Installation Restoration Program

Public Information Materials

5/26/99
Public Meeting – Sites 8, 11, and 12
Held at Irvine City Hall
Irvine, CA

[The Public Meeting for Installation Restoration Program Sites 8, 11, and 12 was held in the late afternoon and early evening, the regular bimonthly RAB meeting followed. Materials/Handouts for the RAB Meeting are listed separately.]

Materials/Handouts Include:

- Public Meeting Overview, Proposed Plan – MCAS El Toro Cleanup of Contaminated Shallow Soil, Sites 8, 11, and 12.
- Proposed Plan for Cleanup of Three Shallow Soil Sites at Marine Corps Air Station El Toro, May 1999.
- MCAS El Toro – Public Comment Form, Proposed Plan for Cleanup of Contaminated Shallow Soil Sites 8, 11, and 12.
- Meeting Evaluation, MCAS El Toro Public Meeting – May 26, 1999.
- Internet Access, Environmental Web Sites.
- DoD - Environmental Base Realignment and Closure Web Site Publications List.
- MCAS El Toro Installation Restoration Program Mailing List Coupon.
- Flyer: Where to Get More Information.
- Flyer: New Mailing Address for the BEC.

HISTORICAL FACT SHEETS:

- Fact Sheet, December 1993 – Update of the Environmental Investigation at MCAS El Toro: Results of the Phase I Remedial Investigation Announced.
- Fact Sheet, November 1995 - Update of the Environmental Investigation at MCAS El Toro: MCAS El Toro's Building 673-T3 is Certified for Closure.
- Fact Sheet, April 1996 - Update of the Environmental Investigation at MCAS El Toro: Looking Back – Moving Forward.
- Fact Sheet, December 1996 - Update of the Environmental Investigation at MCAS El Toro: Environmental Investigation Reaches Completion.
- Proposed Plan for Marine Corps Air Station El Toro, June 1997 – Marine Corps Proposed No Further Action at Eleven Sites.
- Fact Sheet, January 1999 - Update of the Environmental Investigation at MCAS El Toro: Marine Corps to Proceed with Interim Remedial Action at Site 24.
- Flyer: For More Information on MCAS El Toro Redevelopment.

- Membership Application – Marine Corps Air Station El Toro Restoration Advisory Board.
- Acronyms and Glossary of Technical Terms.
- Executive Summary, March 1999 – Base Realignment and Closure Cleanup Plan (BCP) for Marine Corps Air Station, El Toro, CA.
- Map of Installation Restoration Program Sites – Shows Sites Requiring Action and No Further Action Sites (as of September 1997).
- Map of Water Wells and Vadose Zone Well Locations, Vadose Zone Remediation – Installation Restoration Site 24.
- Photos of Assembly of Central SVE Treatment System, Site 24 VOC Source Area.

- Map of Underground Storage Program MCAS El Toro – Shows Regulatory Closures of Underground Storage Tank Sites and Calendar Year Totals (Total as of April 1999 – 303 Closed Tanks).
- Map of Oil Water Separators at MCAS El Toro.
- Map of Tank 398 Site Vicinity at MCAS El Toro.
- Technical Memorandum on Risk Management Considerations, OU-3A Sites 8, 11, and 12, MCAS El Toro, September 1998.
- Revised Cost Estimates for the OU-3A Proposed Plan, Site 8 Unit 3 Alternatives 2 through 5, Sites 11 and 12 alternative 4, MCAS El Toro, February 1999.
- State of California, Cal-EPA, Department of Toxic Substances Control, Hazardous Waste Management Memo Number EO-95-010-MM: Title: Use Constituting Disposal; Affected Programs: Hazardous Waste Management Program and Site Mitigation Program; dated August 18, 1995.
- Memorandum from the Under Secretary of Defense (Acquisition and Technology), Subject: Responsibility for Additional Environmental Cleanup after Transfer of Real Property, dated July 25, 1997 (Excerpt from the DoD Base Reuse Implementation Manual, December 1997.)

Public Meeting Overview

Proposed Plan - MCAS El Toro

Cleanup of Contaminated Shallow Soil
Sites 8, 11, and 12

- This public meeting has been organized to provide the community with a step-by-step approach for obtaining information, asking questions, and providing comments on the Marine Corps' preferred remedy for remediation of Installation Restoration Program Sites 8, 11, and 12.
- Community members have the opportunity to discuss the issues directly with Marine Corps representatives at various tables throughout the room. We recommend starting at Table 1 - General Background. Please return meeting evaluation forms to the sign-in table or place them in marked boxes.

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Table 1 - General Background:
Provides a summary of MCAS El Toro's history and current mission.

Table 2 - General Environmental:
Presents an overview of the Installation Restoration Program and other environmental cleanup programs at the Station.

Table 3 - Remedial Investigation:
Focuses on the environmental investigations conducted to characterize environmental conditions at Sites 8, 11, and 12. The investigation was tailored to meet the specific characteristics of these sites to evaluate the nature and extent of contamination present. Discuss the risk assessment conducted to determine potential risks to human health and the environment associated with the landfills. Provide information on risk management considerations that played a key role in making recommendations at specific site units.

Table 4 - Feasibility Study and Proposed Plan/Preferred Remedy:
Covers the process used to identify and evaluate landfill closure alternatives and provides results of the evaluation of possible cleanup alternatives for the three sites. Presents the Marine Corps' preferred remedy and other alternatives evaluated.

Table 5 - Formal Public Comments:
Provides community members the opportunity to formally submit written or oral comments to the Marine Corps regarding the proposed remedy for cleanup of contaminated shallow soil at Sites 8, 11, and 12.

PROPOSED PLAN for Cleanup at Three Shallow Soil Sites at Marine Corps Air Station El Toro

Final—May 1999

Marine Corps Proposes Excavation and Recycling of Contaminated Soil

The Marine Corps is requesting comments from the public on alternatives for the remediation (cleanup) of Installation Restoration Program Sites 8, 11, and 12 at the Marine Corps Air Station (MCAS) El Toro.

This Proposed Plan notifies the public of the opportunities to comment on the remedial alternatives, summarizes the results of the remedial investigation (including the human health risk assessment), provides a brief overview of the remedial alternatives, and presents the Marine Corps' preferred remedy for Sites 8, 11, and 12. A more detailed description of the remedial investigation and the remedial alternatives can be found in the Draft Final Remedial Investigation Report and the Draft Final Feasibility Study Report, respectively. These reports are part of the MCAS El Toro Installation Restoration Program Administrative Record file (see page 13) and are available for public review and comment at the Heritage Park Regional Library in Irvine (see page 15). After all public comments on the Proposed Plan have been reviewed and considered, the final remedy for Sites 8, 11, and 12 will be selected and documented in the Record of Decision (ROD).

The Marine Corps' remedial objectives are to protect public health and the environment, remediate the sites to levels that allow for safe reuse of the property, and expedite property transfer. All applicable federal and state environmental laws and regulations are followed to achieve the remedial objectives.

Sites 8, 11, and 12 were divided into units based on physical characteristics and activities performed in each portion of the site (see map on page 3). Dividing the sites into units also allows the Marine Corps to evaluate the remedial alternatives that are the most appropriate for each part of the site.

Based on the risk to human health and the environment from the types and concentrations of chemicals discovered in the soil during the remedial investigation, the Marine Corps is recommending remedial action at portions of Site 8 (Units 3 and 5), Site 11 (Units 1 and 2), and Site 12 (Unit 3 and the catch basin).

The Marine Corps' preferred remedy for the units requiring remediation is excavation of the contaminated soil from each site and recycling the soil as foundation material for the landfill caps at two inactive on-Station landfills.

On-site recycling is feasible because laboratory results from the remedial investigation indicate that the chemicals found in the contaminated soil at Sites 8, 11, and 12 are not at high enough levels to classify the soil as a hazardous waste, therefore this soil is not hazardous. (Any soil discovered during excavation with hazardous levels of contamination would be properly manifested and transported off-Station to a state-permitted hazardous waste disposal facility). After excavation, sampling would be conducted to make sure that the excavated areas have been remediated. Each excavation would then be backfilled with clean fill material as appropriate. Once Sites 8, 11, and 12 have been remediated, no land use restrictions or monitoring would be required because the contaminated soil would be removed and would no longer present a threat to public health or the environment (see page 7 for a detailed description of the preferred remedy).

No further action is recommended at Site 8 (Units 1, 2, and 4), Site 11 (Unit 3), and Site 12 (Units 1, 2, and 4) because of the low concentrations of contaminants and risks to human health and the environment are within the range generally considered allowable by the U.S. Environmental Protection Agency (U.S. EPA).

Public Meeting - May 26, 1999 4:30-7:30 p.m.

Irvine City Hall, Conference and Training Center, One Civic Center Plaza, Harvard at Alton Parkway, Irvine

You are invited to attend a public meeting to discuss the information presented in this Proposed Plan regarding the cleanup at Installation Restoration Program Sites 8, 11, and 12, at MCAS El Toro. Marine Corps representatives will provide visual displays and information on the environmental investigations and the closure alternatives evaluated. You will have the opportunity to ask questions and formally comment on the alternatives.

Public Comment Period - May 8-June 7, 1999

We encourage you to comment on this Proposed Plan and site-related documents during the 30-day public comment period. You may submit written comments by mail **postmarked no later than June 7, 1999** to: Mr. Joseph Joyce, Base Realignment and Closure (BRAC) Environmental Coordinator, AC/S Environment (IAU), MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001 or MCAS El Toro, Building 368, Santa Ana, CA 92709-5001 (for overnight delivery service). Comments may also be faxed to (949) 726-6586. Public comments received during this period, or in person at the public meeting mentioned above, will be considered in the final closure decision for these sites.

Environmental Investigation Overview

Site Background

Sites 8, 11, and 12 are located in industrialized areas in the southwest quadrant of the Station. None of the sites contain any significant ecological habitat, and portions of Sites 8 and 11 are covered with asphalt or concrete. The map on page 3 shows the locations of these sites. Definitions of chemical and technical terms are provided on page 9.

Site 8, Defense Reutilization and Marketing Office (DRMO) Storage Area, is a storage area for containerized liquids, scrap, and salvage material from MCAS El Toro and MCAF Tustin. The scrap materials stored include mechanical and electrical components and various types of liquids. The site consists of two distinct areas, a main storage yard (Units 1 through 4) and an old salvage yard (Unit 5). The old salvage yard was used as a materials storage area from the late 1940s through the 1970s, but by the mid-1980s, it had been elevated and regraded with approximately 5 feet of imported fill material. This area is currently used for vehicle parking.

The main storage yard has been used as a materials storage area since the late 1940s and remains operational. Today, the main storage yard is surrounded by a perimeter fence. One third of the yard is unpaved (Unit 1) and electrical transformers were stored there. Two-thirds of the yard (Unit 2) is paved. Photographs dating back to 1952 show a refuse pile (Unit 3) near the center of the main storage yard. The pile was removed and disposed prior to 1991. In December 1993, the top 2 feet of soil formerly beneath the refuse pile was excavated and removed and the area was then paved. Transformer oil containing polychlorinated biphenyls (PCBs) was reportedly spilled in a specific area (Unit 4) within Unit 1.

Site 11, Transformer Storage Area, is used for storage of equipment and scrap metal. The site is currently fenced. From approximately 1968 to 1983, between 50 and 75 electrical transformers were stored on a concrete pad and on a dirt lot (Unit 3) at the site. Reportedly, five transformers leaked and one spilled transformer oil containing PCBs onto the concrete pad. The transformer oil was believed to have migrated to the concrete pad edge (Unit 1) and flowed onto the unpaved surface of the storage yard or into an asphalt lined drainage ditch (Unit 2) adjacent to the concrete pad. In 1983, all transformers were removed and disposed off-site.

Site 12, Sludge Drying Beds, are situated at the location of a former sewage wastewater treatment plant. The plant operated between 1943 and 1972 and was demolished a few years later. The sludge produced at this facility was deposited in two areas (Units 1 and 2) to dry the material (drying beds). The sludge remaining in the drying beds was reportedly abandoned in place. Earthen berms surrounding the sludge beds were combined with imported fill material and graded in place. The final grade was reportedly about 5 feet higher than the original surface.

An industrial wastewater treatment plant (Unit 4) was also present at Site 12 adjacent to the sewage treatment plant. This plant treated waste liquids generated during metal plating operations. Sludge lines ran from the plant to the sludge drying beds. The industrial wastewater treatment plant reportedly operated for only a brief period in 1945-1946. By 1961, the plant had been dismantled. Treatment plant facilities are no longer present at the site. This area is currently a grassy picnic area and park.

Although not an integral part of the wastewater treatment plant operations, an unlined drainage ditch (Unit 3) at Site 12 was visible in aerial photographs dating back to the mid-1940s. The ditch conveyed runoff from the wastewater treatment plant and surrounding areas to Bee Canyon Wash. In the late 1950s, approximately 150 feet of the upstream end of the ditch was enclosed in a concrete drain pipe and backfilled to the surrounding grade. Other than this, the ditch appears to have remained unchanged since 1946.

Site Investigations

The assessment of the nature and extent of contamination present at Sites 8, 11, and 12 was based on extensive soil sampling data collected during the environmental (remedial) investigation. The investigation focused on shallow soil (from 0 to 10 feet below ground surface [bgs]) but included soil sampling to depths of 100 feet bgs. Groundwater sampling was not required because soil sampling showed that contamination was localized in the shallow soil and did not extend to groundwater. The depth to groundwater is approximately 100 feet or more at these sites.

Each of the three sites was divided into units based on physical characteristics and activities performed in each portion of the site. Dividing the sites into units also allowed the Marine Corps to plan actions most appropriate for each part of the site. The diagrams on page 3 show each of the units at Sites 8, 11, and 12.

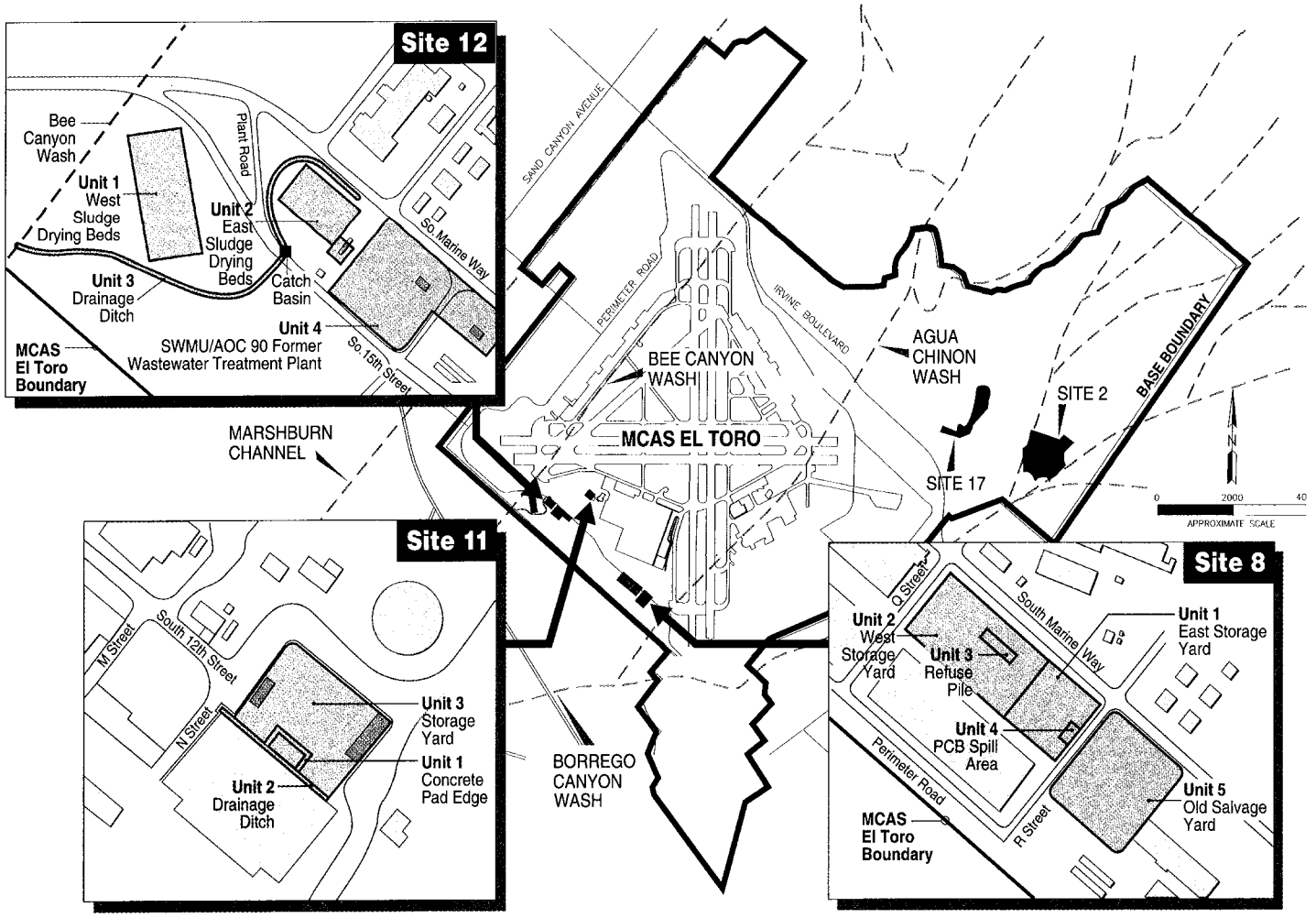
Investigation Results

The investigation of Sites 8, 11, and 12 showed low levels of contaminants present in shallow soil at each site. However, the highest contamination was generally limited to areas very near the surface, usually between 0 and 4 feet bgs.

Throughout this Proposed Plan, the term background levels (of metals) is used. It refers to the naturally occurring range of metals that are found in the native soil both on and off MCAS El Toro property (in the vicinity of the Station). These background levels are not the result of Station operations.

Site 8 – Defense Reutilization and Marketing Office Storage Area. Chemicals in soils identified at Site 8, Units 1 through 5, include volatile organic compounds (VOCs), semi-

MCAS El Toro Location Map – Installation Restoration Program Sites 8, 11, and 12



MCAS El Toro is shown along with the units that comprise Sites 8, 11, and 12.

volatile organic compounds (SVOCs), polynuclear aromatic hydrocarbons (PAHs), PCBs, pesticides, petroleum hydrocarbons, and naturally occurring metals. These identified chemicals were present most frequently between depths of 0 to 4 feet bgs. In addition, the types and concentrations of these chemicals present in shallow soil and deeper subsurface soil (greater than 10 feet bgs) at Site 8 do not pose a threat to groundwater because the depth to groundwater is approximately 100 feet or more at this site. Most of the PCB-contaminated soil beneath the area of the former rubbish pile was removed prior to completion of the remedial investigation in conjunction with construction activities.

Site 11 – Transformer Storage Area. Soil samples at Site 11 were analyzed for PCBs and pesticides. PCBs were present only at Units 1 and 2 and were generally confined to surface soil (0 to 2 feet bgs). Pesticides were reported at Units 1, 2, and 3 and were generally confined in shallow soil to depths of less than 3 feet bgs. The PCBs and pesticides present at Site 11 do not pose a threat to groundwater because the depth to groundwater is approximately 100 feet or more at this site.

Site 12 – Sludge Drying Beds. Chemicals present at Site 12 in shallow soils throughout Unit 1 include VOCs, PAHs, PCBs, pesticides, herbicides, and petroleum hydrocarbons. Most of this shallow soil contamination is confined to the upper 5 feet bgs interval. VOCs, SVOCs, PAHs, PCBs, pesticides, petroleum hydrocarbons, herbicides, cyanide, and metals above the naturally occurring background levels were reported in shallow soil throughout Units 2, 3, and 4. At Unit 3, chemicals were present at the highest concentrations from 0 to 5 feet bgs. A catch basin in the Unit 3 drainage ditch was also sampled. Results showed that the basin contained the same chemicals as those present in the drainage ditch, but at slightly lower concentrations.

For detailed information on investigation findings, the Draft Final Remedial Investigation Report for Sites 8, 11, and 12 is available for public review and comment (see page 13) or contact project representatives (see page 15).

Human Health Risk Assessments

As required by federal law set forth in the 1990 National Oil and Hazardous Substances Pollution Contingency Plan, a human health risk assessment was performed as part of the remedial investigation to determine if environmental cleanup or controls are necessary as a result of potential risks to human health. Results from the risk assessment indicate that action should be taken to mitigate risks at Site 8 (Units 3 and 5), Site 11 (Units 1 and 2), and Site 12 (Unit 3). Under current conditions, risks at the other portions of Sites 8, 11, and 12 are within the U.S. EPA generally allowable risk range. No further action is necessary to be protective of human health in these areas.

Identifying Exposure Pathways

To assess the potential human health risks, information on the types and amounts of chemicals at ground surface and in the shallow soil beneath Sites 8, 11, and 12 was collected during the remedial investigation. Possible exposure pathways, which show how people could come in contact with chemicals, were then identified. The risk assessment hypothetically assumes people are living at a site for a period of 30 years. It was assumed that children and adults could be exposed to shallow soil (0 to 10 feet bgs) through eating soil (ingestion), skin (dermal) contact, or breathing (inhalation) of vapors. Possible health effects from exposure to chemicals were evaluated and combined with other information to estimate potential health risks if chemicals remain at the sites.

Estimating Human Health Risks

Calculated risk levels are an indication of potential risks, and are not an absolute prediction that risk will occur at a certain level. Actual human exposures and risks are likely to be much less than those calculated for the risk assessment. The assumptions made during the risk assessment process lead to an overestimation of potential risk and provide a margin of safety to protect public health and the environment.

U.S. EPA guidance requires that the Marine Corps look at various ways the public could be exposed to chemicals and the health risks associated with exposures to the chemicals. Health risks associated with exposure to and toxicity of chemicals were estimated for cancer-causing (carcinogenic) and non-cancer-causing (noncarcinogenic) effects. The cancer risk is expressed in terms of the chances of humans contracting cancer as a result of living at the sites and being exposed to the various chemicals over a period of 30 years. This probability is expressed as the number of additional cancer cases that would occur within a population, and it is calculated assuming an individual has an extended exposure to the chemicals. The term "additional cancer cases" refers to cancer cases that could occur, in addition to those cases that otherwise occur, in a population not exposed to site chemicals.

To manage carcinogenic risk and protect human health, the U.S. EPA follows the protective risk ranges established by the National Contingency Plan: greater than one additional cancer case in a population of 10,000 is unacceptable; one additional cancer case in a population of 10,000 to one additional cancer case in a population of 1,000,000 can be generally considered allowable; and less than one additional cancer case in a population of 1,000,000 is allowable.

Noncarcinogenic risks are expressed as a hazard index. The U.S. EPA considers a hazard index of less than 1 as protective of human health. A hazard index of 1 indicates that the exposure to the chemicals has limited potential for causing adverse health effects (e.g., respiratory distress). A site with a hazard index greater than 1 does not by itself require remedial action, but indicates the need to take into account the types of chemicals, historical activities, and potential toxic effects of the chemicals of potential concern.

Risk Assessment Results

Soil

Site 8 – Defense Reutilization and Marketing Office Storage Area. Chemicals present in soil resulting from Marine Corps' activities that contribute to human health risks are PCBs at Unit 3 and PAHs at Unit 5.

Site 11 – Transformer Storage Area. PCBs identified in soil contribute to human health risks at Unit 1 and 2.

Site 12 – Sludge Drying Beds. Chemicals that contribute to human health risks are PCBs and PAHs at Unit 3.

Groundwater

Soil sampling showed that contamination was localized and did not extend to groundwater at any of these sites. A human health risk assessment was not conducted for groundwater because there are no site-specific contaminants in groundwater at Sites 8, 11, and 12.

Recommended Action

The Marine Corps' recommendations for the specific units at Sites 8, 11, and 12 are based on the results of the remedial investigation and the human health risk assessment, and the assumption of future residential use of these properties. The site-by-site summary on page 5 presents risk assessment results and recommended actions for each site unit. A summary of potential alternatives developed for cleanup at Sites 8, 11, and 12 are presented beginning on page 6. Units at these sites recommended for Remedial Action are shown in the site diagrams on pages 8 and 9.

