PROPOSED PLAN

for Closure of Two Inactive Landfills at Former Marine Corps Air Station, El Toro

January 2007

Navy Proposes New Preferred Remedy for Landfill Closure at Sites 3 and 5

PROPOSED PLAN SUMMARY

This Proposed Plan presents the Navy's preferred remedial alternative for Installation Restoration Program, Operable Unit 2C, Site 3, Original Landfill, and Site 5, Perimeter Road Landfill at Former Marine Corps Air Station (MCAS) El Toro. The **preferred remedy, Alternative 4d**, calls for capping these inactive, non-operational landfills with a cover that meets applicable or relevant and appropriate (ARARs) for closure (see page 16 for discussion).

This Proposed Plan summarizes the site history, environmental investigations, risk assessments, and remedial alternatives evaluation conducted at Sites 3 and 5 and describes the basis for choosing the preferred alternatives.

This Proposed Plan (2007 Proposed Plan) is a revision to a Proposed Plan (1998 Proposed Plan) that the Navy issued for public comment in 1998. Based upon new information, the Navy, working collaboratively with federal and state regulatory agencies, prepared a ****Feasibility Study*** Addendum Report that modified and reevaluated remedial alternatives for Sites 3 and 5, previously evaluated in the Draft Final Phase II Feasibility Study Reports for Sites 3 and 5 (September 1997).

The Navy invites you to review and comment on the 2007 Proposed Plan. Detailed reports covering the environmental investigations and the development and evaluation of remedial alternatives are available for public review at the MCAS El Toro Administrative Record file on-station and the Information Repository at the Heritage Park Regional Library in Irvine, California (see page 19 for location information and a list of the key reports). After all public comments on this 2007 Proposed Plan have been reviewed and considered, the final remedial alternative or remedy for Sites 3 and 5 will be selected and documented in the ***Record of Decision (ROD)***.

The cleanup or remedial objective of the Navy is to protect human health and the environment and meet all applicable 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. The **preferred remedy, Alternative 4d,** calls for capping the landfills with a cover that meets the ARARs for closure of landfills, implementing institutional controls in the form of land use restrictions to limit access or activities at the sites to further protect human health

Opportunities for Community Involvement

30-Day Public Comment Period — January 22–February 21, 2007

We encourage you to comment on this Proposed Plan during the 30-day public comment period. Comments may be submitted orally or in writing at the January 31, 2007 public meeting, or by regular mail, e-mail, or fax. Written comments should be submitted to Mr. Darren Newton, BRAC Environmental Coordinator, MCAS El Toro, 7040 Trabuco Road, Irvine, CA 92618-1700, and **be sent or postmarked no later than February 21, 2007;** contact information is listed on page 19.

Public Meeting — Wednesday, January 31, 2007 at 6:30 p.m.

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

You are invited to this community meeting to discuss the proposed closure alternative for Sites 3 and 5, two inactive landfill sites at Former MCAS El Toro. Navy representatives will make a presentation covering the proposed alternatives. You will have the opportunity to provide questions and formally comment on this Proposed Plan.

*Words in ***bold italic*** typeface are defined in the glossary on page 18.

and the environment, and conducting long-term environmental monitoring for up to 30 years. Long-term monitoring would ensure the landfills contain waste materials within landfill boundaries, do not impact groundwater, or release ***landfill gas*** into the air at concentrations greater than regulatory thresholds. Installation of the landfill caps would reduce infiltration of surface water into the landfills to prevent formation of ***leachate***. The landfill closure remedy does not require cleanup of groundwater; however, monitoring of groundwater to assess the effectiveness of the remedy.

The covers would include vegetation and be designed to meet the specific characteristics of each landfill site to control erosion and slope instability. Landfill gas systems would be installed at each site to collect and dispose of gas that may be created after the landfills are capped. At Site 3, identified waste areas would be consolidated into one area followed by installation of the landfill cap to contain these materials. Wastes at Site 5 are contained in a single area, so waste consolidation would not be necessary.

MCAS El Toro was listed on the National Priorities List in 1990. The Navy entered into a Federal Facility Agreement (FFA) with U.S. Environmental Protection Agency (U.S. EPA), California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC), and Cal/EPA's Santa Ana Regional Water Quality Control Board (RWQCB) in 1990. The MCAS El Toro Base Realignment and Closure (BRAC) Cleanup Team, established in 1993, is composed of representatives of the Navy, U.S. EPA, DTSC, and Santa Ana RWQCB. The Regulatory Agencies have carefully evaluated environmental data, technical information, and remedial alternatives for Sites 3 and 5 and concurs with the Navy's recommendation of the **preferred remedy, Alternative 4d.**

Background Summary and Overview—Sites 3 and 5

This section presents a description of Sites 3 and 5, an overview of key milestones, and an update on the current status of the sites. The Navy prepared this Proposed Plan to inform the public of the preferred remedy modifications that have been made and to seek public comment on the remedial alternatives.

Sites 3 and 5 are located in the eastern portion of the former Station and are shown on the map on page 3. A list of key environmental and technical reports discussed below is presented on page 19.

Site Descriptions

Site 3, Original Landfill, the original landfill at the former Station, operated as a trench-and-fill disposal facility from 1943 to 1955. 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. Prior to burial, wastes were burned at an incinerator to reduce volume. Record searches and interviews of former employees helped to initially determine waste types. Reportedly, any wastes generated on the former Station may have been disposed at Site 3; they may have included metals, incinerator ash, solvents, paint residues, hydraulic fluids, engine coolants, construction debris, oily wastes, municipal solid waste, and various inert solid wastes. Presently, infrastructure at the site consists of concrete and asphalt pads and temporary structures associated with environmental field investigations.

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

Remedial Investigation and Feasibility Study

An extensive ***remedial investigation (RI)*** was conducted in 1996 at Sites 3 and 5 to obtain data necessary to characterize the environmental conditions. Results were presented in separate Draft Final Phase II Remedial Investigation Reports (April 1997). The RI incorporated analyses of air, soil gas, soil, surface water, and groundwater to determine the nature of contamination present at and around each landfill. As part of the RI, human health and ecological risk assessments were conducted to deter-

SENSITIVE RECORD

PORTIONS OF THIS RECORD ARE CONSIDERED SENSITIVE AND ARE NOT AVAILABLE FOR PUBLIC VIEWING

FORMER MCAS EL TORO LOCATION MAP –
INSTALLATION RESTORATION PROGRAM SITES 3 AND 5

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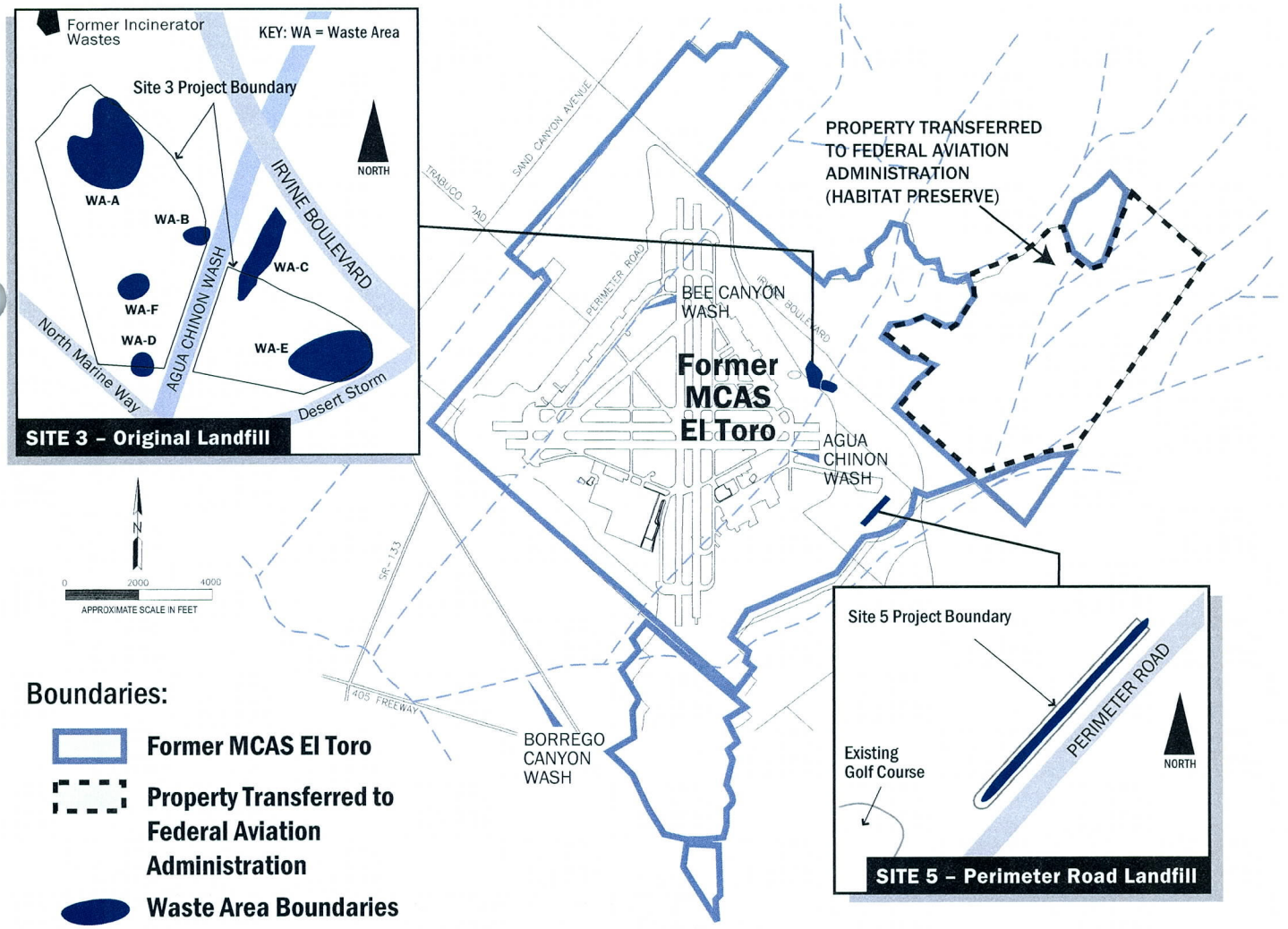
mine potential risks to human health and the environment from each landfill. Data obtained from the RI were used to determine remedial action objectives for the landfills. These objectives were used in the feasibility study to focus the development and detailed evaluation of remedial alternatives. As new environmental and technical information became available since issuing the 1998 Proposed Plan, the FFA signatories determined that the original remedial alternatives needed to be modified. As a result, this 2007 Proposed Plan was prepared to inform the public of the modifications and to seek out public comment.

