SDMS DOCID# 1120142

Final
Record of Decision Amendment
Site 39 Inland Ranges

Former Fort Ord, California

August 25, 2009

United States Department of the Army
Base Realignment and Closure (BRAC)
Former Fort Ord, California

CONTENTS

1.0 DECLARATION 1

1.1 Site Name and Location 1
1.2 Basis and Purpose 2
1.3 Site Assessment 4
1.4 Description of the Selected Remedy 4
1.5 Statutory Determination 6
1.6 ROD Amendment Data Certification Checklist 7
1.7 Authorizing Signatures 8

2.0 DECISION SUMMARY 13

2.1 Site Description 13
2.2 Site History 13
2.3 Enforcement and Regulatory History 15
2.4 Community Participation 15
2.5 Scope and Role of Amended Response Action 16
2.6 Site Characteristics 18
2.7 Current and Potential Future Land and Resource Uses 24
2.8 Summary of Site Risks 25
2.9 Description of Alternatives 27
2.10 Principal Threat Wastes 31
2.11 Selected Remedy 31
2.11.1 Summary of the Rationale for the Selected Remedy 31
2.11.2 Description of the Selected Remedy 34
2.11.3 Summary of the Estimated Remedy Costs 36
2.11.4 Expected Outcomes of Selected Remedy 36
2.12 Statutory Determinations 36
2.13 Documentation of Significant Changes from Preferred Alternative of Proposed Plan 38

3.0 RESPONSIVENESS SUMMARY 39

3.1 Overview 39
3.2 Background on Community Involvement 40
3.3 Summary of Comments Received During the Public Comment Period and Department of the Army Responses 40

4.0 REFERENCES 51

TABLES

1 Summary of Cleanup Levels for Chemicals of Concern in Soil

PLATES

1 Former Fort Ord Location Map
2 Site 39 Inland Ranges
3 Proposed Excavation Areas for Selected Remedy

APPENDIX

A APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR THE SELECTED REMEDY

1.0 DECLARATION

1.1 Site Name and Location

The former Fort Ord is located in northwestern Monterey County, California, approximately 80 miles south of San Francisco (Plate 1). The U.S. Environmental Protection Agency (EPA) identification number for Fort Ord is CA7210020676. This Record of Decision Amendment (ROD Amendment) addresses lead and constituents of explosives in soils at the Site 39 Inland Ranges at the former Fort Ord Army Base in Monterey County, California (Plate 2).

Since 1917, portions of the former Fort Ord were used by cavalry, field artillery, and infantry units for maneuvers, target ranges, and other purposes. Military munitions used on the facility included artillery and mortar projectiles, rockets and guided missiles, rifle and hand grenades, land mines, bombs, demolition materials, and small arms. Soil contamination at these ranges has been investigated and determined to primarily contain lead that is co-located with bullets associated with small arms usage, as well as constituents of explosives associated with munitions and explosives of concern (MEC) usage.

The Site 39 Inland Ranges are comprised of the approximate 8,000-acre former historical Impact Area (Impact Area) that was the previous location of the Fort Ord Range Complex, and a former 2.36-inch rocket range just north of the area. These ranges were used for live fire training exercises with a variety of weapons. The Impact Area is entirely within the natural resources management area described in the *Installation-Wide Multispecies Habitat Management Plan* (HMP) (*USACE, 1997*) as a "habitat reserve" area. The HMP and additional reports identify requirements regarding habitat management at the former Fort Ord (*USACE, 2005; USFWS, 1999, 2002, 2005; BLM/Army, 2004; Zander, 2002*)—hereinafter referred to as the "HMP and Related Requirements." These Related Requirements include guidelines for the conservation and management of wildlife, plant species, and habitats that largely depend on former Fort Ord land for survival; and describe land use, conservation, management, and habitat monitoring requirements for target species within habitat reserve areas that comprise the Impact Area, as well as development areas. Habitat management in the Impact Area is essential to the protection and management of habitat reserve species, and is vital to the reuse of the former Fort Ord because it balances species losses in other areas of the former Fort Ord that are designated for development.

Potential human health and ecological risks related to any soil contamination from small arms ammunition and military munitions usage within the Site 39 Inland Ranges from metals, including lead, and constituents of explosives below explosive concentrations that were identified as chemicals of concern (COCs) are addressed in this ROD Amendment. The portion of the Site 39 Inland Ranges addressed in this ROD Amendment is comprised of approximately 6,830 acres designated as habitat reserve in the HMP and Related Requirements (Plate 2) within the 8,000-acre Impact Area.

The Site 39 Inland Ranges also fall within the Track 3 site known as the Impact Area Munitions Response Area (Impact Area MRA). Track 3 sites are areas at the former Fort Ord where MEC are known or suspected to be present, but MEC investigations have not yet been completed. Implementation of the selected remedy identified in the *Record of Decision, Impact Area Munitions Response Area, Track 3 Munitions Response Site, Former Fort Ord, California* (Impact Area MRA ROD) (*Army, 2008b*) will address current or potential explosive safety hazards to human health and the environment from MEC at the Impact Area MRA, and will also enable soil investigations to be conducted in previously inaccessible areas. During munitions response at the Impact Area MRA, the Army will continue to conduct characterization of metals and constituents of explosives in soil associated with former military munitions range uses. The Army will evaluate the data in a timely manner to determine whether sampling is required to characterize an area further with respect to potential soil contamination from military

munitions. If there is evidence that military munitions recovered from the subsurface have degraded and released constituents of explosives or metals into soils, these specific locations will be evaluated to determine if additional sampling or remediation for constituents of explosives or metals is necessary.

Since there are explosive hazards posed by MEC within the Site 39 Inland Ranges, the Army will implement land use restrictions to address MEC as identified as part of the selected remedy in the Impact Area MRA ROD (*Army, 2008b*) There are no additional institutional controls required in the Site 39 Inland Ranges due to residual chemical contamination in soil, which was determined not to pose a risk to human health or the environment based on the results of the *Comprehensive Basewide Range Assessment Report, Former Fort Ord, California* (BRA) (*Shaw/MACTEC, 2006*); *Ecological Risk Assessment for Site 39 Ranges, Habitat Areas, Impact Area* (ERA) (*MACTEC/ABBL, 2007*); and *Final Feasibility Study Addendum, Site 39 Inland Ranges, Former Fort Ord, California* (FS Addendum) (*MACTEC, 2008*) that have been conducted since the Basewide ROD was signed in 1997.

This ROD Amendment presents the selected remedy that addresses potential risks to humans and ecological receptors from COCs in soil at the ranges shown on Plate 2 within habitat reserve areas at the Site 39 Inland Ranges.

1.2 Basis and Purpose

This decision document presents a change in the final soil cleanup levels and volume of soil to be addressed under the selected remedial action for the Site 39 Inland Ranges (Site) at the former Fort Ord originally identified in the *Record of Decision, Basewide Remedial Investigation Sites, Fort Ord, California* (Basewide ROD) dated January 13, 1997 (*Army, 1997a*). The selected remedy identified in the Basewide ROD addressed the risks to human health from lead contamination in soils co-located with bullets and constituents of explosives in soils from MEC usage at the Site 39 Inland Ranges. Since the Basewide ROD was signed in 1997, additional range areas and soil volumes within this habitat reserve area have been identified as requiring cleanup to address ecological risks to animal and plant species at these ranges.

The Basewide ROD identified the selected remedy for the Site 39 Inland Ranges as *Excavation and Onsite Placement at the Operable Unit 2 Landfill Beneath a Cap* at the former Fort Ord based on the protection of human health for reuse of the site as habitat reserve (*Army, 1997a*). Following completion of the Basewide ROD, some portions of the original 8,000 acres comprising the Site 39 Inland Ranges were identified for development.

This remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on information and reports contained in the Administrative Record for the former Fort Ord, in compliance with NCP Section 300.825(a)(2).

The FS Addendum (*MACTEC, 2008*) presents the revised soil remedial units originally identified in the Basewide Remedial Investigation/Feasibility Study (Basewide RI/FS) and Basewide ROD for the Site 39 Inland Ranges at the former Fort Ord in Monterey County, California (Plate 1) (*HLA, 1995a; Army, 1997a)*. The FS Addendum evaluated and compared potential alternatives for remediation of metals and constituents of explosives in soils based on: (1) no action, (2) cleanup to Basewide ROD human health based levels of concern for reuse of the areas as a habitat reserve, (3) cleanup to ecologically based cleanup levels, and (4) cleanup to background levels. The FS Addendum also re-evaluated treatment/disposal options for the volumes of soil to be excavated under each alternative, and confirmed that the selected remedy in the Basewide ROD of *Excavation and Onsite Placement at the Operable Unit*

2 (OU2) Landfill Beneath a Cap still best meets the evaluation criteria for these soil volumes.

Three Explanation of Significant Differences (ESDs) to previous RODs documented the following modifications for the remedy identified for implementation at the Site 39 Inland Ranges:

- *Explanation of Significant Differences, Consolidation of Remediation Waste in a Corrective Action Management Unit (CAMU), Operable Unit 2 Landfill, Former Fort Ord, California (Army, 1997b)*:

  The CAMU ESD identified remediation wastes (contaminated soils and debris) excavated from the Site 39 Inland Ranges and other Basewide ROD sites as the foundation layer material at the OU2 Landfill, which would then be capped with no further waste accepted. Evaluations indicated the remediation wastes could be used in lieu of procuring "clean" (uncontaminated) soils identified in the remedy originally selected in the OU2 Landfill ROD (*Army, 1994*).

- *Explanation of Significant Differences, Excavation and Segregation of Spent Ammunition from Soil, Site 39, Former Fort Ord, California (Army, 2003)*:

  The 2003 ESD eliminated segregation and recycling of spent small arms bullets from Site 39 soils prior to placement at the OU2 Landfill from the remedy originally selected in the Basewide ROD (*Army, 1997a*), because these procedures were determined to be technically and economically impractical based on full-scale implementation data and further evaluation of alternative technologies.

- *Explanation of Significant Differences, No Further Action Related to Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of CAMU Requirements as ARARs, Operable Unit 2 Landfills, Former Fort Ord, California (Army, 2006)*:

  The 2006 ESD addressed the potential presence of MEC within the Landfill Parcels; Implementation of landfill gas control measures; Alternative reuse of treated groundwater; and, Clarification that the CAMU ESD *(Army, 1997b)* is intended to designate CAMU regulations as Applicable or Relevant and Appropriate Requirements (ARARs) for the Fort Ord Landfills (OU2 Landfill), but not to designate the OU2 Landfill as a CAMU.

Re-evaluation of the selected remedy for the Site 39 Inland Ranges identified in the Basewide ROD was required because of the following additional studies conducted after the Basewide RI/FS and Basewide ROD that identified: (1) ecological cleanup levels, and (2) associated volumes of soil requiring cleanup to protect ecological receptors based on the results of these studies and the subsequent FS Addendum (*MACTEC, 2008*):

- Further characterization of potentially contaminated soils at small arms ranges under the Basewide Range Assessment program that included the following reports: *Final Basewide Range Assessment Work Plan and Contractor Quality Control Plan for Small Arms and Multi-Use Ranges, Former Fort Ord, California* (BRAWP) (*Harding ESE/IT, 2001*); *Draft Final Sampling and Analysis Plan, Characterization of Small Arms and Multi-Use Ranges, Former Fort Ord, California* (SAP) (*MACTEC/Shaw, 2003*); and *Comprehensive Basewide Range Assessment Report, Former Fort Ord, California* (BRA) (*Shaw/MACTEC, 2006)*;

- Ecological Risk Assessments for metals and constituents of explosives at the small arms ranges characterized under the BRA program that included the following report: *Ecological Risk Assessment for Small Arms Ranges, Habitat Areas, Impact Area* (ERA) prepared to address potential ecological risks associated with metals and explosives compounds based on an assessment of habitat quality and distribution of contaminants within the ranges (*MACTEC/ABBL, 2007*).

- A remedial technology screening of treatment and disposal options for excavated soil volumes was conducted in the FS Addendum (*MACTEC, 2008*) to confirm the selected remedy for protection of

human health in the Basewide ROD of *Excavation and Onsite Placement at the Operable Unit 2 (OU2) Landfill Beneath a Cap* would still best meet the EPA evaluation criteria under NCP §300.430(e)(9)(iii)(A)-(I) since the results of the BRA and ERA identified a significant increase in the volume of soil could be remediated to address ecological risks after the ROD was signed.

This Amendment to the Basewide ROD establishes revised cleanup levels, identifies a larger volume of soil proposed for remediation, confirms that the landfill is still the best location to place the contaminated soil, eliminates the need to conduct a post-remediation risk assessment, and eliminates the need for institutional controls related to the chemical contamination. It further identifies details related to the placement of the remaining Site 39 contaminated soil on top of the existing geomembrane and subsequent construction of a new cover system (low permeability geomembrane and vegetative layer) over this foundation layer, adding detail to the description of the remedy identified in the 1997 CAMU ESD.

The decision documented in the Basewide ROD and this Amendment to that decision (ROD Amendment) are undertaken pursuant to the President's authority under CERCLA Section 104, as delegated to the United States Department of the Army (Army) in accordance with Executive Order 12580, and in compliance with the process set out in CERCLA Section 120. The selection of the remedies is authorized pursuant to CERCLA Section 104, and the selected remedy will be carried out in accordance with CERCLA Section 121.

The Army and EPA have jointly selected the remedy in compliance with the terms of the Federal Facility Agreement (FFA) executed in November of 1990, as amended. The California Environmental Protection Agency (Cal/EPA), as represented by the Department of Toxic Substances Control (DTSC) and the Regional Water Quality Control Board – Central Coast Region (RWQCB), have had an opportunity to review and comment on the ROD Amendment and their concerns were addressed.

1.3 Site Assessment

The response actions selected in this ROD Amendment are necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances at the Site 39 Inland Ranges into the environment.

It should be noted that the estimated human health and ecological risks posed by chemicals of concern in soil are based on long term exposure to residual contamination over many years under the planned habitat management and monitoring activities and recreational reuses of the site within habitat reserve areas.

1.4 Description of the Selected Remedy

The selected remedy described in this ROD Amendment addresses current or potential significant risks to human health and the environment posed by lead and constituents of explosives in soils at the Site 39 Inland Ranges. The selected remedy identified in the Basewide ROD (*Excavation and Onsite Placement at the OU2 Landfill Beneath a Cap)* is amended to include the soil volumes identified based on the results of the BRA, ERA, and FS Addendum for the Site 39 Inland Ranges that will be placed at the OU2 Landfill as follows:

Remedial Alternative 3 – Remediation to Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors.