Site-by-Site Summary: Risk Assessment Results and Recommended Actions

Site/Unit	Cancer Risk[a]	Noncancer Risk[a]	Risk Management Considerations	Recommended Actions
➤ Site 8				
Units 1 and 4 (Evaluated as one area)	2 additional cases in 100,000	0.79	PCB-contaminated soil is present in various locations at these units. Based on human health risk factors calculated for Units 1 and 4: concentrations of PCBs are significantly less than 10 parts per million (typical cleanup level for PCBs in a residential area); and the nearest groundwater is located 145 feet below ground surface (bgs).	No Further Action
Units 2 and 3 (Evaluated (as one area)	4 additional cases in 100,000	2.3	At Unit 2, the only risk drivers present are arsenic and manganese. No site-related activities involved use of these metals. Arsenic and manganese occur naturally in native soil on and off MCAS El Toro property.	No Further Action
			At Unit 3, soil beneath the refuse pile formerly located at this unit was contaminated with PCBs. During construction activities, prior to the remedial investigation, most of the PCB-contaminated soil was removed. Sampling performed during the remedial investigation indicates that not all of the PCB-contaminated soil was removed.	Proposed Remedial Action – remove remaining PCB-contaminated soil (approx. 365 cubic yards)
Unit 5	1 additional case in 10,000	1.1	PAH-contaminated soil is present throughout the unpaved portion of this unit.	Proposed Remedial Action – remove PAH-contaminated soil from unpaved area (approx. 18,580 cubic yards)
➤ Site 11				
Unit 1	9 additional cases in 100,000	4.5	Small volume of PCB-contaminated soil is present in this localized area.	Proposed Remedial Action – remove up to six feet of soil (approx. 133 cubic yards).
Unit 2	6 additional cases in 1,000,000	0.3	Small volume of PCB-contaminated soil is present in this localized area.	Proposed Remedial Action – remove up to six feet of soil (approx. 100 cubic yards).
Unit 3	3 additional cases in 10,000,000	0.017	Both the cancer and noncancer risk values are allowable.	No Further Action
➤ Site 12				
Unit 1	8 additional cases in 100,000	4.6[b]	Based on the following factors a remedial action at Unit 1 is not appropriate: Conservative nature of risk assessment calculations (using maximum concentrations of chemicals of potential concern [COPC] when most of the COPCs were only reported once); no site related activities involved the use of arsenic or manganese; and the fact that concentrations of PAHs, pesticides, PCBs and metals are confined to the upper 5-foot-bgs soil interval, are not mobile, and do not present a risk to groundwater.	No Further Action
Units 2 and 4 (Evaluated as one area)	3 additional cases in 100,000	2.1	The cancer risk value is within the allowable range. Although the noncancer risk value is slightly above the allowable range, most of this risk is associated with the metals manganese and arsenic. No site related activities involved the use of arsenic or manganese. These metals occur naturally in native soil on and off MCAS El Toro property.	No Further Action
Unit 3	5 additional cases in 100,000	5.9	The concentrations and type of contaminants are similar to those at Site 12 Unit 1; however this unit is a drainage ditch that conveys surface water runoff into Bee Canyon Wash approximately 50 feet upstream of the Station boundary. PCB and PAH-contaminated soil in this unit may be transported off-site and eventually off-Station.	Proposed Remedial Action – remove contaminated soil to prevent migration of contaminants offsite (approx. 6,165 cubic yards).
Catch basin	1 additional case in 1,000,000	0.18	Both the cancer and noncancer risk values are below the allowable range.	No Further Action

Notes:

a See "Estimating Human Health Risks on page 4 for explanation of U.S. EPA's generally allowable range of cancer risk and the hazard index for noncancer risk.

b Noncancer risk generally considered allowable because value is associated with a pesticide that was only present in one sample.

Summary of Site Cleanup Alternatives

The Marine Corps' remedial objective for Site 8, 11, and 12 is to protect public health and the environment by preventing exposure to soil and reducing the potential for threats to the environment. For Site 12, an additional remedial objective is to prevent off-site or off-Station migration of contaminated surface water or sediment. Five alternatives were developed to achieve these objectives. Descriptions of the alternatives are presented below. Key supporting information from the feasibility study includes:

- cost comparison estimate of remedial alternatives (page 6).
- evaluation of the preferred remedy (page 10).
- comparative analysis of remedial alternatives (page 11).
- potential federal and state applicable or relevant appropriate requirements (ARARs) for cleanup at Sites 8, 11, and 12 (page 12).

The Marine Corps' preferred remedy for those units at all three sites that require remediation is Alternative 3, Excavation with Recycling of the Excavated Soil as Cover Material. Contaminated soil that is not hazardous would be recycled and used as foundation layer material beneath the landfill caps at Installation Restoration Program Site 2, Magazine Road Landfill, and Site 17, Communication Station Landfill.

Alternative 1 - No Action

By law, the No Action alternative is evaluated to provide a basis from which to develop and evaluate other remedial alternatives. Under the No Action alternative, the Marine Corps would not implement any cleanup actions and there would be no change to the existing site conditions.

Alternative 2 - Asphalt Cap or Monolithic Soil Cap with Vegetative Cover, Plus Restrictive Covenant

Under Alternative 2, Site 8 (Units 3 and 5) and Site 11 (Units 1 and 2) would be covered by an asphalt cap. Site 12 (Unit 3) would be covered by a monolithic (single-layer) soil cap with a grass cover to prevent erosion. A storm drain would be installed

MCAS El Toro Remedial Alternatives Cost Estimate Comparison
(For Comparison Purposes Only)

Remedial Alternatives Evaluated	Estimated Cost in $ Millions		
	Site 8 (Units 3 and 5)	Site 11 (Units 1 and 2)	Site 12 (Unit 3)
Alternative 1 No Action	0	0	0
Alternative 2 Capping and Restrictive Covenant	1.58	0.06	0.35
***Alternative 3—Preferred Remedy for Sites 8, 11, and 12 Excavation and Recycling**	**1.20**	**0.07**	**0.75**
Alternative 4 Excavation, Soil Washing, and Thermal Destruction	8.64	0.43	7.08
Alternative 5 Excavation, Soil Washing, and Off-Station Disposal	6.28	0.13	2.72

*Alternative 3 includes excavation of contaminated soil and hauling the soil to Site 2 and/or Site 17, sampling to ensure that human-health risks have been reduced to allowable levels, and backfilling the excavated area with clean soil. There are no maintenance costs associated with this alternative. (The Marine Corps may choose to dispose contaminated soil at an appropriate off-Station disposal facility.)

beneath the Site 12 cap to allow surface water to be conveyed across the site without eroding the cap or coming in contact with contaminated soil. The asphalt and soil caps would reduce human health risks by preventing exposure to contaminated soil. A restrictive covenant (deed restrictions or lease conditions) would be placed on the property at all three sites. The covenant would prohibit future owners from performing activities such as subsurface excavation that could damage the cap. The covenant would limit use at the site to industrial activities that are protective of the cap and also allow Marine Corps and regulatory personnel access to the site to maintain or inspect the cap.

Alternative 3 – *Preferred Remedy* – Excavation with Recycling of the Excavated Soil as Cover Material)

Under this alternative, an estimated 25,000 cubic yards of contaminated soil from Sites 8, 11, and 12 would be excavated for use as foundation layer material for on-Station landfills. Once the soil has been excavated, soil sampling would be performed to confirm that all of the contaminated soil that could cause an unacceptable risk to human health has been removed. Upon completion of the removal operations, the excavated areas would be backfilled using clean, compacted fill material as appropriate. Restrictive covenants and monitoring would not be necessary because contamination would be removed from the sites.

Upon completion of remedial activities, the backfilled soil at Site 12 would be graded to facilitate proper drainage of the surrounding area.

Recycling of Excavated Soil. The Marine Corps is currently taking action to cap and close four inactive landfills at the Station. Alternative 3, the preferred remedy, for Sites 8, 11, and 12, would recycle all the contaminated soil excavated from these sites that is not hazardous. Based on remedial investigation results, hazardous levels of contaminants are not expected to be present. However, if hazardous wastes are identified during excavation they would be disposed off-Station at a state-permitted hazardous waste disposal facility. Soil that is not hazardous would then be used as part of the foundation layer beneath the landfill caps at Installation Restoration Program Site 2, Magazine Road Landfill, and Site 17, Communication Station Landfill. Recycling of this soil as landfill foundation layer material would be done during construction of the caps. This procedure would eliminate the long-term risks to human health and the environment at Sites 8, 11, and 12. No exposure pathway to the recycled soil by people or animals and wildlife would exist after the landfill is capped. (The Marine Corps may choose to dispose contaminated soil at an appropriate off-Station disposal facility.)

Alternative 4 – Excavation with On-Site Treatment by Soil Washing and Thermal Destruction or Excavation with Low-Temperature Thermal Desorption

Under this alternative, an estimated 25,000 cubic yards of contaminated soil from Sites 8, 11, and 12 would be excavated and treated to remove contaminants. At Site 8 (Unit 3), the contaminated soil would be treated with an on-site soil washing system. As a result of soil washing, fine-grained material (silt and clay) becomes separated from coarse-grained material (sand and gravel). Soil washing would successfully treat (clean) the coarse-grained material. However, contaminants would continue to bind, chemically or physically, to the fine-grained materials. Therefore, additional treatment for the fine-grained material is required. The fine-grained material would be further treated on-site with a mobile thermal destruction unit that destroys organic contaminants (mainly PCBs). After thermal destruction, the residual material (ash) would be transported to an off-Station, state-permitted disposal facility. The washed (clean) coarse-grained material would be reused to partially backfill the excavated areas. This soil would be supplemented with clean fill material. Soil from Sites 11 and 12 would also be hauled to Site 8 for treatment. The cleaned coarse-grained material would be hauled back to Sites 11 and 12 and reused to partially backfill the excavated areas.

Contaminants in the soil at Site 8 (Unit 5) are PAHs. The excavated soil would be treated on-site using low-temperature thermal desorption (a less costly treatment method that thermal destruction), followed by thermal oxidation (afterburning). This two-step process separates the PAHs from the soils and destroys them. The treated soil, which is then clean, would be reused to backfill the excavated area at Unit 5.

Alternative 5 – Excavation, On-Site Soil Washing, and Off-Station Disposal at a Class I Landfill

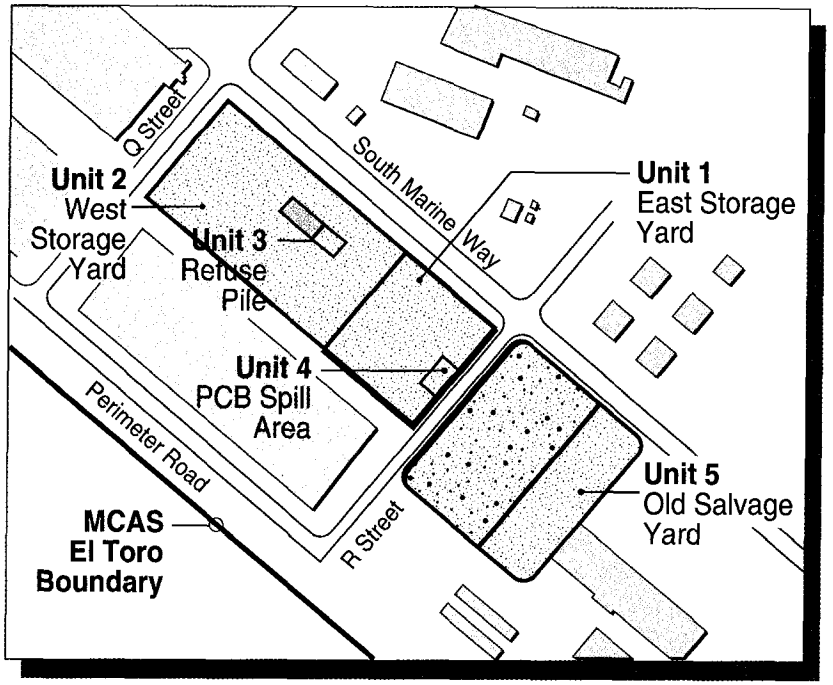
Under Alternative 5, an estimated 25,000 cubic yards of contaminated soil from Sites 8, 11, and 12 would be excavated and treated with an on-site soil-washing system to separate the fine-grained soil from the coarser material. The finer material would then be transported to an off-Station disposal facility. The treated (clean) coarser material would be reused to partially backfill the excavated areas. This soil would be supplemented with clean fill material.

➤ Diagrams that show areas recommended for remedial action are on pages 8 and 9.

➤ For more information on the remedial action alternatives for Sites 8, 11 and 12 consult the Draft Final Feasibility Study Report (see page 13) or contact project representatives (see page 15).

Units at Sites 8, 11, and 12 Recommended for Remedial Action

Site 8 – DRMO Storage Yard

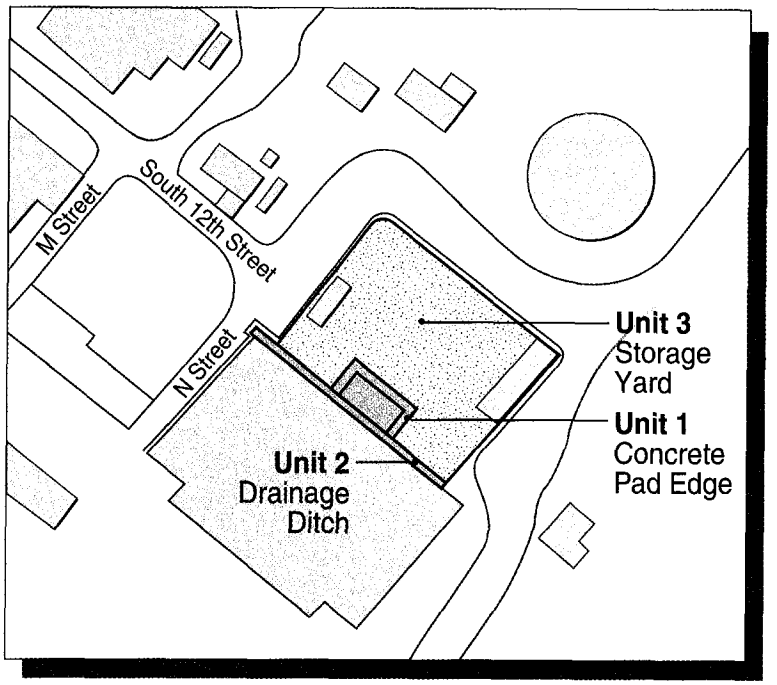


Portions of Units 3 and 5 are recommended for remedial action.

Site 11 – Transformer Storage Area

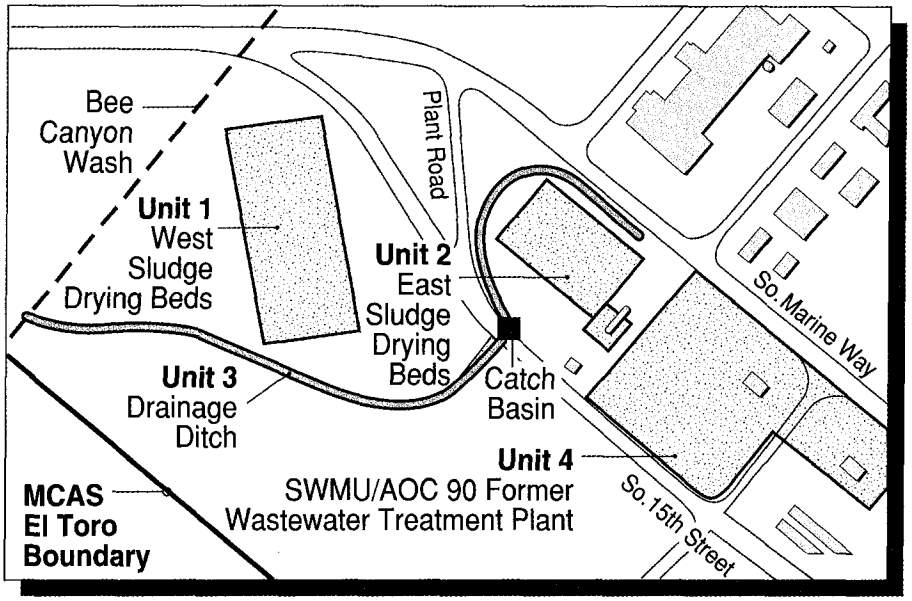
Legend

- Area Recommended for Remedial Action
- Area Recommended for No Further Action
- Building or Pad
- Unit Boundary
- Improved Roads
- Base Boundary



Units 1 and 2 are recommended for remedial action.

Site 12 – Sludge Drying Beds



Unit 3 is recommended for remedial action.

Definitions of Chemical and Technical Terms

- **VOCs** (volatile organic compounds) make up a general category of organic (carbon-containing) compounds that evaporate easily at room temperature. They are commonly used for machinery and parts degreasing, paint stripping, and other industrial operations. At MCAS El Toro, historical activities have included more than 40 years of aircraft maintenance that used industrial solvents, like trichloroethene (TCE), that are categorized as VOCs. Within the category of VOCs, there are possible cancer-causing compounds.
- **SVOCs** (semivolatile organic compounds), another general category of organic compounds, evaporate at a slower rate than VOCs. There are suspected cancer-causing compounds within the category of SVOCs.
- **PCBs** (polychlorinated biphenyls) are a specific class or group of SVOCs and are suspected as cancer-causing compounds. They were commonly contained in transformer oil up to the late 1970s. At MCAS El Toro, several areas were used to store transformers.
- **Petroleum hydrocarbons** are chemical components of fuels. The individual compounds (e.g., VOCs, SVOCs) that make up petroleum hydrocarbons are evaluated for potential health effects. Petroleum hydrocarbon compounds are managed outside the CERCLA program.
- **PAHs** (polynuclear aromatic hydrocarbons) are a specific class or group of SVOCs, and some are suspected as cancer-causing compounds. They are commonly associated with fuels and waste oil. At MCAS El Toro, historical activities included spraying waste oil on the ground surface to control dust.
- **Metals** found at the sites include aluminum, arsenic, beryllium, and manganese. Arsenic and beryllium are known to cause cancer. Aluminum and manganese are noncancer causing chemicals that can affect the nervous system (aluminum and manganese) and the respiratory system (manganese). Aluminum, arsenic, beryllium, and manganese naturally occur in the soils native to areas on and off MCAS El Toro property.
- **Pesticides and herbicides** were used to control insects and vegetation. Depending on the specific chemicals used for this purpose, they could be cancer-causing or noncancer causing.
- **Thermal destruction** is a treatment method that uses high heat (up to 2000 degrees Fahrenheit) to destroy organic compounds (VOCs, PCBs).
- **Thermal desorption** is a proven technology that uses relatively low temperatures (about 500 to 700 degrees Fahrenheit) to vaporize and thermally eliminate PAHs.

Evaluation of Alternative 3—the Preferred Remedy

Each alternative has undergone detailed evaluation and analysis, using evaluation criteria developed by the U.S. EPA. The nine criteria are categorized into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The threshold criteria must be satisfied in order for an alternative to be eligible for selection. The primary balancing criteria are used to weigh major tradeoffs among alternatives. Generally, the modifying criteria are taken into account after public comment is received on the Proposed Plan and reviewed with the various State regulatory agencies to determine if the preferred alternative remains as the most appropriate remedial action. The nine criteria are defined below and are accompanied by the key points from the evaluation of the five alternatives with emphasis on Alternative 3, the preferred remedy. A chart that summarizes evaluation of the five alternatives is shown on page 11.

A. Threshold Criteria

1. Overall Protection of Human Health and the Environment – *assesses whether a cleanup remedy provides adequate public health protection and describes how health risks posed by the site will be eliminated, reduced, or controlled through treatment, engineering controls, or institutional and regulatory controls.*

Alternative 1 is not protective of human health and the environment because it does not reduce risk associated with contaminants in shallow soil. Alternative 2 is only protective as long as the cap is maintained. Alternatives 3, 4, and 5 result in the same significant reduction of risk because all three alternatives permanently remove the contaminated soil from the site.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) – *addresses whether a cleanup remedy will meet all federal, state, and local environmental statutes or requirements.*

Alternative 1 does not comply with potential ARARs for Sites 8, 11, and 12. Alternative 3 complies with the potential ARARs (see pages 12 and 13).

B. Primary Balancing Criteria

3. Long-Term Effectiveness and Permanence – *refers to the ability of a remedy to continue protecting human health and the environment over time after the cleanup action is completed.*

Alternative 1 is not effective in protecting human health and the environment. Alternative 2 is protective, but only if the asphalt caps at Sites 8 and 11 and the soil cap at Site 12 are properly inspected and maintained. Alternatives 3, 4, and 5 are effective, permanent solutions for contamination at Sites 8, 11, and 12.

4. Reduction of Toxicity, Mobility, and Volume – *refers to the degree to which a cleanup alternative uses treatment technologies to reduce: 1) harmful effects to human health and the environment (toxicity), 2) the contaminant's ability to move (mobility), and 3) the amount of contamination (volume).*

Only Alternatives 4 and 5 reduce the toxicity, mobility, and/or volume of contaminated soil ***through treatment***. Although no treatment is involved, Alternative 2 effectively achieves a reduction in mobility of the contaminated soil at each site by preventing wind erosion and minimizing sediment transport in surface water runoff through capping, while Alternative 3 effectively achieves a reduction in the volume of contaminated soil at each site by removing the soil and recycling it as foundation layer material beneath the landfill caps at Sites 2 and 17. Recycling of the contaminated soil, that is not hazardous, as landfill foundation layer material would reduce the risks to human health and the environment at Sites 8, 11, and 12 (see page 7 "Recycling of Excavated Soil").

5. Short-Term Effectiveness – *assesses how well human health and the environment will be protected from impacts due to construction and implementation of a remedy.*

Alternative 1 does not have any short-term impacts on health and safety because this alternative involves no action. Alternative 2 minimizes short-term impacts because the soils do not need to be displaced. Alternatives 3, 4, and 5 involve short-term impacts to health and safety as a result of potential dust emissions from excavation, treating, and transporting of soils. Of these alternatives involving excavation, Alternative 3 has the least impact on health and safety because it involves only excavation and transport and does not require treatment of contaminated soil. Alternative 3 also requires the shortest time to implement.

6. Implementability – *refers to the technical feasibility (how difficult the alternative is to construct and operate) and administrative feasibility (coordination with other agencies) of a remedy. Factors such as availability of materials and services needed are considered.*

All of the action alternatives developed for remediation of Sites 8, 11, and 12 use proven, reliable technologies. However, the alternatives differ significantly in implementability. Alternative 3 involves excavation, hauling of soil, and backfilling the excavated area with clean imported soil. Alternative 2 is more complex because it requires construction of an asphalt or single-layer soil cap which must be designed, built, and maintained for a period of approximately 30 years. Alternatives 4 and 5 do not require maintenance, but do involve using the more complex technologies of soil washing and/or thermal destruction/thermal desorption. In addition, for Alternative 4, a significant amount of resources are expected to be expended in the effort to permit a thermal destruction unit at Site 8.

7. Cost – *evaluates the estimated capital costs and present worth in today's dollars required for design and construction and long-term operation and maintenance costs of a remedy.*

There is no cost associated with Alternative 1. Alternatives 2 and 3 are the least costly of the protective alternatives. Alternatives 4 and 5 are significantly more expensive and do not achieve a higher degree of protection than the preferred remedy at the sites. Alternatives 4 and 5 do reduce concentrations of contaminants in soil through treatment.

C. Modifying Criteria

8. State Acceptance – *reflects whether the State of California's environmental agencies agree with, oppose, or have no objection to or comment on the Marine Corps' preferred alternative.*

State of California representatives on the MCAS El Toro Base Realignment and Closure Cleanup Team (including California EPA's Department of Toxic Substances Control and Regional Water Quality Control Board) can accept the Marine Corps' preferred remedy, Alternative 3.

9. Community Acceptance – *evaluates whether community concerns are addressed by the remedy and if the community has an apparent preference for a remedy. Although public comment is an important part of the final decision, the Marine Corps is compelled by law to balance community concerns with the other criteria.*

This Proposed Plan is the Marine Corps' request to the community to comment on the remedial alternatives, the preferred remedy, and the Draft Final Remedial Investigation and Feasibility Study Reports.

Comparative Analysis of Remedial Alternatives

	REMEDIAL ALTERNATIVES				
	1	**2**	**3** ***Preferred Remedy***	**4**	**5**
U.S. EPA Criteria					
1 Overall Protection of Human Health and the Environment	**No** Does not prevent exposure to contaminated soil.	**Yes** Provides protection if cap is not disturbed.	**Yes** Provides protection by removing contaminated soil.	**Yes** Provides protection by removing and treating contaminated soil.	**Yes** Provides protection by removing and treating contaminated soil.
2 Compliance with Applicable or Relevant and Appropriate Requirements	**N/A** ARARs are only applicable when remedial action is taken.	**Yes** Complies with all ARARs for this alternative.	**Yes** Complies with all ARARs for this alternative.	**Yes** Complies with all ARARs for this alternative.	**Yes** Complies with all ARARs for this alternative.
3 Long-Term Effectiveness and Permanence	**Low** No reduction in risk.	**Moderate** Does not treat soil. Reduces mobility.	**High** Permanently reduces risks by removing contaminated soil.	**High** Permanently reduces risks by removing and treating contaminated soil.	**High** Permanently reduces risks by removing and treating contaminated soil.
4 Reduction of Toxicity, Mobility, or Volume through Treatment	**Low** No reduction in toxicity, mobility, or volume.	**Low** Does not treat soil. Capping reduces mobility at the sites.	**Low** Does not treat soil. Reduces volume at the sites by recycling soil at landfills.	**High** Reduces volume and toxicity by soil washing and thermal processes.	**High** Reduces volume by soil washing.
5 Short-Term Effectiveness	**High** No additional exposure to workers or public.	**Moderate** Contaminated soil is not removed.	**Low** Excavation may expose workers to contaminants.	**Low** Excavation, stockpiling, and treatment may expose workers to contaminants.	**Low** Excavation, stockpiling, and treatment may expose workers to contaminants.
6 Implementability	**High** No construction activities.	**Moderate** Capping uses proven technologies. Institutional controls will require administrative effort.	**Moderate** Excavation and hauling use proven technologies. Recycling will require administrative effort.	**Low** Significant technical and administrative effort to treat soil and allow various thermal units.	**Low** Significant technical effort to wash soil. Significant administrative effort to dispose of soil.
7 Total Cost – Sites 8, 11, and 12	None	$1,990,000	$2,020,000	$16,150,000	$9,130,000
8 State Acceptance	The State cannot accept this alternative.	The State can accept this alternative.	The State can accept this alternative.	The State can accept this alternative.	The State can accept this alternative.

9 Community Acceptance – This criteria will be evaluated following the public comment period and addressed in the Record of Decision.

Applicable or Relevant and Appropriate Requirements for Cleanup at Sites 8, 11, and 12

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 applicable or relevant and appropriate requirements (ARARs). MCAS El Toro was listed on the National Priorities List in 1990. 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*** *– addresses 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 Alternative 3 (preferred remedy) for cleanup and closure at MCAS El Toro Installation Restoration Program Sites 8, 11, and 12 are described below. Also included (on page 13) are key state To Be Considered guidelines that pertain to recycling of wastes that are not hazardous.

