



PROPOSED PLAN for Closure of Inactive Landfills at Marine Corps Air Station El Toro

Final—May 1998

Marine Corps Proposes Soil Cap and Long-Term Monitoring

The Marine Corps is requesting comments from the public on the alternatives for closure of Installation Restoration Program Sites 2, 3, 5, and 17, four inactive landfills at Marine Corps Air Station (MCAS) El Toro. Inactive landfills are non-operational and no longer receive wastes for disposal.

This Proposed Plan notifies the public of opportunities to comment on these alternatives and provides an overview of the environmental investigation results presented in the Draft Final Remedial Investigation Reports prepared by the Marine Corps. The Plan also summarizes the Draft Final Feasibility Study Reports that give the results of the evaluation of possible closure alternatives for the four landfill sites. It presents the Marine Corps' preferred alternative that is based on the U.S. Environmental Protection Agency's (U.S. EPA's) presumptive remedy approach for landfills. This approach is used to help guide the process of identifying a proven method for landfill closure that protects both public health and the environment. A final remedy for the sites will be selected only after the public comment period has ended and all comments have been reviewed and considered. The final remedy will be documented in the Record of Decision (ROD).

The cleanup or remedial objective of the Marine Corps is to protect public health and the environment and meet all applica-

ble or relevant and appropriate federal and state environmental laws and regulations for closure of landfills. Meeting this objective involves preventing people from coming in contact with the landfill materials, and protecting the environment by reducing infiltration of surface water into the landfills to prevent formation of leachate. Leachate is formed when surface water mixes with landfill materials and creates liquid wastes that could migrate downward and impact groundwater.

The Marine Corps' preferred remedy for each landfill site includes installing a 4-foot-thick single-layer soil cap or cover on top of each landfill. The cover would include vegetation and be designed and engineered to meet the specific characteristics of each landfill site to control erosion and slope instability. Nonengineered actions or "institutional controls" would also be taken to limit access or activities at the sites to further protect public health and the environment. Long-term environmental monitoring of the landfills would also be conducted for approximately 30 years to assess each landfill's performance in containing waste materials within its boundaries.

Reports describing the field investigations and evaluations of potential alternatives are available for public review at the Heritage Park Regional Library in Irvine (see back page). These documents are part of the MCAS El Toro Installation Restoration Program Administrative Record file (see page 13).

Opportunities for Community Involvement

Public Meeting

Thursday, June 18, 1998 4:30-8:30 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 closure of four inactive landfills, Installation Restoration Program Sites 2, 3, 5, and 17, 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 15 – July 13, 1998

We encourage you to comment on this Proposed Plan and site-related documents during the 60-day public comment period. Originally set for 30 days, the public comment period was expanded by the Marine Corps to accommodate a request for an extension. You may submit written comments by mail **postmarked no later than July 13, 1998** 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 (714) 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 the landfills.

Environmental Investigation Overview

Site Background

The map on page 3 shows the locations of the landfills.

Site 2, Magazine Road Landfill, was used from the late 1950s until 1980. During the 1970s, all solid wastes from MCAS El Toro and some waste from MCAS Tustin were disposed in this landfill. Suspected types of waste include construction debris, municipal wastes, batteries, waste oils and solvents, hydraulic fluids, paint residues, and transformers. Investigators conducted record searches and interviews of former employees to initially determine waste types. Site 2 is bordered by Borrego Canyon Wash. An unlined, constructed drainage channel crosses through the central portion of the landfill (Areas A and B), see map on page 3. Site 2 is located in the foothills of the Santa Ana Mountains in the eastern portion of MCAS El Toro and occupies approximately 27 undeveloped acres. Vegetation at the site provides a habitat for the California gnatcatcher, a federally listed, threatened bird species.

Site 3, Original Landfill, was active from 1943 to 1955. This landfill, the first at the Station, was operated as a trench-and-fill disposal facility. Prior to burial, wastes were burned at a former incinerator to reduce volume. Reportedly, any wastes generated on the Station may have been disposed at Site 3. The wastes are likely to have included metals, incinerator ash, solvents, paint residues, hydraulic fluids, engine coolants, construction debris, oily wastes, municipal solid waste, and various inert solid wastes. Record searches and interviews of former employees helped to initially determine waste types. Site 3 encompasses approximately 11 acres and is situated between Irvine Boulevard and North Marine Way. Agua Chinon Wash, an unlined drainage channel, crosses the site. Presently, infrastructure at the site consists of concrete and asphalt pads and temporary structures associated with environmental field investigations that are adjacent to facilities that support Marine Corps aircraft activities.

Site 5, Perimeter Road Landfill, was active from approximately 1955 until the late 1960s and operated as a trench-and-fill disposal facility. Wastes were often placed in a trench at the site and burned to reduce volume, and then covered with soil. Wastes are likely to have included burnable trash, municipal solid waste, cleaning fluids, scrap metals, paint residues, and unspecified fuels, oils and solvents. Former employees and record searches assisted in determining waste types. Site 5 encompasses approximately 1.8 acres and is located in the eastern portion of the Station near the foothills of the Santa Ana Mountains. The site is flat and is currently undeveloped.

Site 17, Communication Station Landfill, was active from 1981 to 1983 as a Station-wide disposal facility. Suspected waste types included domestic waste and rubble, cooking

grease, oils and fuels from sumps, and empty drums. Record searches and interviews of former employees helped to ascertain waste types. Site 17 is located near Site 2 in the foothills and occupies approximately 11 undeveloped acres. Site 17 also provides a habitat for the California gnatcatcher.

Landfill Investigations

Investigations were performed at each landfill to obtain data necessary to characterize environmental conditions. Generally, these investigations involved extensive sampling and analysis of air, soil gas, soil, surface water, and groundwater to determine the nature of contamination present at and around each landfill. Each investigation was tailored to meet the specific characteristics of each landfill. Sampling of landfill materials is not considered practical because of the large variation and random location of wastes. Sampling procedures followed the U.S. EPA presumptive remedy approach for landfills used throughout the country.

