that chlorinated VOCs can be completely degraded to non-toxic reaction products as groundwater flows through a wall of reactive iron. In Alternative 5, slurry walls (subsurface trenches filled with low-permeable materials) would be used to direct the contaminated groundwater through permeable sections of reactive iron. The slurry and permeable reaction walls are configured such that all groundwater within the plumes eventually passes through the reactive iron. The technology relies on natural groundwater flow for contaminant transport to and through the reactive walls.

Alternative 6, 6A—Vacuum-Enhanced Extraction

Alternative 6 is a refinement of Alternative 4 that uses a vacuum on the extraction wells in the first WBZ to increase the groundwater extraction rate and improve VOC removal. The use of vacuum-enhanced extraction (VEE) wells would remove additional contaminants in the soil vapor as the groundwater table is lowered and VOCs are stripped from the newly exposed subsurface soil. Conventional groundwater extraction wells would be installed to remove VOCs from the second WBZ. The extracted groundwater would be treated to remove contaminants, and the treated groundwater would be discharged to a storm drain that eventually empties into Peters Canyon Channel.

As with Alternative 4, the VEE system would consist of a network of extraction wells located to capture the VOC plume in the first and second WBZs. The extraction wells would be configured to control the potential for VOC migration into the third WBZ. Extraction would continue until contaminant levels in the first two WBZs reach site cleanup goals or the extraction wells are no longer effective. After the extraction systems are shut down, natural processes (dilution, dispersion, and adsorption) would continue to reduce the concentrations of VOCs to site cleanup goals.

Alternative 6 also uses soil excavation to accelerate the rate of cleanup in the underlying permeable sand layers. Alternative 6 and 6A are identical except contaminated soil in Alternative 6 is disposed at a landfill, and 6A uses on-site thermal treatment for the soil.

Alternative 7—Hydraulic Containment with Hot Spot Removal (Preferred Alternative)
Alternative 7 uses the same extraction wells as Alternative 3 to hydraulically contain and prevent migration of the VOC plume. Soil and groundwater hot spots are also addressed, to increase the effectiveness of the remedy and reduce the amount of time required to reach cleanup goals. Contaminated soils characterized by the highest VOC concentrations that contribute to groundwater contamination (hot spot) would be excavated at IRP-13S. Excavated soil would be thermally treated on-site and reused to backfill the hot spot excavation. In addition, VOC hot spots in groundwater would be removed using extraction well. Extracted groundwater would be treated to remove VOCs. After treatment, the clean water would be discharged to a storm drain that eventually leads to Peters Canyon Channel. The hot spot extraction well would be operated until contaminant concentrations are reduced and the wells are no longer effective.

ALTERNATIVE GROUNDWATER DISPOSAL OPTIONS FOR OU-1A

The FS evaluated several options for disposal of clean, treated groundwater. These options included off-site disposal, sewer discharge, stormwater discharge, injection/infiltration, and other beneficial uses (e.g., irrigation, wetlands). Based on this initial evaluation, disposal options determined to be acceptable based on effectiveness, implementation, and cost, have been incorporated into the alternatives evaluated in the FS. However, the disposal options presented in the FS will be reevaluated in the remedial design to select the most appropriate approach for groundwater disposal. The evaluation will include such factors as regulator requirements for disposal of treated groundwater, input from the public on the disposal method to be used, and potential for beneficial uses at and adjacent to the site.

Table 3
Summary of OU-1A Remedial Alternatives

Computer modeling was used to evaluate the effectiveness of remedial alternatives. Models simulated and compared the rate of contaminant removal, amount of contaminant migration, and time to reach site cleanup goals for all the alternatives.

Alternative	Cleanup Time (Years)	Total Cost[a]
Alternative 1—No Action	>100	$0
Alternative 2—Monitored Natural Attenuation	>100	$0.8 million
Alternative 3—Hydraulic Containment	>100	$3.8 million
Alternative 4—Aggressive Groundwater Extraction with Off-Site Soil Disposal	50–60	$8.5 million
Alternative 4A—Aggressive Groundwater Extraction with On-Site Soil Treatment	50–60	$7.6 million
Alternative 5—Permeable Reaction Wall	>100	$19.0 million
Alternative 6—Vacuum-Enhanced Extraction with Off-Site Soil Disposal	50–60	$6.4 million
Alternative 6A—Vacuum-Enhanced Extraction with On-Site Soil Treatment	50–60	$5.6 million
Alternative 7—Hydraulic Containment with Hot Spot Removal	30–60	$4.3 million

Notes:
a Net present value in 2002 dollars.

