



PROPOSED PLAN

For Environmental Restoration at Marine Corps Air Station El Toro

May 1997

Marine Corps Proposes Soil Vapor Extraction for Cleanup of Contaminated Soil at Site 24

The Marine Corps is requesting comments from the public on the cleanup alternatives for contaminated soil at Installation Restoration Program Site 24 at Marine Corps Air Station (MCAS) El Toro. This Proposed Plan also notifies the public of opportunities to comment on these alternatives. A future proposed plan will address the groundwater under Site 24 as well as the regional groundwater west of the Station.

This Proposed Plan provides an overview of the environmental investigation results presented in the Draft Final Remedial Investigation Report prepared by the Marine Corps. The plan also summarizes the Feasibility Study report that gives the results of the evaluation of possible soil cleanup alternatives for the site. It presents the Marine Corps' preferred cleanup alternative that is based on the U.S. Environmental Protection Agency's presumptive remedy approach. This approach is used to help guide the process of identifying a proven method for soil cleanup that protects public health and the environment.

This Proposed Plan and the corresponding public comment period comply with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).

The remedial (cleanup) action objective at Site 24 is to protect human health and the environment by reducing concentrations of volatile organic compounds (VOCs) in the soil to prevent or minimize further impact to groundwater. VOCs comprise a category of chemicals, mainly solvents, formerly used for aircraft maintenance at the Station. The soil cleanup will significantly reduce the movement of VOCs from Site 24. The Marine Corps' preferred alternative for cleanup of soil contamination at Site 24 calls for the construction, operation, and maintenance of a soil vapor extraction (SVE) system to remove TCE and other VOCs from the soil. This soil cleanup is estimated to take 2 to 4 years to complete and would be conducted entirely on site without excavating contaminated soil.

The remedial action for Site 24 soil is regarded as "interim" because groundwater is not addressed in this Proposed Plan. Groundwater at the site will be addressed in a future proposed plan. The soil remedy will be considered final.

Opportunities for Community Involvement

Public Meeting: Thursday, May 15, 1997 4:30-8:30 p.m.
**Irvine City Hall, Conference and Training Center, One Civic Center Plaza,
Harvard Avenue at Alton Parkway, Irvine**

You are invited to attend a community meeting regarding the Proposed Plan for contaminated soil cleanup at Site 24, Volatile Organic Compound Source Area, also known as Operable Unit 2A. At the meeting, Marine Corps representatives will provide information on the investigation and cleanup alternatives evaluated and discuss the preferred cleanup alternative. You will have the opportunity to ask questions and comment on the alternatives.

Public Review and Comment Period: April 30 - May 30, 1997

We encourage you to comment on the alternatives and site-related documents during the 30-day public comment period. Comments may be submitted orally or in writing at the community meeting, or you can mail written comments **postmarked no later than May 30, 1997** to: 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 (714) 726-6586.

Investigation Summary

Site Background

Historical activities at MCAS El Toro include more than 40 years of aircraft and vehicle maintenance using solvents like trichloroethene (also called TCE) and similar chemicals classified as volatile organic compounds (VOCs). At some of the maintenance locations, use of these solvents resulted in the contamination of soil and groundwater.

Site 24 encompasses approximately 200 acres. It is located in the southwest quadrant of the Station and underlies two large aircraft hangars (Buildings 296 and 297). Aircraft maintenance performed at the site involved the use of industrial solvents for degreasing parts, paint stripping, and aircraft washing. Solvents, mostly TCE, were formerly used at Buildings 296 and 297. The precise origin, nature, and use of TCE released at the site (for example, unused and discarded, spent, mixed or diluted, etc.) and the specific circumstances and quantities of individual releases are unknown. TCE was used in aircraft maintenance activities, and releases of TCE or materials containing TCE were incidental to those activities. Solvents containing TCE are no longer used at the Station.