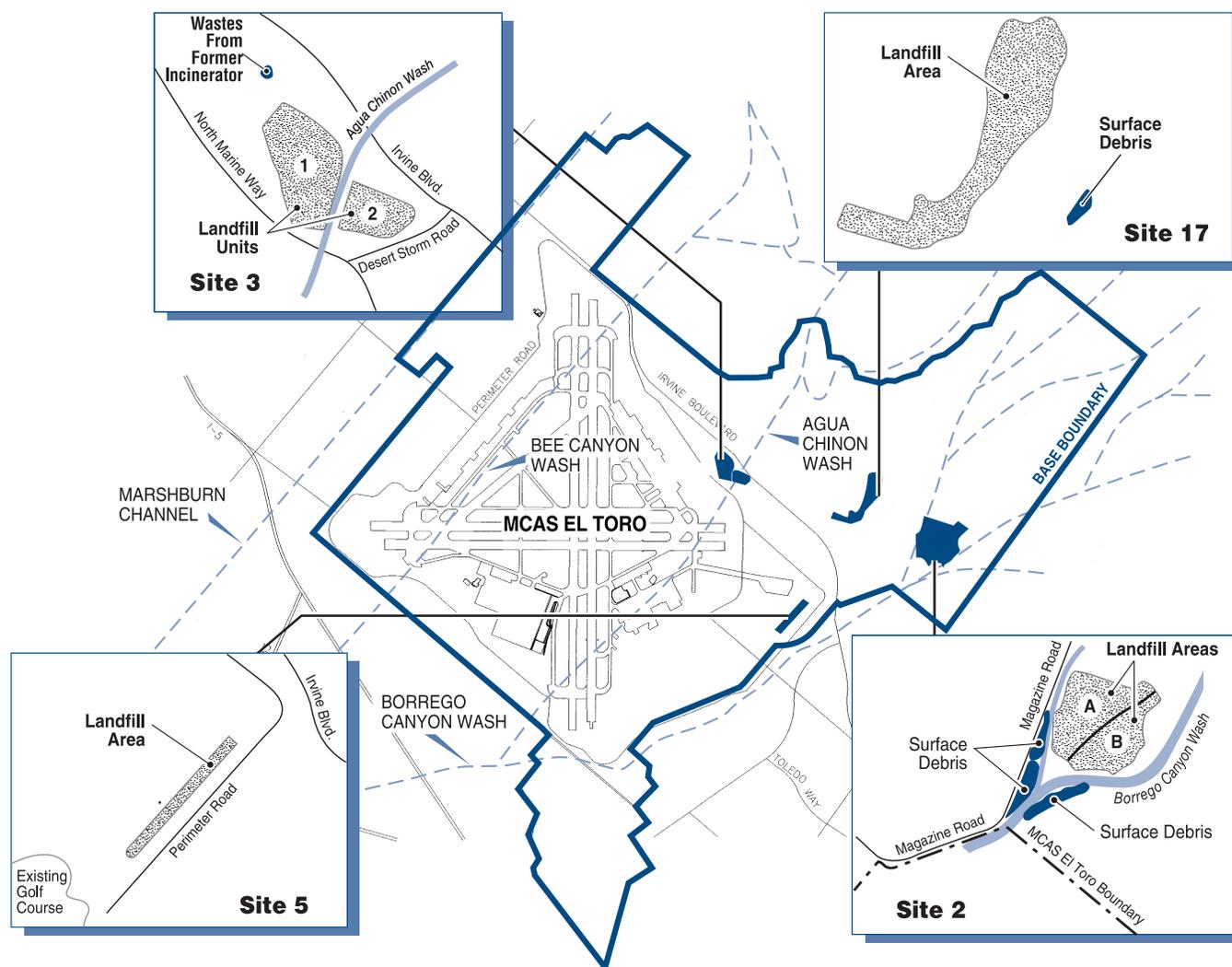
Air samples were collected to determine if landfill gases are being released to the atmosphere. Soil gas samples were collected from landfill soils and at the perimeter of each landfill to evaluate whether hot spots (localized areas with high concentrations of chemicals) are present and if methane or other landfill gases are moving beyond landfill boundaries. Analysis of shallow soil samples was performed to obtain data for the human health and ecological risk assessments. Subsurface sampling of soils surrounding the buried landfill materials was conducted to determine if contaminants from the landfills are moving toward groundwater. Groundwater monitoring wells were installed to sample and test groundwater surrounding (up-gradient and downgradient) landfill boundaries. Depth to groundwater varies from site to site and ranges from 25 to 230 feet deep. Wells were not drilled through the landfills because well borings could create a pathway for chemicals to move downward from the landfill into groundwater. To sample for leachate underneath the landfills, lysimeters (devices that collect moisture in soil) were installed in slanted borings from landfill perimeters to reach under the sites. Leachate is formed when surface water infiltrates landfills and mixes with or dissolves landfill materials and creates liquid wastes that could impact groundwater.

Investigation Results

Wastes have not been disposed of at the landfills for many years, but the environmental investigations showed that landfill materials at these sites have the potential to impact the environment if actions are not taken to prevent erosion of the existing landfill covers and infiltration of water into the landfills. Investigation results show that no chemicals that would be derived from landfill contents were found outside of site boundaries.

Air sampling showed that volatile organic compounds (VOCs) and methane gas are present at low levels over the landfills. VOCs were detected in soil gas sampling but no

MCAS El Toro Location Map—Inactive Landfill Sites



localized hot-spot sources of landfill gases were found. Air and soil gas sampling at all four landfills confirmed that controls are not presently needed to contain landfill gases due to their low concentrations. Soil sampling indicated the presence of VOCs, semivolatile organic compounds (SVOCs), petroleum hydrocarbons, and metals that could contribute to the formation of leachate. Groundwater sampling and monitoring results show that one or more of several metals, including nickel, chromium, selenium, thallium, and arsenic, were present at Sites 2, 3, 5, and 17 at concentrations that exceeded drinking water standards established by the federal government and the State of California. However, groundwater in the region of MCAS El Toro is not used for drinking water purposes. These metals in the groundwater that exceed drinking water standards are found upgradient and downgradient of the landfill sites. A computer modeling analysis of these metals, performed as part of the remedial investigation, examined chemical changes to the metals as they move through groundwater. This analysis indicates that these metals are not expected to travel a significant distance from the

sites because the chemical conditions in groundwater that allow the metals to exist in a dissolved state change as groundwater moves away from the landfills. Under these conditions the metals have a natural tendency to *precipitate out* (become separated) from the water. After metals precipitate out of the water solution, they form as a solid on the surface of soil particles.

The remedial investigation showed that groundwater beneath Site 2 contains small plumes of two chlorinated solvents, trichloroethene (TCE) and perchloroethene (PCE). A plume is an area within the groundwater that contains chemicals and generally moves in the direction of, and with, groundwater flow. Since TCE and PCE are not naturally occurring, the solvents are believed to have been disposed in the landfill. Sampling results indicate that these two plumes are small and extend slightly downgradient of the landfill but do not impact regional groundwater in areas where potential drinking water could be extracted. Also, calculations performed for the Site 2 feasibility study estimated that there is less than one pound of

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these solvents present in groundwater, which equates to approximately one cup of solvents.

Other Site Conditions

Site 2 – Magazine Road Landfill: some landfill materials were exposed during flooding of Borego Canyon Wash in 1993. The Marine Corps has taken action to remove or cover the exposed landfill materials and reduce erosion. These actions, undertaken in 1996 and 1997, included installing new fencing at the site to restrict access, moving landfill wastes from Borrego Canyon Wash to a staging area where the materials were recycled or placed in the main body of the landfill and covered, and constructing surface drainage improvements to prevent erosion of landfill materials (see page 8). However, permanent actions are required to improve site drainage and prevent further erosion.

Site 2 also contains large flat areas that are susceptible to ponding of water. Ponded water has the potential to infiltrate into the landfill where it can dissolve landfill materials and create leachate. The leachate can travel, or migrate, downward and may cause contamination of groundwater beneath the site.

Sites 3 – Original Landfill: contains large flat areas that are susceptible to ponding of water and has the potential to produce leachate. The leachate can travel downward and cause contamination of groundwater beneath the site. Landfill materials are located

on both sides of the Agua Chinon Wash. The wash itself is unlined and shows evidence of erosion upstream of the site. If the channel were to erode into the landfill, contents could become exposed. An existing fence is used to control site access.

Site 5 – Perimeter Road Landfill: is flat and susceptible to ponding and leachate formation. The site is not susceptible to erosion, but landfill materials in portions of the site are covered with a thin soil cover. If an individual dug into the soil at this site, it is possible that he or she could easily come into direct contact with landfill contents. An existing fence is used to control site access.

Site 17 – Communication Station Landfill: is located in a small canyon and overflows out of the canyon mouth onto a flat, weed-covered field formerly used for agriculture. Site 17 is experiencing some erosion over the surface of the landfill. Removal actions performed in 1996 and 1997 included installing new fencing at the site, removing drums from the surface of the site to a staging area to reduce potential exposure to these containers, sampling drum contents and disposing of these containers in appropriate off-Station facilities, and building surface drainage control structures (see page 8).

Details of the removals conducted at Sites 2 and 17 are on page 8. For detailed information on investigation findings, the Draft Final Remedial Investigation Reports prepared for each site are available for public review (see page 13).

Human Health and Ecological Risk Assessments

Human health and ecological risks assessments were performed, as part of the remedial investigations, to determine if environmental cleanup or controls are necessary as a result of potential risks to human health and the environment from each landfill. Results from the risk assessments indicate that if actions are not taken at all four landfills to prevent exposure to wastes or to control infiltration, potential risks to human health and the environment would continue to be present.

During the remedial investigations, only the environmental media (e.g., soils, air and groundwater) surrounding the buried wastes, and not the actual wastes, were sampled for analysis. This approach is typical for landfills and is used throughout the country. Sampling of landfill materials is also not considered practical because of the large variation in waste types found within landfills. Drilling into the landfills could also create a conduit for water to pass into the wastes and cause leachate to form that could impact groundwater. U.S. EPA guidance requires that the Marine Corps consider ways that the public could be exposed to chemicals and the risks associated with exposures to the chemicals.

Human health risk assessments were performed at Sites 2, 3, 5, and 17; ecological risk assessments were performed at Sites 2, 5, and 17. The ecological risk assessments were particularly

important at Sites 2 and 17 because these sites provide habitat for the California gnatcatcher, a federally listed threatened bird species. No ecological risk assessment was performed at Site 3 because this site is covered with gravel or pavement and therefore does not support wildlife habitat.