This alternative includes:

- Excavation of soil containing concentrations above the following ERA cleanup levels: a range-wide weighted average of 225 milligrams per kilogram (mg/kg) for lead, and for constituents of explosives

of 5.9 mg/kg for trinitrotoluene (TNT), 3.1 mg/kg for cyclotrimethylene trinitramine (RDX), and 2.7 mg/kg for cyclotetramethylene tetranitramine (HMX). These cleanup levels are designed to be protective of ecological receptors, and take into account the HMP and Related Requirements by incorporating special considerations to minimize destruction of potential California tiger salamander reproductive habitat and high quality habitat. To determine the range-wide weighted average for each remediation area (Plate 2) for each COC, areas containing soil confirmation samples with concentrations of COCs that exceed the cleanup levels are identified for each area containing low, medium, and high-quality habitat, and the analytical results within these areas are then averaged. These cleanup levels are also protective of human health, because they are lower than human health-based levels of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor), and are lower than the current EPA Residential Soil Regional Screening Levels (RSLs; formerly Preliminary Remediation Goals (PRGs)). In an effort to address specific habitat concerns, the remedial design will include the following provisions:

- Special considerations for ranges near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40), where all sample locations with lead concentrations above 225 mg/kg will be removed, and the range-wide weighted averages for constituents of explosives will be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX.

- Special considerations for ranges with large areas of very high quality chaparral habitat (Range 19) that include remediation of the target and firing lanes and all areas with greater than 10 percent spent small arms bullets distribution.

- The approximate range-wide weighted average concentrations of lead that will remain onsite under the selected remedy vary from 50 to 190 mg/kg, except for Range 19, which would result in a range wide weighted average of 355 mg/kg.

- Excavation of approximately 125,000 cubic yards of soil and spent bullets based on current data to depths ranging from approximately 1 to 2 feet below ground surface (bgs) over a total estimated remediation area of approximately 53 acres that will result in a moderate amount of disturbance to the critical habitat including rare, threatened and endangered species.

- The Army will continue to conduct characterization of metals and constituents of explosives in soil within the Site 39 Inland Ranges that are associated with former military munitions range uses, as munitions responses are completed within the Impact Area MRA. The Army will evaluate the data in a timely manner to determine whether sampling is required to characterize an area further with respect to potential soil contamination from military munitions. If there is evidence that military munitions recovered from the subsurface have degraded and released constituents of explosives or metals into soils, these specific locations will be evaluated to determine if additional sampling or remediation for constituents of explosives or metals is necessary.

- Placement of the excavated soil and spent bullets on top of the OU2 Landfill (Area E cell) above the existing geomembrane cover as described in the Technical Memorandum, OU2 Landfills Vertical Expansion at Area E presented in Appendix B of the FS Addendum (*MACTEC, 2008*). The estimated soil volume of approximately 125,000 cubic yards will be placed over approximately 15 acres of the Area E cell as a foundation layer, and a new cover consisting of a low permeability geomembrane and vegetative layer will be placed over the foundation layer.

After remediation is completed under this alternative, no institutional controls (e.g., access management measures or land use restrictions) will be required related to residual chemical contamination in soil, which was determined not to pose a risk to human health or the environment based on the results of the BRA, ERA, and FS Addendum that have been conducted since the Basewide ROD was signed in 1997. These results modify the specification in the Basewide ROD that institutional controls prohibiting residential use will be required unless a post-remediation risk evaluation indicates the residual contaminant levels in soil do not pose a risk and the site is appropriate to be designated for unlimited or unrestricted use. Since there are explosive hazards posed by MEC within the Site 39 Inland Ranges, the Army will implement land use restrictions to address MEC as identified as part of the selected remedy in the Impact Area MRA ROD (*Army, 2008b*).

Details associated with implementation of the range-specific remedial approaches identified in the selected remedy will be provided in the Remedial Action Work Plan (RAWP) that will be prepared for the Site 39 Inland Ranges. A description of revegetation and restoration efforts associated with the post-remediation cleanup for the ranges are included in the *Draft Habitat Restoration Plan, Site 39 Inland Ranges, Former Fort Ord, California* (HRP) (*Duffy/Shaw, 2007*). Habitat and wetland monitoring procedures will be conducted in accordance with the *Vegetation Monitoring Plan* and *Wetlands Restoration Plan* (*Burleson, 2007, 2006*). Results of monitoring will be documented in annual reports submitted to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG).

Range-specific details regarding vegetation regrowth monitoring and restoration activities are described in detail in the HRP, include an assessment of the restoration potential for each range, and identify the specific HMP species that occur.

1.5 Statutory Determination

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, is cost effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for the Site 39 Inland Ranges. Although the remedy does not include treatment for which there is a statutory preference as a principal element of the remedy (i.e., reduction of the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment), placement of excavated soils beneath a cap at the OU2 Landfill would be equally protective of human health and the environment as treatment.

The selected remedy will result in chemical contamination remaining within the Site 39 Inland Ranges below levels that require use restrictions. Therefore, a statutory review within five years after initiation of the remedial action related to chemical contamination is not necessary to ensure the remedy is, or will be, protective of human health and the environment. A statutory review of the protectiveness of the selected remedy for MEC for the Site 39 Inland Ranges will be conducted within five years after initiation under the Impact Area MRA ROD (*Army, 2008b*).

In order to mitigate the explosive hazards posed by MEC at the Site 39 Inland Ranges, and to maintain preservation of the natural habitat and diversity of native species specified in the HMP and Related Requirements, the Army will implement land use restrictions to address MEC as identified as part of the Impact Area MRA ROD (*Army, 2008b*) selected remedy: (1) access management measures such as maintaining fences and signs surrounding the site perimeter, and (2) a land use restriction that prohibits unrestricted land use.

1.6 ROD Amendment Data Certification Checklist

The following information is included in the Decision Summary section of this ROD Amendment. Additional information can be found in the Administrative Record file for this site.

- Chemicals of concern in soil and and their respective cleanup levels (Table 1).
- Scope and role of the amended response action (Section 2.5).
- Chemicals of concern detected in soil and habitat types and quality identified at the ranges during remediation mapping (Section 2.8).
- Ecological and human health risks represented by the chemicals of concern, cleanup levels established, and the basis for these levels (Section 2.8).
- How source materials constituting principal threats are addressed (Section 2.10).
- Current and reasonably anticipated future land use assumptions and current and potential future uses used in the ERA and ROD Amendment (Section 2.7).
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs for which the remedy cost estimates are projected (Section 2.11).
- Key factor(s) that led to selecting the remedy (Section 2.11).

1.7 Authorizing Signatures

Record of Decision Amendment
Site 39 Inland Ranges
Former Fort Ord, California

Craig E. College
Deputy Assistant Chief of Staff
for Installation Management

SEP 25 2009
Date

Record of Decision Amendment
Site 39 Inland Ranges
Former Fort Ord, California

Gail Youngblood

23 Sept 2009
Date

Gail Youngblood
Base Realignment and Closure (BRAC) Environmental Coordinator
Fort Ord BRAC Office
U.S. Department of the Army

Record of Decision Amendment
Site 39 Inland Ranges
Former Fort Ord, California

Michael M. Montgomery
Assistant Director
Federal Facilities and Site Cleanup Branch
U.S. Environmental Protection Agency
Region 9

9/30/09
Date

Record of Decision Amendment
Site 39 Inland Ranges
Former Fort Ord, California

The State of California, Department of Toxic Substances Control (DTSC) had an opportunity to review and comment on the ROD Amendment and our concerns were addressed.

Daniel T. Ward

Daniel T. Ward, P.E.
Supervising Hazardous Substances Engineer I
Sacramento Office
Brownfields and Environmental Restoration Program
Department of Toxic Substances Control

9/30/09
Date

Record of Decision Amendment
Site 39 Inland Ranges
Former Fort Ord, California

The California Environmental Protection Agency, California Regional Water Quality Control Board, Central Coast Region (RWQCB) had an opportunity to review and comment on the ROD Amendment and our concerns were addressed.