Impact of Solvents on Soil and Groundwater

The Marine Corps estimates that approximately 6,000 pounds of TCE are in the soil beneath Buildings 296 and 297. Other VOCs, perchloroethene (PCE), carbon tetrachloride, 1,1-dichloroethene (1,1-DCE), and Freon 113, were also found in the soil but in smaller amounts. Similarly, PCE, 1,1-DCE, and carbon tetrachloride are present in the groundwater but at much lower concentrations than TCE. These solvents have migrated

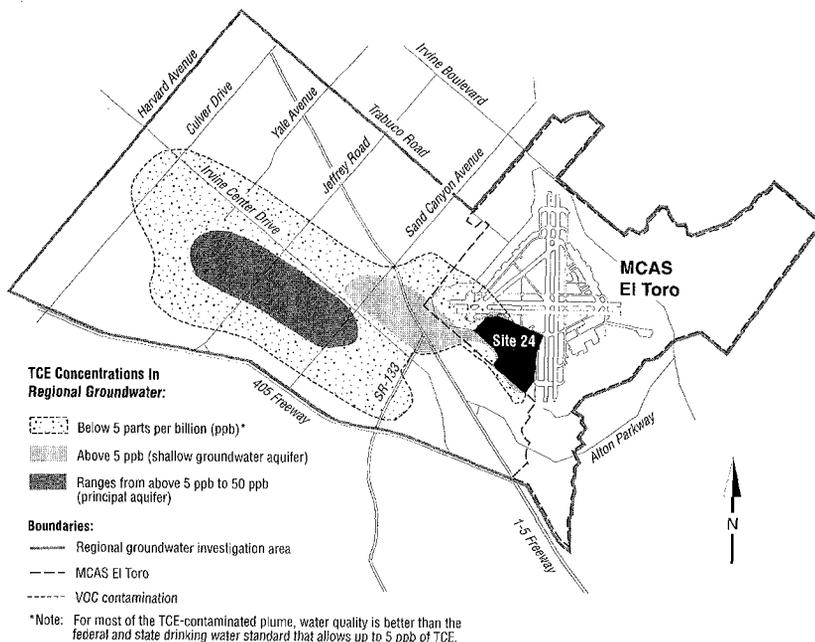


Figure 1 Site Map

Site 24 Soil Cleanup Reports and Documents Available for Review and Comment

An Administrative Record file is the collection of all reports and documents used by the Marine Corps in the selection of cleanup alternatives. This collection provides a record of all decisions and actions taken by the Marine Corps. Such a collection has been compiled for Site 24, VOC Source Area, Operable Unit 2A, and includes the Draft Final Remedial Investigation and Feasibility Study Reports. This collection also contains the U.S. EPA's policies on presumptive remedies and the results of soil vapor extraction pilot tests at MCAS El Toro. It is available for public review and comment through May 30, 1997. The relevant documents that pertain to Site 24 and a complete index of all MCAS El Toro Administrative Record documents are housed at the Information Repository at the Heritage Park Regional Library, 14361 Yale Avenue in Irvine. Call (714) 551-7151 for current hours.

The complete collection of documents listed in the index is available for review at MCAS El Toro. To arrange a time to review documents at the Station, contact Ms. Charly Wiemert at (714) 726-2840.

from the soil at Site 24 into the shallow groundwater and then to the regional groundwater.

The contaminated soil beneath Buildings 296 and 297 has been determined to be the ongoing source of the low-level regional VOC groundwater contamination that forms a plume extending about 3 miles west of the Station. A plume is defined as a single area of groundwater contamination extending from a distinct source. Figure 1 to the left shows the location of Site 24 and the concentrations of TCE in the shallow groundwater and the deeper groundwater (referred to as the principal aquifer). An aquifer is an underground, water-bearing layer in rock, gravel, or sand that will yield a quantity of water. Figure 2 on page 3 shows the link established between the VOC-contaminated soil and groundwater at Site 24.

The principal aquifer beneath the site is not affected. However, the principal aquifer west of the Station boundary has low-level TCE contamination as shown in the map. The TCE in groundwater that originates from Site 24 is gradually diluted as it moves farther away and into the deeper, principal aquifer. Other VOCs were also found in the groundwater, but only within the plume.