Identifying Exposure Pathways

To assess potential human health and ecological risks, "industrial" and "recreational" scenarios were evaluated. During the planning stages of the remedial investigations, the Base Realignment and Closure Cleanup Team (Marine Corps, U.S. EPA, and the Cal-EPA's Department of Toxic Substances Control and the Regional Water Quality Control Board) agreed that the "residential" scenario, where it is assumed people live at the landfills, would not be assessed. Future construction of residential units at the landfills was considered to be a remote possibility because development within 1,000 feet would likely require extensive construction elements for protection of human health as required under California Code of Regulations, Title 27, Section 21190. Information collected during the remedial investigations was used to identify possible exposure pathways, or ways that humans, plants, and animals could come in contact with these chemicals.

To determine potential risks from exposure to soils, the human health risk assessments assumed that people would not live at any of these sites. At Sites 2 and 17, it was assumed that children might play in the adjacent habitat reserves. At Site 3, it was assumed that industrial office workers may work there even though fencing restricts access, and children might play in Agua Chinon Wash. At Site 5, it was assumed for the purposes of the risk assessment that children might play in the soil covering the landfill materials.

To determine potential risks from exposure to groundwater, the human health risk assessments assumed that a house would be built directly adjacent to or downgradient from each site and a well would be used as the source of water for domestic use (i.e., drinking, bathing). This hypothetical assumption is very conservative because it is highly unlikely that any future residential units would be built this close to the landfill as a result of regulatory limitations.

Estimating Human Health and Ecological 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 and nonhuman exposures and risks are likely to be much less than those calculated for the risk assessments. 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.

Risks to human health associated with exposure to and toxicity of chemicals were estimated for cancer-causing (carcinogenic) and noncancer-causing (noncarcinogenic) effects. Risks are expressed as a result of being exposed to the various chemicals from the sites. For the recreational scenario (children) exposure was estimated for 7 years. For the industrial scenario (workers) exposure was estimated for 25 years.

For carcinogens, potential risk is expressed in terms of the probability of an individual contracting cancer (cancer risk). 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 risks and protect human health from known or suspected carcinogens, the U.S. EPA has established acceptable *exposure levels* at general concentration levels that represent an *excess* upper bound lifetime cancer risk to an individual of between 10^{-4} (1 additional case in a population of 10,000) and 10^{-6} (1 additional case in a population of 1,000,000). Various site specific factors such as exposures, types of contaminants, and potential future uses are factored into the selection of a remedy that protects human health.

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.

An ecological risk assessment evaluates potential effects on plants and animals from exposure to chemicals at the sites. It focuses on potential reproductive damage and reductions in reproductive life span rather than the risk of developing cancer. Ecological risks are expressed in terms of a hazard index. Hazard indexes greater than 1 indicate a potential for adverse effects on wildlife, but no adverse effects are expected for a hazard index less than 1. At Sites 2 and 17, plants, mice, and soil were collected and analyzed to determine actual intake of potential contaminants by birds to assess impacts to the California gnatcatcher. For comparison purposes, samples were also taken from a nearby uncontaminated reference site.

Risk Assessment Results

Soil



The chance of a child contracting cancer from exposure to soils while playing at Sites 2 and 17 and for an industrial worker at Site 3 is between 1 in 10,000 and 1 in 1,000,000. At Sites 3 and 5, the chance of a child contracting cancer from exposure to soils while playing is less than 1 in 1,000,000. The cancer risks at all the sites are within the range considered acceptable by the U.S. EPA. Noncancer risks from exposure to soils are below the levels considered acceptable by the U.S. EPA.

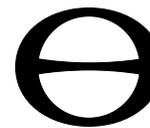
Groundwater



The additional chance of a resident contracting cancer from exposure to groundwater is between 1 in 10,000 and 1 in 1,000,000 at the four sites. The human health risk assessments also concluded that exposure to groundwater would result in noncancer risks greater than 1. Risk assessment results show that the contamination present in groundwater at Sites 2, 3, 5, and 17 does not present a current risk to human health because the impacted water is not used for domestic purposes. Restrictions may be needed to prevent domestic use of this water in the future.

Ecological

Ecological risk assessments performed at Sites 2, 5, and 17 and at the reference site exceeded the hazard index of 1. The risk assessments concluded that ecological risks at Sites 2 and 17 are slightly elevated for animals which are dependent on a plant and insect diet such as the California gnatcatcher. However, these risks are not elevated for predators such as the coyote or red-tailed hawk.



Summary of Landfill Closure Alternatives

The Marine Corps' remedial (closure) objective for the landfill sites is to protect public health and the environment by preventing direct contact with landfill materials, and eliminating or reducing infiltration of water into the buried wastes to prevent further formation of leachate and potential impact to groundwater. The Marine Corps' feasibility studies and evaluation of cleanup alternatives were guided by the U.S. EPA's presumptive remedy approach used at other landfill sites throughout the country. Presumptive remedies can be cleanup technologies, control technologies, or institutional controls that have proven to be most effective for typical landfills.

The presumptive remedies of landfill capping, institutional controls (deed and access restrictions), and long-term monitoring are components of the alternatives evaluated for Sites 2, 3, 5, and 17. Other presumptive remedies for landfills, such as landfill gas collection and treatment, leachate collection and treatment, and source area groundwater control, were found to

be not appropriate for the landfills at MCAS El Toro. Metals present in groundwater at the four sites and the solvent plumes in groundwater at Site 2 are expected to be reduced by natural precipitation and monitored natural attenuation, respectively.

When TCE and PCE dissolve into groundwater, several natural processes can occur to destroy or alter these chemicals. These processes, known collectively as *natural attenuation*, include adsorption to soil particles, biological breakdown of contaminants, and dilution and dispersion in groundwater. Adsorption of contaminants to soil particles prevents them from migrating off the site. Although biological breakdown may not occur at all sites with chlorinated solvents, it can be an important process in destroying these contaminants. Dilution and dispersion do not destroy contaminants, but can significantly reduce their potential risk at many sites. Monitored natural attenuation is not a presumptive remedy but is recognized by U.S. EPA as a viable method for cleanup of groundwater. The selection of monitored natural attenuation as a component

MCAS El Toro Landfill Closure Remedial Alternatives and Cost Comparison

Remedial Alternatives Evaluated	Estimated Cost in \$ Millions			
	Site 2	Site 3	Site 5	Site 17
Alternative 1 No Action (Sites 2, 3, 5 & 17)	0	0	0	0
Alternative 2 Institutional Controls and Monitoring (Sites 2, 3, 5 & 17)	1.7	2.8	2.2	2.0
Alternative 3—Preferred Alternative Single-Layer Soil Cap with Institutional Controls and Monitoring (Sites 2, 3, 5 & 17)	13.0	7.8	4.2	5.9
Alternative 4 Single-Barrier Cap with Institutional Controls and Monitoring (Sites 2, 3, 5 & 17)				
Option A – clay barrier	16.4	8.7	4.5	7.2
Option B – soil/bentonite barrier	17.2	9.0	4.7	7.6
Option C – geocomposite clay liner (GCL)	14.7	8.1	4.4	6.7
Option D – synthetic flexible membrane liner (FML)	16.7	8.8	4.7	7.5
Alternative 5 Single-Barrier Cap with Additional Soil Cover, Institutional Controls, and Monitoring (Sites 2 & 17)				
Option A – clay barrier	18.7	N/A	N/A	8.0
Option B – soil/bentonite barrier	19.5	N/A	N/A	8.3
Option C – geocomposite clay liner (GCL)	17.0	N/A	N/A	7.3
Option D – synthetic flexible membrane liner (FML)	19.0	N/A	N/A	8.2
Alternative 5 Pavement Cap with Institutional Controls and Monitoring (Sites 3 & 5)				
Option A – concrete cap	N/A	8.0	4.4	N/A
Option B – asphalt cap	N/A	8.8	4.7	N/A
Alternative 6 Pavement Cap with a Flexible Membrane Liner Barrier with Institutional Controls and Monitoring (Sites 3 & 5)				
Option A – concrete cap	N/A	8.6	4.7	N/A
Option B – asphalt cap	N/A	9.5	5.0	N/A

N/A – Alternative is not applicable at this site.

of any site remedy is based on its ability to protect human health and the environment and it is expected to reduce contaminant levels in groundwater within a reasonable time frame.