During the RI, air samples were collected to determine if landfill gases were being released to the atmosphere. Air sampling showed that ***volatile organic compounds (VOCs)*** in landfill gas are present at low concentrations near the ground surface only over the central portions of the landfills.

Soil gas samples were collected at the surface in the central portions and at the perimeters of the landfills to evaluate whether localized areas with elevated concentrations of chemicals were present and whether methane or other landfill gases were moving beyond the landfill boundaries. VOCs were also detected in soil gas samples, but no localized sources of high concentrations of landfill gases were found.

Former MCAS El Toro Location Map — Installation Restoration Program Sites 3 and 5



At both sites the waste areas have been revised based on information obtained from supplemental site characterization activities.

Soil samples were also collected at depth intervals at the landfill boundaries to determine whether contaminants from the landfills were moving toward groundwater. Shallow soil samples were collected to provide data for the human health and ecological risk assessments. Soil sampling indicated the presence of VOCs, ***semivolatile organic compounds (SVOCs), petroleum hydrocarbons,*** and ***metals*** that could contribute to the formation of leachate.

Air and soil gas sampling confirmed that controls are not needed to protect against landfill gases due to their low concentrations.

Groundwater monitoring wells were installed to evaluate whether contaminants were impacting groundwater at the site. To sample for leachate directly underneath the landfills, lysimeters (devices that collect moisture in soil) were installed using slanted borings from the landfill perimeter. A subsequent evaluation of metals present in groundwater at the Sites 3 and 5 landfills concluded metals were a result of natural, ambient conditions; therefore, no action is necessary for groundwater.

Although wastes have not been disposed of at the landfills for many years, the RI showed that landfill wastes have the potential to impact the environment at these sites if no actions are taken to prevent erosion of the existing landfill covers and to minimize infiltration of water into the landfills. Results show that any contaminants that could be derived from landfill wastes were not found outside the boundaries of the sites.

The FS was completed in 1997 and results were presented in separate Draft Final Phase II Feasibility Study Reports for Sites 3 and 5 (September 1997). U.S. EPA's presumptive remedy approach, used at other landfill sites throughout the country, guided the development and evaluation of remedial alternatives during the FS process. The presumptive remedies of landfill capping, institutional controls (deed and access restrictions), and long-term monitoring were used to develop six remedial alternatives.

The six remedial alternatives, some with optional components, were evaluated in the FS process using the nine criteria as required in the federal National Oil and Hazardous Substances Pollution Contingency Plan (NCP): 1) overall protection of human health and the environment; 2) compliance with ARARs; 3) long-term effectiveness and permanence; 4) short-term effectiveness; 5) reduction of toxicity, mobility, or volume through treatment; 6) implementability; 7) cost; 8) state acceptance; and 9) community acceptance. Alternative 1, No Action, served as a baseline to which the other alternatives were compared and evaluated. See page 13 for information on these nine evaluation criteria.

1998 Proposed Plan and 1999 Draft Record of Decision

The 1998 Proposed Plan was issued in June 1998 to present the results of the development and evaluation of remedial alternatives conducted during the FS, to present the Navy's preferred alternative for final closure of Sites 3 and 5, and to solicit public comments. A public meeting was held and comments were received from the public during the 30-day public comment period. Based on an evaluation of all comments received, Alternative 3, Single-Layer Soil Cap with Institutional Controls and Monitoring, was identified as the selected remedy for final closure of the sites and was documented in the Draft Record of Decision (ROD), Operable Unit 2C, Sites 3 and 5 (March 1999). The selected remedy presented in the Draft ROD provided a balance among the alternatives with respect to the nine NCP evaluation criteria.

Supplemental Site Characterization

Additional site characterization was completed in 2004 to further refine the landfill boundaries and to determine if additional engineering and/or institutional controls would be appropriate for Sites 3 and 5. Trenching and soil gas sampling were used to reevaluate the volume and extent of waste in the landfills and to refine the landfill boundaries. Trenches were dug to visually inspect the subsurface and to monitor for chemical vapors. Landfill gas (soil gas) monitoring wells were also installed at the perimeters of the landfills to confirm the absence of landfill gas at the boundaries and to confirm that landfill gas migration was not occurring.

At Site 3, supplemental site characterization results confirmed that there are approximately 30,000 ***bank cubic yards*** of waste. Bank cubic yards are defined as the undisturbed in-place volume of waste. This is significantly less than the previous estimate of 163,500 to 243,000 bank cubic yards of waste presented in the Draft ROD. The waste placement boundary was revised to include an area outside of the previously estimated landfill boundary. The estimated thickness of the wastes ranges from 1 to 18 feet, while the existing cover thickness is estimated to range from less than 1 foot to 7 feet.

At Site 5, results indicated there are approximately 18,000 bank cubic yards of waste. The estimate included in the Draft ROD was approximately 40,000 bank cubic yards. The waste placement boundary was revised slightly outward at the north end of the landfill and slightly inward on all other sides. The thickness of the waste ranges from less than 1 foot to a maximum of 15 feet, while the existing cover thickness ranges from less than 1 foot to 8 feet.

Landfill gas monitoring at the perimeters of and within the Sites 3 and 5 landfill boundaries indicates that landfill gases are at concentrations that would not typically require

landfill gas controls. Based on the results of this investigation and an underlying concern for potential landfill gas migration, the FFA signatories and the California Integrated Waste Management Board (CIWMB) agreed that a 100-foot buffer zone (comprised of a 50-foot compliance zone and an additional 50-foot buffer) would be established around the landfills if both passive and active landfill gas control systems were incorporated into the remedies for Sites 3 and 5. Within this 100-foot land-use restriction buffer zone, construction of structures would require concurrence of the FFA signatories and the CIWMB. The landfill gas control systems would be designed to comply with the *California Code of Regulations* Title 27 substantive requirements for preventing and/or minimizing landfill gas concentrations and the potential migration that may occur.

Radiological Investigations

Radiological evaluations of Sites 3 and 5 were conducted in 2000, 2001, and 2004. A historical radiological assessment was conducted in 2000 throughout the former station to identify potential, likely, or known radioactive source material or contamination. This assessment used information obtained from records searches and interviews of former station employees, and focused on identifying sites that would need further evaluation to protect human health. ***Radium-226 (Ra-226),*** a radioactive metallic element, was identified as a chemical of potential concern (COPC) due to its use in luminescent paint used for aircraft dials, gauges, and other equipment. Based on the results of the historical radiological assessment, the surface areas within Sites 3 and 5 were recommended for further investigations including radiological scan surveys and soil sampling.

Radiological scan surveys at Sites 3 and 5 included scanning the entire surface using portable instruments capable of detecting gamma radiation released during radioactive decay. In addition, soil samples from random areas at Sites 3 and 5 were analyzed to assess Ra-226 concentrations in surface soils (upper 18 inches) at these sites. Site-specific surveys and those conducted to determine the naturally occurring radiation level at the former Station were conducted in accordance with guidelines contained in the Multi-Agency Radiation Survey and Site Investigation Manual, which is used by the Nuclear Regulatory Commission, the Department of Energy, the Department of Defense, and U.S. EPA. To determine the naturally occurring background radiation level at the former station, radioactivity was measured and soil samples were collected from non-impacted reference areas with similar soil and geological characteristics to Sites 3 and 5 and at other reference areas across the entire station.

Statistical analyses were performed on the survey and sampling data from each site and it was determined that the radiation levels in surface soils resulted from natural radioactivity contained in ground surface materials, including gravel and crushed rock. In addition, radiation dose models were used to calculate the dose and to assess the risk for each site. The risks due to Ra-226 in surface soil at these two sites were within the NCP-defined risk management range of 10^{-4} to 10^{-6} (see Table 1 on page 7).

Full results of the radiological investigations at Sites 3 and 5 are presented in a Final Radiological Release Report (see page 19). This report concluded that radionuclides on the surface areas of the sites, specifically Ra-226, were within background. However, due to the potential for the existence of small quantities of radioactive material in the subsurface at Sites 3 and 5, Ra-226 should be considered a COPC for response actions at these sites.

Feasibility Study Addendum

Based on the new site-specific data and technical information obtained from the Supplemental Site Characterization, an addendum to the FS Report was prepared to revise the remedial action objectives, and as necessary, modify and reevaluate the remedial alternatives previously developed for Sites 3 and 5.

The change from Alternative 3, the preferred remedy presented in the 1998 Proposed Plan, to Alternative 4d, Single-Barrier Cap with Institutional Controls and Monitoring with Synthetic Flexible Membrane Liner, is based upon the new information and the revised evaluation of alternatives presented in the Feasibility Study Addendum.

In summary, new information collected since the FS was completed confirmed that significant amounts of leachate are not being produced and that low concentrations of methane are present over the central portions of the landfills would not typically require landfill gas control. Additional trenching exercises confirmed the volume of waste at the landfills was less than previous estimates.