9-3-09

Roger W. Briggs
Executive Officer
California Environmental Protection Agency
California Regional Water Quality Control Board, Central Coast Region

Date

2.0 DECISION SUMMARY

2.1 Site Description

The former Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco (Plate 1). The former Army post consists of approximately 28,000 acres adjacent to Monterey Bay and the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and Marina to the north. The Union Pacific Railroad and State Route 1 pass through the western portion of former Fort Ord, separating the beachfront from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border former Fort Ord to the south and southeast, respectively, as well as several small communities such as Toro Park Estates and San Benancio. Additional information about the site:

- EPA Identification Number: CA7210020676;
- Lead Agency: Army;
- Lead Oversight Agency: EPA;
- Support Agencies: DTSC and RWQCB;
- Source of Cleanup Monies: Army;
- Site Type: Former Military Installation.

2.2 Site History

Beginning with its founding in 1917, Fort Ord served primarily as a training and staging facility for cavalry and infantry troops. From 1947 to 1974, Fort Ord was a basic training center. After 1975, the 7th Infantry Division occupied Fort Ord. Fort Ord was selected in 1991 for decommissioning, but troop reallocation was not completed until 1993 and the base was not officially closed until September 1994. The property remaining in the Army's possession was designated as the Presidio of Monterey Annex on October 1, 1994 and subsequently renamed the Ord Military Community (OMC). Although Army personnel still operate the base, no active Army division is stationed at the former Fort Ord. Since the base was selected in 1991 for base realignment and closure (BRAC), site visits, historic and archival investigations, military munitions sampling, and removal actions have been performed and documented in preparation for transfer and reuse of former Fort Ord property. The Army will continue to retain the OMC and the U.S. Army Reserve Center located at the former Fort Ord. The remainder of Fort Ord was identified for transfer to Federal, State, and local government agencies and other organizations and, since base closure in September 1994, has been subjected to the reuse process. Some of the property on the installation has been transferred. A large portion of the Inland Training Ranges was assigned to the U.S. Department of the Interior, Bureau of Land Management (BLM). Other areas on the installation have been or will be transferred through economic development conveyance, public benefit conveyance, negotiated sale, or other means.

Several CERCLA (Superfund) investigations have been conducted at the former Fort Ord that included the area now referred to as the Site 39 Inland Ranges. Originally, the Impact Area was identified as Site 39, the Multi-Range Area, as part of the Basewide RI/FS completed in 1993 and 1994 (*HLA, 1995a*), and was recently renamed the Impact Area because of changes to military munitions terminology implemented by the Army. Several investigations of the area occurred prior to the development of the

BRA Program in 2001, including the Basewide RI/FS, several pilot studies, and additional characterization and remediation of areas within the Impact Area where reuse was modified from habitat reserve to development.

The portion of the Site 39 Inland Ranges addressed in this ROD Amendment is comprised of approximately 6,830 acres designated as habitat reserve in the HMP and Related Requirements within the 8,000-acre Impact Area. This portion of the Impact Area is restricted from future residential development (Plate 2). The remaining 1,170-acre portion of the Impact Area occurs within designated development areas where remedial actions are being conducted, have been completed, or no further action was recommended based on the results of the BRA (*Shaw/MACTEC, 2006).* Remedial actions in the development portions of several ranges (Ranges 18, 19, 21, 24, 25 and 46) have been completed since 1999 based on the results of the characterization activities completed (*IT, 2000, 2002, 2003, 2005*). Evaluation of chemical contamination related to military munitions use within the Site 39 Inland Ranges was first conducted as part of the Basewide RI/FS (*HLA, 1995a*). The area was investigated for chemical contamination related to small arms ammunition and military munitions use at military targets within specific ranges. Concentrations of metals and constituents of explosives were generally not detected, and were present primarily in surface soils and in ranges that showed evidence of heavy use, such as at demolished targets and where visible evidence of munitions usage (e.g., munitions debris) was present. For areas with small arms contamination, the Basewide ROD identified excavation of spent small arms bullets (ammunition) and soil and placement at the OU2 Landfill beneath a cap as the selected remedial action when greater than 10 percent of the surface distribution was spent small arms bullets (ammunition) or soils contained greater than the human health-based level of concern identified in the Basewide RI/FS and ROD for lead. This action was based on the protection of human health for reuse of the areas as a habitat reserve.

A study was conducted in 1998 to refine the approach for characterization of small arms ranges, which were the predominant type of range within the Site 39 Inland Ranges. The primary objective of the study was to clarify the relationship between visual mapping of surface spent small arms bullets and surface soil concentrations of lead and other metals associated with spent arms bullets (*HLA, 1999a*). The results indicated that, for soil samples collected in areas of greater than 10 percent spent small arms bullets, lead concentrations generally exceeded the Basewide ROD human health-based level of concern for lead for reuse of the areas as a habitat reserve (*Army, 1997a*). The study results also indicated that mapping spent small arms bullets concentrations in the inland ranges was difficult due to the thick brush present in most of the ranges. The results of this study were used to modify the site mapping program to emphasize mapping of range features such as targets, firing lines, and areas of 10 percent spent small arms bullets, where visible. The mapping of these features aided the development of conceptual models for the different types of ranges present and enabled refinement of sampling programs for these ranges.

Additional characterization was conducted in the residential and mixed use areas of the Impact Area that do not occur within habitat reserve areas under the *Draft Final Additional Soil Characterization – Site 39, Work Plan, Former Fort Ord, California* (*HLA, 1999b*). This characterization included performing a literature review to identify other areas of potential small arms use inside and outside the Impact Area, site reconnaissance and mapping, soil sampling, and data evaluation, and developing recommendations for remedial actions within the non-habitat reserve areas of the Impact Area.

The additional characterizations and risk evaluations were focused on identifying areas where chemical contamination that may pose a risk to ecological receptors may be present in habitat reserve areas, where remediation has not yet been conducted. Because previous ecological risk evaluations for the Site 39 Inland Ranges were conducted using limited soil and biota data, an ERA sampling program was conducted to fill data gaps for the evaluation of ecological risks. Baseline (no action) risks were estimated for the receptors and exposure areas, and risk estimates were then calculated for a range of

remedial exposure scenarios to evaluate both the level of risk reduction gained and amount of habitat destroyed under various potential remediation scenarios. The primary goal of developing the remedial risk scenarios was to devise a remediation approach which maximizes risk reduction along with preservation of quality habitat to be used in remedial decision-making.

Based on the spatial analysis of lead and constituents of explosives concentrations and habitat quality, remedial exposure scenarios were developed for each Range Area using best professional judgment. The primary goal for developing the remedial exposure scenarios was to remove areas associated with the highest lead concentrations in surface soil with the lowest amount of habitat destruction (i.e., maximize risk reduction along with preservation of quality habitat). Thus, removal of low quality areas (i.e., removal of soils associated with lead concentrations greater than 225 mg/kg within low quality habitat and its borders) was preferred, followed by removal of soils from medium quality, high quality, and then very high quality habitat. Because many of the ranges have significant areas of very high quality habitat, and remediation of lead contamination would not be possible without destroying the habitat, consideration was also made for the type of habitat within these areas. Because each Range Area is unique (i.e., the extent and magnitude of lead contamination and distribution of habitat quality vary significantly throughout and between each Range Area), removal of soils from low quality areas was not always possible. Hence, best professional judgment was used to develop Range Area-specific exposure scenarios by incorporating a general preference for removal of soils from low quality habitat areas, where possible.

The final remedial risk scenarios developed under the ERA were used to devise a remediation approach that maximizes risk reduction while preserving quality habitat (*MACTEC/ABBL, 2007*). The FS Addendum (*MACTEC, 2008*) then evaluated four remedial alternatives associated with different cleanup levels and remedial approaches to risk reduction and preservation of quality habitat, and identified the associated volume of soils potentially requiring remediation under the preferred remedial alternative presented in the Proposed Plan (*Army, 2008a*).