Potential risks to human health from exposure to VOCs present at Site 24 were also evaluated. The levels of VOCs in the soil are very low, thus the risk to human health from exposure to this soil is also low. For more information on potential health risks, see page 3.

Human Health Risk Assessment

Human health and ecological risk assessments are used to determine if environmental cleanup is necessary at a site. The decision to conduct a site cleanup is based upon the presence of materials that could potentially affect human health or the environment. At Site 24, a human health risk assessment was performed. Because no wildlife is present in this operational area of the Station, an ecological risk assessment was not conducted.

To assess the potential human health risk, information on the types and amounts of chemicals in the soil and groundwater beneath the site was collected during the environmental investigation. The next step identified possible exposure pathways, which show how people could come into contact with these chemicals. Possible exposure pathways examined for VOC-contaminated soil were inhalation of VOC vapors, ingestion of soil, and contact with skin. For the purposes of evaluating risk from exposure to groundwater, potential exposure to VOCs from using water for drinking and bathing was evaluated even though this water is not used for these purposes. The risk assessment also assumes people are either living or working at the site over a period of 30 years. Finally, the possible health effects from these exposures to each chemical were evaluated and combined with other information from the site to estimate potential health risks.

The health risks associated with exposure and toxicity of chemicals were estimated for cancer-causing (carcinogenic) and noncancer-causing (noncarcinogenic) effects. The carcinogenic

risk is expressed in terms of the chance of humans contracting cancer as a result of being exposed to VOCs from the site for 30 years. To manage carcinogenic risk and protect public health, the U.S. Environmental Protection Agency (U.S. EPA) has set a protective risk level not to exceed the range at *one person in a population of ten thousand to one person in one million*.

The risk assessment concluded that the chance of contracting cancer over a 30-year period from exposure to VOCs in the soil at Site 24 is approximately *five chances in one billion*. This is well below the U.S. EPA range for protection of public health for carcinogens. Concentrations of VOCs in soil are not high enough to cause noncarcinogenic effects in workers or possible future residents.

Although the risk from exposure to soil was very low, contaminated soil is an ongoing source of groundwater contamination. The risk presented by exposure to VOCs in groundwater to a possible future resident of the property is on the order of *one chance in one thousand*. The results also showed that under the same scenario, VOC concentrations are high enough to potentially cause noncarcinogenic effects to the future resident. These risks are considered high only if the groundwater from the contaminated aquifer does not undergo any treatment and is used for drinking and bathing. Groundwater at the site is not currently used for domestic or agricultural purposes. Existing wells installed at Site 24 are only used to monitor site conditions.