Evaluation of the OU-1A Groundwater Cleanup Alternatives

Each OU-1A alternative has undergone detailed evaluation and analysis, following the nine criteria developed by the U.S. EPA. These criteria are categorized into three general groups: threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria must be satisfied in order for an alternative to be eligible for selection. Primary balancing criteria are used to weigh major tradeoffs among alternatives. Generally, modifying criteria are taken into account after public comment is received on the Proposed Plan and reviewed with various state regulatory agencies to determine if the preferred alternative remains the most appropriate remedial action. Table 4 on page 13 summarizes the comparative analysis of all the OU-1A remedial alternatives.

A. THRESHOLD CRITERIA

Overall Protection of Human Health and the Environment—assesses whether an alternative provides for adequate protection of public health and the environment by eliminating, reducing or controlling risks through treatment, engineered response actions or controls, or institutional and regulatory controls.

Alternative 1, No Action, does not protect human health and the environment because risk associated with contaminated groundwater is not reduced. Alternatives 2, 3, 4/4A, 5, 6/6A and 7 protect human health through institutional controls that prevent exposure to untreated groundwater. However, Alternative 2 does not protect the environment because VOC-contaminated groundwater is expected to eventually migrate into Barranca Channel.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)—evaluates whether an alternative complies with all federal, state and local environmental statutes, regulations, and other requirements, or whether a waiver is justified. ARARs are discussed in greater detail on pages 18 and 19.

Potential ARARs do not apply to Alternative 1 because no action is being taken. Alternatives 2, 3, 4/4A, 5, 6/6A and 7 comply with ARARs.

B. PRIMARY BALANCING CRITERIA

Long-Term Effectiveness and Permanence—considers the ability of an alternative to maintain protection of human health and the environment over time after remediation is complete.

Alternative 1 is not effective at protecting human health or the environment because it would not prevent the long-term migration of contaminated groundwater into Barranca Channel. Alternative 2 protects human health but does not protect the environment because it allows VOCs to migrate to Barranca Channel. Alternatives 3, 4/4A, 5, 6/6A, and 7 are considered effective and permanent in the long term. Of these alternatives, Alternatives 4/4A, 6/6A, and 7 would provide the best overall long-term permanence, because they are most effective at reducing VOC concentrations in groundwater. While maximum VOC concentrations would decline slightly faster with Alternative 6/6A, the performance of Alternatives 4/4A and 7 is generally expected to be similar to Alternative 6/6A after 15 years to 20 years of remediation.

Until cleanup goals are reached, institutional controls are used by all the action alternatives to prevent human exposure to VOCs. Alternatives 3 and 7 would prevent further migration of VOCs and maintain site cleanup goals at the existing plume margins. Alternatives 4/4A, 5, and 6/6A would allow some areas of the plume with low concentrations of VOCs to continue to migrate and be remediated by natural processes. These alternatives could be modified by changing the number and location of wells to prevent the predicted migration of low concentrations of VOCs.

Reduction of Toxicity, Mobility, or Volume through Treatment—refers to the degree to which an alternative uses treatment technologies to reduce: 1) harmful effects to human health and the environment (toxicity), 2) contaminant's ability to move (mobility) in the environment, and 3) the amount of contamination (mass and volume).

Computer modeling performed for the OU-1A FS estimated the reduction in the contaminant mass over a 30-year period. Based on these estimates, Alternatives 4/4A, 6/6A, and 7, which involve a combination of VOC-contaminated groundwater extraction, excavation of VOC-contaminated soil, and follow-up treatment for both groundwater and soil, are the most effective at reducing the toxicity, mobility, or volume of contamination through treatment. Modeling results indicate Alternatives 6/6A would achieve the greatest reduction in contaminant mass in the OU-1A plumes. However, results of pilot tests conducted for Alternatives 6/6A indicate the estimated mass removal is probably not attainable due to unfavorable subsurface soil conditions.

Short-Term Effectiveness—considers the impact of an alternative relative to human health and the environment during the construction and implementation phase and until remedial action objectives are achieved. Also considers time to achieve cleanup goals.

Alternatives 2, 3, and 7 would be the most effective in the short term. These alternatives use proven tech-

nologies, are readily implementable, and would have minimal impact on workers or the public during implementation. Based on computer modeling, Alternative 7 is the most effective in the short term, followed by Alternatives 4/4A and 6/6A (50 to 90 years). Alternatives 1, 2, 3, and 5 require over 100 years to reach cleanup goals.

Implementability considers the technical feasibility (how difficult the alternative is to construct and operate) and administrative feasibility (coordination with other agencies) of implementing an alternative.