The inclusion of passive and active landfill gas control systems as a component of the remedial alternatives, as agreed upon by the FFA signatories and the CIWMB, added an additional measure of protection from the potential for landfill gas migration. These factors led to adding new remedial action objectives for landfill gas to protect human health, and resulted in a refinement and reevaluation of the remedial alternatives following the nine NCP evaluation criteria. The revised remedial action objectives and remedial alternatives are discussed starting on page 8.

Human Health and Ecological Risk Assessments

Human health risk assessments were conducted for Sites 3 and 5 as part of the RI. A human health risk assessment estimates the potential for health problems as a result of exposure to the chemicals at a site. Human health risk assessments estimate risks separately for exposure to cancer-causing chemicals (cancer risk) and for those chemicals that cause other health effects (non-cancer risk). Cancer risk is estimated as a probability of an individual developing cancer, and is expressed as the number of additional cancer cases within a given population. For example, a cancer risk probability of 2 in 100,000 (typically written as 2×10^{-5}) means that 2 additional cancer cases may occur in a population of 100,000 people as a result of exposure to cancer-causing chemicals at a site. Non-cancer risk is expressed as a total hazard index, presented as a whole number or a fraction.

To characterize risk and assist decision-makers in determining whether further action is needed at a site, the U.S. EPA has established a risk management range of 10^{-4} to 10^{-6} for cancer risk. Risks less than or equal to 10^{-6} are considered acceptable, and risks within the risk management range of 10^{-4} to 10^{-6} may be acceptable when site-specific factors are considered. A non-cancer risk hazard index equal to or less than 1 indicates limited potential for other adverse health effects to occur; greater values may require further evaluation. Table 1 (see page 7) presents the risk ranges established by U.S. EPA to protect human health.

An ecological risk assessment evaluates the potential effects on plants and animals from exposure to chemicals at a site. An ecological risk assessment was conducted only at Site 5, because Site 3 is covered with gravel or pavement and does not support wildlife habitat. For the ecological risk assessment, samples were also taken from a nearby uncontaminated reference site for comparison purposes.

RISK ASSESSMENT PROCESS

Risk assessments generally follow a four-step process:

- **Step 1 - Analyze Contamination**
- **Step 2 - Estimate Exposure**
- **Step 3 - Assess Toxicity**
- **Step 4 - Characterize Site Risks**

The ecological risk assessment focuses on potential reproductive damage and reduction in reproductive life span rather than the risk in developing cancer. This assessment also focuses on adverse effects on growth. Ecological risks are expressed in terms of a hazard index. A hazard index equal to or less than 1 indicates that no adverse effects on wildlife would be expected, greater values may require further evaluation.

Analyze Contamination

In Step 1, the Navy looked at concentrations of chemicals found at a site and other scientific studies on the effects these chemicals have on people (or animals, where human studies are unavailable). During the remedial investigation, only the environmental media (soil, 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. Representative sampling of landfill materials is also not considered practical because of the 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.

Estimate Exposure

In Step 2, the Navy evaluated different ways that people potentially could be exposed to the chemicals identified in Step 1. This included the chemical concentrations that people might be exposed to and the potential frequencies and durations of exposure during certain activities.

To determine potential risks from exposure to soil, the human health risk assessments assumed that people would not live at any of these sites. At Site 3, it was assumed that industrial office workers may work there, and that children might play in Agua Chinon Wash. At Site 5, a more conservative approach was applied, and it was assumed that children might play in the soil covering the landfill materials. Children were assumed to be exposed to chemicals in soil through ingestion (eating) of soil, inhalation of vapors or dust (breathing), and direct skin contact (touching).

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 (drinking, bathing). This hypothetical assumption is very conser-

vative because it is highly unlikely that any future residential units would be built this close to the landfill as a result of regulatory limitations.

The exposure assessment for ecological risk assessment typically requires the expertise of a skilled wildlife biologist. Through site visits and literature research, the biologist develops a habitat description for the site and determines a comprehensive list of those organisms that are present or may be potentially present. As mentioned earlier, Site 3 is covered with gravel and does not support a wildlife habitat, so the ecological risk assessment process continued beyond this point for Site 5 only. At Site 5, the biologist then identified the potential exposure pathways and determined which of these may be complete such that exposure to site chemicals could occur. Potential routes of exposure included ingestion of soil, ingestion of plant and animal tissue exposed to chemicals in the soil, and direct contact with the soil.

Assess Toxicity

In Step 3, using criteria established by U.S. EPA and California EPA, the Navy assessed the toxicity of site chemicals identified in Step 1. The objective of this step is to determine the relationship between dose and toxic response for each chemical and assign toxicity values for inclusion into the risk assessments. Human health toxicity values for cancer-causing chemicals are known as cancer slope factors; values for chemicals that can cause other health effects are termed reference doses. Ecological toxicity values are concentrations, or doses, of chemicals that cause no observable negative effects to wildlife, and are termed toxicity reference values. The various toxicity values and the concentrations of site chemicals are then inserted into calculations to determine human health and ecological risks.

Characterize Site Risks

In Step 4, results of the human health and ecological risk calculations are combined, evaluated, and summarized. The Navy and regulatory agencies use this information to determine whether site risks are great enough to cause health problems for people (Sites 3 and 5) or affect plants and animals (Site 5). Risk managers take into account that calculated risk levels are an indication of potential risks and, by design, are conservative in nature to provide a margin of safety for decision making.

Risk Assessment Results

Results from the risk assessments indicate potential risks to human health and the environment would continue to be present if actions are not taken at Sites 3 and 5 landfills to prevent exposure to wastes or to control infiltration.

Soil—At Sites 3 and 5, the probability of a child developing cancer from exposure to soil while playing is less than 1×10^{-6}. Noncancer risks from exposure to soil are less than a total hazard index of 1.

Groundwater—The additional chance of a resident developing cancer from exposure to groundwater is between 10^{-4} and 10^{-6} at both sites. The risk assessments also concluded that exposure to groundwater would result in non-cancer risks greater than 1. Risk assessment results show that the chemicals present in groundwater at Sites 3 and 5 do not present a current risk to human health because the impacted water is not used for domestic purposes. Further analysis of the groundwater at these sites indicated that the chemicals present in the groundwater were naturally occurring and not resulting from the landfills; therefore, no response action for groundwater cleanup is necessary.

Ecological—The ecological risk assessment performed at Site 5 and at the reference site both resulted in a total hazard index greater than 1. The risk assessments support the conclusion that significant ecological effects are not expected.

Table 1: Risk Ranges to Protect Human Health

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

Summary of Landfill Closure Alternatives

The Feasibility Study Addendum effort focused on the following three key steps: revise the remedial action objectives for Sites 3 and 5; revise the remedial alternatives first presented in the original FS Report; and conduct a reevaluation and comparative analysis of the revised alternatives. The remedial action objectives identified in the original FS Report were reevaluated based on the review of supplemental site characterization results and the proposed additional engineering and institutional controls. The original FS evaluation proposed that monitoring of leachate and landfill gas be a determining factor in installing leachate and landfill gas controls if deemed necessary in the future. Based on agreements between the California Integrated Waste Management Board (CIWMB), one of the state agencies responsible for overseeing landfills, and the FFA signatories, the remedial alternatives as presented in the FS Addendum now directly address the underlying concern of potential landfill gas migration at Sites 3 and 5. An evaluation of metals in groundwater at the landfills concluded that elevated concentrations of metals in groundwater resulted from natural conditions and were not associated with waste disposal activities conducted at Sites 3 and 5. Therefore, no response action for groundwater is required.

To address potential landfill gas migration, all alternatives (including the preferred remedy) except for Alternative 1, contain four key components.

1. An active landfill gas collection system and passive vent system would be installed as a part of the remedy. While inactive, wells/pipes screened within the waste would be used to monitor landfill gas within the waste itself, providing an early warning feature. The system would remain inactive or vent passively unless a contingency action is triggered based on results of landfill gas monitoring.

2. As an additional feature, passive gas control trenches installed within the compliance monitoring zone and filled with gravel would be installed as a part of the remedy.

3. CIWMB monitoring protocol would be implemented with compliance landfill gas monitoring probes within 50 feet of the waste boundary. The perimeter would be monitored to demonstrate that landfill gas is not migrating beyond the landfill boundary. Once adequate data are collected, and with CIWMB concurrence, monitoring would be discontinued and land-use restrictions would be removed.

4. Land-use restrictions would be implemented within 100 feet of the waste boundary. This includes the 50-foot compliance monitoring zone plus another 50 feet as an additional buffer. Within this 100-foot land-use restriction buffer zone, construction of structures would require concurrence of the FFA signatories and the CIWMB.

continued on page 10

Table 2: Former MCAS El Toro Remedial Alternatives Cost Estimate Comparison (for comparison purposes only)

Remedial Alternatives Evaluated	Estimated Cost in $ Millions	
	Site 3	Site 5
Alternative 1—No Action	0	0
Alternative 2—Institutional Controls and Monitoring	3.8	3
Alternative 3—Single-Layer Soil Cap with Institutional Controls and Monitoring	8.5	5.9
Alternative 4—Single-Barrier Cap with Institutional Controls and Monitoring		
Option a—clay barrier	9.6	6.2
Option b—soil/bentonite barrier	9.7	6.4
Option c—geocomposite clay liner	9	6.1
Option d—synthetic flexible membrane liner—Preferred Alternative	9.6	6.5
Alternative 5—Pavement Cap with Institutional Controls and Monitoring		
Option a—concrete cap	9.1	6.3
Option b—asphalt cap	9.8	6.5
Alternative 6—Pavement Cap with a Flexible Membrane Liner Barrier with Institutional Controls and Monitoring		
Option a—concrete cap	9.6	6.5
Option b—asphalt cap	10.4	6.8

Institutional Controls – Sites 3 and 5 Landfills

Institutional controls described in this Proposed Plan include land use restrictions that would be established to reduce or limit exposure to on-site contamination at the landfills and to protect the remedy and associated equipment. Institutional controls are applicable to all alternatives evaluated (except Alternative 1, No Action) and will be implemented as soon as feasible.