Chemical-specific ARARs

- **Federal – U.S. Environmental Protection Agency (U.S. EPA)**

  The preferred remedial action could potentially involve the generation of hazardous waste (e.g. excavated contaminated soil) during the construction phase of the remedial action. Substantive provisions of the federally authorized (Resource Conservation and Recovery Act) RCRA program implemented in the state of California require that these wastes be characterized to determine if they are hazardous. Potential federal ARARs for waste characterization include Title 22 *California Code of Regulations* [CCR] 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a)(1), and 666261.100. If based on the above determination, wastes are determined to be RCRA hazardous waste, hazardous waste accumulation requirements would be applicable.

- **State**

  State of California regulations related to the identification of non-RCRA hazardous waste are potentially applicable to the preferred remedial action. These regulations include Title 22 CCR 66261.22(a)(3), and (4), 66261.24(a)(2) to (a)(8), 66261.101, 66261.3(a)(2)(C) or 66261.3(a)(2)(F).

Location-specific ARARs

- No potential federal or state location-specific ARARs were identified for Sites 8, 11, and 12.

Action-specific ARARs

- **Federal – U.S. EPA**

  The preferred remedial action will involve generation of on-site waste. Substantive portions of the federally authorized RCRA program in the state of California for on-site waste generation are potentially applicable. These include Title 22 CCR 66262.10(a) and 66262.11. The determination of whether waste generated during remedial actions is hazardous will be made as wastes are excavated. Excavated waste which is classified as RCRA hazardous waste will be accumulated in accordance with Title 22 CCR 666264.34 and be containerized for storage or transport in compliance with Title 22 CCR 66264.171-174 and 175(a) and (b). At closure, storage containers will be decontaminated in accordance to Title 22 CCR 66264.178. The remedial action will also comply with clean closure regulations to the extent necessary to protect human health and the environment in accordance with Title 22 CCR 66264.111.

- **State – South Coast Air Quality Management District (SCAQMD)**

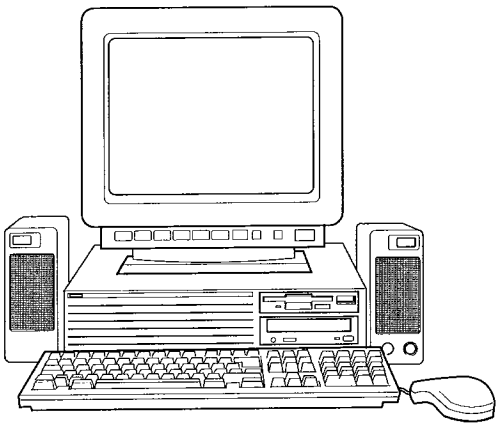
  Certain SCAQMD Rules and Regulations are potential state ARARs for air emissions. Fugitive dust emissions are expected for the soil excavation and storage as part of the remedial action alternatives. The substantive provisions of SCAQMD Rules 401 and 403 may be potential ARARs for these fugitive dust emissions.

Guidelines To Be Considered

- **State – California EPA Department of Toxic Substances Control (DTSC)**

  DTSC has published a Management Memo (EO-95-010-MM) that offers guidelines for recycling materials that are non-RCRA hazardous wastes. The "use constituting disposal" restriction affects the eligibility of recyclable materials for the exclusions and exemptions provided under Health and Safety Code 25143.2. These guidelines are To Be Considered for on-Station use of contaminated soil as landfill cover material.

Internet Connection Environmental Web Sites



For access to information on MCAS El Toro (Restoration Advisory Board meeting minutes, proposed plans, and fact sheets), check out the *Southwest Division Naval Facilities Engineering Command Web Site* at:

www.efdswest.navfac.navy.mil/pages/envrnmtl.htm

Other environmental web sites include:

Dept. of Defense Environmental Web Site

www.dtic.mil/environdad/envbrac.html

U.S. EPA Superfund Web Site

www.epa.gov/superfund/index.htm

Reports Available for Review and Comment

The collection of reports and documents used by the Marine Corps in the selection of cleanup or environmental management alternatives is the Administrative Record (AR). A site-specific AR file has been compiled for Sites 8, 11, and 12 discussed in this Proposed Plan. It includes the Phase I Remedial Investigation Draft Technical Memorandum (May 1993); the Draft Final Phase II Remedial Investigation Report for all three sites (June 1997); and the Draft Final Phase II Feasibility Study for all three sites (January 1998); the Technical Memorandum on Risk Management Considerations for OU-3A Sites 8, 11, and 12 (November 1998); and the Revised Cost Estimates for the OU-3A Proposed Plan - Site 8 (Unit 3, Alternatives 2 through 5), Sites 11 and 12 (Alternative 4) (February 1999).

The Remedial Investigation and Feasibility Study Reports, other relevant documents that pertain to these sites, and a complete index of all MCAS El Toro documents are housed in the Information Repository at the Heritage Park Regional Library, 14361 Yale Avenue in Irvine, (949) 551-7151.

The complete collection of documents listed in the AR index is also available for review at MCAS El Toro. To schedule a time to review documents at the Station during the public comment period, contact Joseph Joyce at (949) 726-3470 or 726-2840.

Cleanup at Sites 8, 11, and 12 Plays Key Role in Restoration Program

Cleanup of Installation Restoration Program (IRP) Sites 8, 11, and 12 represents one component of the comprehensive environmental investigation and cleanup program underway at MCAS El Toro. Designed to protect public health and the environment, the IRP provides a structure for the Marine Corps to identify, investigate, and implement remedies for contamination that resulted from past operations and waste disposal activities. This effort is being coordinated with the scheduled operational closure of the Station in July 1999. Shown below is the IRP process and the current status of Sites 8, 11, and 12.

To effectively manage the overall cleanup effort, the Marine Corps organized the IRP sites into Operable Units or OUs.

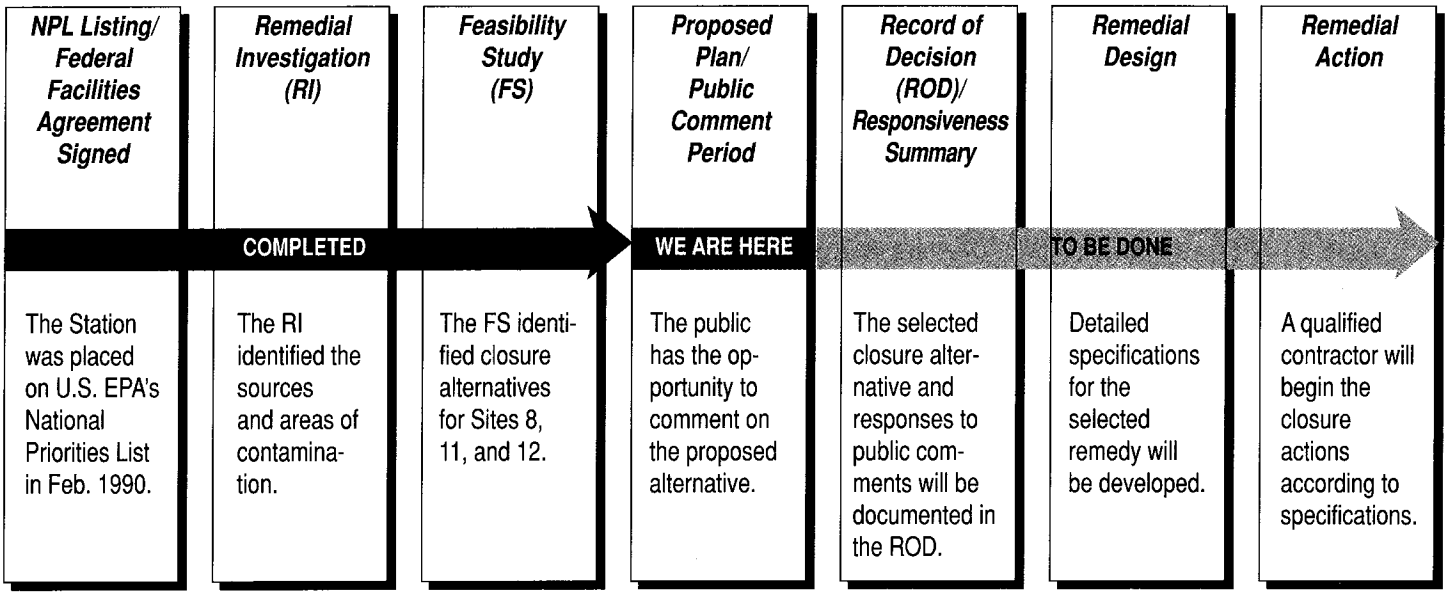
- OU-1 addresses the TCE contamination in the regional groundwater that extends 3 miles west of the Station.
- OU-2A includes Site 24, the VOC Source Area, and Site 25, the Major Drainage Channels.
- OU-2B (Sites 2 and 17) and OU-2C (Sites 3 and 5) address landfill sites that contain a variety of waste materials.
- OU-3 includes the remaining sites at the Station.

In 1997, the Marine Corps issued Proposed Plans and established public comment periods for: the Site 24 VOC Source Area for soil cleanup using soil vapor extraction technology (SVE); and for the Marine Corps' recommendation for No Further Action for OU-3 Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, 22, and OU-2A Site 25. After consideration of public comments on the proposed alternatives, Records of Decision that formally document the remedial actions planned for these sites were issued in September 1997. The Remedial Design for the SVE system at Site 24 was finalized in January 1999. The Interim Remedial Action began in March 1999.

In May 1998, the Marine Corps issued a Proposed Plan for closure of inactive landfills at the Station OU-2B (Sites 2 and 17) and OU-2C (Sites 3 and 5) and established a public comment period. Completion of the ROD for closure of the four landfills is anticipated to occur in 1999. The Marine Corps currently anticipates issuing the Proposed Plan for VOC groundwater cleanup at OU-1 and OU-2A in 1999. The Proposed Plan for remaining OU-3 sites is expected to be released in 2001.

What are the Proposed Reuses for Sites 8, 11, and 12?

Reuse planning for MCAS El Toro is still in the preliminary stages. The preferred reuse option selected in the December 1996 Community Reuse Plan was a major commercial airport with a variety of potential future uses for MCAS El Toro sites. According to this plan, Sites 8, 11, and 12 are located within areas designated for industrial use. The proposed reuse in the area of Site 8 is Institutional (Distribution Center). The proposed reuse in the area of Sites 11 and 12 is Airport Support.



Where to Get More Information

Copies of Remedial Investigation and Feasibility Studies Reports, including the human health risk assessments and other key documents relating to environmental activities at MCAS El Toro, are available for public review at this Information Repository: **Heritage Park Regional Library, 14361 Yale Avenue, Irvine, California 92714; (949) 551-7151**. Current hours of operation: Monday – Thursday 10 a.m. to 9 p.m.; Friday – Saturday 10 a.m. to 5 p.m.; and Sunday 12 p.m. to 5 p.m.

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

Mr. Joseph Joyce
BRAC Environmental Coordinator
Commanding Officer
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(949) 726-3470

Captain Adrienne Dewey
BRAC Public Affairs Officer
Marine Corps Air Bases,
Western Area (1AS)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(949) 726-3853

Mr. Andrew Bain
Community Involvement Coordinator
Superfund Division
U.S. EPA
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075

Ms. Marsha Mingay
Public Participation Specialist
California EPA
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, CA 90630
(714) 484-5416

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAS El Toro, please complete the coupon below and mail to: Commanding Officer, AC/S, Environment, (1AU), Attn: Mr. Joseph Joyce, IRP Department, MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001.

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

❒ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____ Zip Code _____

Affiliation (optional) _____ Telephone _____

See Inside

PROPOSED PLAN
for Cleanup at Three Shallow Soil Sites

- Environmental Investigation Overview
- Human Health Risk Assessments
- Summary of Site Cleanup Alternatives
- Evaluation of the Preferred Remedy
- Applicable or Relevant and Appropriate Requirements for Cleanup
- Where to Get More Information

Commanding Officer
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001

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MCAS EL TORO - PUBLIC COMMENT FORM
PROPOSED PLAN - CLEANUP OF CONTAMINATED SHALLOW SOIL
SITES 8, 11, AND 12

USE THIS FORM TO WRITE YOUR COMMENTS ***Date:*** _____

(Attach additional pages if you need more space.)

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_____

Name: _____

Address: _____

City: _____

State: _____ **Zip Code:** _____

Telephone: (___) _____

Mail written comments **postmarked no later than June 7, 1999** to: Mr. Joseph Joyce, Base Realignment and Closure (BRAC) Environmental Coordinator, AC/S Environment (1AU), MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001. Comments may also be faxed to (949) 726-6586.

Meeting Evaluation

MCAS EL TORO PUBLIC MEETING – May 26, 1999

Please take a few minutes to complete this evaluation and place it in the box at Table 5. Your input will help shape future meetings and improve our communication with you.

1. How did you learn about this meeting? Please check off ✔.

__ Newspaper ad - which paper? _____
__ Newspaper story - which paper? _____
__ TV/radio - which station? _____
__ Mailer - where did you receive the mailer? _____
__ MCAS El Toro Restoration Advisory Board Meeting?
__ Other _____

2. Please rate the items below using the following rating system by circling the corresponding number:

1- poor, 2- fair, 3- good, 4- very good, 5 - excellent

a.	Were the efforts to announce this meeting satisfactory?	1	2	3	4	5
b.	How did the format of this meeting meet your information needs?	1	2	3	4	5
c.	Were the displays informative?	1	2	3	4	5
d.	Were the handouts helpful?	1	2	3	4	5
e.	Were you able to discuss issues of concern with project staff?	1	2	3	4	5
f.	Were you satisfied with the various methods for providing public comments?	1	2	3	4	5

3. Please make any additional comments or suggestions that will help enhance communication with the community at future public meetings. Use the back of this form if needed.

_____
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Thank you

Internet Access
Environmental Web Sites

Southwest Division Naval Facilities Engineering Command Web Site:

http://www.efdswest.navfac.navy.mil/DEP/ENV/default.ht

Department of Defense - Environmental BRAC Web Site:

www.dtic.mil/environdod/envbrac.html

Defense Environmental Response Task Force Web Site:

www.dtic.mil/environdod/brac/dertf299.html

U.S EPA Superfund Web Site:

www.epa.gov/superfund/index.html

Publications

HOME

The following publications have been produced by the Office of the Assistant Deputy Under Secretary of Defense (Environmental Cleanup).

Some of these documents are in Adobe PDF format. In order to read these files you must Download Adobe Acrobat Reader, if it is not already installed on your computer. Once you have installed Adobe Acrobat Reader, click on the PDF document you wish to view. Then, select the ".exe" (executable) file in the Adobe Acrobat directory when your browser prompts you to select an application for viewing the document. (See page 2, backside.)

Guidance Documents

- BRAC Cleanup Plan Abstract and BCP Abstract Instructions
- BRAC Cleanup Plan (BCP) Guidebook (Fall 95)
- Retention of Environmental Professionals at Closing Installations

Policy Documents

- Environmental Review Process to Obtain the Finding of Suitability Required for Use of Early Transfer Authority for Property Not on the National Priorities List (April 1998) New!
- DoD Finding of Suitability to Transfer for BRAC Property (FOST) Policy Memorandum (June 1994)
- Asbestos, Lead-based Paint (LBP) and Radon Policy Memorandum (October 1994)
- FAST Track Cleanup at Closing Installations (May 1996)
- Implementation of Authority to Transfer Property Before Completing Remediation (September 1996)
- DoD Future Land Use Policy (July 1997)
- Clarification of "Uncontaminated" Environmental Condition of Property at Base Realignment and Closure (BRAC) Installations (October 1996)

Factsheets, Guides, & Tools

- Fact Sheet - Early Transfer Authority (May 1998) New! **Adobe PDF Format**
- Fact Sheet - CERCLA/RCRA Overlap in Environmental Cleanup (May 1998) New! **Adobe PDF Format**
- A Guide to Establishing Institutional Controls at Closing Military Installation , (February 1998) New!
- A Guide to Assessing Reuse and Remedy Alternatives at Closing Military Installations (February 1996)
- BRAC 1995 Quick Reference: Community and Environment (1995)
- BRAC Fast -Track Cleanup Environmental Guide
- Expediting BRAC Cleanups Using CERCLA Removal Authority Fact Sheet (Spring 1997)
- Fact Sheet - Field Guide to FOSL
- Fast Track to FOST A Guide to Determining if Property is Environmentally Suitable for

Transfer (Fall 1996)
- Innovative Solutions Save Time and Money Fact Sheet (Spring 1997)
- Institutional Controls - What They Are and How They Are Used Fact Sheet (Spring 1997)
- Keys to Opening the Door to BRAC Cleanup Team (BCT) Success
- Overview of the Fast-Track Cleanup Program Fact Sheet (Spring 1997)
- Map of Fast-Track Cleanup Installations Under BRAC
- United Efforts Strengthen Cleanups - Partnering Makes a Difference (Spring 1997)
- Updating your RAB to Meet BRAC Needs (June 1996)
- Using CERCLA ARAR Waivers in BRAC Cleanups (Fall 1997)

Reports

- Fast-Track Cleanup; Successes and Challenges, 1993-1995

Presentations

- No presentations are currently available.

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You can also reach this web page from the Adobe home page **www.adobe.com** and then click on the icon "Get Adobe Reader".

MCAS El Toro

Installation Restoration Program

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAS El Toro, please complete the coupon below and mail to: Commanding General, AC/S, Environment, (1AU), Attn: Mr. Joseph Joyce, IRP Department, MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001.

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

❒ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____ Zip Code _____

Affiliation (optional) _____ Telephone _____

Where To Get More Information:

Copies of Remedial Investigation and Feasibility Study reports, other key documents, and additional information relating to environmental cleanup activities at MCAS El Toro are available for public review at the following information repository:

Heritage Park Regional Library
14361 Yale Avenue
Irvine, CA
(949) 551-7151

Current hours:
Monday-Thursday 10am-9pm
Friday-Saturday 10am-5pm
Sunday 12pm-5pm

Mr. Joseph Joyce
BRAC Environmental Coord.
Commanding General
AC/S, Environment (IAU)
MCAS El Toro
PO. Box 95001
Santa Ana, CA 92709-5001
(949) 726-3470 or 726-2840

Lt. Adrienne Dewey
BRAC Public Affairs Officer
Marine Corps Air Bases
Western Area (IAS)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(949) 726-3853

Mr. Andrew Bain
Community Involvement Coordinator
Superfund Division
U.S. EPA
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075

Ms. Marsha Mingay
Public Participation Coordinator
Cal-EPA
Department of Toxic Substances Control
5976 Corporate Avenue
Cypress, CA 90630
(714) 484-5416

NEW MAILING ADDRESS

Effective **June 25, 1999**, all mail correspondence relating to Base Realignment and Closure (BRAC) must be forwarded to:

Base Realignment and Closure
Attn: Mr. Joseph Joyce
P. O. Box 51718
Irvine, CA 92619-1718

Mr. Joseph Joyce, BRAC, Environmental Coordinator will retain the same office on Station at Marine Corps Air Station (MCAS) El Toro, Marine Way, Bldg. 368, 2nd floor. He can reached at the same telephone and fax numbers:

Tele: (949) 726-3470
Fax: (949) 726-6586

Ms. Charly Wiemert, Environmental Program Support Specialist, will remain with Mr. Joyce in Bldg. 368 where the Administrative Record is maintained. She can be reached at the same telephone and fax numbers:

Tele: (949) 726-2840
Fax: (949) 726-6586

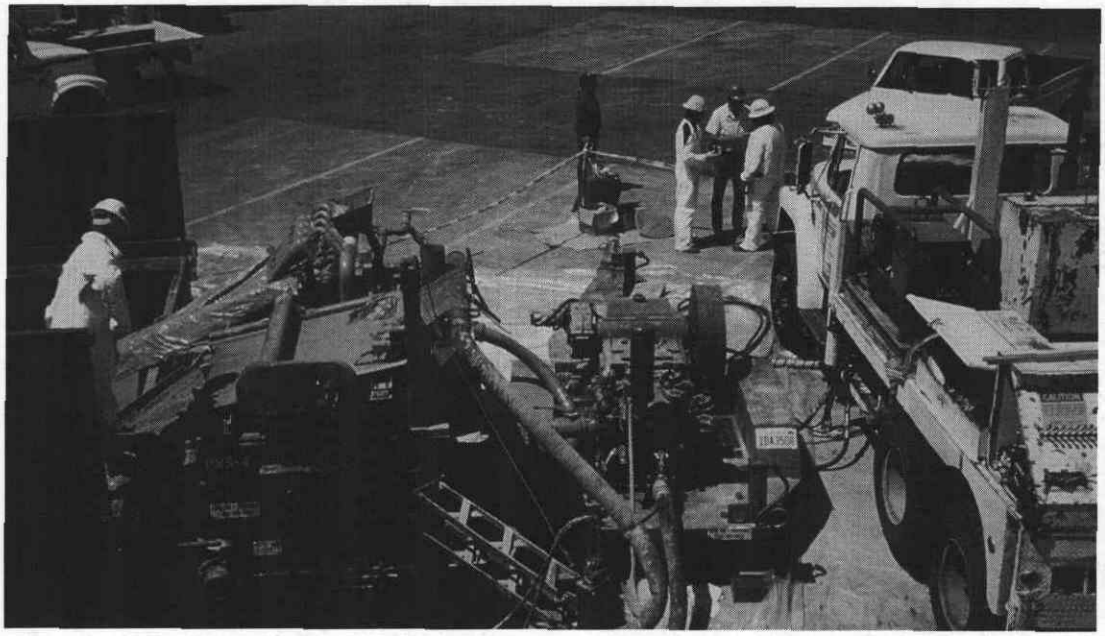
For **overnight mail** (Federal Express, etc.), please address correspondence to:

Mr. Joseph Joyce
Base Realignment and Closure
Marine Corps Air Station El Toro
Marine Way, Bldg. 368, 2nd Floor
Santa Ana, CA 92709-5001

UPDATE OF THE ENVIRONMENTAL INVESTIGATION AT MARINE CORPS AIR STATION EL TORO

Fact Sheet No. 2

December 1993



This fact sheet describes the investigation of possible hazardous substance contamination at Marine Corps Air Station El Toro. The investigation is being conducted under the Department of Defense's Installation Restoration Program. This is the second in a series of fact sheets that will be issued throughout the investigation and remediation process. Future fact sheets will provide updates on the progress and inform you of opportunities for public involvement.

RESULTS OF THE PHASE I REMEDIAL INVESTIGATION ANNOUNCED

Marine Corps Air Station (MCAS) El Toro has completed Phase I of the Remedial Investigation (RI) of 25 potential hazardous waste sites at MCAS El Toro (Station). The purpose of the RI is to locate the source(s) and characterize the extent of contamination at these sites. This fact sheet describes the important findings presented in the Phase I RI Technical Memorandum, which is available for public review at the information repositories listed on page 6 of this fact sheet.

MCAS El Toro is located in Orange County, California and currently serves as the center for Marine Aviation operations on the Pacific Coast. The facility occupies 4,700 acres comprised of hangars, flight-line areas, maintenance areas, fueling facilities, a medical clinic, a golf course, housing areas, and community services. MCAS El Toro lies within the Irvine Groundwater Basin, a subbasin of the Los Angeles Groundwater Basin.

THE REMEDIAL INVESTIGATION

The objectives of the RI were to: 1) obtain initial samples of surface and subsurface soil, sediment, and surface water to assess the presence of contamination, 2) assess if detected contamination presents a risk to human health or the environment, 3) characterize the source and pathways for Volatile Organic Compound (VOC) groundwater contamination, 4) gather preliminary data to establish viable remedial action alternatives, and 5) evaluate whether emergency removal actions are necessary. These goals were achieved by conducting comprehensive field investigations of the surface and subsurface soils, sediments, surface water, and groundwater. Groundwater monitoring wells were installed and sampled to

vide data on the quality of groundwater. Soils were also collected and analyzed to obtain information about contaminants in the surface and subsurface soil and the geology of the contaminated areas. This information was used by MCAS El Toro to determine the extent of contamination and refine the geology and hydro-geology beneath the Station.

From May 1992 to January 1993, ninety-five monitoring wells were installed. The locations of the wells are shown on Figure 1. The wells range in depth from 60 to over 1,000 feet below ground surface (bgs). Over 1,500 samples of surface water, soils, sediments, and groundwater were collected and analyzed. Data from existing monitoring wells was used to provide current and historical water quality data.

Twenty-two sites, including Site 18, the regional groundwater investigation, are included under the RI. These sites are grouped into three Operable Units (OUs). OU-1 comprises the regional VOC groundwater investigation, conducted both on- and off-Station. OU-2 includes the sites considered to be potential source areas for regional groundwater VOC contamination including the four landfill sites (Sites 2, 3, 5, and 17) and the Petroleum Disposal Area, Site 10. The remaining 16 sites are grouped together as OU-3. The primary concerns at OU-3 sites involve potential soil and sediment contamination.

REMEDIAL INVESTIGATION RESULTS

Geology and Hydrogeology

Understanding the geology (the soils and rocks beneath the Station) and hydrogeology (how water moves through the ground) is necessary to calculate how the contamination is moving in the Irvine Groundwater Basin and how it can be contained and remediated. The information from soil borings, monitoring wells, and other studies indicates that the aquifer zones in the Irvine Groundwater Basin are composed primarily of discontinuous layers of clay, silty sands, and fine gravels.

Three general aquifer zones have been identified near the Station: a shallow perched zone, a middle zone or principal zone, and an underlying zone of lower permeability. The shallow aquifer occurs to a depth of about 200 feet bgs. The middle or principal aquifer zone occurs between 200 and 750 feet bgs. This aquifer system is the main water production zone for the Irvine area. The depth to the lower permeability zone ranges from 50 feet in the foothills to over 1,100 feet in the center of Irvine Groundwater Basin. Figure 2 shows the subsurface geology beneath MCAS El Toro.