The absence of field construction or other remedial activities under Alternative 1, and the limited scope of groundwater monitoring under Alternative 2, make each of these options readily implementable from a technical viewpoint. The technical feasibility of Alternatives 3, 4/4A, and 7 is also considered high, as each would employ reliable, widely available technologies. Alternative 5 is rated lower for implementability because reactive iron walls would be difficult to install, especially in the deeper second WBZ, and the technology may not be reliable in groundwater containing high concentrations of dissolved minerals. Pilot tests conducted for Alternatives 6/6A at IRP-3 (OU-1B) indicate that these alternatives would be only marginally more effective than standard groundwater extraction.

Alternative 7 would be the most implementable followed by Alternatives 4/4A. Successful containment and cleanup methods used prior to development of the OU-1A FS, including the existing TCRA system, demonstrate the feasibility and efficiency of extraction and treatment of VOC-contaminated groundwater from the OU-1A plume. The deed restrictions required by all of the active alternatives are considered administratively feasible and are not expected to prevent future redevelopment of the Former MCAS Tustin property.

Cost—includes estimated capital and annual operations and maintenance costs, and present worth costs. Present worth is the total cost of an alternative over time and all estimates are expressed in terms of year 2001 dollars.

In terms of total cost, the alternatives can be grouped into three categories. Alternatives 2, 3, and 7 have the lowest cost (less than $5 million). Alternatives 4/4A and 6/6A are mid-range cost options (approximately $5.6 to 8.5 million). Alternative 5 is the most expensive ($19 million). The high capital costs of Alternative 5 are due to the materials used, transportation and off-site disposal of contaminated soils removed during the initial construction, licensing fees associated with the permeable wall technology, installation of monitoring wells, and the need to conduct

Table 4
Summary of Comparative Analysis of OU-1A Remedial Alternatives

Criterion	Alternative 1 No Action	Alternative 2 Monitored Natural Attenuation	Alternative 3 Hydraulic Containment	Alternatives 4 and 4A Aggressive Groundwater Extraction	Alternative 5 Permeable Reaction Wall	Alternatives 6 and 6A Vacuum Enhanced Extraction	Preferred Remedy Alternative 7 Hydraulic Containment with Hot Spot Removal
1. Overall Protection of Human Health and the Environment	Not Protective	Not Protective	Protective	Protective	Protective	Protective	Protective
2. Compliance with ARARs	Not Applicable	Complies	Complies	Complies	Complies	Complies	Complies
3. Long-Term Effectiveness and Permanence	○	○	◒	◕	◕	◒	●
4. Reduction of Toxicity, Mobility, or Volume through Treatment	○	○	◒	◕	◒	◕	◕
5. Short-Term Effectiveness	○	◒	◕	◕	◕	◕	●
6. Implementability	●	●	◕	◒	○	◒	◕
7. Cost	●	●	◕	◒	○	◒	◕
8. State Acceptance—State concurs with the preferred remedy, performance criteria to be determined for all other alternatives							
9. Community Acceptance—This criteria will be addressed in the Record of Decision.							

Relative Performance in Satisfying NCP Criteria

○ ◕ ◒ ◕ ●

Least → Best

an initial pilot study to determine the site-specific effectiveness of the technology. Specific costs of each alternative are listed on Table 3 on page 11.

Alternative 7, the preferred alternative, has a higher cost than Alternatives 2 and 3, the other low-cost options, but is considered more cost-effectiveness because it removes more mass and achieves cleanup goals in a shorter time than Alternatives 2 and 3.

C. MODIFYING CRITERIA

State Acceptance—considers whether the State of California's environmental agencies agree with the analysis presented in the RI/FS reports and the Marine Corps' preferred remedy.

State of California representatives from the Department of Toxic Substances Control and the Regional Water Quality Control Board Santa Ana Region (RWQCB) on the MCAS Tustin BCT concur with the selection of Alternative 7, the Marine Corps' preferred alternative.

Community Acceptance—evaluates whether the local community agrees with the Marine Corps' analysis and if the community has a preference for an alternative. Although public comment is an important part of the final decision, the Marine Corps is compelled by law to balance community concerns with other criteria.