Interim Land Use Restrictions.

The property is now subject to the following Interim Land Use restrictions set forth in the Lease in Furtherance of Conveyance (LIFOC) between the United States of America and Heritage Fields LLC, A Delaware Limited Liability Company For MCAS El Toro Parcel 2, 12 July 2005, paragraphs 13.15 - 13.19, and 13.21. The Interim Land Use Restrictions set forth in the LIFOC prohibit:

- *Subsurface excavation, digging, drilling, or other disturbance of the ground surface without prior Government approval.*
- *Installation of new groundwater wells of any type and use of contaminated groundwater without prior written Government approval.*
- *Installation of any well that has the potential to affect plume migration.*
- *Alteration, disturbance or removal of groundwater monitoring wells, remedial action equipment (e.g. pumps), or associated utilities without prior written Government approval.*
- *Removal of or damage to security features (e.g., locks on monitoring wells), survey monuments, signs, or monitoring equipment and associated pipelines and appurtenances without prior written Government approval.*
- *Residential use of the sites and construction of day care centers.*
- *Construction of any structure, including placement of trailers without the prior written approval of the Navy and FFA signatories.*

Proposed Land Use Restrictions

The Proposed Land Use Restrictions set forth below will be incorporated into and implemented through two separate legal instruments when title to the property within OU-2C (Sites 3 and 5) is conveyed:

- *Restrictive covenants included in a "Covenant to Restrict Use of Property" entered into by the Navy and DTSC as provided in the Navy/DTSC 2000 Memorandum of Agreement and consistent with the substantive provisions of tit. 22 Cal. Code Regs. Section 67391.1, and*
- *One or more Quitclaim Deeds from the Navy to the property recipient.*

Restricted Land Uses

The following restricted land uses for property within OU-2C must be reviewed and approved in writing in advance by the FFA Signatories and CIWMB, and California Dept. of Health and Safety (DHS) Radiological Branch (at the discretion of DTSC) in accordance with the "Covenant(s) to Restrict Use of the Property" and Quitclaim Deed(s) prior to use of the property for any of the restricted uses:

- *A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation,*
- *A hospital for humans,*
- *A school for persons under 21 years of age,*
- *A day care facility for children, or*
- *Any permanently occupied human habitation other than including those used for commercial or industrial purposes.*

Restricted Activities

The following restricted activities are prohibited throughout OU-2C unless they are reviewed and approved in writing in advance by the FFA Signatories, CIWMB, and DHS Radiological Branch (at the discretion of DTSC) in accordance with the "Covenant(s) to Restrict Use of the Property" and Quitclaim Deed(s):

- *Land disturbing activity that involves movement of soil to the surface from below the surface of the land, including but not limited to excavation of soil and construction of roads, utilities, facilities, structures, and appurtenances of any kind.*
- *Alteration, disturbance, or removal of any component of a response or cleanup action including but not limited to landfill cap; leachate collection systems; groundwater extraction, injection, and monitoring wells and associated piping and equipment; or associated utilities.*
- *Extraction of groundwater and installation of new groundwater wells.*
- *Removal of or damage to security features (for example, locks on monitoring wells, fencing, and signs).*
- *Construction of structures within 100 feet of the edge of the landfills.*

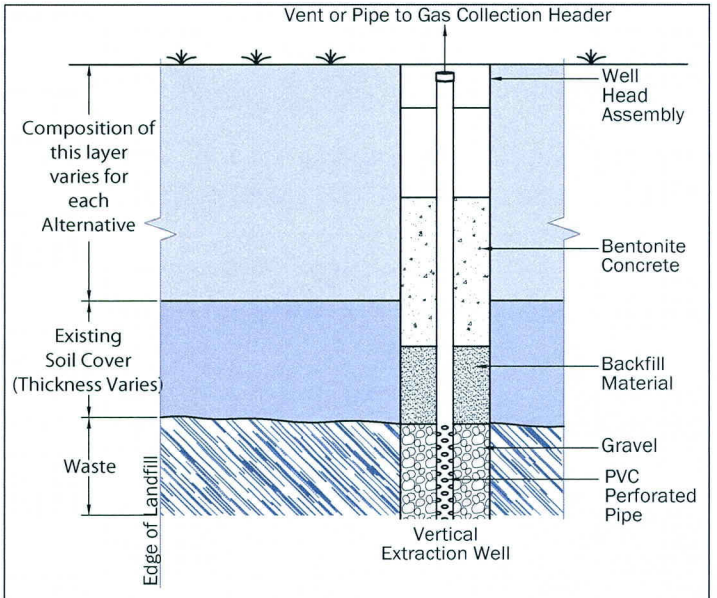
Access provisions are required to ensure the Navy and regulatory agencies have access to remedial equipment and other remedy components for the purpose of implementing the remedial action, performing maintenance activities, and conducting monitoring.

Due to the new remedial action objectives for Sites 3 and 5, active and passive landfill gas controls for direct control of landfill gas are included. The remedial action objectives for Sites 3 and 5 presented in the FS Addendum are prescribed to:

- minimize direct contact with the landfill wastes;
- control surface water run-on and run-off and erosion, minimize infiltration of water and potential contaminant leachate to groundwater;
- minimize the potential for landfill gas to migrate to and beyond the 100-foot buffer zone established for Sites 3 and 5 at concentrations greater than *California Code of Regulations* Title 27 thresholds; and
- minimize the potential for surface waters in the washes from coming in contact with the landfill (Applicable to Site 3 only).

Descriptions of the alternatives evaluated for Sites 3 and 5 are presented below and are numbered as they appear in the FS Addendum Report. The conceptual alternatives presented in the FS Addendum Report were developed to facilitate the comparative evaluation process. The design specifications for the preferred remedy, upon selection, will be defined in the Remedial Design documents and the Remedial Action Work Plan. Conceptual figures that illustrate the landfill caps accompany the alternative descriptions.

Landfill Gas Collection Well



Illustrated above is a typical landfill gas extraction well. A system consisting of these wells comprises a key component of Alternatives 3, 4, 5, and 6; such a well system would be installed within the landfill caps of these alternatives.

Key supporting information also includes the following:

- cost comparison of remedial alternatives (Table 2, page 8);
- evaluation of the alternatives (page 13);
- institutional controls pertaining to landfill closure (page 9); and
- proposed federal and state applicable or relevant appropriate requirements (ARARs) for landfill closure (page 16).

The preferred alternative for Sites 3 and 5 is Alternative 4d, the Single-Barrier Cap with Institutional Controls and Monitoring. The cap would be a modified Title 27 prescriptive (clay) cap with a synthetic flexible membrane liner (FML) and a vegetative soil cover. Since metals in groundwater resulted from natural conditions and were not associated with waste disposal activities conducted at Sites 3 and 5, no response action for groundwater is required.

Alternative 1—No Action

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

Alternative 2—Institutional Controls (Access and Land-Use Restrictions) and Monitoring

For Alternative 2, access and land-use restrictions would be placed on the property to prohibit specific reuses of the property to protect human health and the performance of the remedy (see text box on page 9 for description of institutional controls).

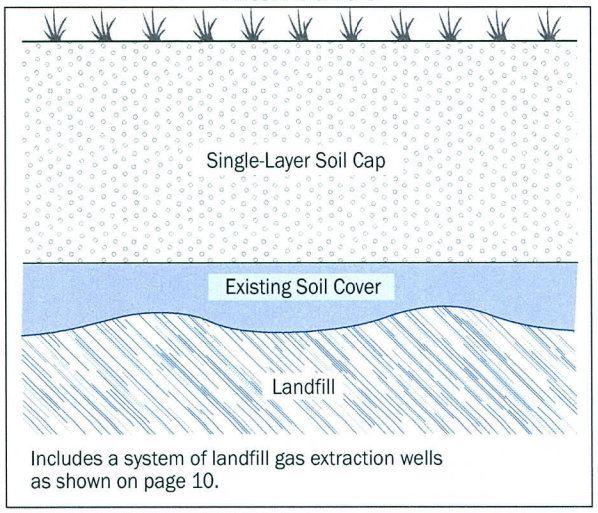
Alternative 2 includes passive gas control trenches and landfill gas monitoring wells that would be installed within the compliance monitoring zone along with vertical landfill gas extraction wells within the waste placement boundary. These vertical wells contain valves to allow either a piping manifold for active extraction or passive venting to the atmosphere. (This landfill gas control and monitoring system, both active and passive components, also applies to Alternatives 3, 4, 5, and 6.)

Environmental monitoring for landfill gas, leachate, and groundwater to assess changes in concentrations or locations of contaminants at the sites would be conducted for up to 30 years. The effectiveness of the remedy would be monitored by visual inspections. Maintenance would be conducted to assure continued integrity of the remedy.

Alternative 3—Single-Layer Soil Cap/Native-Soil Cap with Institutional Controls and Monitoring

Alternative 3 includes construction of a 4-foot single-layer soil cap to contain waste, prevent exposure to landfill materials, and reduce the amount of rainfall that can

Alternative 3



Includes a system of landfill gas extraction wells as shown on page 10.

infiltrate into and through the landfill. The single-layer cover would satisfy the functions and objectives that a *California Code of Regulations* Title 27 prescriptive (clay) cap is intended to serve, specifically minimizing water infiltration and leachate migration. Test 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.

Computer modeling was performed to evaluate the effectiveness of the single-layer soil cap, and it was determined it would be an acceptable engineered alternative to the Title 27 prescriptive cap.

The cap would be graded and built with surface water drainage controls to enhance its effectiveness. 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. The surface of the cap would be revegetated to prevent erosion.

Under Alternative 3, landfill capping at Site 3 would include excavation and removal of wastes from the former incinerator area and Waste Areas B through F (see map on page 3). Excavated wastes would be consolidated in the main landfill area and covered with the single-layer cap. At Site 5, consolidation of wastes in this manner is not necessary since all wastes are confined to one area. (Consolidation of wastes as described here also applies to Alternatives 4, 5, and 6.)