Groundwater generally flows northwest along the southwest boundary of the Station. However, groundwater flow patterns are influenced by groundwater pumping for agricultural water supply. The direction of flow near these agricultural wells can change seasonally because the supply wells typically are pumped most heavily during the summer months.

Nature and Extent of Contamination

MCAS El Toro sampled and analyzed the groundwater, soils, and sediments for VOCs, semi-volatile organic compounds, metals, petroleum hydrocarbons, polychlorinated biphenyls (PCBs), pesticides, and herbicides. Results from the groundwater analyses were compared against federal and state drinking water standards called Maximum Contaminant Levels (MCLs). The groundwater samples from the investigation at OU-1 (Site 18) contained twenty-four VOCs, of which tricholoethylene (TCE) was the most common. Other VOCs detected are tetrachloroethylene PCE, 1,1-dichlorethylene (1,1-DCE), 1,2-dichloroethene (1,2-DCE), benzene, and carbon tetrachloride.

TCE and PCE were detected primarily in the eastern portion of the Station near the Magazine Road Landfill and in the southwestern portion of the Station below Sites 7, 8, 9, 10, and 22 (see Figure 1). On-Station, this contamination also appears to be confined to the uppermost zones of the groundwater aquifer.

The highest concentration of TCE was found at the Crash Crew Pit No.1 (Site 9), where a groundwater sample contained 2,000 parts per billion (ppb). Five nearby groundwater samples collected from wells between Site 7 and Site 10 had more than 100 ppb of TCE; these wells are located between the Drop Tank Drainage Area No. 2 (Site 7) and the Petroleum Disposal Area (Site 10).

Although the TCE concentrations in the groundwater are high enough to suggest the presence of a nearby source, the limited data on TCE detected in soil does not pinpoint the exact location of the source of the regional groundwater TCE contamination. Neither historical records nor the Phase I RI sampling data suggest a particular site as the source. The TCE source may be the areas downgradient from the Drop Tank Drainage Area No. 2 (Site 7) and upgradient from the Crash Crew Pit No. 1 (Site 9) and the Petroleum Disposal Area (Site 10), where TCE was found in wells. This is consistent with the past usage of this area for industrial maintenance and repair.

Fate and Transport

Once contaminants reach the groundwater, their migration throughout the Irvine Groundwater Basin is controlled primarily by groundwater flow. Groundwater flows in complex patterns around the solid particles underground, although the overall flow may be in a single direction. The flow pattern can result in the spreading (dispersion) of contaminants carried with the groundwater. Physical and chemical reactions between some contaminants and the soil particles retard their rate of movement.

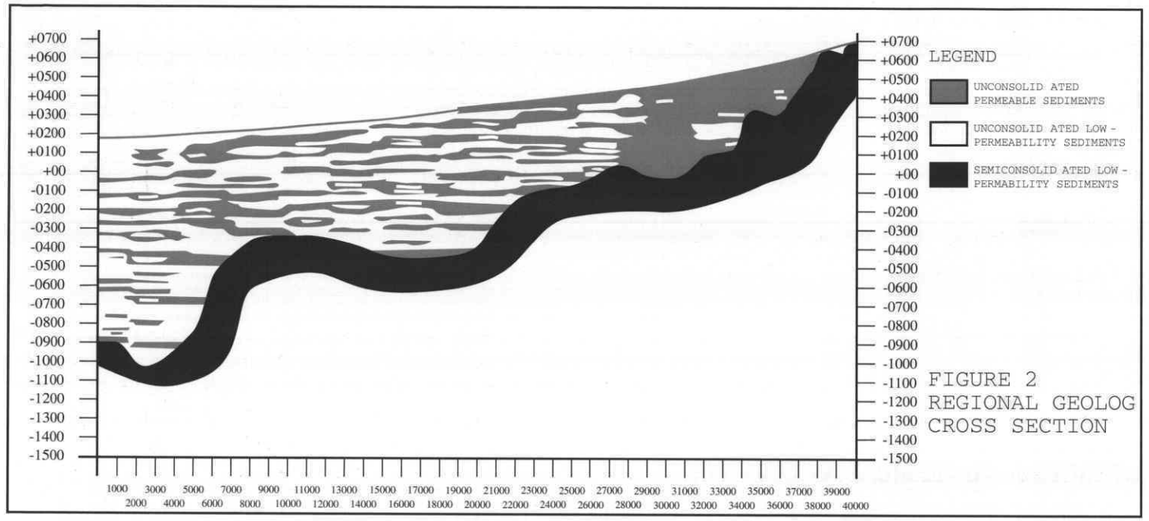


FIGURE 2
REGIONAL GEOLOG
CROSS SECTION

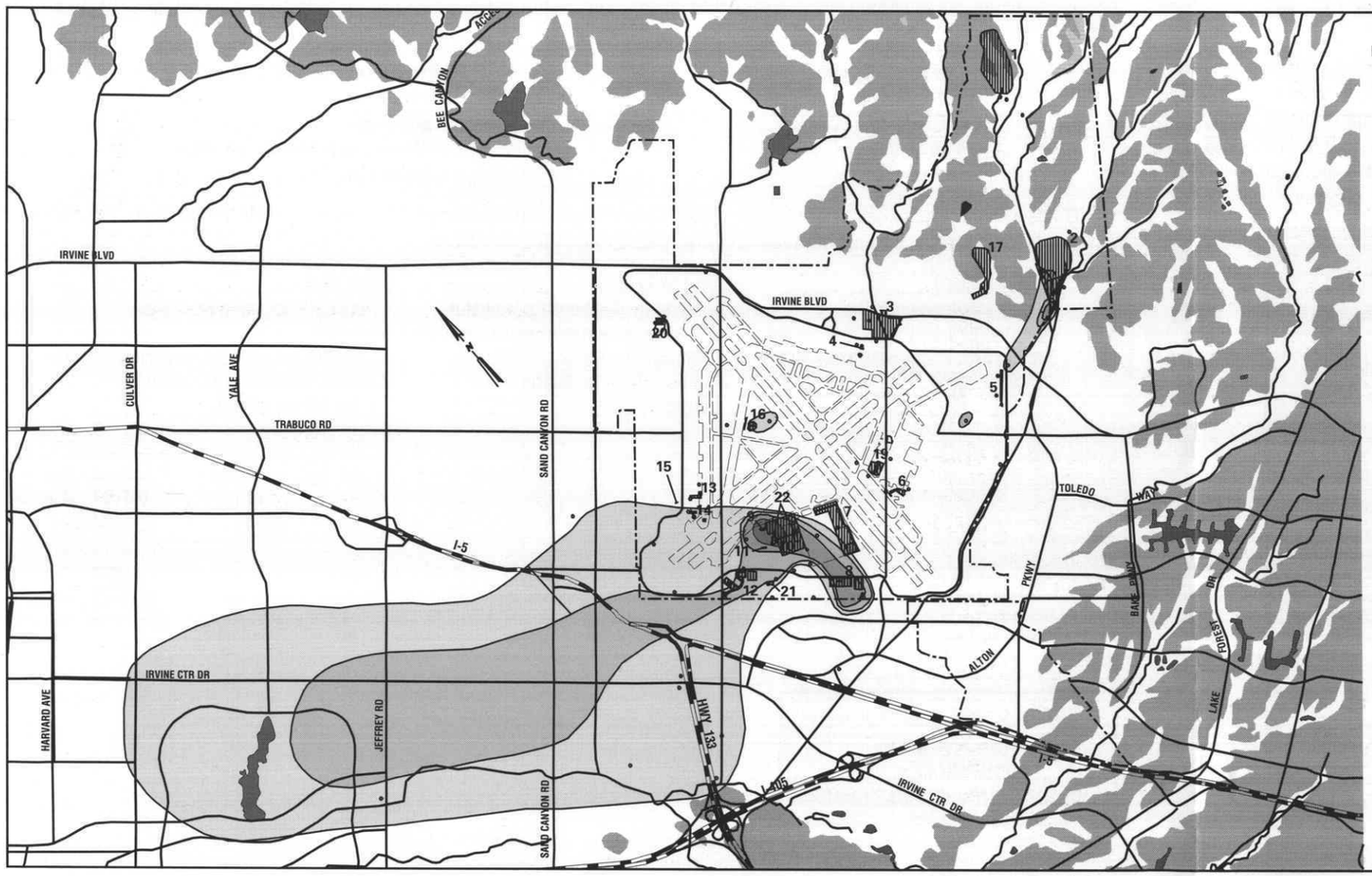


FIGURE 1
TRICHLOROETHYLENE (TCE) CONCENTRATIONS IN GROUNDWATER

SECOND ROUND OF WATER QUALITY MONITORING (UNVALIDATED)
JUNE - AUGUST 1993

The RI estimated the average rates of TCE migration from the estimated groundwater flow velocity and the estimated effects of physical retardation (entrapment on soil particles). Retardation may slow the average TCE migration to velocities approximately one half to one third the velocity of groundwater.

The average groundwater velocity is estimated to be at 620 feet per year (1.7 feet per day) and TCE migration at about ten inches per day. Local pumping conditions accelerate the horizontal and vertical movement of groundwater and the transport of contaminants.

POTENTIAL RISK TO HUMAN HEALTH AND THE ENVIRONMENT

A health risk assessment was done to determine if contamination could pose significant human health risks based on current conditions and on potential future land uses. Results indicated that present conditions do not pose any significant health threats to nearby residents or on-site workers.

If the site were not remediated and residential homes were present on the site, inhalation of soil vapor emissions could pose a slight health threat to residents in the vicinity of the burn pits. The contaminated groundwater would be harmful only in the unlikely event that it was used as a drinking water supply.

FUTURE STUDIES

MCAS El Toro is currently using the results of the Phase I RI to perform a Feasibility Study (FS) to address VOC contamination in both the groundwater and soil in and around the Station. As part of the Phase II RI/FS, MCAS El Toro began a second round of groundwater sampling in June 1993. Samples are being collected from Phase I RI wells and selected Orange County Water District (OCWD) wells. MCAS El Toro has begun to review FS remedial alternatives for OUs-1,-2, and-3. The RI Phase II Work Plan is currently in draft form and is available in the information repositories for public review. Comments on the Work Plan should be submitted by January 13, 1994 to the contacts listed on page 6 of this fact sheet.

MCAS El Toro is negotiating with the OCWD to participate in the Irvine Desalter Project. The Desalter Project was originally designed to remove total dissolved solids, nitrate, and selenium from groundwater in the eastern Irvine Groundwater Basin. The project also has the potential to capture groundwater contamination from MCAS El Toro and to remove VOCs from the pumped groundwater.

BASE CLOSURE

In September 1993, Marine Corps Air Station (MCAS) El Toro was selected by Congress for closure under Round III of the Base Closure and Realignment Act of 1988. Base closure will not impede the progress of the Installation Restoration Program. The environmental studies will continue until the completion of the program.

THE COMMUNITY RELATIONS PROGRAM

The community relations program at MCAS El Toro is designed to inform the community about the environmental remediation process, provide the community with opportunities to participate in the decision-making process, and voice its concerns. Community meetings and public comment periods will be held at critical decision points in the process. During public comment periods, concerns voiced by the community will be considered and responded to in a separate report called the Responsiveness Summary. Public notices

proabout upcoming public comment periods and meetings will be published in the *Orange County Register, Los Angeles Times - Orange County Edition,* and the Station newspaper, *The Flight Jacket.* Fact Sheets will also be issued periodically about the progress of remediation activities.

A Technical Review Committee (TRC) has been established to review and comment on proposed actions for remediation of MCAS El Toro. The TRC includes representatives from U.S. Marine Corps; local and Station communities; the City of Irvine; and local, state, and federal regulatory agencies. The TRC meets as needed to discuss project progress, review reports, and comment on environmental activities. After each TRC meeting, summaries of the meetings are placed in the information repository.

On July 2, 1993, President Clinton announced a five-part program to speed the economic recovery at communities where military bases are slated to close. The Department of Defence (DoD), on September 9, 1993, issued guidance entitled "Fast Track Cleanup at Closing Installations," to implement the President's plan to expedite the cleanup and reuse of these closing military bases.

A key element of the DoD guidance deals with improving public involvement opportunities in the base cleanup program, including the establishment of a Restoration Advisory Board (RAB) at each closing base. The existing Technical Review Committee (TRC) at MCAS El Toro will be converted to a RAB. The RAB will include community members who reflect the diverse interest of the local community. For information on the RAB, please contact:

Christa Mitchell
AC/S Environmental (IAU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
714/726-6607

BACKGROUND

From 1985 to 1986, an investigation was conducted under the Navy Assessment and Control of Installation Pollution Program to locate sites potentially contaminated with hazardous materials from past operations. Seventeen sites were identified based on the results of record searches and employee interviews. While this study was being conducted, the OCWD discovered VOCs in groundwater from an agricultural well about 3,000 feet west of MCAS El Toro. VOCs are solvents that readily evaporate at room temperature and are commonly used in dry cleaning, metal plating, and metal degreasing. OCWD launched its own investigation to determine the source and extent of VOC contamination.

In 1987, the California Regional Water Quality Control Board (RWQCB), Santa Ana Region required the U.S. Marine Corps to conduct a Perimeter Study to investigate the possibility of VOC contamination along the southwestern boundary of MCAS El Toro. Results from the Perimeter Study indicated that VOCs were present in the shallow groundwater near the Station boundary. As a consequence of the findings, an interim groundwater pump and treatment system was installed at the southwestern boundary of the Station. In June 1989, the treatment system began operation.

In June 1988, the U.S. Environmental Protection Agency (U.S. EPA) recommended that MCAS El Toro be placed on the National Priorities List (NPL). The NPL is a list of the top-priority sites in the country contaminated with hazardous substances. MCAS El Toro was recommended for placement on the NPL due to the presence of two VOCs, TCE and PCE, in groundwater at the Station boundary and in agricultural wells to the west of the Station. **Drinking water supply wells have not been affected by VOCs**. TCE and PCE, known cancer-causing compounds, are a concern when found in drinking water supplies because of the potential for frequent exposure through drinking and bathing. MCAS El Toro was included on the NPL on February 22, 1990.

In October 1990, the Navy signed a Federal Facilities Agreement (FFA) with the U.S. EPA, and the RWQCB, and Regional Water Quality Board, the California Department of Toxic Substances control (formerly a program within the California Department of Health Services). The FFA includes specific schedules and milestones in the clean-up process.

TECHNICAL ASSISTANCE GRANTS

The TAG Program provides funds for community groups to hire a technical advisor to assist in understanding technical information. Under this program, one eligible community group at each Superfund site may obtain a grant of up to $50,000.

To be eligible, a group must be incorporated, meet a 20 percent matching funds requirement (in-kind contributions such as donated goods and services are permissible), meet financial and administrative requirements, and prepare a plan for how the TAG will be used based on U.S. EPA's technical work schedule. For more information on the TAG Program, contact:

Dorothy Wilson,
Community Relations Coordinator
U.S. Environmental Protection Agency
75 Hawthorne Street (H-1-1)
San Francisco, CA 94105
1/800/231-3075

MAILING LIST COUPON

If you would like to be on the permanent mailing list to receive future information about environmental remediation activities at MCAS El Toro, please fill out the coupon below and mail it to Chrisa Mitchell, MCAS El Toro, AC/S Environmental 1AU, Santa Ana, CA 92709-5001.

Name _____

Address _____

Telephone number _____

Organization/Affiliation _____

WHERE CAN YOU GET MORE INFORMATION

Copies of all documents and correspondence relating to the environmental remediation are on file and can be reviewed at the following information repositories listed below. The Administrative Record is on file at the Heritage Park Regional Library.

Heritage Park Regional Library
14361 Yale Avenue
Irvine, California 92714
714/551-7151

MCAS El Toro
Library
Building 280
Santa Ana, California 92709-5001
714/726-2569

If you have any questions or comments, would like to be put on the mailing list to receive fact sheets and other information, or would like someone to make a presentation to your group, please contact:

Chrisa Mitchell
AC/S Environmental 1AU
MCAS El Toro
Santa Ana, California 92709-5001
714/726-6607

Dorothy Wilson
Community Relations Coordinator
U.S. Environmental Protection Agency
75 Hawthorne Street (H-1-1)
San Francisco, CA 94105
1/800/231-3075

Claire Best
Public Participation Specialist
Cal-EPA
(Department of Toxic Substances Control)
245 W. Broadway, Suite 350
Long Beach, CA 90802
310/590-4949

Commanding General
ATTN: Chrisa Mitchell
AC/S Environmental 1AU
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001

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INSIDE:
UPDATE ON THE ENVIRONMENTAL INVESTIGATION AT MCAS EL TORO

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UPDATE ON ENVIRONMENTAL RESTORATION PROGRAM AT MARINE CORPS AIR STATION EL TORO

Fact Sheet No. 5 **November 1995**

MCAS El Toro's Building 673-T3 is Certified for Closure

The closing of MCAS El Toro's Building 673-T3 was carried out under provisions of the Resource Conservation and Recovery Act (RCRA). The building, located just off East Marine Way in the eastern corner of the base, is shown in Figure 1.

In general, RCRA requires that structures and facilities in which hazardous wastes were stored obtain a permit from the State of California for this use. When a permitted facility is closed down, it must first be cleansed of potential contamination. Building 673-T3 falls under RCRA's provisions, since it was used as a State of California-permitted hazardous waste storage building from June 1992 to August 1994.

Building 673-T3 stored hazardous wastes such as oil, gasoline, cleaning compounds, paints, fuel filters, old batteries, nitric acid, and lead-based paints. These hazardous wastes, generated by day-to-day base operations, were accumulated in small containers and then transferred to Building 673-T3. At this centralized storage building, wastes were consolidated into larger containers to increase the suitability for recycling and to reduce transportation and disposal costs.

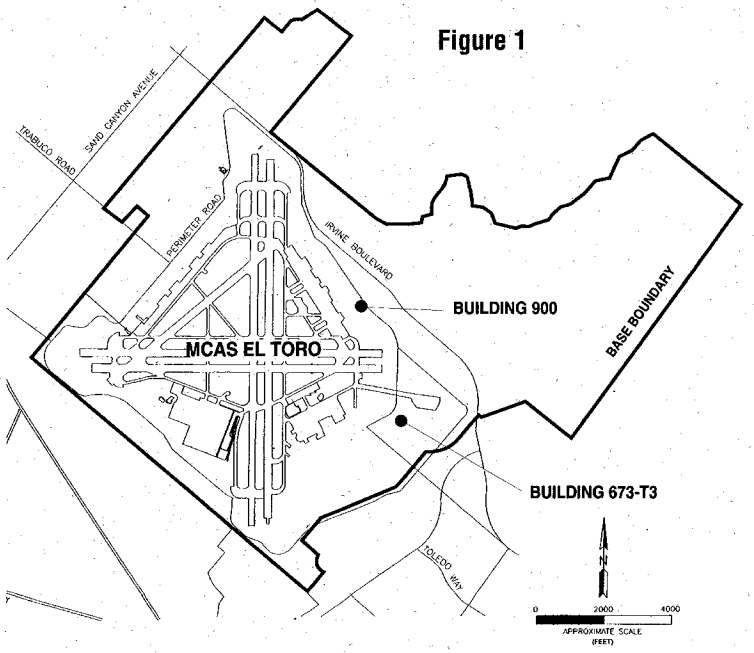
OHM Remediation Services Corporation of Irvine carried out the decontamination and closure of the building during June and July of 1995 under a contract awarded by the Naval Facilities Engineering Command's Southwest Division. Following basewide safety and health procedures, OHM workers:

- used dry vacuuming, scrubbing, and pressure washing to clean the building's floors and walls
- collected and analyzed wash water and soil samples to ensure that contaminants were reduced to levels acceptable to the State of California following the cleaning
- disposed of solid wastes and water generated by the cleaning process at an off-base waste disposal facility.

The cleanup was carried out under the guidance of the California Environmental Protection Agency (Department of Toxic Substances Control), as well as the MCAS El Toro Environment and Safety Department. Ongoing base activities that generate additional waste materials are regulated by RCRA. These wastes are stored less than 90 days at a temporary accumulation area near Building 900 (shown in Figure 1) prior to transfer off-base. Temporary accumulation areas do not require storage permits from the state.

This is the fifth in a series of communications issued during the investigation and cleanup process at Marine Corps Air Station (MCAS) El Toro, California. Future fact sheets will provide updates on further progress and will inform you of opportunities for public involvement.

Figure 1



MCAS El Toro, located along the eastern boundary of the city of Irvine and the northern boundary of the city of Lake Forest, encompasses 4,741 acres of runways, aircraft maintenance and training installations, housing and shopping areas, and other support facilities. The base was first established in 1943 as a Marine Corps pilots fleet operation training base. Seven years later, it was selected for development as a master jet air station and as a permanent center for Marine aviation on the West Coast to support the operations and combat readiness of Pacific Fleet Marine forces. The base will close in 1999 as a result of the 1993 Base Realignment and Closure law.

Where to Get More Information

Copies of documents and correspondence relating to environmental cleanup activities at MCAS El Toro are available for public review at the information repository listed below (please call the library for operating hours):

Heritage Park Regional Library
14361 Yale Avenue
Irvine, CA 92714
(714) 551-7151

If you have questions regarding the environmental program at MCAS El Toro or would like additional information, please contact:

Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environmental (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(714) 726-3470

Ms. Marsha Mingay
Public Participation Specialist
Cal-EPA, Dept. of Toxic
Substances Control
245 W. Broadway, Suite 425
Long Beach, CA 90802-4444
(310) 590-4881

Captain Brad Bartelt
BRAC Public Affairs Officer
Marine Corps Air Bases, Western Area
MCAS El Toro
Santa Ana, CA 92709-5001
(714) 726-3853

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAS El Toro, please fill out the coupon below and mail it to Mr. Joseph Joyce, BRAC Environmental Coordinator, AC/S, Environmental (1AU), MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001.

☐ Add me to the MCAS El Toro Installation Restoration Program mailing list.

☐ Add me to the MCAS El Toro Restoration Advisory Board mailing list so that I can receive board meeting notices, agendas, and minutes.

☐ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____ Zip Code _____

Affiliation (optional) _____ Telephone _____

Commanding General
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environmental (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001

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spectively. The feasibility studies for OU-2 will be completed in the coming months. Meanwhile, interim steps will be implemented to reduce additional erosion of earthen landfill covers and prevent movement of landfill contents.

■ The Remedial Investigation for the OU-3 sites continues; proposed cleanup actions are scheduled for public review in mid-1997.

Underground Storage Tanks

In addition to cleaning up the hazardous waste sites included in the Installation Restoration Program, the environmental project team is addressing regulatory compliance and closure issues related to underground storage tanks. To date, 58 former storage tank sites have been cleaned up, with 108 tanks scheduled for removal by 1997. The Marine Corps/Navy will remove all remaining nonoperational tanks and clean up contaminated soil around the tanks in time for the station's closing in 1999.

Public Involvement

An important part of the Marine Corps/Navy's Installation Restoration Program is building a partnership with the local community. Keeping the public informed about the results of the investigation and seeking public input on cleanup alternatives is key to this partnership. At major technical milestones, the public is invited to provide formal comment on project documents. MCAS El Toro also distributes periodic fact sheets, provides workshops, conducts site tours, and issues press releases to keep the public informed. A Community Relations Plan has been developed that outlines plans for these and other public participation activities.

Restoration Advisory Board

A key component of MCAS El Toro's community relations program is the local Restoration Advisory Board (RAB). This community-based board brings together the diverse interests of the community to discuss the station's Installation Restoration Program. Formed in April 1994, the RAB is guided by two cochairs — one selected by the Marine Corps/Navy, the other selected by community members of the board. The 46-member board meets to review and comment on work plans, environmental and health risk assessments, and alternatives for site cleanup. RAB meetings are open to the public and are held at the Irvine City Hall Conference and Training Center on the last Wednesday of designated months. Currently, RAB meetings are scheduled from 6:30-9:00 pm on May 29, July 31, and August 28 (there is no meeting in June). Interested members of the public are encouraged to call the contacts listed below for additional information about membership and confirmation of meeting dates.

Where to Get More Information

Copies of documents and correspondence relating to environmental cleanup activities at MCAS El Toro are available for public review at this information repository (please call the library for current operating hours): Heritage Park Regional Library, 14361 Yale Avenue, Irvine, California 92714, (714) 551-7151.

If you have questions regarding the environmental program at MCAS El Toro or would like additional information, please contact:

Mr. Joseph Joyce
Base Realignment and Closure
Environmental Coordinator
Commanding General
AC/S, Environmental (1AU)
MCAS El Toro, P.O. Box 95001
Santa Ana, CA 92709-5001
(714) 726-3470

Mr. Fraser Felter
Community Relations Coordinator
U.S. EPA
75 Hawthorne Street (H-1-1)
San Francisco, CA 94105
(800) 231-3075

Captain Brad Bartelt
Commanding General
BRAC Public Affairs Officer
Marine Corps Air Bases, Western Area (1AS)
MCAS El Toro, P.O. Box 95001
Santa Ana, CA 92709-5001
(714) 726-3853

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

❒ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____ Zip Code _____

Affiliation (optional) _____ Telephone _____

Commanding General
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environmental (1AU)
MCAS El Toro
P.O. Box 95001
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UPDATE ON ENVIRONMENTAL RESTORATION PROGRAM AT MARINE CORPS AIR STATION EL TORO

Fact Sheet No. 6 **April 1996**

Looking Back — *Moving Forward*

Introduction

At Marine Corps Air Station (MCAS) El Toro, looking back is a critical step in moving forward. With complete closure and property transferred for public use scheduled for July 1999, the station's land must first be environmentally clean. A team of environmental specialists, including federal and state regulatory agencies, has been working together to complete field studies and review historic chemical use and disposal activities. Now, the environmental cleanup of soil and groundwater is moving steadily forward, preparing additional areas of the station for transfer.