2.3 Enforcement and Regulatory History

Environmental investigations began at the former Fort Ord in 1984 at Fritzsche Army Airfield (FAAF) under RWQCB cleanup or abatement orders 84-92, 86-86, and 86-315. Investigations indicated the presence of residual organic compounds resulting from training at the Fire Drill Burn Pit (Operable Unit 1 or OU1). The subsequent Remedial Investigation/Feasibility Study (RI/FS) for OU1 was completed in 1988, and cleanup of soil and groundwater began under RWQCB cleanup or abatement orders 86-87, 86-317, and 88-139. In 1986, further investigations began at the former Fort Ord Landfills (Operable Unit 2 or OU2) and the preliminary site characterization was completed in 1988. In 1990, the former Fort Ord was placed on the EPA's National Priorities List (NPL), primarily because of volatile organic compounds (VOCs) found in groundwater at OU2. A Federal Facility Agreement (FFA) was signed in 1990 by the Army, EPA, the DTSC (formerly the Department of Health Services or DHS) and the RWQCB. The FFA established schedules for performing remedial investigations and feasibility studies, and requires remedial actions be completed as expeditiously as possible. The basewide RI/FS began in 1991. The Army is performing these activities pursuant to the President's authority under CERCLA Section 104, as delegated to the Army in accordance with Executive Order 12580 and in compliance with the process set out in CERCLA Section 120.

2.4 Community Participation

The BRA and ERA reports for the Site 39 Inland Ranges at the former Fort Ord in Monterey County, California, were made available to the public in 2006 and 2007. The Final FS Addendum report was published on March 28, 2008, and the Proposed Plan for the Site 39 Inland Ranges was made available to

the public on April 1, 2008 for a 60-day public comment period. The Proposed Plan presented the preferred alternative selected as the final remedy in this ROD Amendment, and summarized information in the BRA, ERA, FS Addendum and other supporting documents in the Administrative Record. These documents are available to the public at the following locations:

- Seaside Branch Library, 550 Harcourt Street, Seaside, California.
- California State University Monterey Bay (CSUMB) Library Learning Complex, 100 Campus Center, Building 12, Seaside, California.
- Former Fort Ord Administrative Record, Building 4463, Gigling Road, Room 101, Ord Military Community, California.
- www.fortordcleanup.com website.

The notice of the availability of the Proposed Plan was published in the Monterey County Herald and the Salinas Californian on April 5, 2008. The initial public comment period was held from April 1 to May 1, 2008, and was extended by 30 days at the request of the public, ending on June 1, 2008. In addition, a public meeting was held on April 10, 2008 to present the Proposed Plan to a broader community audience than those that had already been involved at the site. At this meeting, representatives from the Army, EPA, DTSC, and RWQCB were present, and the public had the opportunity to submit written and oral comments about the Proposed Plan. The Army's response to the comments received during this period is included in the Responsiveness Summary, which is part of this ROD Amendment.

2.5 Scope and Role of Amended Response Action

This ROD Amendment addresses changes to the planned remedial action that was based on protection of human health identified in the Basewide ROD (*Army, 1997a*), to also address risks to ecological receptors from soils contaminated by lead and constituents of explosives at the Site 39 Inland Ranges, as described in the FS Addendum and summarized in the Proposed Plan (*MACTEC, 2008; Army, 2008a*). The remedy selected in this ROD Amendment will be the final remedy for protection of both human health and the environment, and amends the 1997 Basewide ROD for the Site 39 Inland Ranges. The remedial action of *Excavation and Onsite Placement at the Operable Unit 2 (OU2) Landfill Beneath a Cap* was identified as the selected remedial alternative for the Site 39 Inland Ranges in the Basewide ROD in 1997 based on protection of human health (*Army, 1997a*). However, several studies including the BRA and ERA that were performed since that time identified an increase in the volume of soil for the remedial action based on protection of the environment for the ecological receptors identified in the ERA.

A remedial technology screening was conducted in the FS Addendum to reassess the treatment/disposal component of the selected remedy for the Site 39 Inland Ranges in the Basewide RI/FS and Basewide ROD (*HLA, 1995a; Army, 1997a*)—*Excavation and Onsite Placement at the Operable Unit 2 (OU2) Landfill Beneath a Cap*. The purpose of the screening was to confirm that the selected remedy would still best meet the EPA evaluation criteria since additional investigations and the ERA were conducted that required re-evaluation of the areas and volumes of soil requiring remediation. In accordance with EPA's RI/FS Guidance (*EPA, 1988*), the screening included an evaluation and comparison of current technologies based on the three primary EPA evaluation criteria of effectiveness, implementability, and relative cost. Based on the screening of remedial technologies against the selected remedy in the Basewide RI/FS and Basewide ROD for the Site 39 Inland Ranges, *Excavation and Onsite Placement at the OU2 Landfill Beneath a Cap* was retained for the volume and extent of soils identified in the BRA and ERA, because it has proven site-specific effectiveness and implementability, and has a low to

moderate relative cost compared to other technologies. In addition, based on the results of the screening, none of the other technologies are expected to better meet any of the screening and evaluation criteria.

Remedial Alternative 3, which was presented in the Proposed Plan as the preferred remedial alternative, has been selected. It is summarized as follows:

Remedial Alternative 3 – Remediation to Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors.

This alternative includes:

- Excavation of soil containing concentrations above the following ERA cleanup levels: a range wide weighted average of 225 milligrams per kilogram (mg/kg) for lead, and for constituents of explosives of 5.9 mg/kg for TNT, 3.1 mg/kg for RDX, and 2.7 mg/kg for HMX. These cleanup levels are designed to be protective of ecological receptors, and take into account the HMP and Related Requirements by incorporating special considerations to minimize destruction of potential California tiger salamander reproductive habitat and high quality habitat. To determine the range-wide weighted average for each remediation area (Plate 2) for each COC, areas containing soil confirmation samples with concentrations of COCs that exceed the cleanup levels are identified for each area containing low, medium, and high-quality habitat, and the analytical results within these areas are then averaged. These cleanup levels are also protective of human health, because they are lower than human health-based levels of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve, and are lower than the current EPA RSLs. In an effort to address specific habitat concerns, the remedial design will include the following provisions:

    - Special considerations for ranges near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40), where all sample locations with lead concentrations above 225 mg/kg will be removed, and the range-wide weighted averages for constituents of explosives would be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX.

    - Special considerations for ranges with large areas of very high quality chaparral habitat (Range 19) that includes remediation of the target and firing lanes and all areas with greater than 10 percent spent small arms bullets distribution.

    - The approximate range-wide weighted average concentrations of lead that will remain onsite under the selected remedy vary from 50 to 190 mg/kg, except for Range 19, which would result in a range wide weighted average of 355 mg/kg.

    - The ecological risk would be reduced to a Hazard Quotient less than 1. A Hazard Quotient of less than 1 means harmful effects are not likely.

- Excavation of approximately 125,000 cubic yards of soil estimated based on current data to depths ranging from approximately 1 to 2 feet bgs over a total estimated remediation area of approximately 53 acres. It also incorporates special considerations to minimize destruction of potential California tiger salamander habitat, and very high quality habitat. Implementation of this alternative would result in a moderate amount of disturbance to the critical habitat including rare, threatened, and endangered species, and is expected to require a moderate level of vegetation restoration in order for the habitat to recover.

- The Army will continue to conduct characterization of metals and constituents of explosives in soil within the Site 39 Inland Ranges that are associated with former military munitions range uses, as

munitions responses are completed within the Impact Area MRA. The Army will evaluate the data in a timely manner to determine whether sampling is required to characterize an area further with respect to potential soil contamination from military munitions. If there is evidence that military munitions recovered from the subsurface have degraded and released constituents of explosives or metals into soils, these specific locations will be evaluated to determine if additional sampling or remediation for constituents of explosives or metals is necessary.