Institutional controls that would be implemented under Alternative 3 will include site access and land-use restrictions as described under Alternative 2 (see text box on page 9 for description of institutional controls). Alternative 3 includes the identical landfill gas monitoring and control system described under Alternative 2. Environmental monitoring of landfill gas, leachate, and groundwater would be the same as for Alternative 2. The effectiveness of surface water (run-on and run-off) controls, revegetation of the covers, and site security would also be monitored by visual inspections. Maintenance would be conducted to assure continued integrity of the landfill cap and its components.

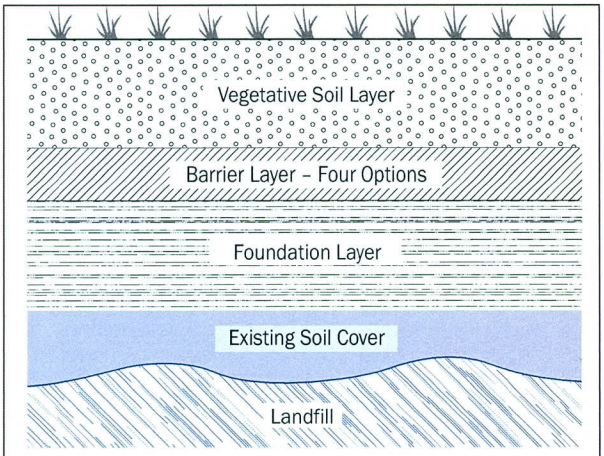
Alternative 4—Single-Barrier Cap with Institutional Controls and Monitoring (four options developed)—*Preferred Remedy for Sites 3 and 5—Alternative 4d*

Alternative 4 consists of a single-barrier cap that would minimize water infiltration and leachate migration. This cap would consist of a soil foundation layer, a Title 27 prescriptive cap with a barrier layer (four separate options) made of either clay, soil/bentonite mix, geocomposite clay liner, or a synthetic flexible membrane (plastic) liner (FML), and topped off with a top soil layer to support vegetation. The surface of the cap would be revegetated to prevent erosion.

Prior to installation of the cap, wastes would be consolidated at Site 3 in the same manner described in Alternative 3. Consolidation of wastes is not necessary at Site 5. Alternative 4 includes the identical landfill gas monitoring and control system described under Alternative 3. Institutional controls that would be implemented under Alternative 4 will include site access and land-use restrictions as described under Alternative 3 (see text box on page 9 for description of institutional controls). Environmental monitoring of landfill gas, leachate, and groundwater, and conducting of visual inspections to monitor the effectiveness of the cap and other components of the remedy would be the same as for Alternative 3.

Alternatives 4a, 4b, 4c, and 4d (the preferred remedy) are the same except for the barrier (middle) layer of the cap. In all four options, the foundation layer consists of existing cover material. It would be compacted to provide

Alternative 4



Barrier Layer Options

Option 4a — Clay Barrier

Option 4b — Soil/Bentonite Barrier

Option 4c — Geocomposite Clay Liner (GCL)

Option 4d — *Preferred Remedy* — Synthetic Flexible Membrane Liner (FML)

All four options include a system of landfill gas extraction wells as shown on page 10.

adequate structure for the overlying layers. The top layer would be a layer of top soil placed on top of the barrier layer to protect the barrier layer and provide a medium for vegetation. Barrier layer options are summarized below.

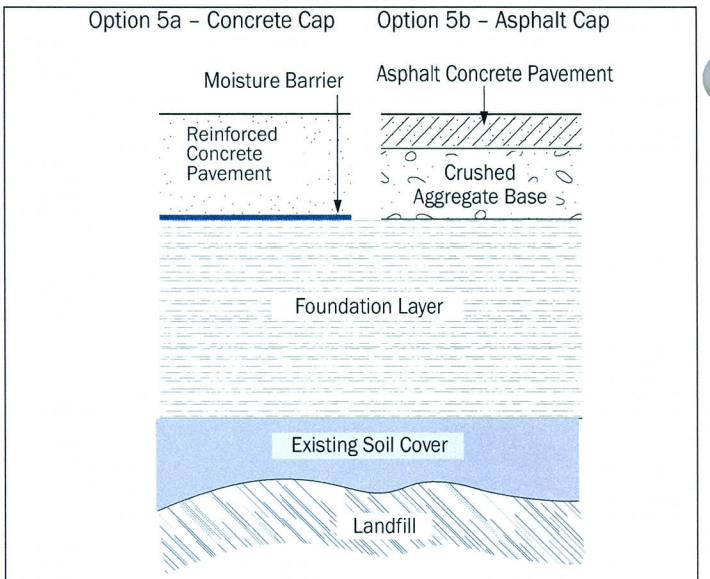
- Alternative 4a barrier layer—would consist of compacted clay that would act as a barrier to infiltration.
- Alternative 4b barrier layer—would be composed of a soil/bentonite clay mixture that would use an off-site borrow source of fine-grained soil and bentonite clay imported from a commercial supplier. These materials would be mixed according to the specifications in the Remedial Design documents.
- Alternative 4c barrier layer—would consist of a geocomposite clay layer that is a manufactured hydraulic barrier of sodium-bentonite clay sandwiched between two layers of geotextile material that are held together by stitching or adhesives.
- **Alternative 4d barrier layer—preferred remedy**—would use a FML made of either high- or low-density polyethylene plastic sheeting instead of the clay layers, avoiding the potential for clay layers to dry out.

Institutional controls for all Alternative 4 options will include site access and land-use restrictions as described under Alternative 2 (see text box on page 9 for description of institutional controls). All Alternative 4 options include the identical landfill gas monitoring and control system described under Alternative 2. Environmental monitoring of landfill gas, leachate, and groundwater would be the same as for Alternative 2. Visual inspections and maintenance to assure the continued integrity of the landfill cap and its components would be the same as for Alternative 3. Since metals in groundwater resulted from natural conditions and were not associated with waste disposal activities conducted at Sites 3 and 5, no response action for groundwater is required.

Alternative 5—Pavement Cap with Institutional Controls and Monitoring (two options developed)

Alternative 5 would use a landfill cap that consists of a soil foundation layer covered with a reinforced concrete (Option 5a) or asphalt pavement (Option 5b) cap. For the foundation layer, on-station soil would be excavated and compacted on the landfill in layers. The concrete or asphalt pavement cap would be constructed with surface water drainage controls to direct run-on and run-off and to prevent erosion. This type of cap is effective in reducing infiltration of water into the landfills and prevents plants and animals from rooting or burrowing into the landfill. A thin layer of pliable plastic sheeting would be used as a moisture barrier. Alternative 5b would have a layer of crushed aggregate on top of the foundation layer. Asphalt pavement would be placed on top of the aggregate.

Alternative 5



Foundation layer and existing cover are the same for both options. Both options include a system of landfill gas extraction wells as shown on page 10.

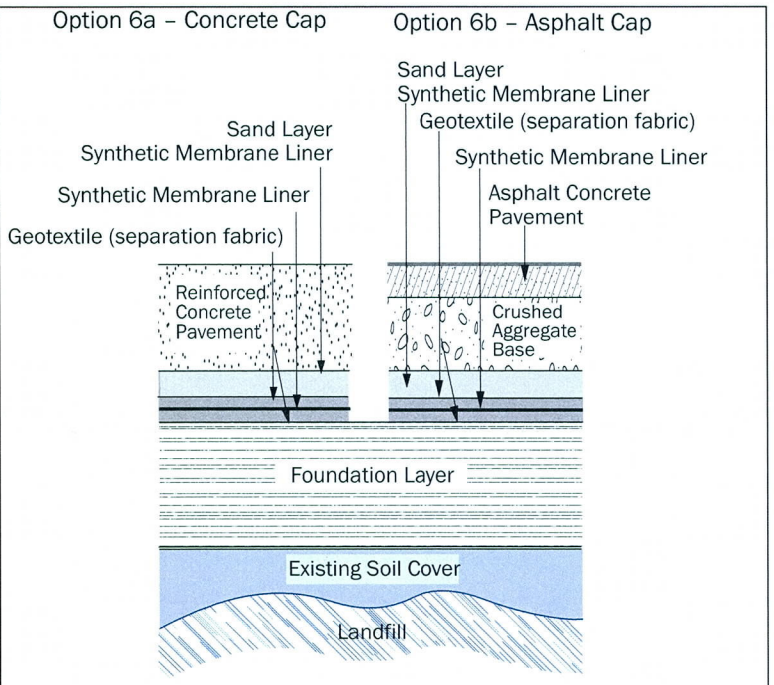
Both options under Alternative 5 would use the same process for consolidation of wastes for Site 3 as described for Alternative 3. Consolidation of wastes does not apply to Site 5.

Institutional controls for both Alternative 5 options will include site access and land-use restrictions as described under Alternative 2 (see text box on page 9 for description of institutional controls). Both Alternative 5 options include the identical landfill gas monitoring and control system described under Alternative 2. Environmental monitoring of landfill gas, leachate, and groundwater would be the same as for Alternative 2. Visual inspections and maintenance to assure the continued integrity of the landfill cap and its components would be the same as for Alternative 3. Both of these cap options would require maintenance and repair to prevent leaking if cracks form in the pavement.