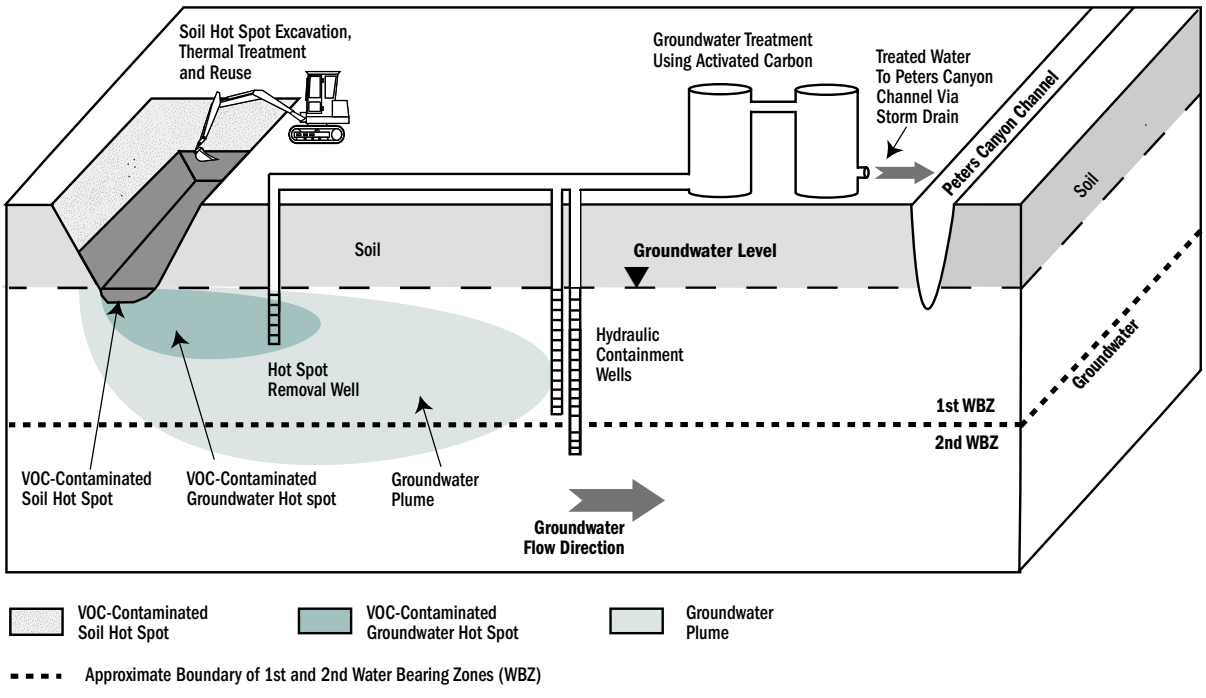
This Proposed Plan is the Marine Corps' request to the community to comment on the remedial alternatives, the preferred alternative, and the RI and FS Reports. Responses to comments received from the public will be addressed in the ROD/RAP, see page 16.

OU-1A Preferred Remedy — Alternative 7 Hydraulic Containment with Hot Spot Removal

The Marine Corps' preferred remedy for cleanup of OU-1A – Alternative 7 – would employ a combination of response actions and institutional controls to limit further migration of the VOC groundwater plume and prevent human exposure to VOC-contaminated groundwater. The preferred remedy will address contaminated groundwater and soil that is acting as a continuing source of groundwater contamination.

Groundwater — Containment wells would be placed along the leading edge of each plume in the first and second WBZs. Groundwater will be pumped at low flow rates from these containment wells in order to create a hydraulic barrier that effectively restricts further migration of VOCs within the shallow aquifer. Existing extraction wells have been previously installed for the TCRA system and may be utilized as part of the final remedy based on an evaluation to be conducted during the remedial design.

Figure 4 Alternative 7—The Preferred Remedy



Institutional Controls

Institutional controls described in this Proposed Plan include deed restrictions, which would be established to limit human exposure to and use of contaminated shallow groundwater. Institutional controls are applicable to Alternatives 2 through 7, and will be implemented through deed restrictions at the time of property transfer.

The Marine Corps plans to use institutional controls to: prevent future use of contaminated groundwater; allow access to extraction and monitoring wells and other remedial action components; and protect wells and other equipment installed at MCAS Tustin. Access provisions are needed to ensure the Department of the Navy and the regulatory agencies have access for the purpose of implementing the remedial action, performing maintenance activities, and conducting groundwater monitoring. The institutional controls shall consist of land-use restrictions that will be incorporated and implemented through two separate legal instruments: (1) a "Covenant Agreement" with Cal/EPA pursuant to state laws; and (2) a Quitclaim Deed from the Navy to the property recipient.

Groundwater would also be removed via an extraction well from hot spots of VOC contamination located within the plume. This hot spot well would supplement the containment wells. The hot spot extraction well would be operated for several years and be turned off after contaminant concentrations are reduced to the point that the well is no longer effective. Extracted groundwater from both hot spot and containment wells would be treated using granular activated carbon to remove VOCs. Treated water would be safely discharged to Peters Canyon Channel via a storm drain or disposed of by another method based on the reevaluation of disposal options to be conducted during the remedial design. Treatment of groundwater may utilize components of the existing TCRA treatment system at the site.

Soil — Hot spot of VOC contamination in soil would be excavated at IRP-13S. Excavated soil would be thermally treated on-site and the clean, treated soil would be reused to backfill the excavated area. Thermal treatment applies sufficient heat to destroy VOCs present in soil.