Long-term monitoring of groundwater upgradient and downgradient of the landfills will be performed to verify that concentrations of metals at all four sites are stable and solvents at Site 2 are decreasing with time.

Other technologies (not presented in this Proposed Plan) were also evaluated during the feasibility studies but were eliminated from further consideration. These technologies either could not effectively control, reduce, or contain landfill wastes and contamination, or would incur excessive costs compared to other methods that can achieve the same degree of protection for human health and the environment.

The MCAS El Toro Restoration Advisory Board (RAB), a community-based advisory group, was extensively involved in the evaluation of landfill closure options and the comparison with the presumptive remedies of landfill capping. Closure options involved digging up landfill contents for disposal at

another landfill. Any hazardous wastes removed would be disposed at a state-permitted hazardous waste disposal facility. RAB members who examined the technical aspects and costs of these alternatives concluded that the presumptive remedy approach was better suited for closing Station landfills.

Descriptions of the alternatives evaluated for Sites 2, 3, 5, and 17 are presented below and are numbered as they appear in the respective Draft Final Feasibility Study Reports. Key supporting information from the feasibility studies includes:

- cost comparison of remedial alternatives (page 6).
- postclosure maintenance and monitoring (page 9).
- evaluation of the preferred alternative (page 10).
- institutional controls pertaining to landfill closure (page 13).
- federal and state applicable or relevant appropriate requirements (ARARs) for landfill closure (page 14).

The Marine Corps' preferred alternative for all four sites is Alternative 3, the Single-Layer Soil Cap with Institutional Controls and Monitoring.

Alternative 1 – No Action (Sites 2, 3, 5, and 17)

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 – Institutional Controls and Monitoring (Sites 2, 3, 5, and 17)

The term "institutional controls" refers to nonengineering mechanisms taken to limit exposure to the chemicals in the landfills. For Alternative 2, land-use restrictions or lease conditions would be placed on the property to prohibit excavation, construction of homes, or use of groundwater. Wording of these restrictions and conditions would be finalized at the time the property is transferred for all four sites, and be consistent with the general language in the Marine Corps' Record of Decision for the sites. Physical access would be controlled by fences and appropriate signage.

Environmental monitoring would be used to assess changes in concentrations or locations of contaminants at the sites. Existing groundwater monitoring wells would be used: five at Site 2, seven at Site 3, five at Site 5, and three at Site 17. In addition, landfill gas and leachate would be monitored at Sites 3, 5, and 17 using three existing lysimeters at each site. Monitoring would be conducted for 30 years.

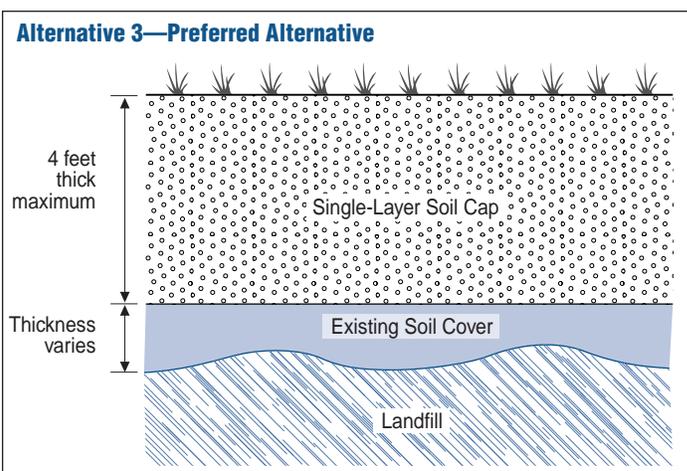
Alternative 3 – Preferred Alternative – Single-Layer Soil Cap with Institutional Controls and Monitoring (Sites 2, 3, 5, and 17)

Alternative 3 includes construction of a 4-foot single-layer soil cap to prevent exposure to landfill materials and reduce the amount of rainfall that can infiltrate into and through the landfill. At each of the sites, wastes on the periphery will be consolidated to minimize the size of the cap (see page 12). The top of the cap would be graded to prevent ponding. Drainage channels constructed of riprap (boulder-sized rocks) or concrete would be designed for placement at the perimeter of the cap and, if necessary, within the cap surface

to control runoff to prevent erosion of landfill materials. Riprap will also be used to protect slopes exposed to flood events at Sites 2, 3, and 17. Soil in the cap would be compacted to reduce the amount of water that could pass through the cap, thereby reducing the chance for leachate to form and potentially affect groundwater.

Computer modeling was performed to evaluate if the single-layer soil cap would meet California Code of Regulations Title 27 for final landfill cover requirements and be an acceptable engineered alternative to the Title 27 prescriptive (clay) cap. Results showed that the single-layer soil cap is as effective at reducing infiltration as the clay cap. It is expected to achieve an equivalent standard of performance for protecting groundwater.

The surface of the cap would be vegetated with drought-resistant annual grasses to reduce erosion. Coastal sage scrub is currently present at Sites 2 and 17 and provides a nesting area for breeding pairs of the California gnatcatcher. Coastal sage scrub that is removed from the newly capped areas of Sites 2 and 17 would be replaced with twice as many plants in those areas close to the sites that do not currently contain this plant. Initially, the annual grasses on the surface of the cap at all four sites would be mowed to inspect the landfill cap and drainage



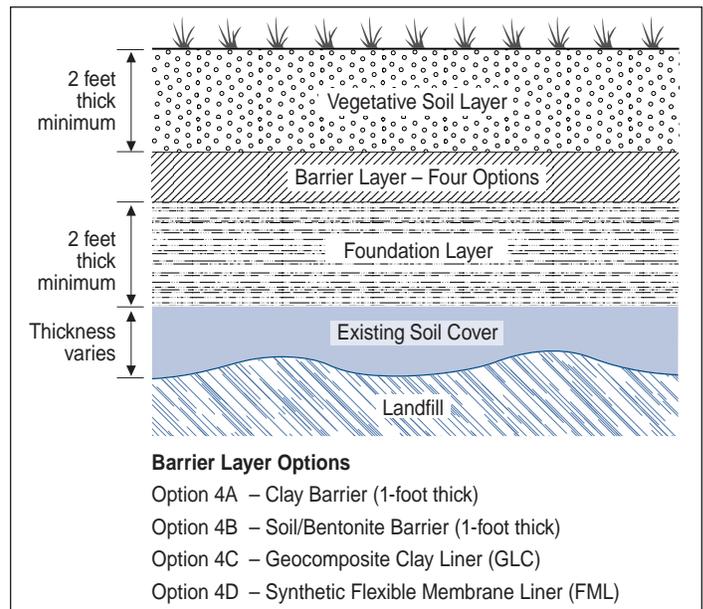
system. Eventually, natural plants such as coastal sage scrub would be allowed to reinvade Sites 2 and 17. Combined with the revegetation near the site, this would provide a significant net gain in California gnatcatcher habitat at these sites.

Institutional controls for Alternative 3 are similar to those for Alternative 2 and include land-use restrictions and access controls. Monitoring would consist of landfill gas, leachate, and groundwater monitoring and be conducted for 30 years. Alternative 3 also includes perimeter gas monitoring wells to sample for gases that might move away from the landfills. Visual inspections would also be performed to assess the condition of the landfill caps and erosion control measures.

Alternative 4 – Single-Barrier Cap with Institutional Controls and Monitoring (Sites 2, 3, 5, and 17)

Alternative 4 is similar to Alternative 3 except for construction of the landfill cap. This cap would consist of a 2-foot soil foundation layer, a barrier layer made of either clay, soil/bentonite mix, geocomposite clay, or a synthetic flexible membrane (plastic) liner, and a 2-foot soil layer to support vegetation. The surface would be graded and planted with annual grasses. Coastal sage would not be allowed to reinvade the Alternative 4

cap at Sites 2 and 17 because the roots of this plant are deep enough to damage the barrier layer. Institutional controls and monitoring would be similar to Alternative 3.