Alternative 6—Pavement Cap with a Flexible Membrane Liner Barrier with Institutional Controls and Monitoring (two options developed)

Alternative 6 would use either a reinforced concrete (Option 6a) or an asphalt pavement cap (Option 6b) landfill cap constructed in the same manner as the Alternative 5 options. The soil foundation layer would be constructed in the same manner as Alternative 5. Alternatives 6a and 6b contain additional features to prevent infiltration of moisture into the landfill contents. Above the foundation layer, a synthetic plastic FML would be installed with a geotextile separation fabric above and below FML in both options. A sand layer that would function as a drainage layer would be installed on top of the FML layer. The sand layer would also contain a subsurface drainage, collection, and removal system. In both options, these combined layers would act as a barrier to further prevent surface water

Alternative 6



Foundation layer and existing cover are the same for both options. Both options include a system of landfill gas extraction wells as shown on page 10.

from penetrating and infiltrating into the landfills, since concrete and asphalt can develop cracks over time from shrinkage and settlement. Both options under Alternative 6 would use the same process for consolidation of wastes for Site 3 as described for Alternative 3. Consolidation of wastes does not apply to Site 5.

Institutional controls for both Alternative 6 options will include site access and land-use restrictions as described under Alternative 2 (see text box on page 9 for description of institutional controls). Both Alternative 6 options include the identical landfill gas monitoring and control system described under Alternative 2. Environmental monitoring of landfill gas, leachate, and groundwater would be the same as for Alternative 2. Visual inspections and maintenance to assure the continued integrity of the landfill cap and its components would be the same as for Alternative 3. Both of these cap options would require maintenance and repair to prevent leaking if cracks form in the concrete or pavement.

Evaluation of Landfill Remedial Alternatives—Sites 3 and 5

Each alternative has undergone a detailed evaluation and analysis, using the nine remedy selection criteria set forth in the NCP. These 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 the most appropriate remedial action. The nine criteria are defined below and are accompanied by the key points from the evaluation of the six remedial alternatives, with an emphasis on the preferred alternative: Alternative 4d, Single-Barrier (FML) Cap with Institutional Controls and Monitoring. A chart that summarizes evaluation of all the alternatives is shown on page 14. A conceptual design of Alternative 4d follows on page 15.

A. Threshold Criteria

1. Overall Protection of Human Health and the Environment—assesses whether a remedial alternative provides adequate human 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.

Alternatives 1 and 2 are not protective of human health and the environment. Alternatives 3, 4, 5, and 6 comply with this criterion and prevent contact with the landfill mass, mitigate erosion of landfill materials, and reduce the potential for transport of contaminants from the landfills. Alternatives 2, 3, 4, 5, and 6 all incorporate the installation of landfill gas controls systems utilizing vertical wells and horizontal trenches to prevent potential landfill gases from migrating beyond the 100-foot buffer zone. The barrier layers in Alternative 4d (preferred remedy), as well as those in Alternatives 4c, 5a, 5b, 6a, and 6b allow the least infiltration and minimize or eliminate the possibility of future impacts.

2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)—addresses whether a remedial alternative will meet all federal, state, and local environmental statutes or requirements.

All the alternatives, except for Alternatives 1 and 2, comply with all ARARs for closure and post closure of landfills.

B. Primary Balancing Criteria

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

All of the alternatives leave waste in place at each site. At Site 3, Alternatives 3, 4, 5, and 6 consolidate wastes into one area under the landfill cap. Consolidation is not necessary at Site 5 because all wastes are in the same area. Alternatives 1 and 2 do not take any measures to provide for long-term permanence and effectiveness since they do not eliminate erosion or reduce migration of contaminants to groundwater. Landfill capping (Alternatives 3, 4,

5, and 6) reduces rainfall infiltration by at least 89 percent; Alternatives 4c, 4d (preferred remedy), 5a, 5b, 6a, and 6b provide the greatest reduction in infiltration and, therefore, the highest degree of long-term effectiveness. Alternatives 4c, 4d (preferred remedy), 6a, and 6b have an advantage over the other alternatives with liners, since these barriers are not subject to drying out. Alternatives 4a and 4b, with thicker barrier layers, are more resistant to puncture by root systems or burrowing animals. The pavement covers of Alternatives 5a, 5b, 6a, and 6b are more durable but may require more maintenance due to settlement and cracking. Alternatives 3, 4a, 4b, 4c, and 4d (preferred remedy) have an advantage over the other alternatives when site reuse is considered. Reuse for Sites 3 and 5 is designated as riparian corridor and golf course, respectively.

4. Reduction of Toxicity, Mobility, or Volume—refers to the degree to which a remedial 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).

None of the proposed alternatives attempt to reduce the volume or toxicity of the landfill mass. Alternatives 1 and 2 do not minimize the potential for the production and migration of leachate from the landfills. The landfill capping and drainage features of Alternatives 3, 4, 5, and 6 would reduce infiltration into the landfill, minimizing the production and mobility of leachate to groundwater.

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 a minimal impact during groundwater, leachate, and landfill gas 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. Alternatives 4a and 4b present the most risk to the community

continued on page 16

Table 3: Comparative Analysis of Alternatives—Sites 3 and 5

Preferred Remedy

U.S. EPA Criteria		1	2	3	4a	4b	4c	4d	5a	5b	6a	6b
1 Overall Protection of Human Health and the Environment	Site 3 Site 5	No No	No No	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
2 Compliance with Applicable or Relevant and Appropriate Requirements	Site 3 Site 5	N/A N/A	No No	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes	Yes Yes
3 Long-Term Effectiveness and Permanence	Site 3 Site 5	○ ○	○ ○	◒ ◒	◒ ◒	◒ ◒	● ●	● ●	◒ ◒	◒ ◒	● ●	● ●
4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment	Site 3 Site 5	○ ○	○ ○	◒ ◒	◒ ◒	◒ ◒	● ●	● ●	◒ ●	◒ ◎	● ●	● ●
5 Short-Term Effectiveness	Site 3 Site 5	● ●	● ●	◎ ◎	○ ◒	○ ○	◒ ◎	◒ ◎	● ◎	◎ ◎	◎ ◒	◒ ◒
6 Implementability	Site 3 Site 5	● ●	● ●	◎ ◎	⊙ ⊙	⊙ ⊙	◎ ◎	◎ ◎	● ●	● ●	◎ ◎	◎ ◎
7 Cost	Site 3 Site 5	● ●	● ●	◒ ◒	⊙ ◒	⊙ ○	⊙ ◒	⊙ ◒	⊙ ◒	⊙ ◒	⊙ ◒	○ ○
8 State Acceptance	Site 3 Site 5	None of the state of California environmental agencies support either Alternative 1 or 2. State agencies concur with the Navy's preferred remedy.										
9 Community Acceptance	Site 3 Site 5	Evaluation follows the public comment period and is addressed in the Record of Decision										