- Placement of the excavated soil on top of the OU2 Landfill (Area E cell) above the existing geomembrane cover as described in the *Technical Memorandum, OU2 Landfills Vertical Expansion at Area E* presented in Appendix B of the FS Addendum (*MACTEC, 2008*). The estimated soil volume of approximately 125,000 cubic yards would be placed over approximately 15 acres of the Area E cell as a foundation layer, and a new cover consisting of a low permeability geomembrane and vegetative layer would be placed over the foundation layer.

After remediation is completed under this alternative, no access management measures or land use restrictions would be required related to residual chemical contamination in soil, which was determined not to pose a risk to human health or the environment based on the results of the BRA, ERA, and FS Addendum that have been conducted since the Basewide ROD was signed in 1997. This alternative would eliminate the need for the residential use restriction that was required in the Basewide ROD. However, as described in the Impact Area MRA ROD, there are explosive hazards posed by MEC within the Site 39 Inland Ranges. The Army will implement land use restrictions to address MEC as identified as part of the selected remedy in the Impact Area MRA ROD (*Army, 2008b*).

Details associated with implementation of the range-specific remedial approaches identified in the selected remedy will be provided in the Remedial Action Work Plan (RAWP) that will be prepared for the Site 39 Inland Ranges. A description of revegetation and restoration efforts associated with the post-remediation cleanup for the ranges are included in the Habitat Restoration Plan for the Site 39 Inland Ranges (HRP) (*Duffy/Shaw, 2007*). Habitat and wetland monitoring procedures will be conducted in accordance with the *Vegetation Monitoring Plan* and *Wetlands Restoration Plan* (*Burleson, 2007, 2006*). Results of monitoring will be documented in annual reports submitted to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG).

Range-specific details regarding vegetation regrowth monitoring and restoration activities are described in detail in the HRP, include an assessment of the restoration potential for each range, and identify the specific HMP species that occur.

2.6 Site Characteristics

The portion of Site 39 Inland Ranges that is addressed in this ROD Amendment is shown on Plate 2, and includes the approximate 6,830-acre portion of the Impact Area that is designated as habitat reserve in the HMP and Related Requirements. The Site 39 Inland Ranges overall are comprised of the approximate 8,000-acre historical Impact Area, and a former 2.36-inch rocket range just north of the area that was previously the location of the Fort Ord Range Complex used for live fire training exercises with a variety of weapons.

As described in the Basewide RI/FS, BRA, and ERA, the Site 39 Inland Ranges are entirely within the natural resources management area described in the HMP as “habitat reserve” areas. The HMP was prepared as a mitigation measure required by the U.S. Fish and Wildlife Service (USFWS) and described in Biological Opinions (BOs) (*USFWS, 1993, 1997a, b*) issued to the Army following consultation in accordance with Section 7 of the Endangered Species Act. Changes to the HMP have also been documented since it was published, including additional Biological Opinions (*USFWS, 1999, 2002,*

2005), an Assessment (*Zander, 2002*), a Memorandum of Understanding (*BLM, Army, 2004*), and a *Revised Attachment A - Habitat Management Plan Map* (*USACE, 2005*). The HMP and Related Requirements establish the guidelines for the conservation and management of wildlife and plant species and habitats that largely depend on former Fort Ord land for survival, and described land use, conservation, management, and habitat monitoring requirements for target species within habitat reserve areas, as well as development areas. Habitat management is essential to the protection and management of habitat reserve species, and is vital to the reuse of the former Fort Ord because it balances species losses in other areas of the former Fort Ord that are designated for development. The Conceptual Site Model for the Site 39 Inland Ranges was presented in the BRA and ERA as summarized in Section 1.4 of the FS Addendum (*MACTEC, 2008*).

Basewide Range Assessment

The BRA summarized the status of the investigation of potential COCs at 221 known or suspected small arms ranges, multi-use ranges, and military munitions training areas within the former Fort Ord, including summary information for sites that were investigated and remediated under other programs; and provided appropriate recommendations for each site (*Shaw/MACTEC, 2006*). The sites, known as historical areas (HAs) were identified for investigation as part of the Basewide Range Assessment Work Plan (BRAWP; *Harding ESE/IT, 2001*), previous investigations performed as part of the Basewide RI/FS (*HLA, 1995a*), and the SAP (*MACTEC/Shaw, 2003*).

The objective of the BRA investigation activities described in the report was to: (1) ascertain whether the potential COCs could be present in sufficient amounts to warrant remediation; and if remediation was warranted based on available information, to determine the area within a site where remediation should be recommended, (2) identify which HAs can be eliminated from consideration for potential remediation, and (3) identify sites that require additional investigation, or should be considered for remediation/habitat mapping. The BRA process involved five steps: 1) A review of historical documents including historical training maps, historical aerial photographs, range control records, and military munitions after action removal reports, 2) site reconnaissance and mapping, 3) limited soil sampling for screening purposes, 4) site characterization, and 5) remediation/habitat mapping. Soil sampling methods included bias sampling at targets, backstops, and areas with visible surface distributions of bullets; grid sampling across the ranges; and step out sampling around potential remediation areas.

The BRA identified three primary areas where military munitions and/or small arms were used at designated ranges: (1) the Beach Trainfire Ranges (Site 3), (2) the Impact Area (including the habitat reserves portions of the area included in the Site 39 Inland Ranges), and (3) the East Garrison Ranges (Site 39A). A summary of investigations and remedial actions conducted at Site 39 are presented below. There are a total of 80 HAs in the historical Impact Area, including MRS-16. Of these, 42 HAs are currently designated as no further action; 6 HAs have been remediated; 24 HAs were recommended for further evaluation in the FS Addendum; and 8 HAs are anticipated at this time to potentially require further evaluation following MEC response actions.

Impact Area (Site 39)

Several CERCLA (Superfund) investigations have been conducted at the former Fort Ord that included the area now referred to as the "Site 39 Inland Ranges." Originally, the historical Impact Area was identified as "Site 39, the Multi-Range Area," as part of the Basewide RI/FS completed in 1993 and 1994 (*HLA, 1995a*), and was recently renamed the "Impact Area" because of changes to military munitions terminology implemented by the Army. Several investigations of the Impact Area occurred prior to the development of the BRA Program in 2001, including the Basewide RI/FS, several pilot studies, and

additional characterization and remediation of areas within the Impact Area where reuse was modified from habitat reserve to development.

Evaluation of chemical contamination related to military munitions use within the Site 39 Inland Ranges was first conducted as part of the Basewide RI/FS (*HLA, 1995a*). The area was investigated for chemical contamination related to small arms ammunition and military munitions use at military targets within specific ranges. Concentrations of metals and constituents of explosives were generally not detected, and were present primarily in surface soils and in ranges that showed evidence of heavy use, such as at demolished targets and where visible evidence of munitions usage (e.g., munitions debris) was present. For areas with small arms contamination, excavation of spent small arms bullets and soil was the selected remedial action when greater than 10 percent of the surface distribution was spent small arms bullets or soils contained greater than the Basewide ROD human health-based level of concern for lead. This action was based on the protection of human health for reuse of the areas as a habitat reserve.

A study was conducted in 1998 to refine the approach for characterization of small arms ranges, which were the predominant type of range within the Site 39 Inland Ranges. The primary objective of the study was to clarify the relationship between visual mapping of surface spent small arms bullets and surface soil concentrations of lead and other metals associated with spent small arms bullets (*HLA, 1999a*). The results indicated that, for soil samples collected in areas of greater than 10 percent spent small arms bullets, lead concentrations generally exceeded the Basewide ROD human health-based level of concern for lead for reuse of the areas as a habitat reserve (*Army, 1997a*). Samples collected from areas with 1 to 10 percent spent small arms bullets had lead concentrations that generally exceeded 1,000 mg/kg, while some samples had concentrations greater than the Basewide ROD human health-based level of concern for lead of 1,860 mg/kg. The study results also indicated that mapping spent small arms bullets concentrations was difficult due to the thick brush present in most of the ranges. The results of this study were used to modify the site mapping program to emphasize mapping of range features such as targets, firing lines, and areas of 10 percent spent small arms bullets, where visible. The mapping of these features aided the development of conceptual models for the different types of ranges present and enabled refinement of sampling programs for these ranges.