Erosion Control and Debris Cleanup Actions Performed at Sites 2 and 17

The Marine Corps conducted removal actions to reduce erosion and cleanup debris at two inactive landfill sites at MCAS El Toro. Work began in 1996 and was completed in 1997 at the Magazine Road Landfill (Site 2) and the Communication Station Landfill (Site 17). Most of this work is considered to be part of the final remedy and closure action for the landfills.

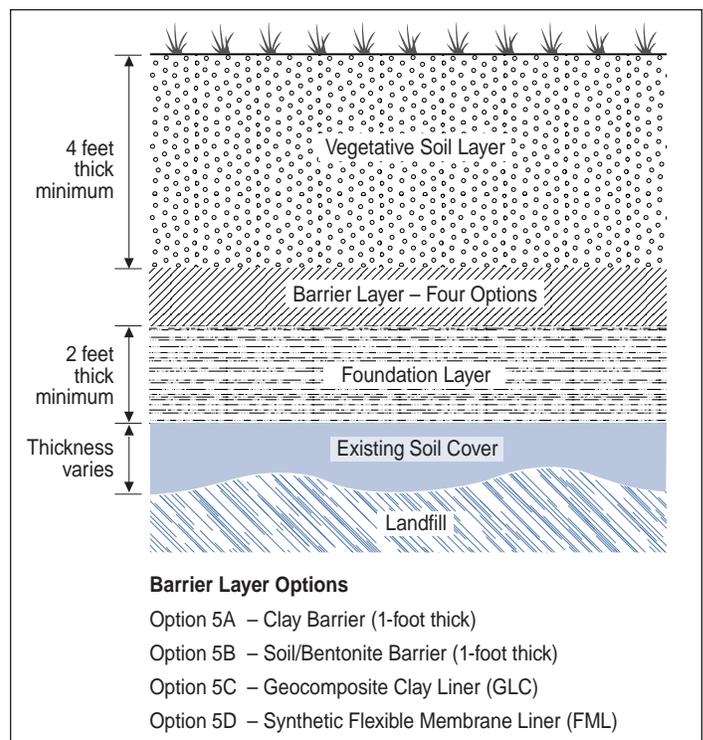
Plans for managing the erosion control and cleanup at these sites were presented to the public by the Marine Corps for a 30-day review and comment period beginning in October 1996. In addition, presentations were made at the September 1996 and January 1997 meetings of the Station's community-based Restoration Advisory Board. The control and cleanup activities included:

- securing the landfill sites with fencing to prevent public access;
- removing eroded landfill materials and debris from Borrego Canyon Wash and placing these wastes in the main body of each landfill site and covering the wastes with native soil;
- diverting surface runoff water away from the landfills with improved drainage channels; and
- improving access roads to minimize the impact on local habitat.

Construction debris along Borrego Canyon Wash, such as scrap metal (approximately 140,000 pounds) and concrete was recycled. Nonhazardous materials were disposed at the landfills while batteries and other hazardous materials uncovered during these activities were collected for disposal at an off-site State of California-permitted hazardous waste disposal facility.

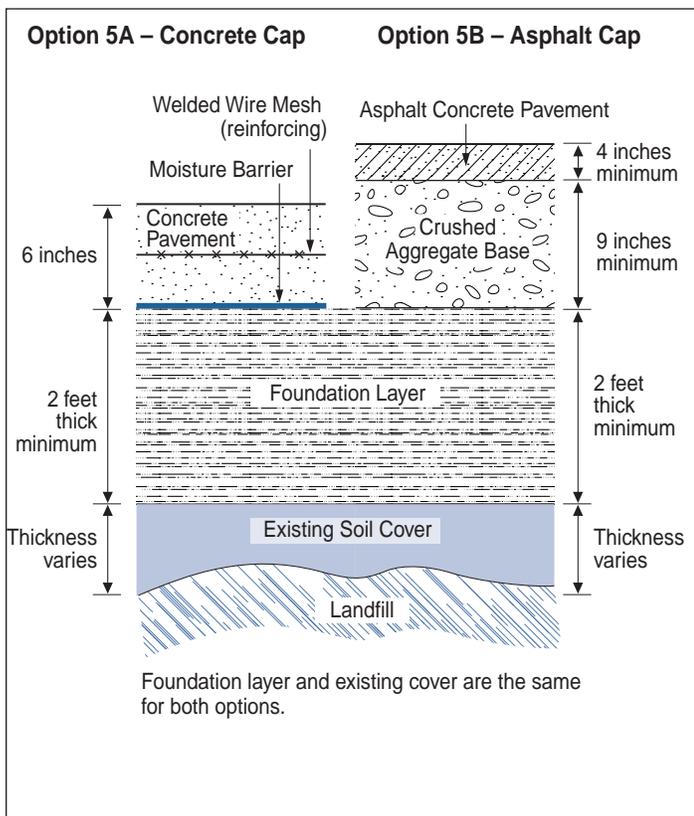
Alternative 5 – Single-Barrier Cap with Additional Soil Cover and Institutional Controls and Monitoring (Sites 2 and 17)

Alternative 5 at Sites 2 and 17 is similar to Alternative 4 except that the upper soil layer for vegetation is 4 feet thick. The additional soil would allow coastal sage scrub to eventually grow back over the landfill cap at Sites 2 and 17 without damaging the barrier layer. Institutional controls and monitoring would be similar to Alternative 3.



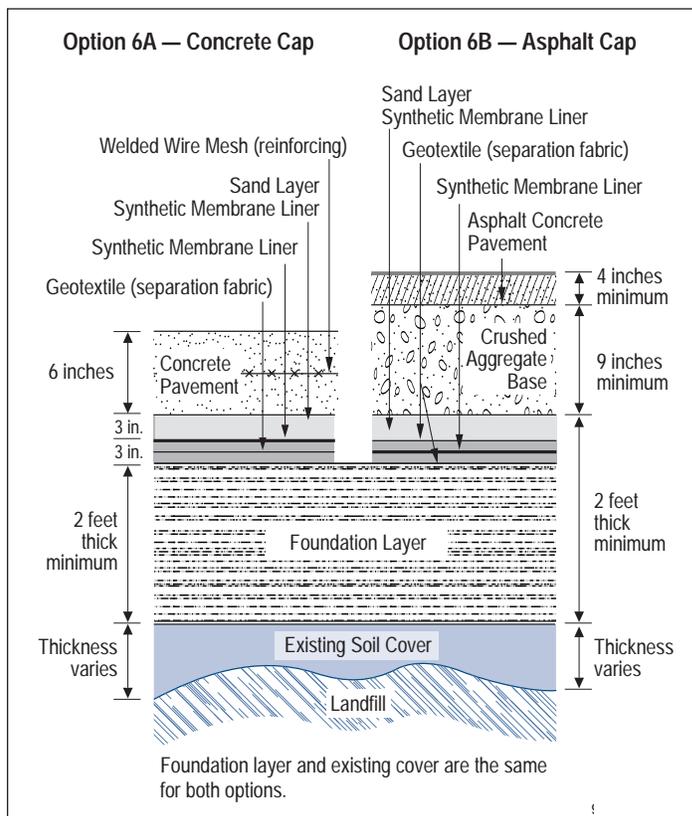
Alternative 5 – Pavement Cap with Institutional Controls and Monitoring (Sites 3 and 5)

Alternative 5 at Sites 3 and 5 consists of a 2-foot soil foundation layer covered with a concrete (Option 5A) or asphalt pavement (Option 5B) cap. This type of cap is effective in reducing infiltration of water into the landfills and allows use of these sites for parking or light storage. Pavement also provides effective erosion control and prevents plants and animals from rooting or burrowing into the landfill. Both of these cap options will require maintenance and repair to prevent leaking. Institutional controls and monitoring would be similar to Alternative 3.



Alternative 6 – Pavement Cap with a Flexible Membrane Liner Barrier with Institutional Controls and Monitoring (Sites 3 and 5)

Alternative 6 at Sites 3 and 5 consists of a 2-foot-thick soil foundation layer overlain with a synthetic flexible membrane liner (plastic) and a concrete (Option 6A) or asphalt pavement (Option 6B) cap. The liner combined with the pavement cap prevents almost all moisture from entering the landfill. The pavement cap also allows use of these sites for parking or storage. Both of these cap options will require maintenance and repair to prevent leaking. Institutional controls and monitoring would be similar to Alternative 3.