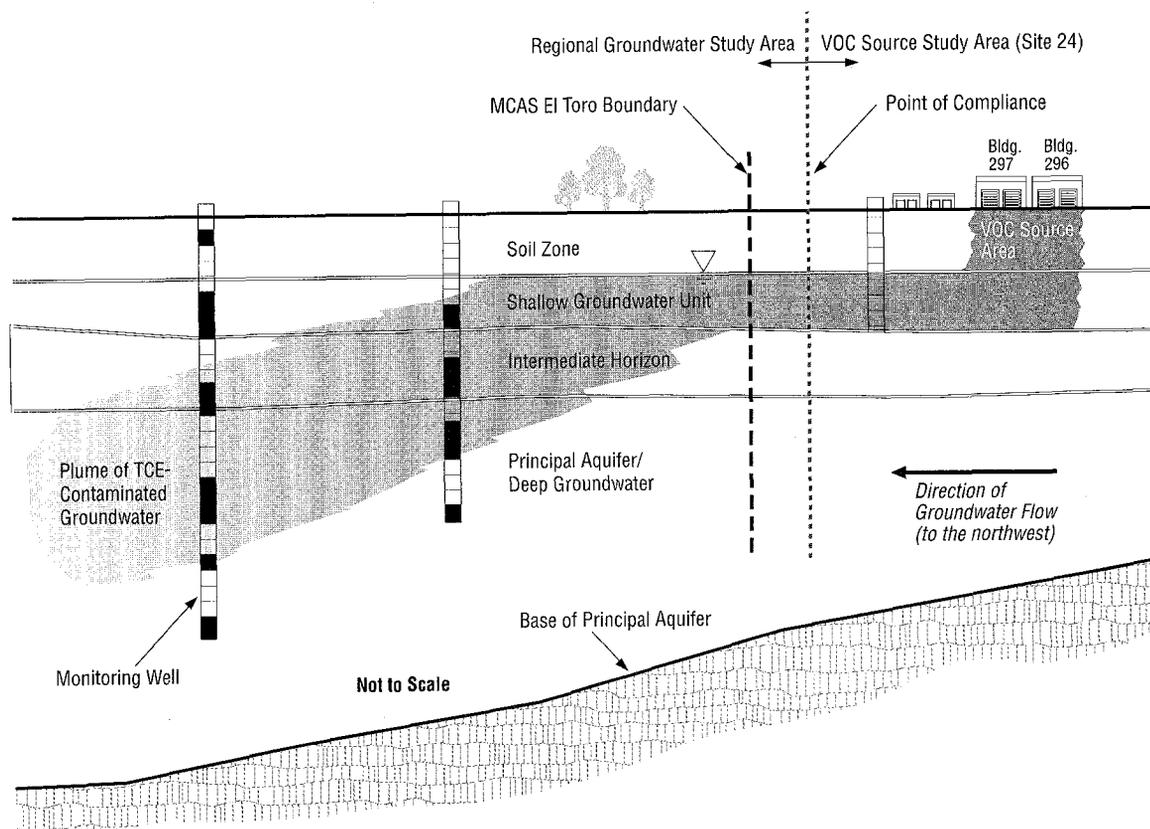


Figure 2 Subsurface Contamination shows the solvent-contaminated soil in the VOC Source Area beneath Site 24 that serves as the source of contamination in the shallow groundwater. This contamination forms a plume of low-level TCE-contaminated groundwater that extends into the principal aquifer approximately 3 miles from MCAS El Toro. None of the groundwater is used for drinking water purposes.

Summary of Remedial Alternatives

The Marine Corps' evaluation of remedial alternatives was guided by the U.S. EPA's experience at VOC-contaminated sites around the country. The Feasibility Study process involved applying the U.S. EPA's presumptive remedy approach, which uses past experiences to accelerate the evaluation and selection of cleanup alternatives. The VOC presumptive remedy approach meets the Marine Corps' objective of protecting human health and the environment by reducing VOC concentrations in the soil to assure that the soil at the site does not continue to contribute to the low-level regional groundwater contamination. The approach also allows the Marine Corps to minimize the identification and screening of a large number of remedial technologies and focus on those technologies that have already proven to be the most effective.

The presumptive remedy selected for detailed evaluation in the Feasibility Study was soil vapor extraction (SVE), U.S. EPA's primary presumptive remedy for cleanup of VOC-contaminated soils.

Soil Vapor Extraction Pilot Tests

Pilot tests were conducted to evaluate the efficiency of using SVE to remove VOCs at Site 24. The first pilot test, conducted for 84 days, removed approximately 485 pounds of TCE, 76 pounds of 1,1-DCE and 63 pounds of Freon 113 from one extraction well. Removal of 485 pounds of TCE represents an 8 percent reduction of total estimated mass of TCE in the soil. The "influence" of the well was estimated to be approximately

280 feet. Influence refers to the area around an SVE well where air flow was induced and solvents were extracted. Additional one-day tests conducted on other SVE wells confirmed that many of these wells had a similar influence. The pilot test data proved that SVE was successfully demonstrated at Site 24 on a pilot test basis.