Additional characterization was conducted in the residential and mixed use areas of the Impact Area that do not occur within habitat reserve areas under the *Draft Final Additional Soil Characterization – Site 39, Work Plan, Former Fort Ord, California* (*HLA, 1999b*). This characterization included performing a literature review to identify other areas of potential small arms use inside and outside the Impact Area, site reconnaissance and mapping, soil sampling, and data evaluation, and developing recommendations for remedial actions within the non-habitat areas of the Impact Area. Remedial actions in development portions of several ranges (Ranges 18, 19, 21, 24, 25 and 46) have been completed since 1999 based on the results of the characterization activities completed at Site 39 (*IT, 2000, 2002, 2003, 2005*).

Ecological Risk Assessment

The ERA is a guide for risk management decision-making that presents a range of options or scenarios for addressing ecological risks at the habitat areas (*MACTEC/ABBL, 2007*). The ERA presented an assessment that evaluates the potential ecological risks for the ranges within the Site 39 Inland Ranges. The overall approach for conducting the ERA was to evaluate potential ecological risk under a baseline scenario (i.e., current conditions with no remediation) and then evaluate risk reduction based on various potential remediation scenarios developed from an assessment of habitat quality and from contaminant distributions and concentrations.

The ERA focused on chemical contamination in soil associated with three types of exposure areas at Site 39: (1) the 22 Range Areas (e.g., range-by-range) for small ranging terrestrial receptors, (2) area-

wide exposure areas for larger ranging receptors, and (3) spatial analysis, or refinement of smaller exposure areas for small-ranging terrestrial receptors. The ERA also focused on: (1) the presence of metals as the primary chemicals of potential ecological concern (COPECs) associated with small arms use at the ranges, including lead that is associated with the most widespread distribution and significant risks to ecological receptors, as well as copper and antimony; and (2) the presence of constituents of explosives as COPECs associated with MEC usage at the ranges.

The Basewide RI/FS included a thorough evaluation of COPECs based on information on site uses, including the composition of small arms and ordnance (*HLA, 1995a*). Several chemicals were identified in soil, sampled for in the RI, and evaluated as COPECs in the Basewide RI/FS ERA (*HLA, 1995a*). However, that evaluation indicated that the only chemicals in soil that showed a potential for risk to ecological receptors were lead and the constituent of explosives HMX. The metal beryllium, total petroleum as hydrocarbon (TPH), and the constituent of explosives RDX were risk drivers for human health only. The other COPECs were evaluated but showed no or low potential for risks to ecological receptors, and were not included as COCs in the ERA. For example, antimony and copper were included as COPECs in the ERA since these chemicals are associated with small arms (as demonstrated by studies in the Basewide RI/FS) and have been shown to be risk drivers at other small arms sites (e.g., Site 3, the Beach Trainfire Ranges). However, elevated concentrations of antimony were co-located with elevated lead concentrations, and potential ecological risks associated with elevated copper concentrations were comparatively much lower than for the other COPECs.

An addendum to the ERA was included to address potential risks associated with explosives compounds (*MACTEC/ABBL, 2007*). Constituents of explosives data has been collected as part of the BRA and previously as part of the Basewide RI/FS (*HLA, 1995a*) and the data have shown generally low levels of these compounds across the site, even within high density target areas (HA-44, HA-45, HA-48, and within the high impact area). Additionally, the small arms ranges that are addressed in the ERA do not show heavy use of military munitions other than small arms. Military munitions other than small arms may have been used during training at some of the multi-use ranges or may have been used prior to establishment of ranges during the 1940s. However, the concentration of munitions debris and MEC at these ranges is much lower than areas sampled as part of the Basewide RI/FS, and chemical residues are not expected at these ranges (HA-26, HA-28, HA-29). Analytical results for samples collected at ranges where military munitions use was more widespread (HA-31, HA-34, HA-37, and HA-55) showed non-detect levels of these compounds.

Ecological receptors evaluated in the ERA included plants, reptiles, herbivorous/insectivorous mammals, omnivorous/carnivorous mammals, herbivorous birds, carnivorous/omnivorous birds, and insectivorous birds. It was assumed that plants and soil invertebrates would be exposed to COPECs in soil via the direct contact/uptake pathway and that complete exposure pathways for wildlife species include both ingestion of contaminated soil and ingestion of food items that have taken up COPECs.

Because previous ecological risk evaluations were conducted using limited soil and biota data, an ERA sampling program was conducted to fill data gaps for the evaluation of ecological risks. A total of 40 locations within the ranges were sampled for biota (and soil, if required), as well as no impact (reference) areas. In addition, lead bioavailability tests were conducted on soil and plant samples, and surface water samples were collected from ponded areas to assess risk to aquatic receptors. Baseline (no action) risks were estimated for the receptors and exposure areas, and risk estimates were then calculated for a range of remedial exposure scenarios to evaluate both the level of risk reduction gained and amount of habitat destroyed under various potential remediation scenarios. The primary goal of developing the remedial risk scenarios was to devise an approach to remedial decision-making that maximizes risk reduction along with preservation of quality habitat.

Based on the spatial analysis of lead and constituents of explosives concentrations and habitat quality, remedial exposure scenarios were developed for each Range Area using best professional judgment. The primary goal for developing the remedial exposure scenarios was to remove areas associated with the highest lead concentrations in surface soil with the lowest amount of habitat destruction (i.e., maximize risk reduction along with preservation of quality habitat). Thus, removal of low quality areas (i.e., removal of soils associated with lead concentrations greater than 225 mg/kg within low quality habitat and its borders) was preferred, followed by removal of soils from medium quality, high quality, and then very high quality habitat. Because many of the ranges have significant areas of very high quality habitat, and remediation of lead contamination would not be possible without destroying the habitat, consideration was also made for the type of habitat within these areas. Because each Range Area is unique (i.e., the extent and magnitude of lead contamination and distribution of habitat quality vary significantly throughout and between each Range Area), removal of soils from low quality areas was not always possible. Hence, best professional judgment was used to develop Range Area-specific exposure scenarios by incorporating a general preference for removal of soils from low quality habitat areas, where possible.

Habitat Types and Quality

Habitat surveys conducted at the Site 39 Inland Ranges indicate the presence of several plant communities associated with the site as presented in the HMP (*USACE, 1997*) including:

- **Central maritime chaparral**; the most extensive natural community at the former Fort Ord, characterized by a diversity of sclerophyllus shrubs in moderate to high densities. Central maritime chaparral supports many of the rare, threatened, and endangered flora and fauna species identified in the HMP.

- **Coast live oak woodland**; dominated by an open to a nearly closed canopy of coast live oaks (*Quercus a. agrifolia*), considered to be potential habitat for HMP species Monterey ornate shrew (*Sorex ornatus salarius*).

- **Coastal scrub**; typified by low to moderately sized shrubs with mesophytic leaves, flexible branches, semi-woody stems growing from a woody base with a shallow root system.

- **Landscaped habitat**; consists of lawns composed of mixed-species grasses that are regularly mowed, ornamental shrubs, ornamental perennials, and ornamental annuals.

- **Upland ruderal habitat**; occurs in areas from which the native vegetation has been completely removed by grading, cultivation, or other surface disturbances.

