



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 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.

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

- VOCs, primarily the solvent trichloroethylene (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.

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 which areas of the Station are sources of industrial wastes found in the regional groundwater and what health risks may be presented by these chemicals. Future fact sheets will provide specific details on cleanup alternatives for addressing this contamination, updates on environmental restoration progress, and will inform you of opportunities for public involvement.

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.

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.

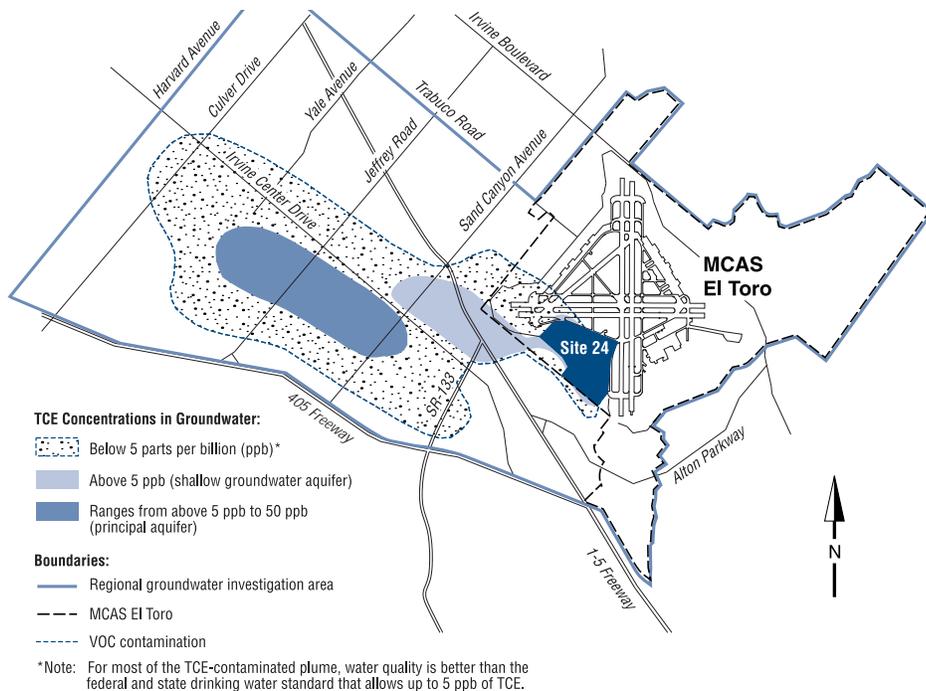


Figure 1 Site Map

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).