Feasibility Study Results

The Feasibility Study process evaluated two alternatives for addressing VOC-contaminated soil at Site 24. A "No Action" alternative was considered as well as soil vapor extraction. Descriptions of the alternatives are numbered as they appear in the Draft Final Feasibility Study Report. The Marine Corps' preferred alternative is Alternative 2, Soil Vapor Extraction.

Alternative 1: No Action

By law, the No Action alternative must be considered as a baseline against which other alternatives are compared. Under the No Action alternative, no activities would be initiated to clean up the soil at Site 24. Actual or threatened releases of hazardous substances from the site, if not addressed by the preferred alternative, may present a current or potential threat to public health or the environment. With no action, VOCs in the soil would continue to contaminate the shallow groundwater. The levels of VOCs in groundwater would continue to exceed those allowed by federal drinking water standards.

Presumptive Remedy Approach

What are presumptive remedies?

Presumptive remedies are cleanup technologies preferred by the U.S. EPA. They are used for sites that have similar characteristics such as the types of contaminants, disposal practices used, or similar environmental impacts. Presumptive remedies are expected to be used at all appropriate sites except when unusual site-specific circumstances occur. The primary presumptive remedy suggested by the U.S. EPA for VOC-contaminated sites is soil vapor extraction (SVE) because it provides effective treatment in place at a relatively low cost. In cases where SVE will not work or site characteristics are not as favorable for using this technology, other presumptive remedies are thermal desorption and incineration.

Which presumptive remedy is best suited for Site 24?

Pilot tests conducted at the site have demonstrated that SVE is technically feasible and poses a minimum risk to public health and the environment. Thermal desorption and incineration were eliminated from consideration because they are more costly and require that contaminated soils be excavated prior to treatment.

What is SVE?

SVE is a relatively simple process that physically separates chemicals from the soil. It removes VOCs and some semivolatile organic compounds from soil beneath the ground surface in the unsaturated zone—the soil below the surface that is located above the water table. A vacuum is applied to a network of underground extraction wells, and chemicals, in the form of vapor or gas, are pulled to the surface. Sometimes, in addition to the extraction wells, air injection wells are installed to increase the air flow and accelerate the removal rate of the vapors.

Where has this technology been used?

SVE systems have been widely used to clean up VOCs at numerous sites and military installations around the country. Some of these include: Norton Air Force Base in San Bernardino, California; Fairchild Air Force Base in Washington; and the Defense General Supply Center in Virginia.

This would cause the potential future cleanup of groundwater to be more costly and time-consuming. There are no direct costs associated with Alternative 1.

Although groundwater monitoring is not a part of Alternative 1, sampling and analysis of groundwater would be performed to assess any potential long-term impacts to groundwater at the Station and in the regional groundwater beyond the Station's boundaries.

Alternative 2: Soil Vapor Extraction – Preferred Alternative

With Alternative 2, VOCs are removed from soil using soil vapor extraction (SVE), the U.S. EPA presumptive remedy, a relatively simple process that physically separates VOCs from the soil. SVE systems are best suited to VOCs that have a tendency to volatilize, or evaporate easily, such as solvents. As the name suggests, SVE extracts chemicals from the soil in the vapor form. By applying a vacuum to a network of SVE wells, VOCs are pulled to the surface as a vapor. This vapor is passed through an activated carbon filter to trap the VOCs before the air is discharged to the atmosphere. When the activated carbon filters become saturated with VOCs, the carbon is returned to the manufacturer where it is regenerated and the VOCs are destroyed. By removing VOCs from the soil, further groundwater contamination is prevented or minimized, thereby reducing the time required for groundwater cleanup. A diagram illustrating the SVE process is shown in Figure 3.

The preferred alternative includes the following:

- constructing, operating, and maintaining an SVE system to remove TCE and other VOCs from the soil;
- performing monitoring throughout the predicted 2 to 4 years of cleanup;
- treating VOC-contaminated soil vapors with activated carbon filters to meet air quality standards prior to discharge to the atmosphere; and
- sampling to confirm SVE treatment effectiveness.