Environmental Background

Soil and groundwater contamination at MCAS El Toro is a result of several past operations that were accepted practices. For example, in the 1940s, aircraft refurbishing included the use of solvents during degreasing activities. Between 1943 and 1955, municipal-type solid waste was generated by station housing (typical residential activities). Early disposal activities included incineration. Later, solid waste disposal was conducted at cut-and-fill landfill sites. Four landfills received solid waste, paint residues, oily wastes, industrial solvents, and incinerator ash. Fire-fighting training exercises were conducted at two burn pit areas and included the use of various flammable liquids such as jet fuel, aviation gasoline, and other waste liquids. Historical rodent and weed control efforts used pesticides and herbicides.

Installation Restoration Program

To investigate and clean up contamination at MCAS El Toro and bases throughout the United States, the Marine Corps and Navy initiated the Installation Restoration Program. The program, established to meet federal and state environmental regulations, examines and puts into use both standard and innovative technologies to control and clean up hazardous wastes, metals, and a variety of other contaminants at such bases.

In addition to being part of the Installation Restoration Program, MCAS El Toro is included on the U.S. Environmental Protection Agency's National Priorities List of hazardous waste sites requiring cleanup. The Marine Corps/Navy and state and federal environmental regulatory agencies work in cooperation as the Base Realignment and Closure Cleanup Team to ensure compliance with environmental laws, rules, and regulations.

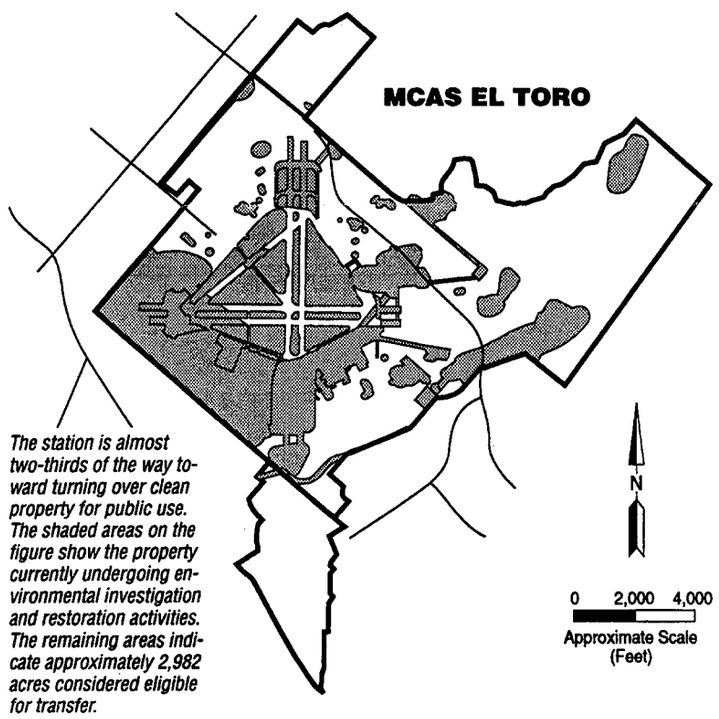
There are currently 24 sites under investigation, and, at several of these sites, treatment of contaminated soil has already begun. For management purposes, these sites have been grouped into three Operable Units (OUs):

- OU-1 addresses groundwater contamination that has migrated off-station.
- OU-2 includes sites with soil contamination that have also contributed to groundwater contamination (sites have been grouped into OU-2A, 2-B, and 2-C for funding and prioritization purposes).
- OU-3 addresses 17 sites not included in either OU-1 or OU-2 that have soil contamination with no impact on groundwater.

Investigation and Cleanup Process

Early in the environmental process, preliminary assessments and inspections were conducted at areas throughout the station that were suspected or known to be contaminated. As the presence of soil or groundwater contamination was confirmed, specific sites around the station entered into a more comprehensive Remedial Investigation process. During the investigation, soil and groundwater samples were collected and analyzed to determine the nature and extent of contamination and the potential to impact public health and the environment. Following the investigation, feasibility studies were performed to examine the investigation results and to evaluate, among other things, the feasibility and costs of various cleanup alternatives. When these studies are complete, they will be made available for public review, allowing the public an opportunity to comment on the proposed remedial (cleanup) alternatives.

At some sites at MCAS El Toro, a fast-track cleanup process may be appropriate to reduce potential threats to public health and the environment and reduce or eliminate the movement of contamination. This process may be used as an interim step to control contamination, prior to implementing longer-term solutions.



The station is almost two-thirds of the way toward turning over clean property for public use. The shaded areas on the figure show the property currently undergoing environmental investigation and restoration activities. The remaining areas indicate approximately 2,982 acres considered eligible for transfer.

Figure 1. Environmental Condition of Property

Cleanup Progress

Investigation and cleanup are at various stages of completion:

- The Feasibility Study for OU-1 (groundwater) is currently being prepared. Among other cleanup alternatives, extraction wells and treatment systems to remove solvent contamination from groundwater are under consideration.
- The Draft Remedial Investigation Reports for OU-2A, 2B, and 2C were completed in February, March, and April 1996, re-

This is the sixth in a series of communications issued during the investigation and cleanup process at MCAS El Toro. This fact sheet has been prepared to inform the local community about the progress of the environmental restoration program now underway. It also describes opportunities for the community to be involved in the program and where those interested may obtain more information.

UPDATE ON ENVIRONMENTAL RESTORATION PROGRAM AT MARINE CORPS AIR STATION EL TORO

Fact Sheet No. 7 **December 1996**

Environmental Investigation Reaches Completion

A comprehensive Remedial Investigation that focused on contamination from volatile organic compounds (VOCs) present in the regional groundwater west of Marine Corps Air Station (MCAS) El Toro and at Installation Restoration Program Site 24 has recently been completed. Site 24 is the the source of the VOC contamination. The investigation represents an integral step in the Marine Corps/Navy's efforts to clean up the Station and support eventual closure and reuse of the property.

The investigation was successful in identifying sources of chemical contamination, specifically VOCs, in the soil and groundwater at areas historically used for aircraft operations and maintenance. VOCs comprise a category of chemicals, mainly solvents, formerly used for aircraft refurbishing and maintenance at the Station. This chemical contamination is a result of waste disposal practices that were used prior to the development of strict environmental regulations in the mid-1970s.

This is the seventh in a series of communications issued during the environmental investigation and cleanup of Marine Corps Air Station (MCAS) El Toro. This fact sheet has been prepared to provide an update of the investigation that was conducted to evaluate chemicals found in regional groundwater. This investigation also determined whether areas of the Station are sources of [illegible]

The key findings of the investigation discussed in this fact sheet are:

- VOCs, primarily the solvent trichlorothylene (TCE), are present in soil and groundwater at Site 24 and are the source of groundwater contamination.
- TCE present in the groundwater forms a plume of contaminated groundwater that extends into the regional groundwater approximately three miles from the source (Site 24).
- TCE concentrations gradually dilute as the contamination moves farther away from the source, and most of the regional groundwater within the boundaries of the plume does not exceed federal and state drinking water standards for TCE.
- Risk assessment results show that the contamination does not present a current threat to human health or the environment because impacted groundwater is not used for domestic purposes.
- Water from irrigation wells used for agriculture is not impacted by the low TCE concentrations in the groundwater.
- Drinking water wells located approximately three miles from the irrigation wells are not affected.
- Current data show that, under existing conditions, the plume will not impact drinking water wells.

Foremost in this investigation process was a detailed analysis of information from soil and groundwater samples to determine the type and extent of potential chemical releases into the environment. The Marine Corps/Navy, U.S. Environmental Protection Agency, and the California Environmental Protection Agency's Department of Toxic Substances Control used this information to conduct health and environmental risk assessments and feasibility studies of potential remedial (cleanup) alternatives. Investigation results will also be used to assess any potential impacts in the future. The overall objective of the Marine Corps/Navy Installation Restoration Program (IRP) is to implement cleanup actions that prevent human exposure to chemicals, minimize the migration (movement) of contaminants, and reduce the levels of contaminants in the soil and groundwater.

To effectively manage the overall cleanup effort at MCAS El Toro, the Marine Corps/Navy organized the IRP sites into Operable Units or OUs. This regulatory term is given to areas where similar cleanup activities will be implemented. OU-1 addresses VOC contamination in the regional groundwater beyond the boundaries of MCAS El Toro. The source area for VOC contamination at Site 24 is part of OU-2A. (See *Installation Restoration Program Process* on page 5 for a summary of OUs at MCAS El Toro.)

Results from the OU-1 and OU-2A studies are documented in the: *Draft Final Operable Unit 1 Interim Remedial Investigation/Feasibility Study Report* (August 1996); the *Draft Final Remedial Investigation Report for the VOC Source Area, Site 24, Operable Unit 2A* (June 1996); and the *Draft Feasibility Study Report for the VOC Source Area, Site 24, Operable Unit 2A* (August 1996). These reports have been submitted to the regulatory agencies and the community-based Restoration Advisory Board for review. They are also available for public review at the Station's Information Repository listed on page 6.

What the Investigation Found

Background

Since 1985, portions of the groundwater beneath the Station and the City of Irvine have been known to contain various chemicals called volatile organic compounds (VOCs). A VOC is an organic, or carbon-containing compound that evaporates easily at room temperature and is commonly used in machinery and parts degreasing, paint stripping, and other industrial operations. At MCAS El Toro, historical activities have included more than 40 years of aircraft maintenance that used solvents, like trichloroethylene (also called TCE), and similar chemicals, that are categorized as VOCs.

Initial studies conducted by the Marine Corps/Navy and the Orange County Water District prior to the comprehensive Remedial Investigation suggested the chemicals were the result of past disposal and waste management policies that were accepted practices prior to the development of environmental regulations in the mid-1970s. Over the years, as the investigation results determined, solvents seeped down through the soil and into the groundwater. The exact sources of these chemicals are unknown but may have included the leakage of solvents from former degreaser pits, underground storage tanks, storm drains, and industrial wastewater lines, as well as runoff from aircraft washing and hazardous waste storage areas.

Investigation Focus

The early portion of the investigation tested soil and groundwater for a variety of wastes but only VOCs were detected. Thus, the main objective of the investigation was to identify specific areas where VOCs are present and determine the extent of this contamination. Information obtained was then used to assess potential risks to human health and the environment and to develop and evaluate cleanup alternatives for areas of contaminated groundwater and soil.

Extensive sampling of soil and groundwater was performed to collect data for characterizing VOCs. The investigation concentrated on Installation Restoration Program (IRP) Site 24, an area with suspected high levels of VOCs in the soil, and the regional groundwater study area beneath Irvine that is bounded by Harvard Avenue, Trabuco Road, and the San Diego Freeway (I-405). These areas are also referred to as Operable Units or OUs. OU-1 consists of the regional groundwater study area and OU-2A comprises Site 24 (see Figure 1 map on page 3).

Numerous soil gas, soil, and groundwater samples were collected and analyzed, indicating where chemicals are present. Groundwater samples were collected at different depths from newly constructed monitoring wells and other pre-existing wells inside and outside the Station boundary. Analysis of groundwater samples provided information needed for determining where and to what extent VOCs are present in groundwater.

For each sample, the measured concentration (or level) of the detected chemical was entered into a computerized database. These concentrations were later compared to federal and state levels considered acceptable for drinking water. The information was then mapped as chemical plumes in the groundwater and also used to determine potential risks to human health and the environment. Detailed maps and lists of the chemicals and their detected levels can be found in the OU-1 and OU-2A Remedial Investigation Reports listed on page 4.

VOCs Originate at Site 24

The Remedial Investigation determined that VOC contamination, primarily the industrial solvent TCE, is present in the soil and groundwater at Site 24. The site encompasses approximately 200 acres and contains two large aircraft hangars—Buildings 296 and 297—as well as several smaller structures used for aircraft and vehicle maintenance and repair. Data confirm that soil containing TCE is present below the aircraft hangars and extends vertically to the groundwater directly beneath the buildings. It is estimated that 6,000 pounds of TCE are contained in the soil in what is considered the primary VOC source area beneath aircraft hangar Buildings 296 and 297. Analysis of groundwater at Site 24 showed that TCE contamination originates in the area of the aircraft hangars. It is also estimated that there are about 1,700 pounds of TCE in the shallow groundwater beneath Site 24. From here, the solvent migrated through the soil into the groundwater below Site 24 and to where it was detected in the regional groundwater west of the Station.

Site 24 Affects Regional Groundwater

The TCE that originates beneath the aircraft hangar area at Site 24 serves as the chemical source and starting point for the contamination that is present in the regional groundwater. However, TCE contamination does not affect human health because water from the affected area does not serve as a source of drinking water. The TCE present forms a plume that is gradually diluted as it moves farther away from the source area. The plume extends approximately three miles west from the Station and blends gradually into the regional groundwater. (A plume is defined as a single area of groundwater contamination extending from a distinct source.) Other VOCs were found as well, but only within the main TCE plume. Figure 1 on page 3 shows the TCE plume that originates at Site 24 and extends to the regional groundwater.

Evaluation of the data focused on the extent to which the TCE plume exists in both shallower groundwater (80 to 110 feet below the ground surface) and in the deeper groundwater (200 to 450 feet deep) that makes up the area's principal aquifer. (An aquifer is an underground, water-bearing layer in rock, gravel, or sand that will yield a quantity of water.) Within the Station's boundaries, concentrations of TCE were generally limited to shallow groundwater, with the highest concentrations found beneath Site 24. In shallow groundwater outside the Station, water quality in most cases is better than the federal and state drinking water standard that allows up to five parts per billion (ppb) of TCE. In the principal aquifer (deep aquifer), TCE concentrations ranged from barely detectable to above the limit allowed for drinking water. However, at the western edge of the plume beneath Culver Drive, about three miles west of the Station, in regard to TCE, water quality is better than the standards

for drinking water. Figure 2 on page 4 shows how TCE migrates from Site 24 into both the shallow groundwater and the principal aquifer.

The portion of the principal aquifer that lies within the OU-1 regional groundwater study area is used as a production aquifer for irrigation and reclaimed water supplies by both the Irvine Ranch and the Orange County water districts. As required by regulatory agencies, the federal drinking water standard is used to compare water quality at these locations, even though the water extracted from this portion of the aquifer is not used for domestic purposes.

Water extracted from irrigation wells for agricultural use at the edge of the plume near Culver Drive is a blend of contaminated water and clean water that complies with the federal drinking water standards for TCE. No irrigation wells have been closed and the plume does not impact drinking water wells located approximately three miles away from the irrigation wells. Investigation results indicate that the agricultural wells near the Station boundary may contribute to the migration of the plume by drawing contaminated groundwater from MCAS El Toro. Agricultural wells further to the west contain the chemicals at the plume's western edge. Current data show that, under existing conditions, the plume will not impact drinking water wells.

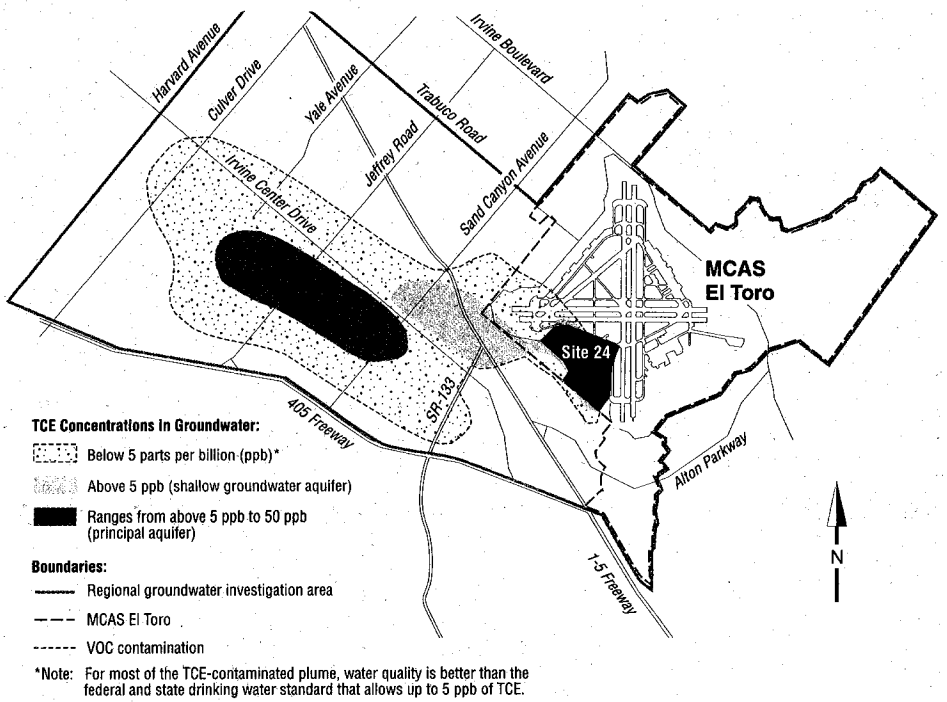


Figure 1 Site Map

Human Health and Ecological Risk Assessments

Human health and ecological risk assessments conducted for Site 24 and the regional groundwater study area confirm that VOCs in soil and groundwater currently pose no threat to human health and the environment. The assessments also helped evaluate what impact these chemicals might have on future property uses.

Conservative assumptions, combined with the actual field data, were used in the risk assessment to provide a factor of safety in the risk being calculated. For example, the assessment assumes that people are living on the site and that exposure occurs 24 hours a day, 350 days a year, for a 30-year period. In this way, the conditions used to calculate the exposure conservatively estimate the potential risks. For both Site 24 and the regional groundwater area, risks were evaluated for both cancer-causing (carcinogenic) and non-cancer-causing (noncarcinogenic) chemicals. At the same time, an ecological risk assessment was conducted to evaluate the potential effects of these chemicals on plants and animals.

What the Risk Assessments Concluded

The risk assessments concluded that no significant risk to human health exists at this time because the impacted groundwater is not presently being used for domestic purposes. The U.S. Environmental Protection Agency and the California Environmental Protection Agency's Department of Toxic Substances Control and Regional Water Quality Control Board concur with the Marine Corps/Navy that use of the impacted water, when extracted and used for irrigation, poses no significant risk to human health or the environment. The small amount of VOCs that may be present readily evaporate into the air during irrigation and are not absorbed by the crops. Agricultural workers are also not affected.

The assessments also concluded that the continued release of VOCs from subsurface soil to groundwater only presents a potential risk to human health if the groundwater is being used entirely for drinking purposes, a scenario that currently does not occur. Wells at Site 24 are not used for domestic or agricultural purposes but only to monitor groundwater conditions. VOC concentrations in the shallow soil (upper 10 feet) are low and exposure through inhalation, ingestion, or contact with the skin does not pose any significant risk to human health. Most of the soil in this area is under the paved tarmac and parking areas.

The Marine Corps/Navy continues to monitor groundwater conditions at Site 24 and in the regional groundwater area to identify if conditions change. Detailed information on the risk assessments is presented in the OU-1 and OU-2A Remedial Investigation Reports (see page 4).

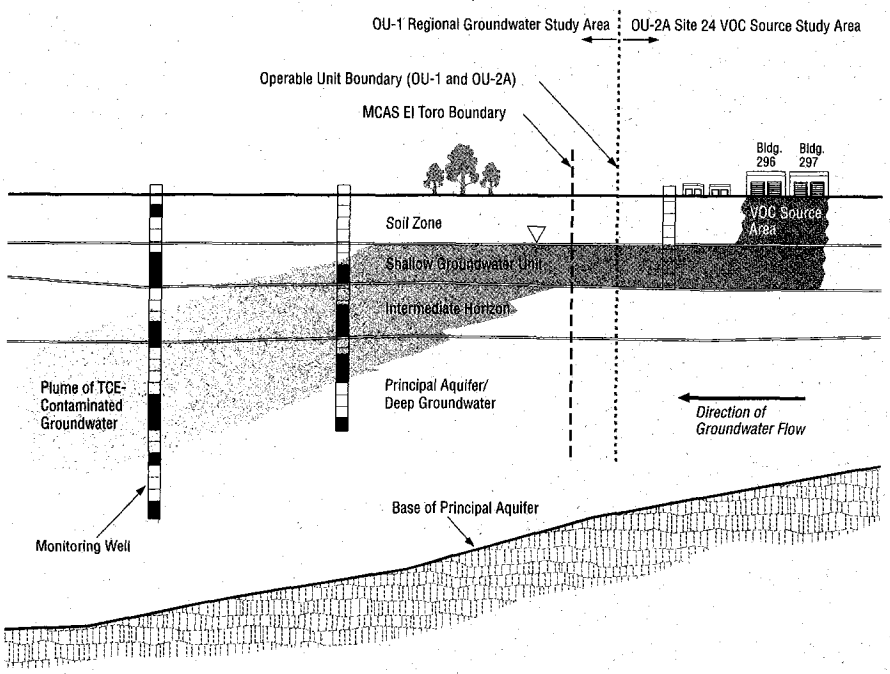


Figure 2 Subsurface Contamination

A Look at Some Cleanup Alternatives

Feasibility Studies have been conducted to develop and evaluate alternatives for controlling and cleaning up the VOCs in both the regional groundwater and beneath Site 24. Possible remedial alternatives were compared and evaluated for such factors as protection of public health and the environment, technical feasibility, and cost. Initial drafts of the Feasibility Study Reports were provided to the regulatory agencies and to the Restoration Advisory Board during the summer of 1996 for review and comment.

Site 24 Cleanup Alternatives

Detailed evaluations were performed for six remedial alternatives. Each of the alternatives addressed the cleanup of VOC contamination in the soil, in shallow groundwater, and in the deep principal aquifer directly beneath Site 24 and—to some extent—in the nearby vicinity. Generally, each alternative was developed to extract and treat contaminated groundwater from the shallow area to limit further migration of chemicals into the principal aquifer. Some of the alternatives include the reinjection of the treated water back into the shallow groundwater. All the alternatives would also use soil vapor extraction technology or other methods to remove TCE from contaminated soil above the shallow groundwater.

Regional Groundwater Alternatives

A draft Interim-Action Feasibility Study (IAFS) that originally examined 12 potential alternatives for controlling and cleaning up regional groundwater contamination was completed in 1995. The draft IAFS itself is described as "interim" since it only focuses on VOC contamination in regional groundwater. However, any alternatives that are eventually adopted by the Marine Corps/Navy for implementation are intended to be final actions. Included among the alternatives singled out for a closer look were groundwater extraction, treatment of VOCs, and groundwater reinjection. After review of and comment on the draft IAFS by the regulatory agencies, three new alternatives were developed, evaluated, and included in the Addendum to the draft final IAFS. The new alternatives incorporate some "natural attenuation" to remediate groundwater. The natural processes of biodegradation, dilution, dispersion, and adsorption, known collectively as natural attenuation, have been shown to be effective in cleaning up large, diluted plumes of contaminated groundwater containing solvents such as TCE. The regulatory agencies recently submitted review comments on the new Feasibility Study alternatives.

Next Step: Proposed Plans and Public Comment

The next step in the environmental restoration process involves the development of Proposed Plans that summarize the narrowed-down field of cleanup alternatives, and present the Marine Corps/Navy's preferred alternative for the regional groundwater (OU-1) and for Site 24 (OU-2A). The Proposed Plans, provided in fact sheet format, will present to the public how the alternatives rate when evaluated against the U.S. Environmental Protection Agency's criteria for environmental cleanup. Summaries of the specific cleanup technologies considered in the Feasibility Studies are also included in the Proposed Plans.

In the selection of any final cleanup remedy, public comment will be considered in the decision-making process. Because of this, the Proposed Plans for OU-1 and OU-2A, along with the draft final Remedial Investigation and Feasibility Study Reports, will be made available for review during a public comment period scheduled for summer of 1997. After the consideration of public comments on the proposed alternatives, the Marine Corps/Navy will issue Records of Decision that formally document the remedial actions planned for these areas. A response to all significant public comments (called a Responsiveness Summary) will be included in the Records of Decision.

An Opportunity to See Project Documents

The Remedial Investigation Reports (which include the risk assessments) and Feasibility Study Reports are available for public review at the Station's Information Repository (see page 6). For the regional groundwater (OU-1) and the VOC source area at Site 24 (OU-2A), the key documents include:

- *Draft Final Remedial Investigation/Interim-Action Feasibility Study Report and Associated Addendum for Operable Unit 1* (August 1996).
- *Draft Final Remedial Investigation Report for the VOC Source Area, Site 24, Operable Unit 2A* (June 1996).
- *Draft Feasibility Study Report for the VOC Source Area, Site 24, Operable Unit 2A* (August 1996).

Installation Restoration Program Helps Drive Cleanup Activity

At MCAS El Toro, and at other military installations in the United States, the Department of Defense is cleaning up its hazardous waste sites according to the Installation Restoration Program (IRP). Designed to protect public health and the environment, this program provides a structure for the Marine Corps/Navy to identify, investigate, and clean up petroleum fuels, metals, and a variety of chemicals that resulted from past operations that were at one time acceptable practice. This step-by-step process is shown below.

Environmental regulatory agencies, such as the U.S. Environmental Protection Agency and the California Environmental Protection Agency's Department of Toxic Substances Control and Regional Water Quality Control Board, are actively working with the Marine Corps/Navy to review all investigation results and proposed cleanup plans and assure that rigorous state and federal cleanup standards are met.

To manage the overall cleanup effort at MCAS El Toro, the Marine Corps/Navy organized its IRP sites into "Operable Units" or "OUs." This term is used to group together sites at a facility that share common characteristics and therefore may be studied and cleaned up together. Descriptions of the OUs at MCAS El Toro are presented below.

- **OU-1** addresses regional groundwater contamination including a trichloroethylene (TCE) plume in groundwater that extends three miles west of the Station.
- **OU-2A** includes sites with soil contamination that are potential sources of regional groundwater contamination, specifically Site 24, the source area for volatile organic compound (VOC) contamination in the regional groundwater. OU-2A also includes Site 25, which consists of the four major drainage channels at the Station.
- **OU-2B** and **OU-2C** are landfill sites that contain a variety of waste materials. Control remedies that are applied at municipal landfills are being considered for these sites.
- **OU-3** includes the remaining sites with surface soil contamination, the majority of which have no anticipated impact on groundwater.