RATIONALE FOR THE MARINE CORPS' PREFERRED REMEDY

The Marine Corps prefers Alternative 7 for remediation at IRP-13S because it is protective of human health, easy to implement, and permanently reduces the toxicity, mobility and volume of contamination. It is also one of the most cost-effective alternatives evaluated. Key points that support the Marine Corps' preference for Alternative 7 are listed below:

- Protective of human health and the environment. Provides protection through institutional controls that prevent exposure to and use of contaminated groundwater.
- Provides long-term protection by reducing concentrations of VOCs and their associated risk.
- Uses proven technologies for groundwater extraction and treatment. The existing TCRA treatment system has demonstrated the feasibility of groundwater extraction and treatment at this site.
- Permanently removes contaminant mass and prevents further migration.
- Construction is expected to be completed within 1 year. Construction-related impacts such as noise, dust, and increased traffic would be mitigated using routine industry practices.
- Falls into the low-cost group of options and is considered to be the most cost-effective at achieving remedial action objectives.

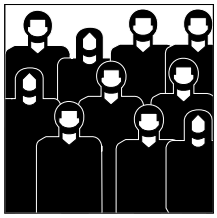
Hydraulic Containment and Hot Spot Removal — Cost Estimate Summary

Cost Category	Costs
Capital Cost	**$1.0 million**
Includes excavation and treatment of contaminated soils; design and construction of the containment and extraction system; and first year operations, maintenance, and monitoring costs (approximately 1 year).	
Operations and Maintenance (O&M) and Monitoring	**$3.3 million**
Costs to run the system, perform all maintenance, and regenerate activated carbon for an estimated period of 30 years. Also involves gauging the system's performance and using groundwater sampling to monitor system effectiveness and cleanup progress during O&M (30 years).	
Total—Estimated Present-Worth Cost	**$4.3 million**
Covers all costs to complete this project and includes a 20 percent contingency because the exact number and locations of extraction wells will be determined during the remedial design phase of the project.	

Detailed information on cleanup cost estimates is presented in the final Feasibility Study Report for OU-1A.

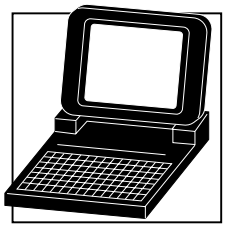
Multi-Agency Environmental Team Concurs with Preferred Remedy

The Base Realignment and Closure (BRAC) Cleanup Team (BCT), composed of the Marine Corps, the U.S. EPA, and Cal/EPA DTSC and RWQCB, was established when MCAS Tustin was designated for closure. The primary goals of the BCT are to protect human health and the environment, expedite the environmental cleanup, and coordinate the environmental investigations and cleanup at the base.



The BCT reviewed all major documents and activities associated with OU-1A, including the RI, the RCRA Investigation, the FS, and the risk assessments. Based on their reviews and discussions on these key documents, the BCT concurs with the Marine Corps' recommendation of Alternative 7, Hydraulic Containment with Hot Spot Removal, as the preferred remedy for the OU-1A site.

Internet Connection



For more information on the closure of MCAS Tustin and the Installation Restoration Program, check out the Southwest Division Naval Facilities Engineering Command Website at:

www.efdsw.navfac.navy.mil/environmental/envhome.htm

MCAS Tustin Restoration Advisory Board

The community-based MCAS Tustin Restoration Advisory Board (RAB), which is made up of representatives from local agencies and members of the public, meets bimonthly with Marine Corps representatives to discuss environmental issues. The RAB has reviewed and commented on the RI and FS Reports for OU-1A. These documents form the basis for this Proposed Plan. If you are interested in becoming a member of the RAB, please complete the mailing coupon on the last page. For additional information on RAB membership, please contact Mr. Jerry Dunaway, Navy RAB Co-Chair, at (949) 726-5398 or (619) 532-0975.

The Next Step for OU-1A—Public Comments

Marine Corps Air Station Tustin

Comments on this Proposed Plan received during the 30-day public comment period (August 8 to September 8, 2003) will be considered in the final environmental determination for OU-1A. Public comments will be accepted on all of the alternatives for the OU-1A site (IRP-13S) outlined in the Proposed Plan and on information presented in the RI/FS reports. During the public comment period, community members may submit comments by mail to: Jerry Dunaway, MCAS Tustin, BRAC Environmental Coordinator, 7040 Trabuco Road, Irvine, CA 92618 **postmarked no later than Monday, September 8, 2003;** by fax [(949) 726-6586] or email [dunawayjt@efdsw.navfac.navy.mil] **no later than September 8, 2003.**

The next step in the IRP is the ROD/RAP that formally documents the selected remedy for IRP-13S. A Responsiveness Summary will accompany the ROD/RAP. The Responsiveness Summary will contain responses to comments provided by the public at the public meeting and during the public comment period.