The estimated cost to implement an SVE system at Site 24 is \$4.9 million. A cost summary is presented on page 6.

Site 24 Soil Cleanup Goals

The remedial (cleanup) action objective at Site 24 is to reduce VOC concentrations in the soil to prevent or minimize further impact to the shallow groundwater. To achieve this objective, cleanup goals for the soil were established to reflect VOC concentrations in the soil that will not contaminate groundwater above the federal and state drinking water standards. These standards are called maximum contaminant levels or MCLs.

Cleanup goals for Site 24 VOC-contaminated soil are defined as threshold soil vapor concentrations. Concentrations above the threshold levels reflect soil conditions that have the potential to contaminate groundwater above the MCLs. Cleanup of the soil will continue until concentrations of VOC vapors are below the threshold levels. These threshold concentrations for soil are calculated based on site- and chemical-specific factors presented in the Draft Final Remedial Investigation/Feasibility Study Reports. The only VOCs in soil that impact groundwater above MCLs are TCE and PCE. Cleanup of soil using the SVE process is specifically targeted for subsurface soil within the boundaries of Site 24 that contain TCE and PCE. Other VOCs found in the soil will be removed along with TCE and PCE. The highest vapor concentrations detected during the environmental investigation for VOCs in soil that impact groundwater are: 6,120 µg/L (micrograms per liter) for TCE; and 192 µg/L for PCE. Corresponding threshold vapor concentrations or cleanup goals for these VOCs are: 27 µg/L for TCE; and 69 µg/L for PCE.

The cleanup goals for soil are established to meet MCLs or groundwater cleanup goals at the point of compliance for groundwater cleanup. The point of compliance, which is shown in Figure 2 on page 3, is located to the west of Site 24 between the site and Station boundaries.

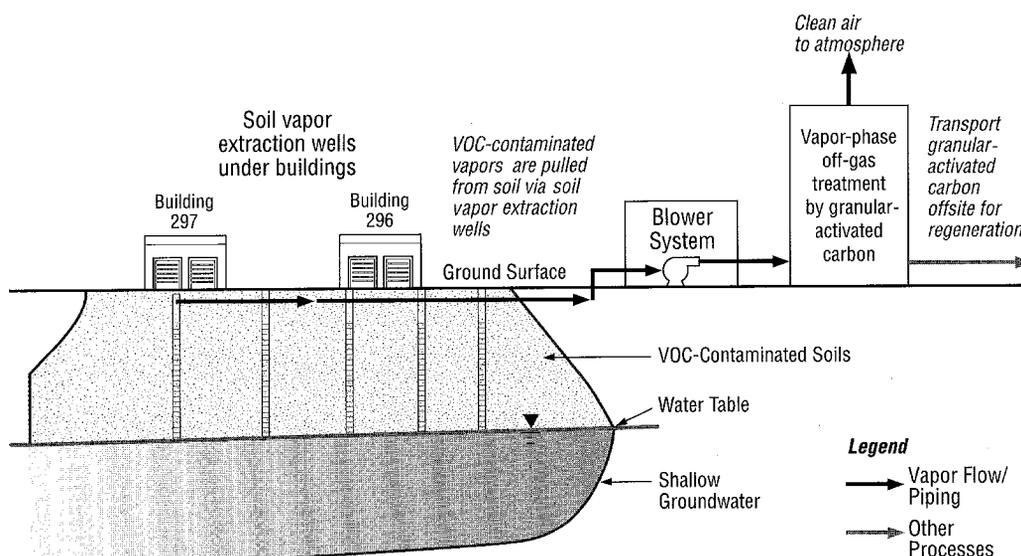


Figure 3 Soil vapor extraction process shows the Marine Corps' preferred alternative that removes and treats solvents from beneath Buildings 297 and 296 at Site 24.