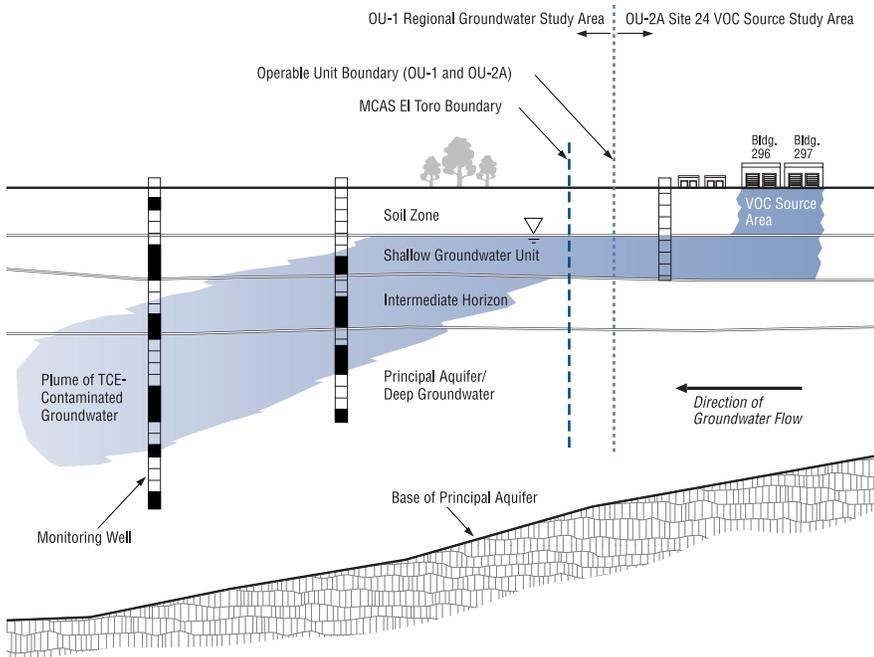


Figure 2 Subsurface Contamination

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, dilute 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.

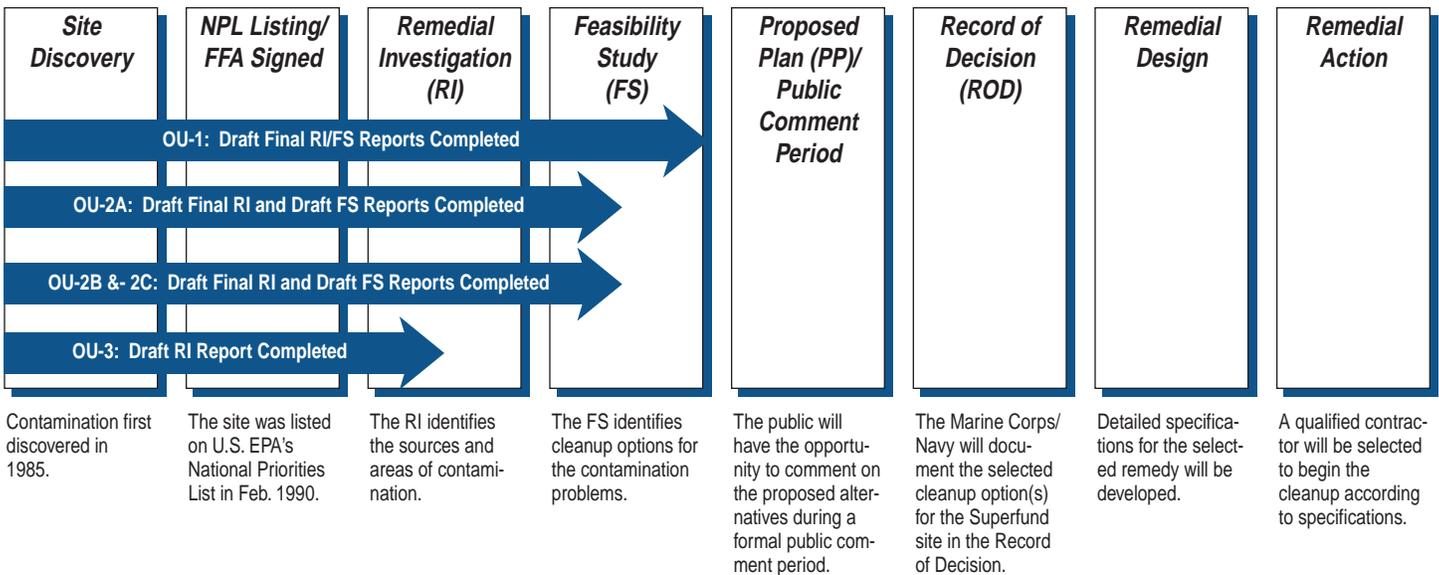


Figure 3 MCAS El Toro – Installation Restoration Program Process

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.

Interested neighbors to MCAS El Toro and other members of the public are encouraged to attend RAB meetings and learn more about the environmental restoration efforts at the Station. The next board meeting is scheduled for January 30, 1997, from 6:30 to 9:00 p.m., at the Irvine City Hall Conference and Training Center. For more information regarding RAB meetings and public participation activities, see *Where To Get More Information* on page 6.

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: Ms. Charly Wiemert, 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 _____

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Affiliation (optional) _____

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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:

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