Postclosure Maintenance and Monitoring at the Landfills

Following construction of the landfill caps, erosion protection structures, and monitoring systems that are required as part of the remedial action, postclosure maintenance and monitoring activities will begin. These activities consist of:

- landfill gas monitoring;
- leachate monitoring;
- groundwater monitoring; and
- monitoring of the landfill cap, surface water run-on and run-off control structures, final grading, revegetation program, and site security measures.

Postclosure activities will take place during the first 30 years following landfill closure. The monitoring, in general, occurs on a more frequent basis during the first 5 years, usually on a quarterly basis, and is conducted on an annual basis thereafter. However, the monitoring frequency and duration may be modified based on evaluations of the monitoring results. In addition, corrective actions such as resampling or installation of additional control systems may be implemented based on the review of monitoring reports.

Evaluation of Alternative 3—the Preferred Alternative

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 six alternatives with emphasis on Alternative 3, the preferred alternative. A chart that summarizes evaluation of the six 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.

All the alternatives, except for 1 and 2, meet this criteria. Alternative 3, the preferred alternative, would use a 4-foot single-layer soil cap barrier to prevent contact with landfill materials and limit infiltration of surface water into the soil to reduce the potential for formation of leachate and potential contamination of groundwater. At Sites 2 and 17, the landfill cap of Alternative 3, the preferred alternative, would provide adequate rooting depth for the reinvasion of coastal sage scrub that provides habitat for the California gnatcatcher. Institutional controls would protect the landfill cap and prevent exposure to groundwater.

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 (see page 14).

All the alternatives, except for 1 and 2, meet all ARARs. The single-layer soil cap of Alternative 3, the preferred alternative, can be shown to be the technical equivalent to a State of California Title 27 clay cap.

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 3, the preferred alternative, provides the most long-term effectiveness and permanence. The single-layer soil cap is less subject to drying and cracking and is tolerant of roots and burrowing animals. For all sites, natural precipitation and monitored natural attenuation are expected to reduce the concentrations of metals and VOCs in groundwater over time. In the meantime, institutional controls would be implemented to prevent use of groundwater at all sites. The single-layer soil cap of Alternative 3, the preferred alternative, has the fewest obstacles of the capping alternatives if modifications are needed for future site use. The clay and soil/bentonite barriers proposed in Alternatives 4A, 4B, 5A, and 5B at Sites 2 and 17 are subject to drying and cracking in semiarid climates and are less effective than the single-layer soil cap. Alternatives 4C, 4D, 5C, and 5D contain thin barriers that can be breached by roots and burrowing animals. Alternatives 5 and 6 (Sites 3 and 5) are also protective of human health and the environment, but require more maintenance and repair of cracks to prevent leaking in order to preserve their effectiveness than the single-layer soil cap of Alternative 3, the preferred alternative. At Sites 3 and 5, Alternatives 5 and 6 (concrete/asphalt caps) would allow for use as parking or storage areas. Alternatives 4, 5, and 6 would require considerable reconstruction efforts if they need to be modified by future owners or users.

to be modified by future owners or users.

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).

Alternatives 3, 4, 5, and 6 are expected to achieve reduction in toxicity, mobility, and volume of metals and VOCs in groundwater through natural precipita-

Preferred Alternative – Cost Estimate Summary Single-Layer Soil Cap with Institutional Controls and Monitoring

Cost Category	Estimated Costs in Millions			
	Site 2	Site 3	Site 5	Site 17
Capital Costs	\$10.2	\$4.0	\$1.5	\$3.0
<i>Includes design and construction of the single-layer soil cap and drainage control features, and includes revegetating the surface with annual grasses.</i>				
Operations and Maintenance and Monitoring Costs	\$2.8	\$3.8	\$2.7	\$2.9
<i>Includes operating and maintaining groundwater, landfill gas, and leachate monitoring systems for 30 years. Also includes maintenance and monitoring of the landfill cap, drainage system, and site security system.</i>				
Total – Estimated Present Worth Costs	\$13.0	\$7.8	\$4.2	\$5.9

Covers all costs to complete this project and includes a 20 percent contingency to cover cost increases that may occur as a result of unforeseen conditions.

Detailed information on estimated costs for closure of Sites 2, 3, 5, and 17 is presented in the Draft Final Feasibility Studies.

tion and monitored natural attenuation. Alternatives 3, 4, 5, and 6 also reduce infiltration into the landfill to limit the production and mobility of leachate to groundwater. None of the proposed alternatives attempts to reduce the volume of the landfill mass.

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 has minimal impact during monitoring. Alternatives 3, 4, 5, and 6 involve short-term impacts to health and safety as a result of dust emissions from the consolidation of wastes and construction of the landfill cap. Alternative 3, the preferred alternative, would result in the least amount of impact. Construction time required for the single-layer soil cap is the shortest of all the capping alternatives.

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.

No problems are expected during implementation of Alternatives 3, 4, 5, and 6 which would use proven construction techniques and available equipment. Alternative 3, the preferred alternative, is the easiest capping alternative to implement because the soils required for the construction of the single-layer soil cap are available from a nearby source. Institutional controls and monitoring are also readily implementable.

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.

Alternative 3, the preferred alternative, is the most cost-effective of all capping alternatives. See the chart on page 6 for a cost comparison of alternatives. Estimated costs specific to the preferred alternative are on page 10.

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.

The Department of Toxic Substances Control has concerns about the selection of an alternative that may impact reuse. The Department of the Navy is continuing to work with the Department of Toxic Substances Control to resolve their concerns. The Regional Water Quality Control Board supports Alternative 3 as the preferred alternative.

9. Community Acceptance – evaluates whether community concerns are addressed by the remedy and if the community has a 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' invitation to the community to comment on the proposed alternatives and the Draft Final Feasibility Studies.

Comparative Analysis of Alternatives

U.S. EPA Criteria	All Sites								Sites 2 and 17				Sites 3 and 5			
	1	2	3	4A	4B	4C	4D	5A	5B	5C	5D	5A	5B	6A	6B	
1 Overall Protection of Human Health and the Environment	X	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
2 Compliance with Applicable or Relevant and Appropriate Requirements	N/A	X	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
3 Long-Term Effectiveness and Permanence*	○	⊙	●	◐	◑	●	●	◐	◑	●	●	●	◐	●	●	
4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	○	○	●	◐	◑	●	●	◐	◑	●	●	●	◐	●	●	
5 Short-Term Effectiveness	●	●	◐	◑	◑	●	●	○	○	⊙	⊙	●	●	◐	◑	
6 Implementability	●	●	●	⊙	⊙	●	●	○	◐	⊙	⊙	●	●	◐	◑	
7 Cost	●	●	◐	◑	○	◐	◑	○	○	◐	○	◐	◑	◐	○	
8 State Acceptance	○	○	●	◐	◑	◐	●	○	○	◐	◑	◐	●	◐	◑	
9 Community Acceptance – To Be Determined for all Alternatives																

X – does not meet criteria ✓ – meets criteria N/A – not applicable

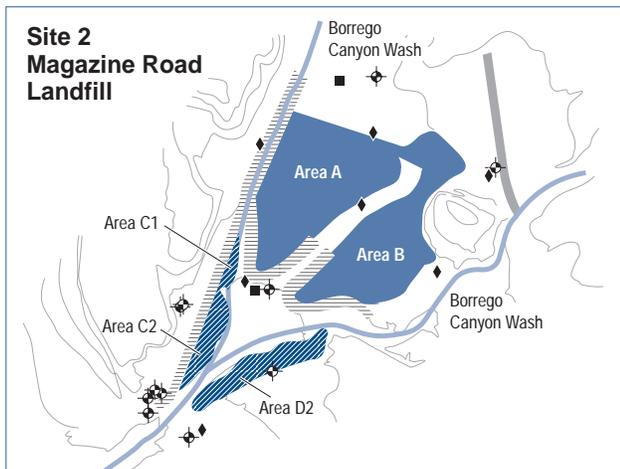
*Note: In the FS reports, Long-Term Effectiveness and Permanence are based on factors from U.S. EPA landfill presumptive remedies, specifically, the ability of the caps to inhibit mobility of landfill contents and maintain cap integrity.