Cleanup Plays Principal Role in Restoration Program

Cleanup of contaminated soil at Site 24 represents a key component of the comprehensive environmental investigation and cleanup program underway at MCAS El Toro. Designed to protect public health and the environment, the Installation Restoration Program (IRP) provides a structure for the Marine Corps to identify, investigate, and clean up industrial solvents, metals, and a variety of chemicals that resulted from past operations that at one time were acceptable practices. This effort is being coordinated with the scheduled operational closure of the Station in July 1999. Figure 4 shows the IRP process and the current status of Site 24.

MCAS El Toro was added to the U.S. EPA's National Priorities List of hazardous waste sites in 1990 due to the presence of VOCs that are present in the regional groundwater. VOCs have moved underground beyond the Station boundary. To effectively manage the overall cleanup effort, the Marine Corps organized the IRP sites into Operable Units or OUs. OU-1 addresses the low-level TCE contamination in the regional groundwater that originates at the Station and extends 3 miles west. OU-2A includes Sites 24 and 25 (Major Drainage Channels). Both sites were thought to be potential source areas of regional groundwater contamination. The environmental investigation for OU-2A determined that Site 24 is the source of the VOC contamination. Contaminated groundwater beneath Site 24 will be addressed together with the groundwater contamination that extends off-Station. OU-2B and OU-2C address landfill sites that contain a variety of waste materials. OU-3 includes the remaining sites around the Station with surface soil contamination.

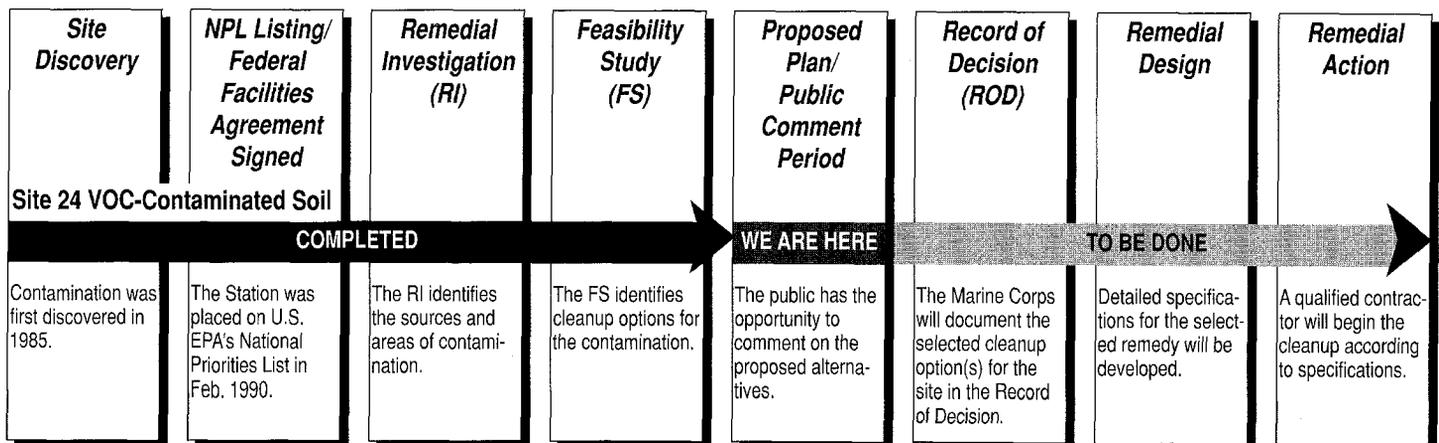
Proposed Plans for each of these operable units will be presented to the public for review and comment. After consideration of public comments on the proposed alternatives, Records of Decision that formally document the remedial actions planned for these sites will be issued. All public comments will be addressed in the Responsiveness Summary section of the Records of Decision. The Marine Corps currently anticipates that the public comment period for the Proposed Plans

for OU-1 and OU-2A groundwater will be held in late 1997. Proposed Plans for OU-2B and OU-2C (landfills) will be released in December 1997, and the first group for OU-3 (soils) in June 1997.