Yes—meets criteria No—does not meet criteria
N/A—not applicable

Relative Performance in Satisfying Criteria

○ Low ⊙ Low Moderate ◒ Moderate ◎ Moderate High ● High

SENSITIVE RECORD

PORTIONS OF THIS RECORD ARE CONSIDERED SENSITIVE AND ARE NOT AVAILABLE FOR PUBLIC VIEWING

CONCEPTUAL DESIGN OF ALTERNATIVE 4d – PREFERRED REMEDY

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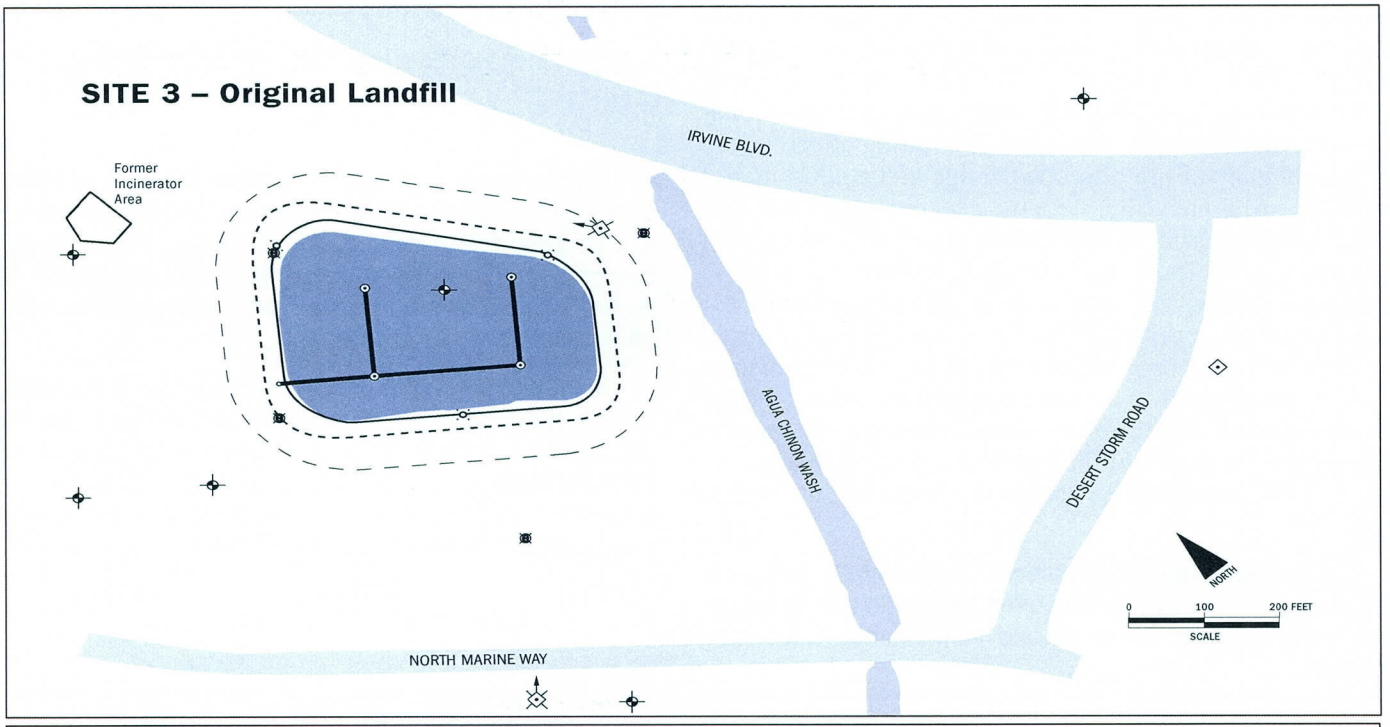
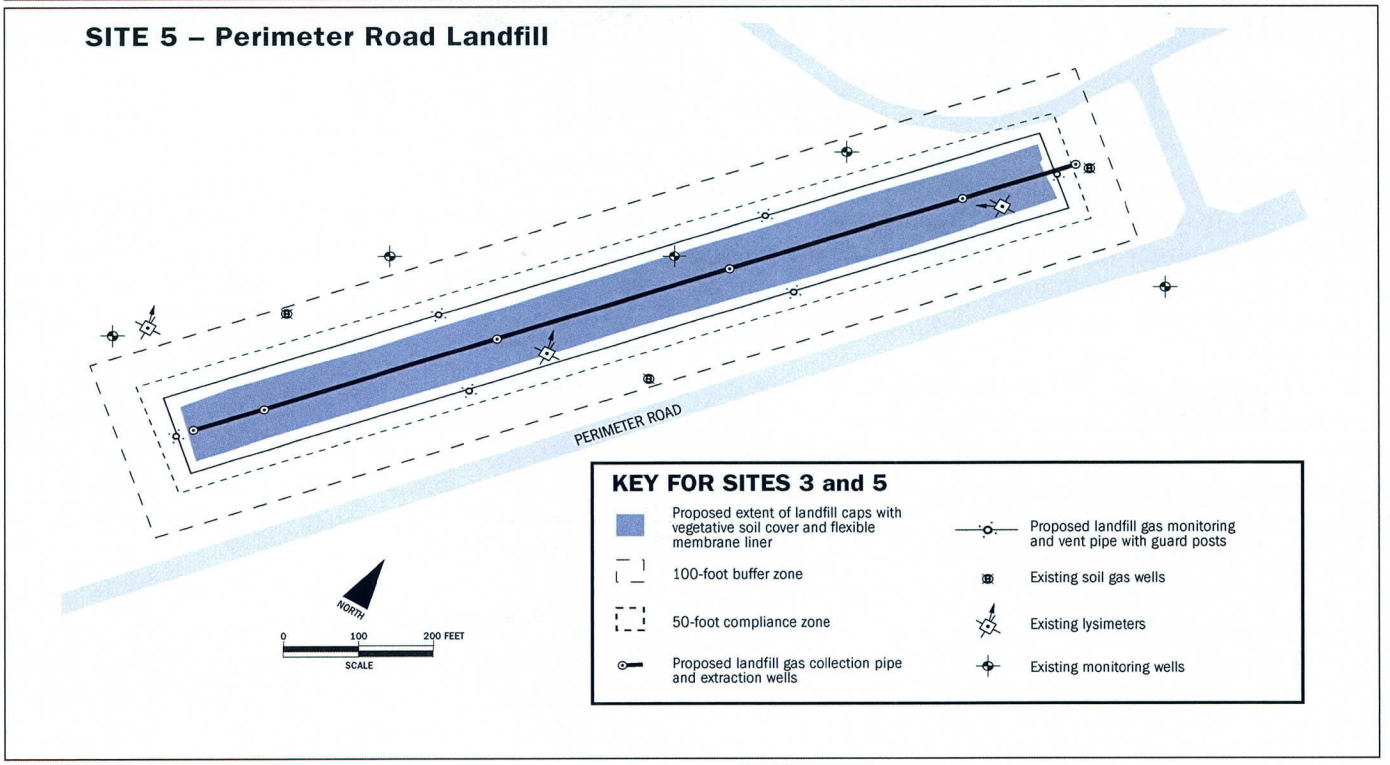
Conceptual Design of Alternative 4d—Preferred Remedy

These diagrams illustrate the conceptual makeup of the preferred remedial alternative for landfill closure at Sites 3 and 5. Shown are the estimated boundaries of the landfill caps, along with other components of the preferred remedy. At Site 3, landfill wastes from defined waste areas (shown on the map on page 3) would be consolidated under the landfill cap. Consolidation of wastes in this manner would not be necessary at Site 5. Other components of the preferred remedy shown are the 100-foot buffer zone (comprised of a 50-foot compliance zone and an additional 50-foot buffer), landfill gas monitoring and control systems, and existing soil gas wells, lysimeters, and groundwater monitoring wells, which would be used to monitor environmental conditions at the sites. The preferred remedy would also include institutional controls, monitoring, and maintenance to ensure the integrity of the landfill caps and associated components of the remedy.





because they require numerous truck trips and more heavy equipment on-site for the delivery and placement of the soil barrier layers. Alternatives 3 and 5a require the shortest amount of time to complete.

6. Implementability—refers to the technical feasibility (ease of construction and operation) and administrative feasibility (level of agency coordination) of a remedy. Factors such as availability of materials and services needed are considered.

Alternative 1 is the easiest to implement since no action would be taken. Alternative 2 would only involve institutional controls and monitoring, so it is readily implementable. Alternative 2 would only involve institutional controls, passive and active landfill gas collection systems, and monitoring, so it is readily implementable. Institutional controls, monitoring systems, and monitoring effectiveness of the alternatives are also comparable and readily implementable. Alternative 4c, with the geocomposite liner barrier, would be easier to install than the FML liner used in Alternatives 4d (preferred remedy), 6a, and 6b because installation of the FML liner requires specialized equipment and trained labor. Alternative 4d (preferred remedy) would be easier to install than Alternatives 4a and 4b. Alternatives 3, 4, 5, and 6 would be more complicated because of the waste consolidation activities at Site 3. Overall, Alternative 3 would be the easiest of the landfill capping alternatives to implement because it does not involve importing off-station soil.

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.

No cost is associated with Alternative 1 (No Action), while Alternative 2 would be the least costly of the other alternatives. Alternatives 6b and 4b would be the most costly of all the alternatives. Site 3 estimated costs range from $3.8 million to $10.4 million. Site 5 estimated costs range from $3.0 million to $6.8 million. A cost comparison of all alternatives is presented on page 8.

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 Navy's preferred alternative.

None of the state of California environmental agencies support either Alternative 1 or 2. State agencies concur with the Navy's preferred remedy.

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

This Proposed Plan is the Navy's invitation to the community to comment on the proposed alternatives that were revised and reevaluated for Sites 3 and 5. Community acceptance will be determined after the conclusion of the public comment period and will be documented in the Responsiveness Summary section of the Record of Decision.

Applicable or Relevant and Appropriate Requirements for Proposed Closure of Sites 3 and 5 Landfills

The federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) requires that remedial alternatives 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).

Significant potential ARARs that will be met by the preferred remedy for cleanup of groundwater are listed below. For more specific information on potential ARARs it is contained in the Final Feasibility Study Addendum (see text box on page 19).

Potential ARARs for Alternative 4d, the preferred remedy, for landfill closure at Sites 3 and 5 at former MCAS El Toro are listed to the right.

Potential Federal ARARs

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

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 requiring offsite disposal are generated as a result of the response action, substantive provisions CCR Title 22 of Sections 66261.21, 66261.22(a)(1), 66261.23, 66261.24(a), and 66261.100;
- accumulation of hazardous wastes requiring off-site disposal (if generated) in containers, substantive provisions of CCR Title 22 of Sections 66264.34, 66264.171, 66264.172, 66264.173, 66264.174, 66264.175(a) and (b), and 66264.178;

- groundwater protection standards, substantive provisions of CCR Title 22, Section 66264.94(a)(1) and (3), (c), (d), and (e) for unsaturated zone;
- generator requirements, CCR Title 22, Sections 66262.10(a), 66262.11, and 66262.13(a) and (b);
- groundwater monitoring program requirements, CCR Title 22, Sections 66264.91(a)(1)-(a)(4) and (c), except permit requirements; 66264.93; 66264.95(a) and (b); 66264.97(b)(1)(A), (b)(1)(B), (b)(4-7), (e)(6), (12)(A) and (B), (13), and (15); 66264.98(e)(1- 5), (i), (j), (k)(1-3), (4)(A) and (D),(5), (7)(C) and (D),(n)(1), (2)(B), and (C); and 66264.99(b), (e)(1)–(6), (f)(3), and (g); and
- landfill closure and post-closure care requirements, CCR Title 22, Sections 66264.111(a) and (b); 66264.228(f); 66264.309(a); and 66264.310(b)(1), (b)(5), and (e)(1);
- fugitive dust emissions, South Coast Air Quality Management District (SCAQMD) Rule 403; and
- particulate emissions from equipment, SCAQMD Rules 404 and 405.

Uranium Mill Tailings Radiation Control Act

Pursuant to Title 40 of the *Code of Federal Regulations* (CFR) Section 192.02(a) and (b), substantive provisions pertaining to effectiveness of controls for residual radioactive materials and potential releases of Radon-222 have been identified as potential ARARs for landfill caps.

Archeological and Historic Preservation Act and Historic Sites, Buildings and Antiquities Act

Pursuant to Title 16 of the *United States Code* (USC) Sections 469–469c-1 and 461–467, substantive provisions of the following federal requirements in Title 40 of the CFR have been identified as potential ARARs pertaining to:

- an archaeological survey for construction on previously undisturbed land and the recovery and preservation of archaeological or historical data, if found, CFR Title 40, Section 6.301(c); and
- avoidance of undesirable impacts on landmarks, CFR Title 40, Section 6.301(a).

Archeological Resources Protection Act of 1979

Pursuant to Title 16 of USC Sections 470aa–470mm (P.L. No. 96-95), the substantive provisions pertaining to excavation, removal, damage, alteration, or defacement of archaeological resources located on public lands unless such action is conducted pursuant to a permit.