Relative Performance in Satisfying Criteria

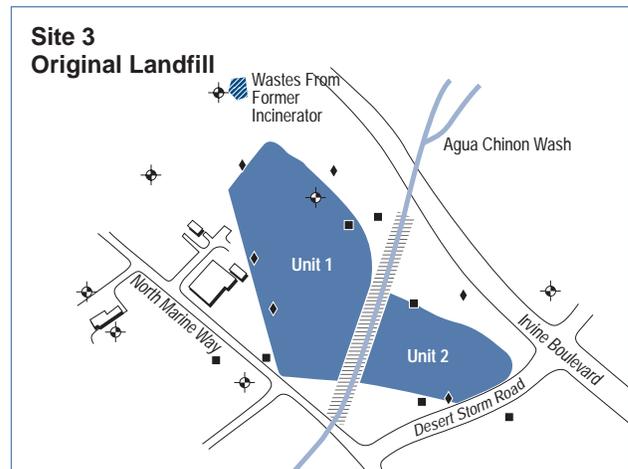


Conceptual Design of Alternative 3 – Preferred Remedy

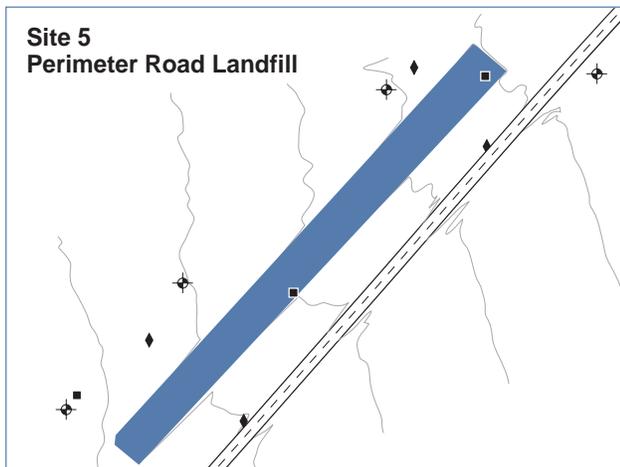
Single-Layer Soil Cap with Institutional Controls and Monitoring



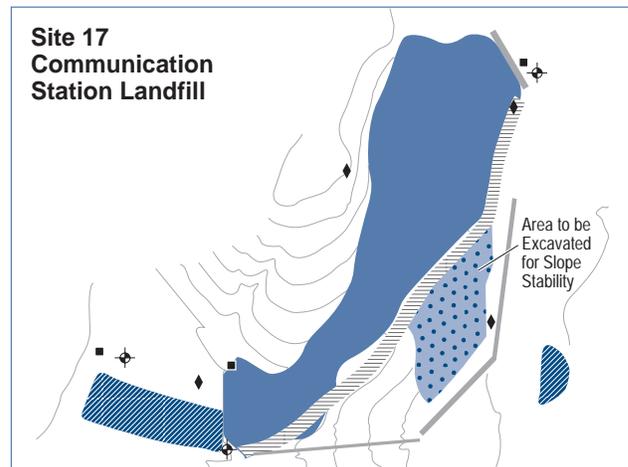
1. Single-layer soil cap (4 feet thick) in Areas A and B planted with annual grasses
2. Areas C1, C2, and D2 to be consolidated in Areas A and B before capping
3. Riprap flood control protection on Borrego Canyon Wash
4. Revegetation (2:1 ratio) of coastal sage scrub
5. Long-term (30 years) monitoring of landfill gas, leachate, groundwater, erosion, settlement, and habitat
6. Institutional controls include deed restrictions on development and groundwater use, and signs restricting access



1. Single-layer soil cap (4 feet thick) in Units 1 and 2 planted with annual grasses
2. Wastes in former incinerator area to be consolidated in Unit 1 before capping
3. Riprap flood control protection on Agua Canyon Wash
4. Long-term (30 years) monitoring of landfill gas, leachate, groundwater, erosion, and settlement
5. Institutional controls include deed restrictions on incompatible land uses, irrigation and groundwater use, and signs restricting access



1. Single-layer soil cap (4 feet thick)
2. Long-term (30 years) monitoring of landfill gas, leachate, groundwater, erosion, and settlement
3. Institutional controls include deed restrictions on incompatible land uses, irrigation and groundwater use, and signs restricting access



1. Single-layer soil cap (4 feet thick) planted with annual grasses
2. Two areas of wastes to be consolidated under cap
3. Area of unstable slope next to landfill to be cut back and soil placed over landfill
4. Riprap drainage protection and diversion channel around cap
5. Revegetation (2:1 ratio) of coastal sage scrub
6. Long-term (30 years) monitoring of landfill gas, leachate, groundwater, erosion, and settlement
7. Institutional controls include deed restrictions on development and groundwater use, and signs restricting access

Legend	Cap	Riprap	Monitoring Wells	Perimeter Soil Gas Probes	Diversion Structures
	Wastes to be Consolidated	Drainages	Lysimeters	Topographic Contour Lines	

Proposed Institutional Controls – MCAS El Toro Landfills

Institutional controls are nonengineering mechanisms and legal measures designed to limit access or activities at a particular property. They may be used as part of an environmental remedy to limit exposure pathways of humans or the environment to contamination that may be present at a site, or to protect a remedy that is in place.

A key consideration in identifying and evaluating potential institutional controls of a remedial action is the planned or anticipated future use of the property. According to the Community Reuse Plan for MCAS El Toro, the preferred redevelopment option for the Station is a major commercial airport. This option includes potential future uses for various zones of Station property. Sites 2 and 17 are located in an area designated as a habitat reserve. Site 3 is located in a zone designated for commercial and light industrial uses. Site 5 is located in a zone designated for recreation (golf).

The Department of the Navy (DoN), on behalf of the Marine Corps, anticipates that the primary legal mechanism for implementing institutional control measures will be either lease conditions if the relevant property is leased or restrictive covenants if the property is transferred by deed. The institutional control measures would fall into two broad categories: 1) restrictions on future land use, and 2) provisions for access for potential future monitoring and maintenance activities.

Land-Use Restrictions

The future landowners or users of Sites 2, 3, 5, and 17 shall be prohibited from conducting the following activities without the prior approval of the DoN and the Federal Facility Agreement (FFA) signatories (Marine Corps, U.S. EPA, and California EPA's Department of Toxic Substances Control and Regional Water Quality Control Board):

- using the sites for residential purposes or day care centers for children;
- performing any activity (such as excavation or construction) on the landfills or on adjacent parcels or properties that will adversely impact the cap and monitoring system or affect the drainage and erosion controls developed for the cap;
- planting of deep-rooted plants and irrigation beyond the amount to establish the proposed grass on the landfill cap;
- disturbing or removing any part of the remedy that prevents access or alerts property users and the public of the presence of landfill materials; and

Internet Connection

For more information on the closure of MCAS El Toro and the Installation Restoration Program, check out the Marine Corps Air Bases Western Area Website at www.eltoro.usmc.mil. Key on BRAC, and you will find base closure information on MCAS El Toro, as well as links to related websites.

- disturbing landfill settlement monuments and wells, probes, and other devices used for groundwater, leachate, or landfill gas monitoring.

Site Access Restrictions, Monitoring and Maintenance

The proposed remedial action includes requirements for long-term monitoring and maintenance activities to ensure the long-term integrity of the landfill cap. DoN will ensure that provisions for access by DoN and the FFA signatories for purposes of conducting or overseeing such monitoring and maintenance activities are included in the relevant lease or deed.

Groundwater

The future landowners and users, without prior approval from the DoN and the FFA signatories, shall be restricted by deed covenants or lease restrictions from conducting subsurface drilling or excavation that would expose groundwater within the shallow or principal aquifers that underlie the landfills. These restrictions also prohibit extracting groundwater within the shallow or principal aquifer from the landfills for drinking, irrigation, or commercial purposes, and injecting fluids which may affect groundwater or contaminant plume flow direction.

Reports and Documents 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 2, 3, 5, and 17 discussed in this Proposed Plan. It includes the Phase I Remedial Investigation Draft Technical Memorandum (May 1993); separate Draft Final Phase II Remedial Investigation Reports for each of the landfill sites (April 1997); and separate Draft Final Phase II Feasibility Studies for the landfills (September 1997).

These 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, (714) 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 (714) 726-3470 or 726-3386.