After the ROD/RAP is signed by the BCT members the Remedial Design/Remedial Action phases begin. Remedial design involves developing detailed designs for the selected remedy. Design documents also undergo BCT review. Remedial action refers to the construction, testing, and operation of the selected remedy. BCT members also provide oversight during this phase. After the Remedial Design is completed, it will be described in a fact sheet produced for the general public.

Status of Other Installation Restoration Program Activities

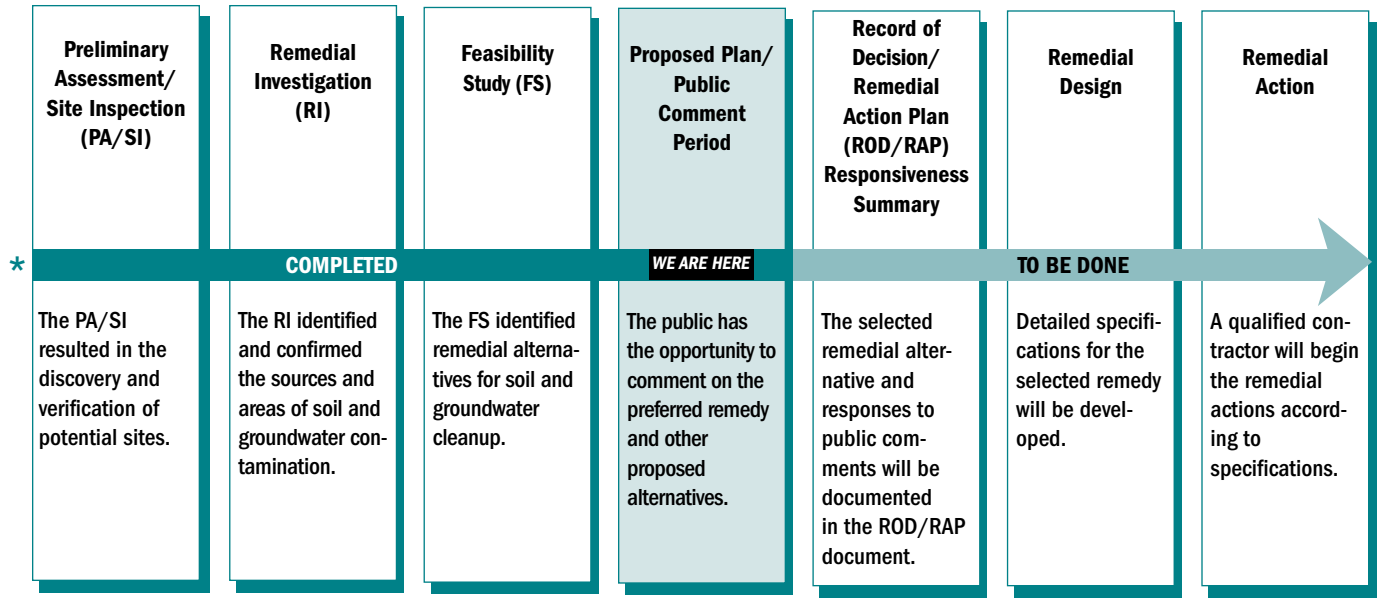
Remediation of contaminated groundwater and soil associated with OU-1A represents a key component of the IRP process at Former MCAS Tustin. Designed to protect public health and the environment, the IRP provides a detailed process for the Marine Corps to identify, investigate, and implement remedies for contamination that resulted from past operations and waste disposal activities. The IRP process is shown below. The arrow shows the status of OU-1A.

To effectively manage the overall cleanup effort at Former MCAS Tustin, IRP sites and AOCs have been organized into the five OUs described below.