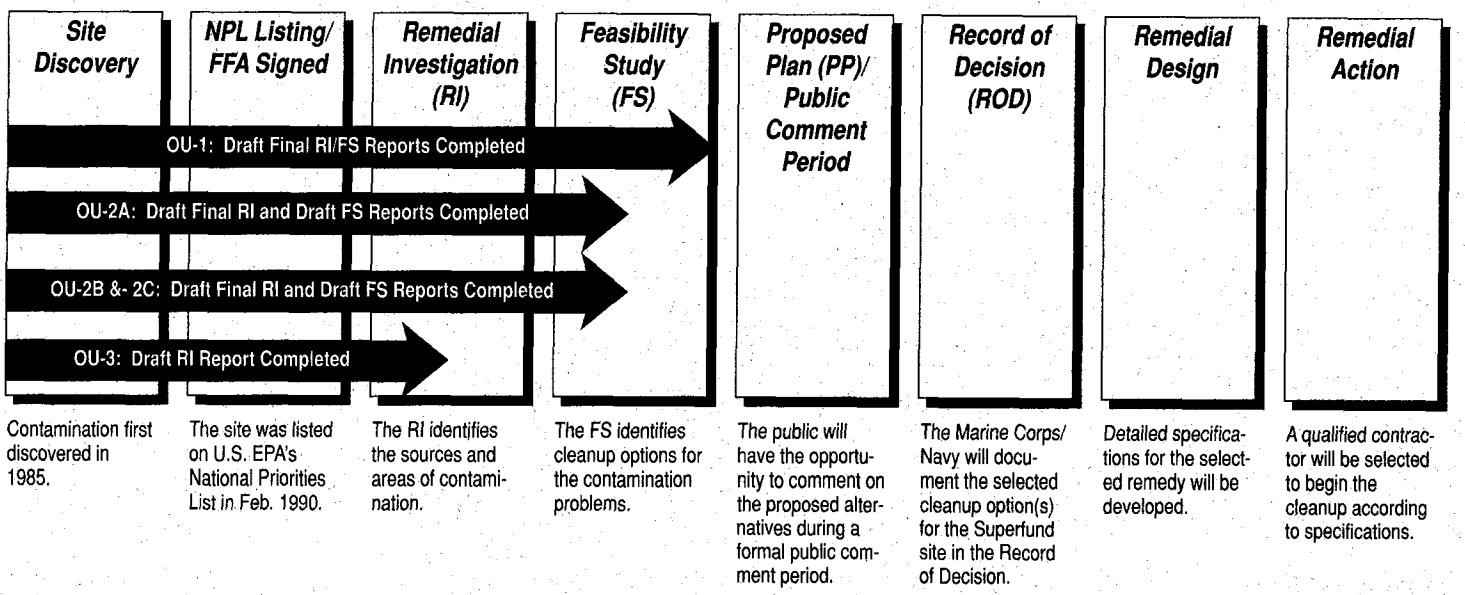


Figure 3 MCAS El Toro – Installation Restoration Program Process

Local Advisory Board Paves Way for Public Participation

With complete closure of MCAS El Toro scheduled for July 1999, the public is playing a vital role in the environmental cleanup program. Through the community-based Restoration Advisory Board (RAB), members of the public meet regularly and participate in reviewing and commenting on investigation reports and feasibility studies. The RAB has been active since April 1994, bringing together a cross section of community interests to discuss cleanup issues. Board members also participate on various subcommittees that focus on reviewing specific reports.

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration at MCAS El Toro, complete the coupon below and mail to: Commanding General, AC/S Environment (1AU), MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001.

☐ Add me to the MCAS El Toro Installation Restoration Program mailing list.

☐ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____

Affiliation (optional) _____ Telephone _____

Where to Get More Information

Copies of Remedial Investigation and Feasibility Study Reports, other key documents, and additional information relating to environmental cleanup activities at MCAS El Toro are available for public review at this information repository: **Heritage Park Regional Library, 14361 Yale Avenue, Irvine, California 92714; (714) 551-7151 (please call for current operating hours).**

If you have questions regarding the environmental program at MCAS El Toro or would like additional information, please contact:

Mr. Joseph Joyce
BRAC Environmental Coord.
Commanding General
AC/S, Environment (1AU)
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Ms. Marsha Mingay
Public Participation Coord.
Cal-EPA
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Commanding General
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001

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PROPOSED PLAN
for Marine Corps Air Station El Toro

June 1997

Marine Corps Proposes No Further Action at Eleven Sites

This Proposed Plan provides an overview of the environmental investigation results for Installation Restoration Program (IRP) Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, 22, and 25 at MCAS El Toro. It also presents the Marine Corps' proposal for no cleanup action for these eleven IRP sites and a discussion of the basis for this proposal. We invite you to review and give us your input on this Plan during the official public comment period from June 16 to August 16, 1997. You may submit your written comments to us and we will consider them in reaching our final cleanup decision. (Please see box below for details.)

The determination that no cleanup action is necessary at these eleven sites is based on the results of extensive field investigations, laboratory analyses, and a thorough assessment of potential human health risks at each location and of potential ecological risks at Site 25. The MCAS El Toro Base Realignment and Closure (BRAC) Cleanup Team, made up of representatives from the Marine Corps, U.S. Environmental Protection Agency (U.S. EPA), and California Environmental Protection Agency (Cal-EPA), has carefully evaluated the remedial investigation results. The team has determined that no cleanup action is necessary at the sites since the risk levels fall within U.S. EPA's range of acceptable risks for protection of human health and the environment. The reports describing the field investigations, laboratory analyses, and risk assessments are part of the MCAS El Toro IRP Administrative Record, which is available to the public at the Heritage Park Regional Library in Irvine.

No Further Action Proposal

Since there are no significant human health risks for Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, 22, and 25, the Marine Corps is proposing that no additional investigation or cleanup action be taken at these sites. The Marine Corps also considered all of the investigation and historical information from these sites in making this proposal (this information comprises the Administrative Record for these sites). Federal and state environmental laws and regulations, including the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), state that a No Further Action decision is warranted for sites that do not pose a current or potential risk to human health or the environment. Under the No Further Action determination, the Marine Corps would not require any land use restrictions for the sites.

Opportunities for Community Involvement

Public Meeting

Thursday, July 31, 1997 4:30-8:30 p.m.

Irvine City Hall, Conference and Training Center, Harvard at Alton Parkway, Irvine

You are invited to this meeting to discuss the information presented in this Proposed Plan for no cleanup action at Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, 22, and 25 at MCAS El Toro. Marine Corps representatives will provide visual displays and information on the environmental investigations and the no cleanup action proposal.

Public Comment Period

June 16 – August 16, 1997

We encourage you to comment on this Proposed Plan and other site-related documents during the 60-day public comment period. Please note that the standard 30-day comment period has been extended to 60 days at the request of the public. Comments may be submitted orally or in writing at the public meeting, or you can mail written comments **postmarked no later than August 16, 1997** to: Mr. Joseph Joyce, Base Realignment and Closure (BRAC) Environmental Coordinator, AC/S Environment (1AU), *MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001* or *MCAS El Toro, Building T-2010, Santa Ana, CA 92709-5001.* Comments may also be faxed to (714) 726-6586. Public comments received during this period will be considered in the final determination for the sites.

Environmental Investigation Summary

This Proposed Plan presents a brief description of the conditions at each of the eleven sites, the results of the human health risk assessment for each site, and the ecological risk assessment at Site 25. (See Figure 1, insert page, for the location of the eleven sites.) The sites were identified through a series of environmental studies and evaluations that examined past use of hazardous substances at MCAS El Toro, including fuels, oils, and solvents. Waste management practices at these sites were changed many years ago. Groundwater is generally not encountered until a depth of 100 feet or more below the ground surface; therefore it has not been impacted at each site.

To better understand the site-specific descriptions and risk values presented below, please read the Human Health and Ecological Risk Assessment discussion in the shaded box to the right.

The human health risk values used to determine no cleanup action for the sites addressed in this Proposed Plan were based on the assumption of future ***residential use*** *of the property for a period of 30 years. This assumption was used by the Marine Corps to provide a conservative estimate of potential future risk.*

It was determined that there are no significant surface water quality or environmental impacts resulting from past operations at the eleven sites. Habitat surveys were performed at the sites and it was concluded that there are no suitable wildlife habitats present at the sites with the exception of Site 25. An ecological risk assessment at Site 25 was conducted, and the results are summarized below.

Throughout this Proposed Plan, the term background levels (of chemicals) is used. It refers to the naturally occurring range of chemicals that are found in the native soil both on and off MCAS El Toro property (in the vicinity of the Station). These background levels have not been impacted by Station operations.

For the definitions of chemical terms discussed in this Proposed Plan, see the enclosed insert page.

Site 4 – Ferrocene Spill Area

This site is comprised of a fuel-stained area and a drainage ditch with a catch basin. Five gallons of a liquid containing an aircraft fuel additive called "ferrocene" were spilled onto the ground in 1983. Soil contaminants reported at the site include volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH), pesticides, and metals.

Based on the risk calculations, this site does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 4 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.4, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range of manganese in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

Human Health and Ecological Risk Assessments

Human health risk assessments for all the sites, and an ecological risk assessment for Site 25, were conducted to determine whether environmental cleanup was necessary. The ecological risk assessment conducted at Site 25 was performed because of the presence of suitable wildlife habitats along parts of the drainages. For an overview and results of the ecological risk assessment for Site 25, please see the site-specific writeup on page 5.

Identifying Human Health Exposure Pathways

To assess the potential human health risks, information on the types and amounts of chemicals at ground surface and in the soil beneath the sites was collected during the environmental field investigations. The next step identified possible exposure pathways, which show how people could come into contact with the chemicals. Possible exposure pathways examined for the chemicals at the surface and in shallow soil at the eleven sites were ingestion of soil, inhalation of vapors and dust, and direct contact with the skin. The risk assessment assumes **people are living at a site for a period of 30 years.** Finally, the possible health effects from exposure to chemicals were evaluated and combined with other information to estimate potential health risks if the chemicals remain at the sites.

Are the conditions at the sites protective of human health and the environment?

Yes. The human health risk assessments, and the ecological risk assessment at Site 25, determined that the type and the concentrations, or amount of chemicals found at the eleven sites, do not pose a significant risk to any potential future resident living on the sites or to wildlife at Site 25.

Estimating Human Health Risks

The health risks associated with exposure to and toxicity of chemicals were estimated for cancer-causing (carcinogenic) and noncancer-causing (noncarcinogenic) effects. The cancer risk is expressed in terms of the **chances of humans contracting cancer as a result of being exposed to the various chemicals from the sites for 30 years.**

In a human health risk assessment, U.S. EPA guidance requires that the Marine Corps look at various ways the public could be exposed to chemicals and the risks associated with exposures to the chemicals. For carcinogens, potential risk is expressed in terms of the probability of an individual contracting cancer (cancer risk level). This probability is expressed as the number of additional cancer cases that would occur within a population, and it is calculated assuming an individual has an extended exposure to the chemicals. The term "additional cancer cases" refers to those cancer cases that could occur in addition to the cases that would otherwise occur in a population not exposed to site chemicals. To manage carcinogenic risk and protect public health, the U.S. EPA has set the following protective risk ranges: greater than one additional cancer case in a population of 10,000 is unacceptable; one additional cancer case in a population of 10,000 to one additional cancer case in a population of 1,000,000 is generally acceptable; and less than one cancer case in a population of 1,000,000 is acceptable.

For noncarcinogenic risks, also expressed as a hazard index, the U.S. EPA considers a hazard index of less than 1 as protective of human health. A hazard index of 1 indicates that lifetime exposure to the chemical(s) has limited potential for causing adverse health effects (e.g., respiratory distress). **A site with a hazard index greater than 1 does not by itself require cleanup action** but indicates the need to take into account the types of chemicals, historical activities, and potential toxic effects of the chemicals of potential concern.

Finally, estimates of potential carcinogenic and noncarcinogenic risks are based on conservative assumptions. These assumptions provide for a margin of safety to protect the public and lead to an overestimation of potential risk. Calculated risk levels therefore are an indication of potential risks, and not an absolute prediction that risk will occur at a certain level.

Risk Assessment Results

Based on the results of soil investigations, surface water tests, and human health risk assessments, the eleven IRP sites pose no significant carcinogenic risk to possible future residents.

The health risk values used to make this determination were based on the assumption of future **residential use** of the property.

The hazard indexes for most of the sites were determined to be less than or equal to 1.4 under the residential land use scenario. The exceptions are Site 10 and Site 21. Upon closer examination, the higher hazard indexes are primarily due to the presence of manganese, a naturally occurring metal in the soil. Additionally, it was determined that manganese levels at the sites fall within the naturally occurring range for this metal (background level). Manganese concentrations reflect the natural variation in the concentration of this metal both on and off the Station, and not contamination resulting from past activities at the Station. The Marine Corps has determined, therefore, that a hazard index greater than 1 is acceptable at these eleven sites. The regulatory agencies, U.S. EPA and Cal-EPA, after review of the field data and risk assessments calculations, concur with the Marine Corps' determination.

The Marine Corps is currently monitoring the stormwater in the Site 25 drainages and is complying with its stormwater runoff discharge permit from the Santa Ana Regional Water Quality Control Board. As a result, the Marine Corps is proposing no cleanup action be taken at Site 25.

The detailed results of the risk assessments are presented in reports currently available for public review in the Information Repository. For additional information on these reports, please see the sidebar on the enclosed insert page.

Are no further action decisions warranted at the sites?

Yes. Because the relatively low levels of contamination are considered safe by Federal guidelines. Therefore, cleanup actions are not warranted.

Conclusions

On the basis of the results of the human health risk assessment for each site, as well as the ecological risk assessment for Site 25, the Marine Corps has determined that current conditions are protective of human health and the environment, and propose that no cleanup action is necessary. The U.S. EPA and Cal-EPA have reviewed the risk assessment results and they concur with this proposal.

Site 6 – Drop Tank Area No. 1

The site is comprised of a wash area, an adjacent drainage ditch with a catch basin, and an area where jet fuel tanks were stored after they were washed. Between 1969 and 1983, water used to rinse out the fuel tanks flowed across a concrete pad and onto an adjacent vegetated area. Soil contaminants reported at the site include VOCs, SVOCs, TPH, and metals.

Based on the risk calculations, this site does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 2 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.4, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the naturally occurring variation of manganese in the vicinity of MCAS El Toro. Therefore the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

Site 9 – Crash Crew Pit No. 1

The site was used for firefighter training between 1965 and 1971, when liquids were ignited and extinguished in unlined pits for fire and rescue training purposes. Soil contaminants reported at the site include VOCs, SVOCs, TPH, and metals.

Based on the risk calculations, this site does not pose a significant human health risk. The cancer risk for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 2 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.4, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range of manganese in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risks at this site are acceptable, and no cleanup action is proposed.

Site 10 – Petroleum Disposal Area

At this site, used crankcase oil, antifreeze, hydraulic and transmission fluids, and solvents were temporarily stored and applied to the ground for local dust control. Soil contaminants reported at the site include VOCs, SVOCs, TPH, and metals.

Based on the risk calculations, the site does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 4 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 2.2, is from manganese and arsenic. There is no documented use of manganese or arsenic at the site, and the presence of arsenic may indicate its use for agricultural or pest-control purposes prior to the construction and expansion of the Station. Since the levels of manganese and arsenic in soil are within the background range of these metals in the vicinity of MCAS El Toro, the Marine Corps has concluded that the noncarcinogenic risk posed by manganese and arsenic at the site is acceptable. Therefore, no cleanup action is proposed.

Site 13 – Oil Change Area

This site was a vehicle maintenance area where used crankcase oil was drained onto the ground. Chemicals reported in the soil include VOCs, SVOCs, TPH, metals, and pesticides.

The results of the risk calculations indicate that this site does not pose a significant human health risk. The cancer risk for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed for this site. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 3 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.1, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range of manganese in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

Site 15 – Suspended Fuel Tank Area

The site included a hazardous waste storage area, and a wash rack that was used for heavy equipment maintenance. Soil contaminants reported at the site include polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), pesticides, TPH, and metals.

As with the other sites, Site 15 does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, are less than 1 additional case per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.1, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

Site 19 – Aircraft Expeditionary Refueling Site

Between 1964 and 1986, this site was used to store fuel bladders (portable fuel tanks). In 1986, one bladder ruptured spilling jet fuel onto the ground. As a spill response, the impacted soil was excavated and disposed of at a permitted off-Station facility. Soil contaminants included VOCs, SVOCs, TPH, and metals.

Because the impacted soil has been removed, this site does not represent a significant human health risk. The cancer risk calculated for this site, after the soil was removed, is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 2 additional cases per 100,000 people.

The hazard index is estimated to be less than 1 indicating that noncancer risks are unlikely to occur, and thus, no cleanup action is proposed.

Site 20 – Hobby Shop

This site is comprised of an outside service area and a drainage ditch with a catch basin. The site is used to service private vehicles. Soil contaminants reported at the site include VOCs, SVOCs, TPH, pesticides, and metals.

Based on the risk calculations, this site does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 2 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.3, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range of manganese in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

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Site 21 – Materials Management Group

The site is a fenced storage yard and a catch basin. The yard was used to store hazardous materials, including oils, paints, solvents, herbicides, and pesticides. Soil contaminants reported at this site include VOCs, SVOCs, TPH, pesticides, herbicides, and metals.

The catch basin has been cleaned up under the Station's environmental maintenance program. The cancer risk calculations for the storage yard are considered generally acceptable by the U.S. EPA. Therefore, no cleanup action is proposed for the site. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 3 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 2, is from manganese, arsenic, and the herbicide MCPP. There is no documented use of manganese or arsenic at the site, and the presence of arsenic may indicate its use for agricultural or pest-control purposes prior to the construction and expansion of the Station. Since the levels of manganese and arsenic in the soil are within the background ranges of these metals in the vicinity of MCAS El Toro, the Marine Corps has concluded that the noncarcinogenic risk represented by manganese and arsenic at the site is acceptable. The presence of the herbicide at the site is also acceptable because it was found in only one soil sample. Based on this information, no cleanup action is proposed.

Site 22 – Tactical Air Fuel Dispensing System

This site is comprised of two former aircraft fuel storage and dispensing areas where spills were reported in the past. Soil contaminants reported at the site include VOCs, SVOCs, TPH, pesticides, and metals.

Although there were past spills of fuels, the site does not pose a significant human health risk. The cancer risk calculated for this site is considered generally acceptable by the U.S. EPA, and, therefore, no cleanup action is proposed. Potential cancer risks, for residents exposed to the soil at the site over 30 years, do not exceed 4 additional cases per 100,000 people.

The majority of the noncarcinogenic risk levels, or the hazard index, estimated at 1.2, is from manganese. However, there is no documented use of manganese at the site, and the levels of manganese in soil are within the background range of manganese in the vicinity of MCAS El Toro. Therefore, the Marine Corps has concluded that the noncarcinogenic risk at this site is acceptable, and no cleanup action is proposed.

Site 25 – Drainage Areas (Agua Chinon Wash, Bee Canyon Wash, Borrego Canyon Wash, and Marshburn Channel)

The site is composed of four major drainage channels that flow through and adjacent to the Station. The channels are usually dry, except during storm events. Storm-runoff that flows from the surrounding hills and irrigated farmland combine with Station runoff. This combined storm runoff then flows off-Station and into San Diego Creek (see Figure 1). The channels were evaluated as a potential source of the regional VOC groundwater contamination. However, the results of the remedial investigation indicate that these channels are not the source of the contamination. Contaminants reported in the sediments within the drainages include pesticides and metals.

Based on the results of the risk calculations, potential cancer risks for people exposed to the sediment over 30 years is less than 1 additional case per 1,000,000 people, and, thus, is considered acceptable by the U.S. EPA. The noncarcinogenic risk levels or hazard index is less than 1. Based on the carcinogenic and noncarcinogenic risks at the site, no cleanup action is proposed.

Identifying Potential Ecological Risks

An assessment of the potential hazards to ecological receptors (wildlife) at Site 25 was performed. Sample analysis provided site-specific chemical concentrations in sediment in the drainages. The potential exposure pathways identified for the wildlife were ingestion of chemicals in the sediment, ingestion of plant and animal tissues exposed to chemicals in the sediment, and inhalation of vapors.

Ecological risks are expressed in terms of a hazard index. Hazard indexes over 1 indicate a potential for adverse effects on wildlife, but no adverse effects are expected for a hazard index less than 1.

Ecological Risk Assessment Results

No adverse impacts to the wildlife in the drainages are expected to occur at Site 25. Chemical levels at Borrego Canyon Wash and Agua Chinon Wash are at or below background levels. Ecological hazard indexes at Bee Canyon Wash were estimated at less than 1.

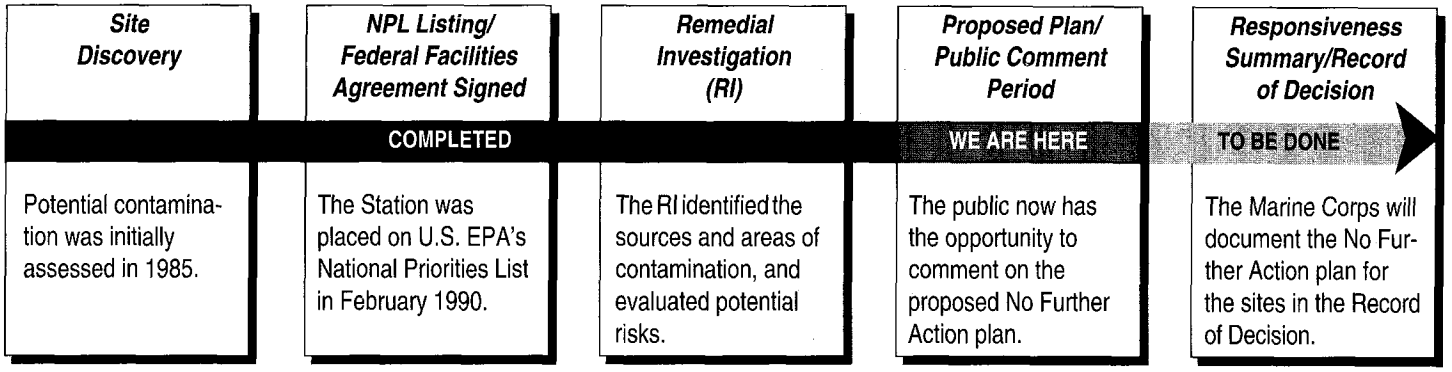
At Marshburn Channel, potential risk to wildlife is estimated to exceed 1. The majority of the ecological hazard indexes is due to pesticides (DDT and DDE). The concentrations of DDT and DDE in this channel are within the background range of pesticides in the vicinity of MCAS El Toro. The channel is also shallow and concrete-lined with little vegetation, resulting in a low quality habitat for wildlife.

Based on the results of the ecological risk assessment at Site 25, the Marine Corps has concluded that the risk to wildlife in all four drainages is not significant, and no cleanup action is proposed.

The Next Step

Public comments on this Proposed Plan received during the period of June 16 to August 16, 1997 will be considered in the final determination for the sites. Responses to all significant comments will be addressed in a Responsiveness Summary. The Responsiveness Summary will be part of the Record of Decision, which will formally document the specific environmental determination for Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, 22, and 25.

MCAS El Toro – Installation Restoration Program Process



Multi-Agency Environmental Team Concurs with No Further Action Proposal

With operational closure of MCAS El Toro scheduled for July 1999, the Marine Corps has formed a team with the U.S. Environmental Protection Agency and the California Environmental Protection Agency to coordinate the Installation Restoration Program (IRP) at the Station.

The primary goals of this Base Realignment and Closure Cleanup Team are to protect human health and the environment and to expedite the environmental cleanup of the Station. The team also serves as the primary forum for assessing cleanup priorities and progress, and obtaining consensus on issues regarding the Station's environmental activities.

The team completed its review of the Draft Remedial Investigation Reports for the sites. Discussions were held regarding the conclusions of the investigations, the risk assessments, and the recommendations presented by the Marine Corps. The regulatory agencies concur with the Marine Corps' proposal that no cleanup action is required at these sites.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) requires that cleanup actions meet applicable or relevant and appropriate requirements (ARARs). ARARs consist of all federal, state, and local environmental and health standards and requirements specific to a site recommended for cleanup action. The intent of meeting ARARs is to select and implement cleanup actions that are protective of human health and the environment in accordance with other regulatory requirements. Because no cleanup actions are proposed for the eleven IRP sites, ARARs were not identified.

The community-based MCAS El Toro Restoration Advisory Board has recently reviewed and commented on the Draft Remedial Investigation Reports, including the risk assessments. This community-based group is made up of local agencies and members of the public. If you are interested in becoming a member of the Restoration Advisory Board, please complete the mailing coupon.

Investigation Reports and Risk Assessment Results Available for Review and Comment

The collection of reports and documents used by the Marine Corps in the selection of cleanup or environmental management alternatives is the Administrative Record (AR). The AR provides a record of decisions and actions taken by the Marine Corps. A site-specific AR has been compiled for the sites discussed in this Proposed Plan. It includes the Phase I Remedial Investigation Draft Technical Memorandum, May 1993; the Draft Final Phase II Remedial Investigation Report for Operable Unit 3A (Sites 4, 6, 9, 10, 13, 15, 19, 20, 21, and 22), June 1997; the Draft Final Phase II Remedial Investigation/Feasibility Study Addendum Site 25 – Major Drainages, May 1997; and the U.S. Environmental Protection Agency's guidance for conducting risk assessments and selecting No Further Action alternatives. This AR is available for public review and comment through August 16,1997.