Applicable or Relevant and Appropriate Requirements for Proposed Closure of MCAS El Toro Landfills

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 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.

ARARs that will be met by the preferred remedy (Alternative 3) for landfill closure at MCAS El Toro are listed below.

The California Regional Water Quality Control Board– Santa Ana Region (RWQCB-SAR)

Pursuant to the California Code of Regulations, Division 2 Title 27, the RWQCB-SAR has designated substantive provisions of the following portions of Title 27, as ARARs pertaining to:

- alternatives to construction or prescriptive standards [Sections 20080(b) and (c)];
- monitoring points and the point of compliance [Section 20405];
- groundwater monitoring system design and operation [Section 20415(e)(1) and (13)];
- corrective action plan requirements [Section 20430];
- closure design documentation [Section 21769];
- final grading [Section 21090(b)(1)];
- groundwater monitoring [Section 21090(c)(3)];
- design of diversion and drainage facilities [Section 21890(c)(4)];
- placement of the foundation layer of the final cover [Section 21090(a)(1)];
- barrier layer design [Section 21090(a)(2)];
- vegetation layer [Sections 21090(a)(3)];
- permeability requirements for the final cover [Section 20324(a)(1)]; and
- development and implementation of a groundwater monitoring program [substantive provisions of Section 20080(g)].

The State Water Resources Control Board

Pursuant to the State Water Resources Control Board (SWRCB), substantive provisions of the following requirements are ARARs pertaining to:

- stormwater runoff controls [SWRCB Order No. 91-13-DWQ (as amended by Order No. 92-12-DWQ) and Order No. 92-08-DWQ];
- drinking water determinations in California [Resolution No. 88-63 (as incorporated in the RWQCB-SAR Basin Plan by Regional Board Resolution 89-42)]; and
- the authorization of state and regional boards and establishment of surface and groundwater quality standards [substantive provisions of California Water Code, Division 7, Section 13263(a)].

The California EPA Department of Toxic Substances Control (DTSC)

Pursuant to the California Code of Regulations, Title 22, substantive provisions pertaining to:

- hazardous waste determinations [Sections 66261.22(a)(3) and (4), 66261.24(a)(2) to (a)(8), 66261.101, 66261.3(a)(2)(C), and (a)(2)(F)];
- generator requirements [Sections 66262.10(a) and 66262.11 and 66263.50 to 66263.34];
- state maximum contaminant levels (MCLs), which are more stringent than federal MCLs [Sections 64435 and 64444.5];
- state secondary MCLs, which are more stringent than federal MCLs and have been promulgated by the state [Section 64473];
- closure performance standards [Section 66264.111];
- compaction requirements [Section 66264.228(e)(1)];
- landfill cover seismic requirements [Section 66264.310(a)(5)];
- prevention of downward entry of water in the closed landfill and maintenance of the effectiveness of the final cover [Sections 66264.310 (a)(1) and (b)(1)];
- benchmark maintenance [Section 66264.310(b)(5)];
- drainage and filter layer requirements [Sections 66264.228(e)(10) and (11)]; and
- because Site 2 is located in a 100-year flood plain [Section 66264.18(b)].

The California Integrated Waste Management Board (CIWMB)

Pursuant to the California Code of Regulations, Division 2, Title 27, substantive provisions of the following portions of Title 27 as ARARs pertaining to:

- landfill closure performance standards [Section 21100];
- security at closed sites [Sections 21135(f) and (g)];
- placement of the final cover [Section 21140(a) and (b)];
- final drainage design [Section 21150];
- landfill gas control [Sections 2092(a)(1)(2), and (3) and 21160(b)];
- postclosure maintenance [Section 211801];
- postclosure land use [Sections 21190(a), (b), and (c)];

- differential settlement monitoring [Sections 20950(d) and 21090(e)(1)];
- emergency response planning [Section 21130];
- information requirements to be included in detailed design packages [Sections 21800 and 21830]; and
- closure certification and documentation [Section 21880].

South Coast Air Quality Management District (SCAQMD)

Pursuant to the rules and regulations of the SCAQMD, substantive provisions of the following SCAQMD requirements have been determined to be ARARs pertaining to:

- a landfill gas control system [Rule 1150.2];
- control of visible emissions [Rule 401];
- fugitive dust emissions [Rule 403]; and
- excavation at landfill sites are relevant and appropriate requirements [Rule 1150].

U.S. Environmental Protection Agency (U.S. EPA)

Pursuant to Title 40 of the Code of Federal Regulations, substantive provisions of the following requirements that pertain to maximum contaminant levels (MCLs) and nonzero MCL goals under the Safe Drinking Water Act have been determined to be ARARs [Sections 141.11 thru 141.16, excluding 141.11(d)(3), 141.60 thru 141.63, and Subpart JF].

Pursuant to Title 22 of the California Code of Regulations (CCR), which is part of the federally authorized Resource Conservation and Recovery Act (RCRA) program in California and pertaining to:

- the classification of RCRA hazardous wastes in the event that wastes are generated as a result of the response action [substantive provisions CCR Title 22 of Section 66261.24(9)];
- groundwater protection standards [substantive provisions of CCR Title 22, Section 66264.94 except 66264.94(a)(2) and (b)].

Landfill Closures Play Key Role in Restoration Program

Closure of Installation Restoration Program (IRP) Sites 2, 3, 5, and 17, four inactive landfills, 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 the landfill sites.

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

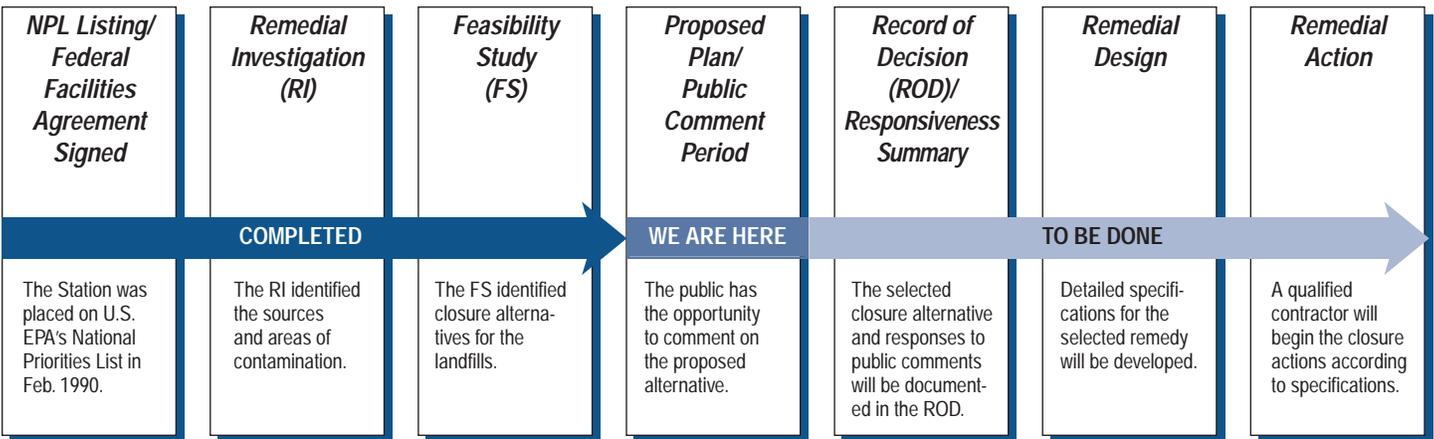
- OU-1 addresses the TCE contamination in the regional groundwater that extends 3 miles west of the Station.
- OU-2A includes Site 24, the VOC Source Area, and Site 25, the Major Drainage Channels.

- 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; 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 Marine Corps currently anticipates issuing the Proposed Plan for VOC groundwater cleanup at OU-1 and OU-2A in early 1999. Proposed Plans for remaining OU-3 sites are expected to be released in 1998 and 1999.

MCAS El Toro Installation Restoration Program Process Landfill Closures – Sites 2, 3, 5, and 17



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; (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
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Santa Ana, CA 92709-5001
(714) 726-3470

Capt. Matthew Morgan

BRAC Public Affairs Officer
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Mr. Andrew Bain

Community Involvement
Coordinator
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U.S. EPA
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(800) 231-3075

Ms. Marsha Mingay

Public Participation Coord.
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 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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