- **OU-1A—IRP-13 South**
  This Proposed Plan focuses on OU-1A.
- **OU-1B—IRP-3 and IRP-12, and four associated AOCs**
  The Proposed Plan for OU-1B was completed in May 2002. A draft final ROD/RAP is under development and is scheduled to be issued in fall 2003. The Marine Corps' preferred remedy, Hydraulic Containment with Hot Spot Removal, will be used to treat TCE present in soil and groundwater. The treatment system for the proposed remedy at OU-1B is scheduled to begin operation in fall 2005.
- **OU-2—IRP Sites 2, 9A/9B, 13E, and nine AOCs**
  Investigation and cleanup of OU-2 is complete. A No Action ROD/RAP was finalized in September 2000.
- **OU-3—IRP-1 (Moffett Trenches and Crash Crew Burn Pits)**
  The final ROD for OU-3 was signed in December 2001. The final Operations and Maintenance Plan was finalized in June 2003. The preferred remedy for OU-3 includes containment, monitoring, and institutional controls.
- **OU-4—IRP Sites 5, 6, 8, 11, 13W, and 16, and eight AOCs**
  Two additional AOCs, the Arsenic AOC and Storage Tanks (ST) 16 A/B were recently added to OU-4. Additional groundwater sampling at six OU-4 sites was conducted through August 2003 to collect data to revise OU-4 human-health risk assessments. A draft Technical Memorandum summarizing sampling results will propose No Further Action (NFA) at several of the OU-4 sites which would become part of OU-4A, and would then proceed directly to the Proposed Plan and ROD/RAP stages. Areas that would require further action to reach closure would become part of OU-4B and would be included in the draft final Focused Feasibility Study (FFS), which is scheduled for distribution in spring 2005. A Proposed Plan and ROD/RAP for OU-4B will be developed following the completion of the FFS.

Installation Restoration Program Process

The arrow* shows the status of OU-1A.



Applicable or Relevant and Appropriate Requirements for Remediation of VOC Contamination at OU-1A

The federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) states that remedial actions at sites listed on the National Priorities List must meet federal or state (if more stringent) environmental standards, requirements, criteria, or limitations that are determined to be legal and applicable or relevant and appropriate requirements (ARARs). The intent of meeting ARARs is to select and implement cleanup or remedial actions that are protective of human health and the environment in accordance with regulatory requirements. Requirements of potential ARARs are divided into three categories:

Chemical-specific—are health- or risk-based numerical values for various environmental media, specified in federal or state statutes or regulations.

Location-specific—address regulations that may require actions to preserve or protect aspects of environmental or cultural resources that may be threatened by remedial actions to be undertaken at the site.

Action-specific—are regulations that apply to specific activities or technologies used to remediate a site, including design criteria and performance requirements.

Potential ARARs that will be met by the preferred remedy (Alternative 7) for cleanup of VOC-contaminated groundwater and soil at OU-1A are listed below.

U.S. ENVIRONMENTAL PROTECTION AGENCY (U.S. EPA)

- The substantive requirements of Title 16 United States Code (USC) Section 469-469C-1 and Title 40 Code of Federal Regulations (CFR) Section 6.301(c) [National Archaeological and Historical Preservation Act] have been determined to be federal location-specific ARARs. A resources management plan, providing steps for further action and reporting, will be implemented in the event that fossil or archaeological resources are encountered during remedial activities.
- The substantive requirements of 40 CFR Section 257.3-4 and App. I [Criteria for Classification of Solid Waste Disposal Facilities and Practices] are potential ARARs for use of treated soil as replacement fill on-site.

Substantive requirements of the following provisions of Title 40 CFR pertaining to the protection of inland surface waters and enclosed bays and estuaries have been determined to be federal chemical-specific ARARs for determining effluent limitations for discharge to Peters Canyon Channel.

- National numeric water quality criteria for priority toxic pollutants, "National Toxic Rule" [Section 131.36];
- Numeric water quality criteria for priority toxic pollutants in California, "California Toxics Rule" [Section 131.38].

Substantive requirements of the following provisions of 40 CFR pertaining to maximum contaminant levels (MCLs) and nonzero MCL goals for VOCs have been determined to be federal chemical-specific ARARs for establishing cleanup standards for 1,2-DCE and TCE. The DON is proposing a risk-based cleanup goal for 1,2,3-TCP in the absence of an established MCL:

- Section 141.61(a).

Substantive requirements of the following provisions of Title 22 of the California Code of Regulations (CCR) have been determined to be federal action- or chemical-specific ARARs:

- Determination of RCRA characteristic hazardous waste [Sections 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 66261.100(a)(1)];
- Onsite waste generation [Sections 66262.10(a), 66262.11, and 66264.13(a) and (b)];
- Hazardous waste accumulation [Section 66262.34];
- Groundwater protection and vadose zone standards of MCLs for VOCs as determined under Section 66264.94(a)(1), (a)(3), (c), (d), and (e); [Note: The Santa Ana Regional Water Quality Control Board (RWQCB) identified State Water Resources Control Board (SWRCB) Res. No. 92-49 as a groundwater and vadose zone protection standard. The Marine Corps does not agree with the RWQCB because SWRCB Res. No. 92-49 is no more stringent than Title 22 CCR Section 66264-94. However, because the standards are identical in these two regulations and the proposed remedy complies with the standards in both regulations, the RWQCB concurs with the proposed remedy while reserving its legal position];
- Groundwater monitoring [Sections 66264.91(a) and (c), 66264.97, 66264.98, 66264.100(a) and (b)]; and
- Thermal treatment [Sections 66265.370 – 66265.383 except 66265.382].