Relevant documents that pertain to these sites (within Operable Unit 3A) and a complete index of all MCAS El Toro Administrative Record documents are housed in the Information Repository at the Heritage Park Regional Library, 14361 Yale Avenue in Irvine, (714) 551-7151.

The complete collection of documents listed in the index is also available for review at MCAS El Toro. To arrange a time to review documents at the Station during the comment period, contact Joseph Joyce at (714) 726-3470.

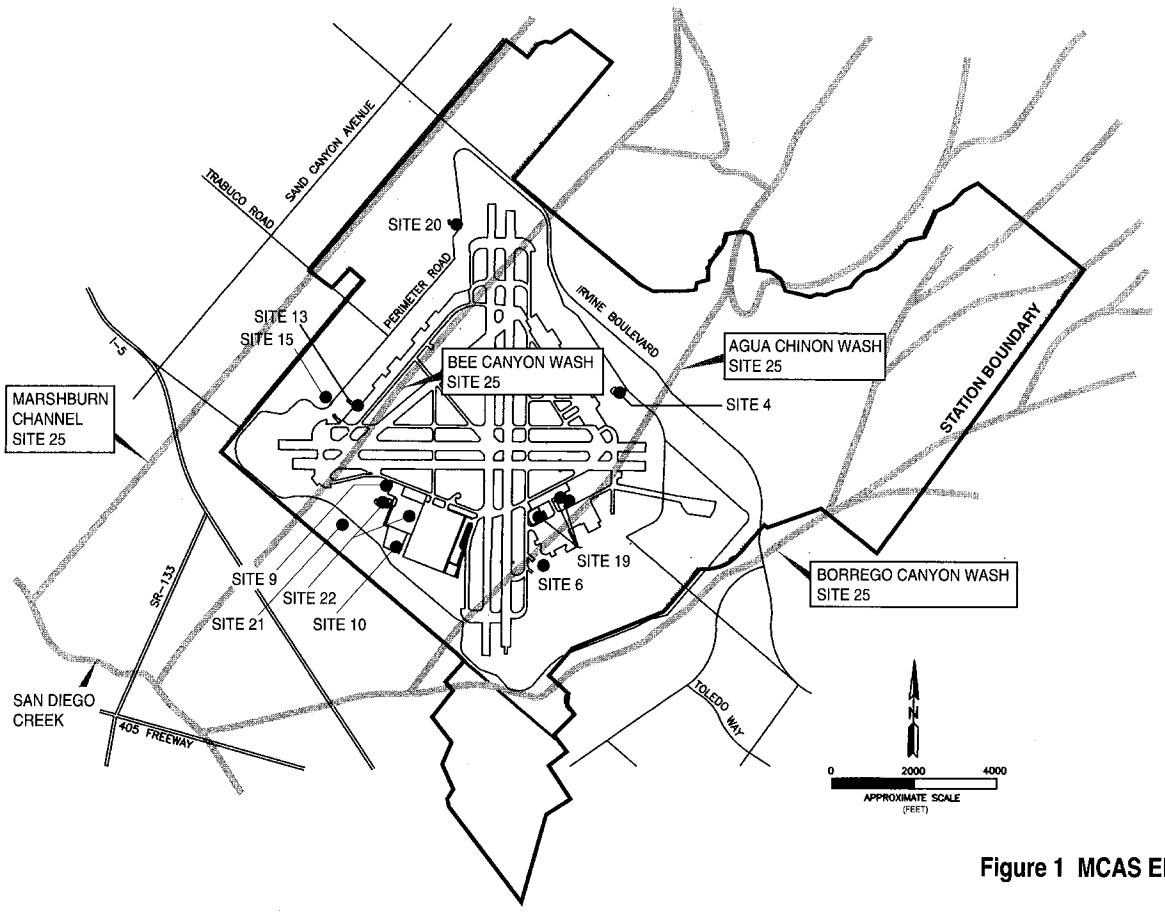


Figure 1 MCAS El Toro

Definitions of Chemical Terms*

■ VOCs (volatile organic compounds) make up a general category of organic (carbon-containing) compounds that evaporate easily at room temperature. They are commonly used for machinery and parts degreasing, paint stripping, and other industrial operations. At MCAS El Toro, historical activities have included more than 40 years of aircraft maintenance that used industrial solvents, like trichloroethene (TCE), that are categorized as VOCs. Within the category of VOCs, there are known cancer-causing compounds.

■ Another general category of organic compounds is SVOCs (semivolatile organic compounds). These compounds evaporate at a slower rate than VOCs. As with VOCs, there are known cancer-causing compounds within the category of SVOCs.

■ PCBs (polychlorinated biphenyls) are a specific class or group of SVOCs and are known as cancer-causing compounds.

■ TPH (total petroleum hydrocarbons) are chemical components of fuels. The individual compounds that make up TPH are evaluated for potential health effects. VOCs and SVOCs are examples of the compounds found in TPH. TPH compounds are managed outside the CERCLA program.

■ PAH (polynuclear aromatic hydrocarbons) are a specific class or group of SVOCs, and some are cancer-causing compounds.

■ Metals found at the sites include arsenic, beryllium, cadmium, chromium, mercury, vanadium, and manganese. Arsenic, chromium, and beryllium are known to cause cancer. Manganese and mercury are noncancer-causing chemicals that can affect both the respiratory and nervous systems. Arsenic, cadmium, chromium, vanadium, and manganese are found in the soils native to areas around the Station.

■ Pesticides and herbicides were used to control insects and vegetation. Depending on the specific chemicals used for this purpose, they could be cancer-causing or noncancer-causing.

**The low level concentrations of chemicals found at these sites do not pose a significant risk to human health and the environment.*

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Where to Get More Information

Copies of Remedial Investigation Reports, including the human health risk assessments and other key documents relating to environmental activities at MCAS El Toro, are available for public review at this Information Repository: **Heritage Park Regional Library, 14361 Yale Avenue, Irvine, California 92714; (714) 551-7151**. Current hours of operation: Monday – Thursday 10 a.m. to 9 p.m.; Friday – Saturday 10 a.m. to 5 p.m.; and Sunday 12 p.m. to 5 p.m.

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

Mr. Joseph Joyce
BRAC Environmental Coord.
Commanding General
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(714) 726-3470

1st Lt. Matthew Morgan
BRAC Public Affairs Officer
Marine Corps Air Bases,
Western Area (1AS)
MCAS El Toro
P.O. Box 95001
Santa Ana, CA 92709-5001
(714) 726-3853

Mr. Andrew Bain
Comm. Involv. Coordinator
Office of Hazardous
Waste Management
U.S. EPA
75 Hawthorne St. (SFD-3)
San Francisco, CA 94105
(800) 231-3075

Ms. Marsha Mingay
Public Participation Coord.
Cal-EPA
Department of Toxic
Substances Control
245 West Broadway, Suite 350
Long Beach, CA 90802-4444
(562) 590-4881

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at MCAS El Toro, please complete the coupon below and mail to: Commanding General, AC/S, Environment, (1AU), Attn: Mr. Joseph Joyce, IRP Department, MCAS El Toro, P.O. Box 95001, Santa Ana, CA 92709-5001.

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

❒ Send me information on Restoration Advisory Board membership.

Name _____

Street _____

City _____ State _____ Zip Code _____

Affiliation (optional) _____ Telephone _____

Commanding General
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environment (1AU)
MCAS El Toro
P.O. Box 95001
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UPDATE ON ENVIRONMENTAL RESTORATION PROGRAM AT MARINE CORPS AIR STATION EL TORO

Fact Sheet **January 1999**

Marine Corps to Proceed with Interim Remedial Action at Site 24

The U.S. Marine Corps announces its intent to start Remedial Action at Installation Restoration Program Site 24, Volatile Organic Compound (VOC) Source Area, by the end of March 1999. Soil Vapor Extraction (SVE) will be utilized to remediate the VOC-contaminated soil at the site.

Site Background

Site 24, VOC Source Area, comprises approximately 200 acres and is located in the southwest quadrant of the Station. Aircraft and support vehicle maintenance utilizing industrial solvents were conducted at Site 24 from the late 1940s to the mid-1970s. Solvents, including trichloroethene (TCE), and other VOCs were used for degreasing parts, paint stripping, and aircraft washing. Releases of VOCs at the site contaminated the subsurface soils (vadose zone) in the vicinity of two large aircraft hangars Buildings 296 and 297. VOCs in the soil have, over time, migrated down into the shallow aquifer, creating a VOC plume in the groundwater that extends approximately 3 miles to the west from Site 24 (see map below).

Interim Remedial Action Objective

The Interim Remedial Action objective at Site 24 is to reduce the concentration of VOCs in the soil to prevent or significantly minimize further impact to groundwater. The term "interim" is used because only soil remediation is addressed in this remedial action. Groundwater remediation at Site 24 will be accomplished in a subsequent remedial action.

Soil Vapor Extraction (SVE) Technology

The Marine Corps' preferred technology for remediating the soil contamination at Site 24 is Soil Vapor Extraction, also called SVE. VOCs are removed from the vadose zone by applying a vacuum to a network of underground extraction wells and pulling the vapors to the surface. Vapors are then passed through an activated carbon treatment system (to remove the contaminants from the vapor stream) prior to discharge to the atmosphere as clean air. Regularly scheduled air quality monitoring will verify the effective operation of the carbon treatment system.

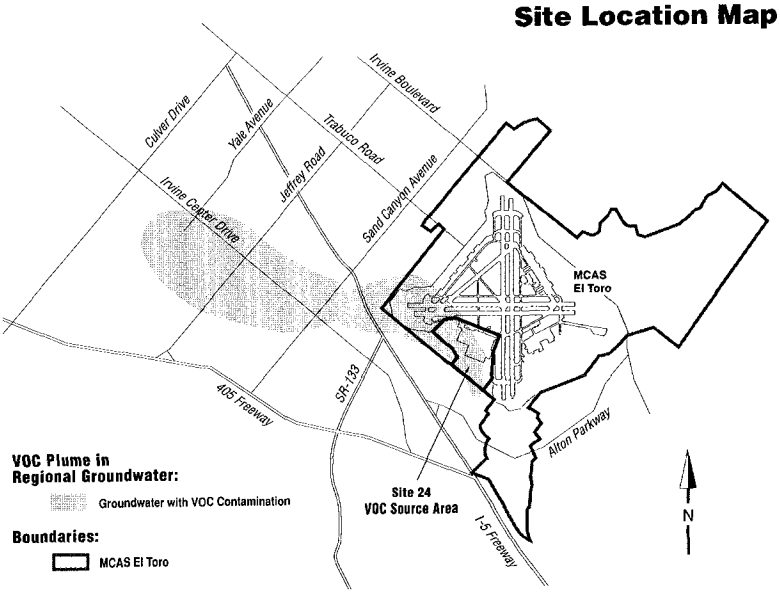
Pilot Tests Conducted

SVE pilot tests were conduced at the site from 1996-1998 to evaluate the feasibility of using this technology at Site 24. Twenty-one SVE wells were tested for 2 to 12 week intervals and approximately 870 pounds of TCE were removed from the vadose zone, confirming that SVE is a viable technology to remediate soil at Site 24.

Remedial Design Completed

Remediation of the site will be conducted in accordance with the Proposed Plan, Record of Decision and Remedial Design documents that underwent regulatory agency review and concurrence. The Remedial Design phase was recently completed when the *Draft Final Engineering Design Report (EDR), Vadose Zone Remediation, Site 24 (December 1998)* was finalized with concurrence by the U.S. EPA and Cal-EPA's Department of Toxic Substances Control and the Regional Water Quality Control Board. This report describes how SVE will be implemented at MCAS El Toro.

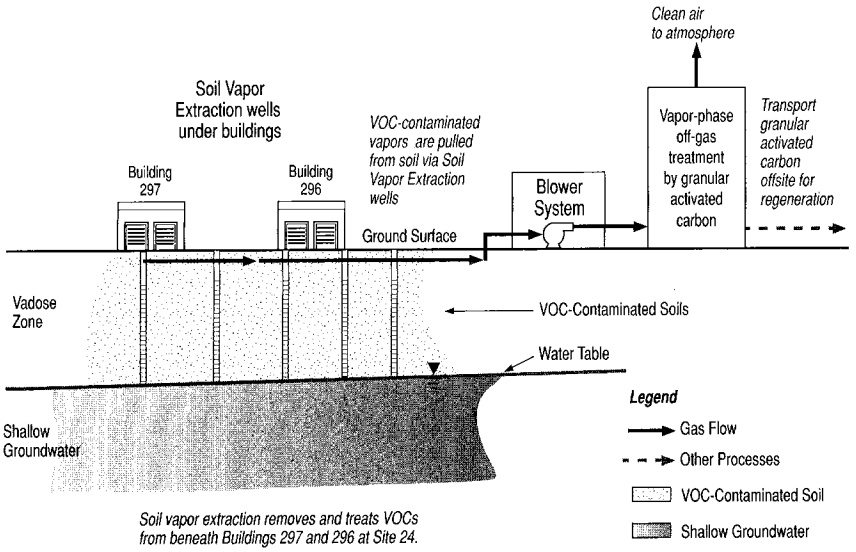
Site Location Map



SVE Treatment System

MCAS El Toro will utilize the same SVE treatment system that was successfully used to remediate VOC-contaminated soils at Norton Air Force Base in San Bernardino, California. Assembly of the system at Building 296 has been completed. Testing and treatment system optimization on ambient air is currently ongoing. When remediation of Site 24 soil begins, the SVE treatment system will be connected to a pre-determined number of extraction wells. Vacuum pressures, air flow rates, vapor concentrations and other performance parameters will be measured and evaluated. Additional wells will be installed and connected to the system, in multiple phases, based on system performance and rate of remediation. The system is scheduled to be operational by the end of March 1999 and will operate until the remedial action objectives have been met. The remediation phase is expected to take about 2 years to complete at an estimated cost of $5 million dollars.

SVE Treatment Process – Site 24



Soil vapor extraction removes and treats VOCs from beneath Buildings 297 and 296 at Site 24.

Project Updates

Periodic reports will document remediation progress. Updates will be provided at Restoration Advisory Board (RAB) meetings. The community-based RAB brings together the diverse interests of the community to discuss key aspects of MCAS El Toro's Installation Restoration Program. Meetings are open to the public and scheduled from 6:30-9:00 p.m. on the last Wednesday of the month (bimonthly) at the Irvine City Hall Conference and Training Center. RAB meetings are currently scheduled for March 31, May 26, and July 28, 1999.

Where to Get More Information

Copies of documents that support the remediation efforts at Site 24, including the Proposed Plan, Record of Decision, Remedial Design documents, and the Remedial Investigation and Feasibility Study Reports, are available at the following locations:

- Heritage Park Regional Library, 14361 Yale Avenue, Irvine, CA 92714, (949) 551-7151
- MCAS El Toro Administrative Record File, Environment and Safety Department, Contact: Mr. Joseph Joyce (see below)

Project Contacts:

- Mr. Joseph Joyce, BRAC Environmental Coordinator, MCAS El Toro (949) 726-3470
- Lt. Adrienne Dewey, BRAC Public Affairs Officer, MCAS El Toro (949) 726-3853
- Mr. Glenn Kistner, Remedial Project Manager, U.S. EPA (415) 744-2210
- Mr. Andrew Bain, Community Involvement Coordinator, U.S. EPA 1-800 231-3075
- Ms. Marsha Mingay, Public Participation Specialist, Cal-EPA, Dept. of Toxic Substances Control (714) 484-5416

Commanding General
Attn: Mr. Joseph Joyce
BRAC Environmental Coordinator
AC/S, Environment (1AU)
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For Information on
MCAS El Toro Redevelopment

Ms. Courtney Wiercoch

Development Program Manager

El Toro Master Development Program

(714) 834-3000

January 27, 1999

The Local Redevelopment Authority (LRA) will continue to meet quarterly on the last Tuesday of the month, prior to the regularly scheduled Board of Supervisors meeting. The following dates and times will serve as the 1999 LRA Meeting Schedule.

March 30, 1999	@ 4:00 pm
June 29, 1999	@ 4:00 pm
September 28, 1999	@ 4:00 pm
*December 21, 1999	@ 8:00 am (last Board meeting of 1999)

These dates are subject to change. If you require additional information, please contact (714) 834-3000.

**December 21, 1999 is the last Board meeting of 1999; however, it is not the last Tuesday of the month. Therefore the LRA will meet prior to the regularly schedule Board of Supervisors meeting which is scheduled for 9:30 am.*

MEMBERSHIP APPLICATION

MARINE CORPS AIR STATION EL TORO
RESTORATION ADVISORY BOARD

Conditions for membership:

Restoration Advisory Board (RAB) members are expected to serve a two year term and attend all RAB meetings or designate an alternate. The alternate must be jointly approved by the Department of Defense and Community Co-Chairpersons. If a member fails to attend two consecutive meetings without contacting the RAB, or at least one of the RAB Co-chairs, or fulfill member responsibilities including involvement in a subcommittee, the RAB Co-chairs may ask the member to resign. Duties and responsibilities will include reviewing and commenting on technical documents and activities associated with the environmental restoration at **MARINE CORPS AIR STATION EL TORO.** Members will be expected to be available to community members and groups to facilitate the exchange of information and/or concerns between the community and the RAB.

RAB membership priority will be given to local residents that are impacted/affected by the closure of the installation. The number of RAB members is limited.

****

Name:_____

Address:_____
Street Apt. # City Zip

Phone: ( )_____ ( )_____ ( )_____
Daytime Home Fax

Group Affiliation:_____

1. Briefly state why you would like to be considered for membership on the Restoration Advisory Board (RAB).

_____

_____

_____

2. What has been your experience working as a member of a diverse group with common goals?

_____

_____

3. Please indicate if you are interested in being considered for the community co-chairperson position on the RAB by checking the space below:

Yes, I would like to be considered.

4. Are you willing to serve a two (2) year term as a member of this RAB?

Yes, I am willing to serve for two (2) years.

5. By submitting this signed application, you are aware of the time commitment which this appointment will require of you.

6. By submitting this signed application, you willingly agree to work cooperatively with other members of the committee to ensure efficient use of time for addressing community issues related to environmental restoration of the Station.

Applicant Signature _____ Date _____

Please return your completed application to:

Commanding General
AC/S, Environment (1AU)
Attn: Mr. Joseph Joyce
MCAS El Toro
P. O. Box 95001
Santa Ana, CA 92709-5001
Fax: (714) 726-6586

MCAS El Toro

Restoration Advisory Board

Acronyms and Glossary of Technical Terms

This handout has been prepared to provide Restoration Advisory Board (RAB) members and others with a better understanding of acronyms and technical terms used during Installation Restoration Program activities and other environmental programs underway at MCAS El Toro.

List of Acronyms

AB	Assembly Bill
accumulation areas	less-than-90-day accumulation areas
ACM	asbestos-containing materials
AC/S	Assistant Chief of Staff
AFB	Air Force Base
AOC	area of concern
AQMP	Air Quality Management Plan
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ASN	Assistant Secretary of the Navy
AST	aboveground storage tank
Basin	the Los Angeles Basin
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BEC	BRAC Environmental Coordinator
BFI	Browning Ferris Industries
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
BRAC III	Base Closure and Realignment Act of 1993
CAC	Citizens Advisory Committee
Cal-EPA	California Environmental Protection Agency
CBCEC	California Base Closure Environmental Committee
CCR	*California Code of Regulations*
CDM Federal	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	*Code of Federal Regulations*
CLEAN	Comprehensive Long-Term Environmental Action Navy
CMC	Commandant of the Marine Corps
COE	(United States) Army Corps of Engineers
COMCABWEST	Commander, Marine Corps Air Bases Western Area
COPC	chemical of potential concern
County	Orange County
CP	Compliance Program
CRP	Community Reuse Plan
CTO	Contract Task Order

D&M	Dames & Moore
DFSC	Defense Fuel Supply Center
the Districts	the County Sanitation Districts of Orange County
DoD	Department of Defense
DOI	Department of Interior
DoN	Department of the Navy
DRMO	Defense Reutilization and Marketing Office
DTSC	(Cal-EPA) Department of Toxic Substances Control
EBS	Environmental Baseline Survey
ECP	environmental condition of property
EE/CA	Engineering Evaluation/Cost Analysis
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EO	Environmental Office
EOD	explosive ordnance disposal
ETRPA	El Toro Reuse Planning Authority
°F	degrees Fahrenheit
FA	further action
FAA	Federal Aviation Administration
FDS	Federal Disposal Services
FFA	Federal Facility Agreement
FOSL	finding of suitability to lease
FOST	finding of suitability to transfer
FS	feasibility study
ft/day	feet per day
gal.	gallon
GIS	geographical information system
HAS	Homeless Assistance Submission
HRA	Historical Radiological Assessment
HUD	(United States Department of) Housing and Urban Development
IAFS	Interim Action Feasibility Study
IDW	investigation-derived waste
IRP	Installation Restoration Program
IRWD	Irvine Regional Water District
IT	International Technology Corporation
IWTP	industrial wastewater treatment plant
JMM	James M. Montgomery Engineers

LBP	lead-based paint
LDPE	low density polyethylene
LOC	location of concern
LRA	Local Redevelopment Authority
MAW	marine air wing
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
mg/L	milligrams per liter
MSL	mean sea level
NAVFAC	Naval Facilities
NAVFACENGCOM	Naval Facilities Engineering Command
NAVRAMP	Navy Radon Assessment and Mitigation Program
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEDTS	Navy Environmental Data Transfer Standards
NFA	no further action
NEPA	National Environmental Policy Act
NFI	no further investigation
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
OCHCA	Orange County Health Care Agency
OCWD	Orange County Water District
OEA	Office of Economic Adjustment
OHM	OHM Remediation Services Corporation
OSHA	Occupational Safety and Health Administration
OU	operable unit
OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbon
PBR	Permit by Rule
PCB	polychlorinated biphenyl
pCi/L	picocuries per liter
PP	Proposed Plan
ppm	parts per million
PRG	preliminary remediation goal
Project Team	BRAC Project Team
PWC	Navy Public Works Center
QAPP	quality assurance project plan

RAB	Restoration Advisory Board
RAC	remedial action contract
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RECLAIM	Regional Clean Air Initiatives Market
RFA	RCRA Facility Assessment
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
RWQCB	Regional Water Quality Control Board
SAIC	Science Applications International Corporation
SCAQMD	South Coast Air Quality Management District
SPCC	Spill Prevention and Countermeasure Plan
Station	Marine Corps Air Station El Toro
STP	sewage treatment plant
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWDIV	Southwest Division Naval Facilities Engineering Command
SWMU	solid waste management unit
TAA	temporary accumulation area
TCRA	time-critical removal action
TDS	total dissolved solids
TRC	Technical Review Committee
TSCA	Toxic Substances Control Act
UCL	upper confidence limit
U.S. EPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
UST	underground storage tank
VOC	volatile organic compound
WW	World War
XFMR	transformer

ACRONYMS/ABBREVIATIONS

Air SWAT	Air Quality Solid Waste Assessment Test
ASTM	American Society for Testing and Materials
BCT	BRAC Cleanup Team
BEIDMS	Bechtel Environmental Integrated Data Management System
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
°C	degrees Celsius
Cal/EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLEAN	Comprehensive Long-Term Environmental Action Navy
CLP	U.S. EPA Contract Laboratory Program
CNDDB	California Natural Diversity Data Base
COPC	chemical of potential concern
CPT	cone penetrometer test
CTO	Contract Task Order
DC	direct current
DCE	dichloroethene
Desalter	Irvine Desalter Project
DoD	Department of Defense
DON	Department of the Navy
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
EC	electrical conductivity
EOD	explosive ordnance disposal
°F	degrees Fahrenheit
FFA	Federal Facilities Agreement
FID	flame ionization detector
FS	Feasibility Study
FSP	Field Sampling Plan
ft/day	feet per day

ACRONYMS/ABBREVIATIONS (continued)

GC	gas chromatograph
gpm	gallons per minute
GPR	ground-penetrating radar
IAFS	Interim-Action Feasibility Study
IAS	Initial Assessment Study
ID	inside diameter
IDWMP	Investigation-Derived Waste Management Plan
IRP	Installation Restoration Program
L/min	liters per minute
µmhos/cm	micromhos per centimeter
MCAS	Marine Corps Air Station
MeCl	methylene chloride
mg/L	milligrams per liter
MS	matrix spike
MSD	matrix spike duplicate
MSL	mean sea level
NACIP	Navy Assessment and Control of Installation Pollutants
NEESA	Naval Energy and Environmental Support Activity
NFESC	Naval Facilities Engineering Service Center (formerly NEESA)
NFRAP	No Further Response Action Planned
NPL	National Priorities List
NTU	nephelometric turbidity units
OCWD	Orange County Water District
OD	outside diameter
OU	operable unit
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PRG	(U.S. EPA Region IX) Preliminary Remediation Goal
psi	per square inch
psig	per square inch gauge

ACRONYMS/ABBREVIATIONS (continued)

QA	quality assurance
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROICC	Resident Officer in Charge of Construction
RPD	relative percent difference
RWQCB	(California) Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SCAQMD	South Coast Air Quality Management District
SIPOA	Site Inspection Plan of Action
SOP	Standard Operating Procedure
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWDIV	Southwest Division Naval Facilities Engineering Command
SWMU/AOC	solid waste management unit/area of concern
TCA	trichloroethane
TCE	trichloroethylene
TDS	total-dissolved solids
TIC	The Irvine Company
TPH	total petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
USCS	Unified Soils Classification System
U.S. EPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
UST	underground storage tank
VOA	volatile organic analysis
VOC	volatile organic compound
v/v	volume per volume
WSA	waste staging area

ACRONYMS/ABBREVIATIONS

ARAR	applicable or relevant and appropriate requirement
BCT	BRAC Cleanup Team
bgs	below ground surface
BNI	Bechtel National, Inc.
BRAC	Base Realignment and Closure
°C	degrees Celsius
Cal-EPA	California Environmental Protection Agency
CCR	*California Code of Regulations*
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (1980)
cfm	cubic feet per minute
CFR	*Code of Federal Regulations*
CLEAN	Comprehensive Long-Term Environmental Action Navy
cm^3/g	cubic centimeters per gram
cm/s	centimeters per second
CPT	cone penetrometer test
CTO	Contract Task Order
DCA	dichloroethane
DCE	dichloroethene
DNAPL	dense nonaqueous-phase liquid
DON	Department of the Navy
DTSC	(Cal-EPA) Department of Toxic Substances Control
DWR	(California) Department of Water Resources
°F	degrees Fahrenheit
FFA	Federal Facilities Agreement
FS	Feasibility Study
ft^3	cubic feet
ft/day	feet per day
ft^3/min	cubic feet per minute
GAC	granular activated carbon
gpm	gallons per minute
HQ	hazard quotient
IAFS	Interim-Action Feasibility Study
ICE	internal combustion engine
IRP	Installation Restoration Program

ACRONYMS/ABBREVIATIONS (continued)

IRWD	Irvine Ranch Water District
Irvine Subbasin	Irvine Groundwater Subbasin
JMM	James M. Montgomery Engineers, Inc.
LGAC	liquid-phase granular activated carbon
LNAPL	light nonaqueous-phase liquid
MCAS	Marine Corps Air Station
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSL	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEESA	Naval Energy and Environmental Support Activity
NPL	National Priorities List
NPW	net present worth
OCWD	Orange County Water District
OU	operable unit
PCE	tetrachloroethene
PCO	photocatalytic oxidation
POTW	publicly owned treatment works
PVC	polyvinyl chloride
RACER	Remedial Action Cost Engineering Requirements
RAO	remedial action objective
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RWQCB	(California) Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act of 1986
SCAQMD	South Coast Air Quality Management District
SHSO	Site Health and Safety Officer
SITE	(U.S. EPA) Superfund Innovative Technologies Evaluation
STLC	soluble threshold limit concentration

ACRONYMS/ABBREVIATIONS (continued)

SVE	soil vapor extraction
SWDIV	Southwest Division Naval Facilities Engineering Command
SWRCB	(California) State Water Resources Control Board
TAL	target analyte list
TBC	to be considered
TCA	trichloroethane
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TPH	total petroleum hydrocarbons
USGS	United States Geological Survey
U.S. EPA	United States Environmental Protection Agency
UV	ultraviolet
VGAC	vapor-phase granulated activated carbon
VES	vapor extraction system
VOC	volatile organic compound
WQCP	(Comprehensive) Water Quality Control Plan (for the Santa Ana Region)

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Terms Of Environment

Glossary, Abbreviations, And Acronyms

Introduction

Terms Of Environment defines in non-technical language the more commonly used environmental terms appearing in EPA publications, news releases, and other Agency documents available to the general public, students, the media, and Agency employees. The definitions do not constitute the Agency's official use of terms and phrases for regulatory purposes, and nothing in this document should be construed to alter or supplant any other federal document. Official terminology may be found in the laws and related regulations as published in such sources as the Congressional Record, Federal Register, and elsewhere.