Soil Vapor Extraction System Cost Estimate Summary

Cost Category	Costs
Capital Cost	\$1.1 million
<i>Includes design and construction of the soil vapor extraction system and includes the activated carbon filters to trap volatile organic compounds for disposal (approximately 1 year).</i>	
Operation and Maintenance (O&M)	\$2.5 million
<i>Costs to run the system, perform all maintenance, and regenerate activated carbon (2-4 years).</i>	
Monitoring	\$1.3 million
<i>Involves gauging the system's performance and using soil vapor sampling to measure system effectiveness and cleanup progress during O&M (2-3 years).</i>	
Total – Estimated Present-Worth Cost	\$4.9 million
<i>Covers all costs to complete this project and includes a 20 percent contingency because the exact number and locations of SVE wells will be determined during the remedial design phase of the project (2-4 years).</i>	
<i>Detailed information on soil cleanup cost estimates is presented in the Draft Final Feasibility Study Report for Site 24.</i>	

Figure 4 MCAS El Toro – Installation Restoration Program Process



Evaluation of the Preferred Remedy

Each alternative considered by the Marine Corps has undergone a detailed evaluation and analysis, using a process developed by the U.S. Environmental Protection Agency. The cleanup remedy selected for a site must meet all nine evaluation criteria, or standards. The nine criteria are defined below and are accompanied by the key points from the evaluation of Alternative 2, Soil Vapor Extraction, the Marine Corps' preferred alternative presented in the Draft Final Feasibility Study Report. The preferred alternative already meets eight of the nine criteria. The ninth, Community Acceptance, will be determined after the close of the public comment period.

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.

- *SVE provides both short-term and long-term protection by reducing the concentration of VOCs in soil and preventing further groundwater contamination.*

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.

- *Waste is removed in place through limited construction and no excavation; few impacts to the environment are likely.*
- *Emission controls are needed to ensure compliance with air quality standards.*

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.

- *Proven to be an effective technique for removing VOCs from soil, thereby eliminating the contamination source.*
- *Requires some treatment of residual wastes (used carbon, filters, or water containing VOCs) generally through regeneration or disposal.*
- *Removes VOCs in soil to levels that will prevent exceedance of drinking water standards in shallow groundwater.*

4. Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment – 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).

- *Significantly reduces toxicity, mobility, or volume through treatment.*
- *Removal and treatment of VOCs produces few waste by-products.*

5. Short-term Effectiveness – assesses how well human health and the environment will be protected during the the period of time needed to complete construction and implement a remedy.

- *Does not present substantive risks to onsite workers or community; potential for some dust generation during well installation.*

- *Potential air emissions are easily controlled through activated carbon adsorption.*
- *Short time frame to achieve cleanup.*
- *Effective for treating waste under buildings and at active industrial or military facilities.*

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 also considered.

- *Few administrative difficulties; technology is readily available.*
- *Successful pilot tests demonstrate feasibility.*
- *Installing and operating extraction wells requires fewer engineering controls than do other technologies (for example, excavation and incineration).*
- *Requires soil vapor sampling to determine when cleanup is achieved.*

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

- *\$4.9 million, includes capital costs and costs for operation, maintenance, and monitoring (see chart on page 6).*

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 Cal-EPA's Department of Toxic Substances Control and the Regional Water Quality Control Board), concur with the Marine Corps' preferred alternative.*

9. Community Acceptance – evaluates whether community concerns are addressed by the remedy and if the community has a preference for a remedy. This Proposed Plan is the Marine Corps' request to the community to comment on the proposed alternatives. Although public comment is an important part of the final decision, the Marine Corps is compelled by law to balance community concerns with all previously mentioned criteria.

- *MCAS El Toro community-based Restoration Advisory Board has had the opportunity to review and comment on the Draft Feasibility Study Report.*
- *Proposed Plan and Draft Final Feasibility Study Report currently available for public comment.*

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, (IAU), 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 this information repository: **Heritage Park Regional Library, 14361 Yale Avenue, Irvine, California 92714; (714) 551-7151 (please call for current operating hours).**

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:

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