U.S. Nuclear Regulatory Commission (U.S. NRC)

Pursuant to Title 10 of the CFR, the substantive provisions pertaining to:

- license termination with unrestricted site use for former incinerator area and Waste Areas B through F of Site 3, Sections 20.1402;
- license termination with restricted use for capped portions of IRP Sites 3 and 5, Section 20.1403(a) and (b);
- temporary storage of excavated waste containing radiological constituents, Sections 20.1801 and 20.1802; and
- radiological waste disposal, Sections 61.41, 61.42, 61.44, 61.52(a)(6), and 61.52(a)(8).

U.S. Department of Transportation

Pursuant to Federal Hazardous Materials Transportation Law, Title 49 of the USC Sections 5101–5127), substantive provisions of the federal requirements in CFR Title 49, Sections 171.2 (f) and (g), 172.300–172.304, 172.312, 172.400, and 172.504 have been identified as potential ARARs pertaining to the on-site packaging, labeling, and shipment of hazardous materials.

Potential State ARARs

The State Water Resources Control Board and Regional Water Quality Control Board–Santa Ana Region

Pursuant to the State Water Resources Control Board and Regional Water Quality Control Board - Santa Ana Region, substantive provisions of the following requirements are potential ARARs pertaining to:

- closure of waste management unit, CCR Title 27, Sections 20950(a)(2)(A) and 20950 (e)
- final grading, CCR Title 27, Sections 21090(b)(1);
- placement and design of the foundation layer, CCR Title 27, Section 21090(a)(1);
- barrier layer design, CCR Title 27, Section 21090(a)(2);
- vegetation layer design, CCR Title 27, Sections 21090 (a)(3);
- postclosure settlement evaluation, CCR Title 27, Sections 21090(e)(2); and
- run-on/run-off and erosion control, CCR Title 27, Section 21090(c)(4).

California EPA Department of Toxic Substances Control

Pursuant to CCR Title 22, the substantive provisions pertaining to:

- non-RCRA hazardous waste determination for wastes requiring off-site disposal, 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);
- land use covenants, Section 67391.1(a) and (e)(1);
- compaction requirements, Section 66264.228(e)(1);

- landfill cover seismic requirements, Section 66264.310(a)(5);
- prevent surface water infiltration in the closed landfill and maintain effectiveness of the final cover, Sections 66264.310 (a)(1) and (b)(1);
- elevation benchmark maintenance, Section 264.310(b)(5); and
- drainage and filter layer requirements, Sections 66264.228(e)(10) and (11).

Pursuant to California Health & Safety Code, the substantive provisions of Sections 25202.5, 25222.1, 25355.5(a)(1)(C), 25233(c), and 25234 have been identified as potential ARARs for implementing institutional controls.

Pursuant to California Civil Code, the substantive provisions of Section 1471 have been identified as potential ARARs for implementing institutional controls.

California Integrated Waste Management Board

Pursuant to the CCR, Division 2, Title 27, substantive provisions of the following portions of Title 27 as potential ARARs pertaining to:

- security at closed sites, Sections 21135(f) and (g);
- placement of the final cover, Section 21140(a) and (b);
- final grading, Section 21142;
- cover seismic requirements, Section 21145;
- erosion control, Sections 21150 and 21160(a) and (b);
- landfill gas control, Sections 20921(a)(1)(2), and (3); 20921(b); 20921(d); 20923; 20925(a), (b), and (c); 20925(d)(1) and (3); 20932; 20933; and 20937;
- postclosure maintenance, Section 21180(a) and (b); and
- postclosure land use, Sections 21190(a) and (b).

South Coast Air Quality Management District

Pursuant to the rules and regulations of the South Coast Air Quality Management District SCAQMD, substantive provisions of the following SCAQMD requirements have been determined to be potential ARARs pertaining to:

- a landfill gas control system, Rule 1150.1;
- control of visible emissions, Rule 401; and
- excavation at landfill sites are relevant and appropriate requirements, Rule 1150.

Definitions of Chemical and Technical Terms

Bank cubic yards: refers to engineering estimates of an undisturbed, in-place volume of soil. Example: A volume of soil that is 5 yards wide, 20 yards long, and 1 yard deep would be 100 bank cubic yards. Excavating or compacting soil can result in an adjustment in volume of approximately 25 percent. Therefore, 100 bank cubic yards in the ground can become 125 cubic yards in trucks hauling loose soil from an excavation area. Similarly, the 125 cubic yards of loose soil could be used to create a compacted soil layer with a fill volume of 94 cubic yards.

Feasibility Study (FS): An analysis of cleanup or remedial alternatives to evaluate their effectiveness and to enable selection of a preferred remedy.

Landfill gas (also called soil gas) consists of methane and other gases generated by the decomposition of organic matter from wastes disposed of in landfills.

Leachate is formed when surface water mixes with landfill materials and creates liquid wastes that could migrate downward and impact groundwater.

Metals found at the sites include aluminum, arsenic, beryllium, and manganese. Arsenic and beryllium are known to cause cancer. Aluminum and manganese are non-cancer-causing chemicals that can affect the nervous system, while manganese can also affect the respiratory system. Aluminum, arsenic, beryllium, and manganese occur naturally in the soils native to areas both on and off Former MCAS El Toro property.

Petroleum hydrocarbons are chemical components of fuels. The compounds (e.g., VOCs, SVOCs) that make up petroleum hydrocarbons are evaluated for potential health effects. Petroleum hydrocarbon compounds are managed outside the CERCLA program.

Radium (chemical symbol Ra) is a naturally occurring radioactive metal. Its most common isotopes are radium-226, radium-224, and radium-228. Radium is a radionuclide formed by the decay of uranium and thorium in the environment. It occurs at low levels in virtually all rock, soil, water, plants, and animals.

Radium-226 (Ra-226) is a radioactive metallic element (isotope) that was used in luminescent paints for dials, gauges, and markers. At Former MCAS El Toro, small quantities of radium-painted parts and gauges may have been stored at Site 8, the Defense Reutilization and Marketing Office Storage Yard.

Record of Decision (ROD) is the public document that explains what cleanup alternative will be used at a specific site. The ROD is based on information and technical analysis generated during the remedial investigation/feasibility study and consideration of public comments and community concerns received throughout the process and in response to the Proposed Plan.

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

Semivolatile Organic Compounds (SVOCs) comprise a general category of organic compounds that evaporate at a slower rate than VOCs. Some SVOCs are known cancer causing compounds.

Volatile Organic Compounds (VOCs) make up a general category of organic (carbon-containing) compounds that evaporate easily at room temperature. VOCs are commonly used for degreasing machinery and parts, paint stripping, and other industrial operations. At Former MCAS El Toro, historical activities include more than 40 years of aircraft maintenance using industrial solvents, like trichloroethene (TCE), that are within the VOC category. Some VOCs are known cancer causing compounds.

INTERNET CONNECTION

For more information on Former MCAS El Toro environmental restoration activities, visit the web site at:

www.bracpmo.navy.mil

For More Information

Environmental Reports Available for Review and Comment

Documents and reports that cover the remedial investigation, the radiological investigation, and the feasibility studies at Sites 3 and 5 are available for review and comment. Key reports include:

- Draft Final Phase II Remedial Investigation Report Operable Unit 2C, Site 3 (April 1997)
- Draft Final Phase II Remedial Investigation Report Operable Unit 2C, Site 5 (April 1997)
- Draft Final Phase II Feasibility Study Report, Operable Unit 2C, Site 3 (September 1997)
- Draft Final Phase II Feasibility Study Report, Operable Unit 2C, Site 5 (September 1997)
- Draft Record of Decision, Operable Unit 2C, Sites 3 and 5 (March 1999)
- Final Historical Radiological Assessment, MCAS El Toro (May 2000)
- Final Feasibility Study Addendum, Operable Unit 2C, IRP Landfill Sites 3 and 5 (December 2006)
- Final Radiological Release Report, IRP Sites 3 and 5 (Including Aerial Photograph Anomaly 46), Anomaly Area 3, and Building, 244 (December 2006)

Copies of these documents are available at the following locations:

- Heritage Park Regional Library, MCAS El Toro Information Repository, 14361 Yale Avenue, Irvine, CA 92714, (949) 551-7151.
- MCAS El Toro Administrative Record File, BRAC Office, Building 83 at Former MCAS El Toro, contact Ms. Marge Flesch, (949) 726-5398.

Project Contacts—Former MCAS El Toro

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**Submit written comments on the Sites 3 and 5 Proposed Plan to Mr. Darren Newton, listed above, no later than February 21, 2007.*

See Inside . . .

Proposed Plan for Closure of Landfill Sites 3 & 5

Public Meeting
Wednesday, January 31, 2007
6:30 p.m., Irvine City Hall

MAILING LIST COUPON

If you would like to be on the mailing list to receive information about environmental restoration activities at Former MCAS El Toro, please fill out the coupon below and send it to: Mr. Bob Coleman, Brown and Caldwell, 9665 Chesapeake Drive, Suite 201, San Diego, CA 92123. If you prefer, e-mail the information requested below to rcoleman@brwncald.com

☐ Add me to the Former MCAS El Toro Installation Restoration Program mailing list.
☐ Send me information on Restoration Advisory Board membership.

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CLEAN 3 TRANSMITTAL/DELIVERABLE RECEIPT

Contract No. N-68711-95-D-7526 **Document Control No.** CTO-0062/0162

File Code: 0216

TO: Contracting Officer
NAVFAC Southwest
Graciela R. Steinway
1220 Pacific Highway
San Diego, CA 92132-5190

DATE: January 18, 2007
CTO #: 0062
LOCATION : Former MCAS El Toro, CA

FROM: Thurman L. Heironimus/Project Manager

DESCRIPTION: Final Proposed Plan for Sites 3 and 5, Installation Restoration Program Dated January 2007

TYPE: ___ Contract Deliverable X CTO Deliverable ___ Change Notice/Project Note ___ Other

VERSION: Final (e.g., Draft, Draft Final, Final, etc.) REVISION #: 0

ADMIN RECORD: (PM to Identify) Yes X No ___ Category ___ Confidential ___

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