The terms selected for inclusion are derived from previously published lists, internal glossaries produced by various programs and specific suggestions made by personnel in many Agency offices. The chemicals and pesticides selected for inclusion are limited to those most frequently referred to in Agency publications or that are the subject of major regulatory or program activities.

Definitions or information about substances or program activities not included herein may be found in EPA libraries or scientific/technical reference documents, or may be obtained from various program offices.

Those with suggestions for future editions should write to the Editorial Services Division, Office of Communications, Education, and Public Affairs, A-107, USEPA, Washington DC 20460.

Abbreviation and acronymn list begins on page 31

A

A—Scale Sound Level: A measurement of sound approximating the sensitivity of the human ear, used to note the intensity or annoyance level of sounds.

Abandoned Well: A well whose use has been permanently discontinued or which is in a state of such disrepair that it cannot be used for its intended purpose.

Abatement: Reducing the degree or intensity of, or eliminating, pollution.

Accident Site: The location of an unexpected occurrence, failure or loss, either at a plant or along a transportation route, resulting in a release of hazardous materials.

Acclimatization: The physiological and behavioral adjustments of an organism to changes in its environment.

Acid Deposition: A complex chemical and atmospheric phenomenon that occurs when emissions of sulfur and nitrogen compounds and other substances are transformed by chemical processes in the atmosphere, often far from the original sources, and then deposited on earth in either wet or dry form. The wet forms, popularly called "acid rain," can fall as rain, snow, or fog. The dry forms are acidic gases or particulates.

Acid Rain: (See: acid deposition)

Action Levels: 1. Regulatory levels recommended by EPA for enforcement by FDA and USDA when pesticide residues occur in food or feed commodities for reasons other than the direct application of the pesticide. As opposed to "tolerances" which are established for residues occurring as a direct result of proper usage, action levels are set for inadvertent residues resulting from previous legal use or accidental contamination. 2. In the Superfund program, the existence of a contaminant concentration in the environment high enough to warrant action or trigger a response under SARA and the National Oil and Hazardous Substances Contingency Plan. The term is also used in other regulatory programs. (See: tolerances.)

Activated Carbon: A highly adsorbent form of carbon used to remove odors and toxic substances from liquid or gaseous emissions. In waste treatment it is used to remove dissolved organic matter from waste water. It is also used in motor vehicle evaporative control systems.

Activated Sludge: Product that results when primary effluent is mixed with bacteria-laden sludge and then agitated and aerated to promote biological treatment, speeding the breakdown of organic matter in raw sewage undergoing secondary waste treatment.

Activator: A chemical added to a pesticide to increase its activity.

Active Ingredient: In any pesticide product, the component that kills, or otherwise controls, target pests. Pesticides are regulated primarily on the basis of active ingredients.

Activity Plans: Written procedures in a school's asbestos- management plan that detail the steps a Local Education Agency (LEA) will follow in performing the initial and additional cleaning, operation and maintenance-program tasks; periodic surveillance; and reinspections required by the Asbestos Hazard Emergency Response Act (AHERA).

Acute Exposure: A single exposure to a toxic substance which results in severe biological harm or death. Acute exposures are usually characterized as lasting no longer than a day, as compared to longer, continuing exposure over a period of time.

Acute Toxicity: The ability of a substance to cause poisonous effects resulting in severe biological harm or death soon after a single exposure or dose. Also, any severe poisonous effect resulting from a single short-term exposure to a toxic substance. (See: chronic toxicity, toxicity.)

Adaptation: Changes in an organism's structure or habits that help it adjust to its surroundings.

Add-on Control Device: An air pollution control device such as carbon absorber or incinerator that reduces the pollution in an exhaust gas. The control device usually does not affect the process being controlled and thus is "add-on" technology, as opposed to a scheme to control pollution through altering the basic process itself.

Adequately Wet: Asbestos containing material that is sufficiently mixed or penetrated with liquid to prevent the release of particulates.

Administrative Order On Consent: A legal agreement signed by EPA and an individual, business, or other entity through which the violator agrees to pay for correction of violations, take the required corrective or cleanup actions, or refrain from an activity. It describes the actions to be taken, may be subject to a comment period, applies to civil actions, and can be enforced in court.

Administrative Order: A legal document signed by EPA directing an individual, business, or other entity to take corrective action or refrain from an activity. It describes the violations and actions to be taken, and can be enforced in court. Such orders may be issued, for example, as a result of an administrative complaint whereby the respondent is ordered to pay a penalty for violations of a statute.

Administrative Procedures Act: A law that spells out procedures and requirements related to the promulgation of regulations.

Administrative Record: All documents which EPA considered or relied on in selecting the response action at a Superfund site, culminating in the record of decision for remedial action or, an action memorandum for removal actions.

Adsorption: An advanced method of treating waste in which activated carbon removes organic matter from wastewater

Adulterants: Chemical impurities or substances that by law do not belong in a food, or pesticide.

Adulterated: 1. Any pesticide whose strength or purity falls below the quality stated on its label. 2. A food,feed, or product that contains illegal pesticide residues.

Advanced Treatment: A level of wastewater treatment more stringent than secondary treatment; requires an 85-percent reduction in conventional pollutant concentration or a significant reduction in nonconventional pollutants.

Advanced Wastewater Treatment: Any treatment of sewage that goes beyond the secondary or biological water treatment stage and includes the removal of nutrients such as phosphorus and nitrogen and a high percentage of suspended solids. (See primary, secondary treatment.)

Advisory: A non-regulatory document that communicates risk information to those who may have to make risk management decisions.

Aerated Lagoon: A holding and/or treatment pond that speeds up the natural process of biological decomposition of organic waste by stimulating the growth and activity of bacteria that degrade organic waste.

Aeration: A process which promotes biological degradation of organic matter in water. The process may be passive (as when waste is exposed to air), or active (as when a mixing or bubbling device introduces the air).

Aeration Tank: A chamber used to inject air into water.

Aerobic Treatment: Process by which microbes decompose complex organic compounds in the presence of oxygen and use the liberated energy for reproduction and growth. (Such processes include extended aeration, trickling filtration, and rotating biological contactors.)

Aerobic: Life or processes that require, or are not destroyed by, the presence of oxygen. (See: anaerobic.)

Aerosol: A suspension of liquid or solid particles in a gas.

Affected Public: The people who live and/or work near a hazardous waste site.

Afterburner: In incinerator technology, a burner located so that the combustion gases are made to pass through its flame in order to remove smoke and odors. It may be attached to or be separated from the incinerator proper.

Agent Orange: A toxic herbicide and defoliant used in the Vietnam conflict, containing 2,4,5-trichlorophenoxyacetic acid (2,4,5-T) and 2-4 dichlorophenoxyacetic acid (2,4-D) with trace amounts of dioxin.

Agricultural Pollution: Farming wastes, including runoff and leaching of pesticides and fertilizers; erosion and dust from plowing; improper disposal of animal manure and carcasses; crop residues, and debris.

Agro-ecosystem: Land used for crops, pasture, and livestock; the adjacent uncultivated land that supports other vegetation and wildlife; and the associated atmosphere, the underlying soils, groundwater, and drainage networks.

AHERA Designated Person (ADP): A person designated by a Local Education Agency to ensure that the AHERA requirements for asbestos management and abatement are properly implemented.

Air Changes Per Hour (ACH): The movement of a volume of air in a given period of time; if a house has one air change per hour, it means that all of the air in the house will be replaced in a one-hour period.

Air Contaminant: Any particulate matter, gas, or combination thereof, other than water vapor. (See: air pollutant.)

Air Curtain: A method of containing oil spills. Air bubbling through a perforated pipe causes an upward water flow that slows the spread of oil. It can also be used to stop fish from entering polluted water.

Air Mass: A large volume of air with certain meteorological or polluted characteristics-e,g, a heat inversion or smogginess-while in one location. The characteristics can change as the air mass moves away.

Air Monitoring: (See: monitoring)

Air Plenum: Any space used to convey air in a building, furnace, or structure. The space above a suspended ceiling is often used as an air plenum.

Air Pollutant: Any substance in air that could, in high enough concentration, harm man, other animals, vegetation, or material. Pollutants may include almost any natural or artificial composition of airborne matter capable of being airborne. They may be in the form of solid particles, liquid droplets, gases, or in combination thereof. Generally, they fall into two main groups: (1) those emitted directly from identifiable sources and (2) those produced in the air by interaction between two or more primary pollutants, or by reaction with normal atmospheric constituents, with or without photoactivation. Exclusive of pollen, fog, and dust, which are of natural origin, about 100 contaminants have been identified and fall into the following categories: solids, sulfur compounds, volatile organic chemicals, nitrogen compounds, oxygen compounds, halogen compounds, radioactive compounds, and odors.

Air Pollution Episode: A period of abnormally high concentration of air pollutants, often due to low winds and temperature inversion, that can cause illness and death. (See: episode, pollution.)

Air Pollution Control Device: Mechanism or equipment that cleans emissions generated by an incinerator by removing pollutants that would otherwise be released to the atmosphere.

Air Pollution: The presence of contaminant or pollutant substances in the air that do not disperse properly and interfere with human health or welfare, or produce other harmful environmental effects.

Air Quality Criteria: The levels of pollution and lengths of exposure above which adverse health and welfare effects may occur.

Air Quality Control Region: An area-designated by the federal government-in which communities share a common air pollution problem, sometimes embracing several states.

Air Quality Standards: The level of pollutants prescribed by regulations that may not be exceeded during a given time in a defined area.

Air Stripping: A treatment system that removes volatile organic compounds (VOCs) from contaminated ground water or surface water by forcing an airstream through the water and causing the compounds to evaporate.

Air Toxics: Any air pollutant for which a national ambient air quality standard (NAAQS) does not exist (i.e., excluding ozone, carbon monoxide, PM-10, sulfur dioxide, nitrogen oxide) that may reasonably be anticipated to cause cancer, developmental effects, reproductive dysfunctions, neurological disorders, heritable gene mutations, or other serious or irreversible chronic or acute health effects in humans.

Airborne Particulates: Total suspended particulate matter found in the atmosphere as solid particles or liquid droplets. Chemical composition of particulates varies widely, depending on location and time of year. Airborne particulates include: windblown dust, emissions from industrial processes, smoke from the burning of wood and coal, and motor vehicle or non-road engine exhausts. exhaust of motor vehicles.

Airborne Release: Release of any chemical into the air.

Alachlor: A herbicide, marketed under the trade name Lasso, used mainly to control weeds in corn and soybean fields.

Alar: Trade name for daminozide, a pesticide that makes apples redder, firmer, and less likely to drop off trees before growers are ready to pick them. It is also used to a lesser extent on peanuts, tart cherries, concord grapes, and other fruits.

Aldicarb: An insecticide sold under the trade name Temik. It is made from ethyl isocyanate.

Algae: Simple rootless plants that grow in sunlit waters in proportion to the amount of available nutrients. They can affect water quality adversely by lowering the dissolved oxygen in the water. They are food for fish and small aquatic animals.

Algal Blooms: Sudden spurts of algal growth, which can affect water quality adversely and indicate potentially hazardous changes in local water chemistry.

Alternate Method: Any method of sampling and analyzing for an air pollutant that is not a reference or equivalent method but that has been demonstrated in specific cases-to EPA's satisfaction-to produce results adequate for compliance monitoring.

Alternative Remedial Contract Strategy Contractors: Government contractors who provide project management and technical services to support remedial response activities at National Priorities List sites.

Ambient Air Quality Standards: (See: Criteria Pollutants and National Ambient Air Quality Standards.)

Ambient Air: Any unconfined portion of the atmosphere: open air, surrounding air.

Anaerobic: A life or process that occurs in, or is not destroyed by, the absence of oxygen.

Anaerobic Decomposition: Reduction of the net energy level and change in chemical composition of organic matter caused by microorganisms in an oxygen-free environment.

Antarctic "Ozone Hole": Refers to the seasonal depletion of ozone in a large area over Antarctica.

Anti-Degradation Clause: Part of federal air quality and water quality requirements prohibiting deterioration where pollution levels are above the legal limit.

Applicable or Appropriate Requirements (ARARs): Any state or federal statute that pertains to protection of human life and the environment in addressing specific conditions or use of a particular cleanup technology at a Superfund site.

Aquifer: An underground geological formation, or group of formations, containing usable amounts of groundwater that can supply wells and springs.

Area of Review: In the UIC program, the area surrounding an injection well that is reviewed during the permitting process to determine if flow between aquifers will be induced by the injection operation.

Area Source: Any small source of non-natural air pollution that is released over a relatively small area but which cannot be classified as a point source. Such sources may include vehicles and other small engines, small businesses and household activities.

Aromatics: A type of hydrocarbon, such as benzene or toluene, added to gasoline in order to increase octane. Some aromatics are toxic.

Arsenicals: Pesticides containing arsenic.

Asbestos: A mineral fiber that can pollute air or water and cause cancer or asbestosis when inhaled. EPA has banned or severely restricted its use in manufacturing and construction.

Asbestos Abatement: Procedures to control fiber release from asbestos-containing materials in a building or to remove them entirely, including removal, encapsulation, repair, enclosure, encasement, and operations and maintenance programs.

Asbestos-Containing Waste Materials (ACWM): Mill tailings or any waste that contains commercial asbestos and is generated by a source covered by the Clean Air Act Asbestos NESHAPS.

Asbestosis: A disease associated with inhalation of asbestos fibers. The disease makes breathing progressively more difficult and can be fatal.

Asbestos Program Manager: A building owner or designated representative who supervises all aspects of the facility asbestos management and control program.

Ash: The mineral content of a product remaining after complete combustion.

Assessment: In the asbestos-in-schools program, the evaluation of the physical condition and potential for damage of all friable asbestos containing materials and thermal insulation systems.

Assimilation: The ability of a body of water to purify itself of pollutants.

Assimilative Capacity: The capacity of a natural body of water to receive wastewaters or toxic materials without deleterious effects and without damage to aquatic life or humans who consume the water.

Attainment Area: An area considered to have air quality as good as or better than the national ambient air quality standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Attenuation: The process by which a compound is reduced in concentration over time, through absorption, adsorption, degradation, dilution, and/or transformation.

Attractant: A chemical or agent that lures insects or other pests by stimulating their sense of smell.

Attrition: Wearing or grinding down of a substance by friction. Dust from such processes contributes to air pollution.

Availability Session: Informal meeting at a public location where interested citizens can talk with EPA and state officials on a one-to-one basis.

B

Background Level: In air pollution control, the concentration of air pollutants in a definite area during a fixed period of time prior to the starting up or on the stoppage of a source of emission under control. In toxic substances monitoring, the average presence in the environment, originally referring to naturally occurring phenomena.

BACT-Best Available Control Technology: An emission limitation based on the maximum degree of emission reduction (considering energy, environmental, and economic impacts) achievable through application of production processes and available methods, systems, and techniques. BACT does not permit emissions in excess of those allowed under any applicable Clean Air Act provisions. Use of the BACT concept is allowable on a case by case basis for major new or modified emissions sources in attainment areas and applies to each regulated pollutant.

Bacteria: (Singular: bacterium) Microscopic living organisms that can aid in pollution control by metabolizing organic matter in sewage, oil spills or other pollutants. However, bacteria in soil, water or air can also cause human, animal and plant health problems.

Baffle Chamber: In incinerator design, a chamber designed to promote the settling of fly ash and coarse particulate matter by changing the direction and/or reducing the velocity of the gases produced by the combustion of the refuse or sludge.

Baghouse Filter: Large fabric bag, usually made of glass fibers, used to eliminate intermediate and large (greater than 20 microns in diameter) particles. This device operates like the bag of an electric vacuum cleaner, passing the air and smaller particles while entrapping the larger ones.

Baling: Compacting solid waste into blocks to reduce volume and simplify handling.

Ballistic Separator: A machine that sorts organic from inorganic matter for composting.

Band Application: The spreading of chemicals over, or next to, each row of plants in a field.

Banking: A system for recording qualified air emission reductions for later use in bubble, offset, or netting transactions. (See: emissions trading.)

Bar Screen: In wastewater treatment, a device used to remove large solids.

Barrier Coating(s): A layer of a material that obstructs or prevents passage of something through a surface that is to be protected, e.g. grout, caulk, or various sealing compounds; sometimes used with polyurethane membranes to prevent corrosion or oxidation of metal surfaces, chemical impacts on various materials, or, for example, to prevent radon infiltration through walls, cracks, or joints in a house.

Basal Application: In pesticides, the application of a chemical on plant stems or tree trunks just above the soil line.

Bed Load: Sediment particles resting on or near the channel bottom that are pushed or rolled along by the flow of water.

BEN: EPA's computer model for analyzing a violator's economic gain from not complying with the law.

Bench-scale Tests: Laboratory testing of potential cleanup technologies (See: treatability studies.)

Beryllium: An airborne metal hazardous to human health when inhaled. It is discharged by machine shops, ceramic and propellant plants, and foundries.

Best Available Control Measures (BACM): A term used to refer to the most effective measures (according to EPA guidance) for controlling small or dispersed particulates from sources such as roadway dust, soot and ash from woodstoves and open burning of rush, timber, grasslands, or trash.

Best Demonstrated Available Technology (BDAT): As identified by EPA, the most effective commercially available means of treating specific types of hazardous waste. The BDATs may change with advances in treatment technologies.

Best Management Practice (BMP): Methods that have been determined to be the most effective, practical means of preventing or reducing pollution from non-point sources.

Bimetal: Beverage containers with steel bodies and aluminum tops; handled differently from pure aluminum in recycling.

Bioaccumulants: Substances that increase in concentration in living organisms as they take in contaminated air, water, or food because the substances are very slowly metabolized or excreted. (See: biological magnification.)

Bioassay: Study of living organisms to measure the effect of a substance, factor, or condition by comparing before-and-after exposure or other data.

Biochemical Oxygen Demand (BOD): A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution.

Biodegradable: Capable of decomposing rapidly under natural conditions.

Biodiversity: Refers to the variety and variability among living organisms and the ecological complexes in which they occur. Diversity can be defined as the number of different items and their relative frequencies. For biological diversity, these items are organized at many levels, ranging from complete ecosystems to the biochemical structures that are the molecular basis of heredity. Thus, the term encompasses different ecosystem, species, and genes.

Biological Control: In pest control, the use of animals and organisms that eat or otherwise kill or out-compete pests.

Biological Magnification: Refers to the process whereby certain substances such as pesticides or heavy metals move up the food chain, work their way into rivers or lakes, and are eaten by aquatic organisms such as fish, which in turn are eaten by large birds, animals or humans. The substances become concentrated in tissues or internal organs as they move up the chain. (See: bioaccumulative.)

Biological Oxidation: Decomposition of complex organic materials by microorganisms. Occurs in self-purification of water bodies and in activated sludge wastewater treatment.

Biological Oxygen Demand (BOD): An indirect measure of the concentration of biologically degradable material present in organic wastes. It usually reflects the amount of oxygen consumed in five days by biological processes breaking down organic waste.

Biological Treatment: A treatment technology that uses bacteria to consume organic waste.

Biologicals: Vaccines, cultures and other preparations made from living organisms and their products, intended for use in diagnosing, immunizing, or treating humans or animals, or in related research.

Biomass: All of the living material in a given area; often refers to vegetation.

Biome: Entire community of living organisms in a single major ecological area. (See: biotic community.)

Biomonitoring: 1. The use of living organisms to test the suitability of effluents for discharge into receiving waters and to test the quality of such waters downstream from the discharge. 2. Analysis of blood, urine, tissues, etc., to measure chemical exposure in humans.

Bioremediation: Use of living organisms to clean up oil spills or remove other pollutants from soil, water, or wastewater; use of organisms such as non-harmful insects to remove agricultural pests or counteract diseases of trees, plants, and garden soil.

Biosphere: The portion of Earth and its atmosphere that can support life.

Biostabilizer: A machine that converts solid waste into compost by grinding and aeration.

Biota: The animal and plant life of a given region.

Biotechnology: Techniques that use living organisms or parts of organisms to produce a variety of products (from medicines to industrial enzymes) to improve plants or animals or to develop microorganisms to remove toxics from bodies of water, or act as pesticides.

Biotic Community: A naturally occurring assemblage of plants and animals that live in the same environment and are mutually sustaining and interdependent. (See: biome.)

Blackwater: Water that contains animal, human, or food waste.

Blood Products: Any product derived from human blood, including but not limited to blood plasma, platelets, red or white corpuscles, and derived licensed products such as interferon.

Bloom: A proliferation of algae and/or higher aquatic plants in a body of water; often related to pollution, especially when pollutants accelerate growth.

BOD5: The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter.

Bog: A type of wetland that accumulates appreciable peat deposits. Bogs depend primarily on precipitation for their water source, and are usually acidic and rich in plant residue with a conspicuous mat of living green moss.

Boom: 1. A floating device used to contain oil on a body of water. 2. A piece of equipment used to apply pesticides from a tractor or truck. (See: sonic boom.)

Botanical Pesticide: A pesticide whose active ingredient is a plant-produced chemical such as nicotine or strychnine. Also called a plant-derived pesticide.

Bottle Bill: Proposed or enacted legislation which requires a returnable deposit on beer or soda containers and provides for retail store or other redemption. Such legislation is designed to discourage use of throwaway containers.

Bottom Ash: The non-airborne combustion residue from burning pulverized coal in a boiler; the material which falls to the bottom of the boiler and is removed mechanically; a concentration of the non-combustible materials, which may include toxics.

Bottom Land Hardwoods: Forested freshwater wetlands adjacent to rivers in the southeastern United States, especially valuable for wildlife breeding, nesting and habitat.

Brine Mud: Waste material, often associated with well-drilling or mining, composed of mineral salts or other inorganic compounds.

Building Cooling Load: The hourly amount of heat that must be removed from a building to maintain indoor comfort (measured in British Thermal Units BTUs).

Broadcast Application: The spreading of pesticides over an entire area.

Bubble Policy: (See: emissions trading.)

Bubble: A system under which existing emissions sources can propose alternate means to comply with a set of emissions limitations; under the bubble concept, sources can control more than required at one emission point where control costs are relatively low in return for a comparable relaxation of controls at a second emission point where costs are higher.

Buffer Strips: Strips of grass or other erosion-resisting vegetation between or below cultivated strips or fields.

Bulk Sample: A small portion (usually thumbnail size) of a suspect asbestos-containing building material collected by an asbestos inspector for laboratory analysis to determine asbestos content.

Bulky Waste: Large items of waste materials, such as appliances, furniture, large auto parts, trees, stumps.

Burial Ground (Graveyard): A disposal site for radioactive waste materials that uses earth or water as a shield.

By-product: Material, other than the principal product, generated as a consequence of an industrial process.