THE CALIFORNIA EPA DEPARTMENT OF TOXIC SUBSTANCES CONTROL (DTSC)

The substantive requirements of the following provisions of Title 22 CCR have been determined to be state chemical-specific ARARs:

- Non-RCRA hazardous waste determinations [Sections 66261.22(a)(3) and (4), 66261.24(a)(2) to (a)(8), 66261.101(a)(1) and (a)(2) and 66261.3(a)(2)(C) or 66261.3(a)(2)(F)]; and
- State MCL listings for organic chemicals [Section 64444].

The following requirements of the California Civil Code and the California Health and Safety Code (HSC) have been determined to be state action-specific ARARs for implementation of institutional controls for property that will be transferred to a non-federal entity:

- California Civil Code Section 1471, Transfer of Obligations;
- California Code of Regulations Section 22, 67391.1, Land Use Covenents;
- HSC Sections 25202.5; 25222.1; and 25233(c).

In addition, on March 16, 2000, DON and DTSC executed a memorandum of agreement that formalizes the Environmental Restriction Covenant that will contain environmental restrictions and serve as a mechanism to implement institutional control use restrictions to be set forth in the OU-1A ROD in accordance with DON policy.

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

- The substantive provisions of SCAQMD regulations 401(b)(1)(A), 403, 404,and 405 pertaining to potential emissions of fugitive dusts constitute potential state action specific ARARs. Dust may be generated during excavation in the vadose zone. Preventative measures include wetting of the soil to assure requirements are met.

Substantive provisions of SCAQMD Rules 212, 1303, and 1401 pertaining to equipment standards to control potential air contaminant emissions during thermal desorption of soil also constitute state action-specific ARARs. Potential air contaminants may be present in the emissions from the soil treatment system. Therefore, the soil treatment system will be equipped with GAC filters and other best available control technology design to eliminate these emissions.

THE CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD—SANTA ANA REGION (RWQCB)

Substantive provisions of the following requirements have been determined to be state chemical- or action-specific ARARs:

- Comprehensive Water Quality Control Plan (CWQCP) for the Santa Ana River Basin, 1995, Chapter 2 through 4;
- Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, Sections 1-3 and 1-4;
- The substantive provisions of Water Code Section 13240 as implemented through the beneficial use designations and VOC water quality objectives in the CWQCP for the Santa Ana River Basin, 1995;
- State Water Resources Control Board (SWRCB) Resolution No. 88-63; and
- California Water Code, Division 7, Sections 13241, 13243, 13360, and 13263(a) (Porter-Cologne Water Quality Act).
- The Santa Ana RWQCB identified the substantive provisions of the "Statement of Policy with Respect to Maintaining High Quality Waters in California" (SWRCB Res. No. 68-16) as a state ARAR and interprets it as prohibiting further migration of the VOC contaminant plumes in OU-1A; the U.S. EPA and the Marine Corps do not agree that SWRCB Res. No. 68-16 applies to further migration; however, the Santa Ana RWQCB concurs with the proposed remedy and agrees that the preferred remedy will comply with their interpretation of SWRCB Res. No. 68-16 because the MCL line of the VOC plume is not expected to move. The Marine Corps accepts SWRCB Res. No. 68-16 and California Water Code Section 13263 as ARARs for discharge of treated groundwater to surface water.

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAS Tustin, please complete this coupon and mail to: Base Realignment and Closure, Attn: Jerry Dunaway, BRAC Environmental Coordinator, MCAS Tustin, 7040 Trabuco Road, Irvine, CA 92618

❒ Add me to the MCAS Tustin Installation Restoration Program mailing list.

❒ Send me information on Restoration Advisory Board membership.

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Telephone _____

For Additional Information

The Marine Corps encourages community involvement in the decision-making process of the environmental restoration program at MCAS Tustin. If you have any questions or concerns about environmental activities at MCAS Tustin, please feel free to contact any of the following project representatives:

Mr. Jerry Dunaway
BRAC Environmental Coordinator
Base Realignment and Closure
Attn: Jerry Dunaway, MCAS Tustin
7040 Trabuco Road
Irvine, CA 92618
(949) 726-5398
(619) 532-0975

Ms. Viola Cooper
Community Involvement Coordinator
Superfund Division, U.S. EPA
Office of Hazardous Waste
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075

Mr. Tim Chauvel
Public Participation Specialist
Cal/EPA, Dept. of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630
(714) 484-5487

Commanding Officer
Base Realignment and Closure
Attn: Jerry Dunaway
BRAC Environmental Coordinator
MCAS Tustin
1230 Columbia Street, Suite 870
San Diego, CA 92101-8517

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