- **Valley needlegrass grassland**; supports native perennial bunchgrasses purple needlegrass and foothill needlegrass.

- **Annual grassland**; mostly non-native annual grasses and perennial and annual herbs.

- **Vernal pool (waterbody)**; areas of land that are inundated or saturated and support specially adapted vegetation either permanently or seasonally. Vernal pool habitat supports many of the fauna species identified in the HMP and the *Wetland Monitoring and Restoration Plan* (*Burleson, 2006*).

In addition to the above plant communities, the Site 39 Inland Ranges are designated as critical habitat for Monterey spineflower (*Chorizanthe p. pungens*), which is listed as threatened under the Endangered Species Act (ESA).

Based on the HMP species present, habitat quality was classified as follows:

- **Low:** disturbed areas (i.e., access roads and erosion) and areas dominated (greater than 50 percent of the vegetative cover) by invasive species (e.g., jubata grass). Plant communities considered as low quality habitats include landscaped and upland ruderal.

- **Medium:** areas with a moderate amount (between 5 to 50 percent of the vegetative cover) of invasive species.

- **High:** areas dominated by native plant species with less that 5 percent of the vegetative cover provided by invasive species. Plant communities considered as high quality habitat include coastal scrub and valley needlegrass grasslands.

- **Very High:** areas dominated by central maritime chaparral, vernal pools and/or with the presence of special-status species.

California tiger salamander require vernal pools for breeding and favor burrows or cracks in the soil of open woodlands and grasslands for summer dormancy. Although not shown on the habitat quality maps, vernal pools are required for reproduction by California tiger salamander. Vernal pools and annual grasslands located within 2 kilometers of documented vernal pools have been reclassified as "Very High."

Small and large patches of bare ground are common in the plant communities described above. While patches of bare-ground may appear to be a low quality habitat, two HMP species, Monterey spineflower and sand gilia, favor bare ground habitat in central maritime chaparral and coastal scrub habitat. Areas of bare-ground in central maritime, coastal scrub, and native habitat were classified as "Very High" quality habitat. Areas of bare-ground in areas dominated by non-native species were classified as "Low" quality habitat. In areas where bare-ground is found at the boundaries of native and non-native species, a 20-feet buffer zone was established around the native vegetation.

The habitat quality classification listed above reflects modifications requested by Agency representatives during a familiarization site walk conducted in July 2004. The habitat quality classifications presented in the *Draft Final Work Plan, Remediation Areas and Habitat Mapping, Impact Area, Former Fort Ord, California* (*Shaw, 2004*) were modified through Field Work Variance TII-117 (*Shaw, 2006*) to include specific criteria used to distinguish each category for consistency if different field biologists map the habitat quality.

Remediation Area Delineation

After completion of habitat mapping, relevant mapped features and sample locations were plotted on a map for evaluation and delineation (*Shaw, 2004*), and were presented in the *Draft Final Report, Remediation Areas and Habitat Mapping, Small Arms Ranges, Impact Area, Former Fort Ord, California (Shaw, 2007)*. Remediation areas were delineated based on consideration of the following mapped features:

- Accumulations of spent small arms bullets (areas with greater than 10 percent distribution or surface coverage); this criterion meets the Remedial Action Objective (RAO) presented in the Basewide ROD (*Army, 1997a*).

- Disturbed areas from extensive range use, reworking of range features, etc.

- Structural range features (e.g., berms, target boxes, firing lines, roads).

- The location of discrete sample locations with metals and/or constituents of explosives concentrations exceeding screening levels; and
- The proximity of the detections to each other and other mapped features.

Maps were prepared for each of the three remediation approaches showing the distribution and concentrations of lead and constituents of explosives described in Section 2.8.

2.7 Current and Potential Future Land and Resource Uses

Future land uses are primarily based upon the Fort Ord Reuse Authority (FORA) March 1997 Fort Ord Base Reuse Plan (*FORA, 1997*), the July 1995 USACE and Bureau of Land Management (BLM) Site Use Management Plan (SUMP) (*USACE, 1995*), and the 1997 HMP (*USACE, 1997*). Since Base closure, the Army has been coordinating with the BLM regarding the management of habitat reserve within the former Fort Ord. The 1995 SUMP and 1997 HMP outline agreements on conceptual reuse and management of the Site 39 Inland Ranges and Impact Area MRA based on MEC cleanup expectations at the time. Since then, BLM has provided several updates on its plans for reuse and habitat management. These documents include the 2004 draft Proposed Management Plan (*BLM/Army, 2004*), 2006 Proposed Resource Management Plan/Final Environmental Statement, and *Draft Installation-Wide Multispecies Habitat Conservation Plan for Former Fort Ord, California* (draft HCP; *Zander, 2006*).

The Base Reuse Plan identified approximately 20 land-use categories at Fort Ord (*FORA, 1997*) including habitat management, open space/recreation, institutional/public facilities, commercial, industrial/business park, residential, tourism, mixed use, and others. The Site 39 Inland Ranges is designated as a habitat reserve in the FORA Base Reuse Plan.

A general goal of the HMP is to promote preservation, enhancement, and restoration of habitat and populations of HMP species while allowing development on selected properties on the former Fort Ord. The base-wide implementation of the HMP must comply with the Federal Endangered Species Act and Biological Opinions for the disposal and reuse of the former Fort Ord. As such, habitat management parcels or habitat corridors that include portions of the Impact Area were designed to offset habitat loss from designated development areas outside the Impact Area MRA. The HMP (*USACE, 1997*), East Garrison and Parker Flats Land Use Modification Assessment (*Zander, 2002*), and the Revised Attachment A – HMP map (March 2006) present the revised boundaries of the habitat reserve areas, including those managed by the BLM. For the habitat reserve in the Impact Area, the HMP and biological opinions (*USFWS, 1999, 2002, and 2005*) prescribe certain management actions and mitigation measures for predisposal actions (environmental cleanup and munitions response). These include minimizing disturbances in the habitat, conducting employee education program, habitat monitoring, and vegetation burning in support of munitions response in maritime chaparral habitat. Post-disposal management guidelines for the Impact Area habitat reserve areas include habitat restoration, enhancement, and monitoring; access control; controlled burning; and allowance for development-oriented use in as much as 2 percent of the Natural Resource Management Area (HMP; *USACE, 1997*).

BLM recently provided the draft HCP (*Zander, 2006*) to the Army. The draft HCP describes the projected land uses (habitat reserve), existing habitat features, species covered by the plan, and the resource conservation and management activities anticipated for the habitat reserve in the Impact Area.

2.8 Summary of Site Risks

Soil cleanup levels, requirements, and ecological considerations were used in the development of potential remedial alternatives to address the risks to human health and ecological receptors posed by chemical contamination in soil. Groundwater contamination at the Site 39 Inland Ranges has not been identified and is not of concern, because chemicals of concern in soil at the site do not have a significant leachability or migration potential to groundwater at the shallow depths and concentrations found.

It should be noted that the estimated human health and ecological risks posed by chemicals of concern in soil are based on long term exposure to residual contamination over many years under the planned habitat management and monitoring activities and recreational reuses of the site within habitat reserve areas. .

Potential human health risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the Human Health Risk Assessment (HHRA) using data collected at the ranges (*Basewide RI/FS, Volume II; HLA, 1995a*). The HHRA addressed potential risks posed by chemicals detected at the Site 39 Inland Ranges to future onsite workers and site visitors.

Potential ecological risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the ERA (*MACTEC/ABBL, 2007*). Data from additional sampling and bioavailability tests conducted under the ERA were used in the assessment of potential risks to ecological receptors (plants, reptiles, and birds and mammals with varying diets) for the ranges falling within habitat reserve areas. These assessments estimated potential ecological risks under a baseline scenario (i.e., current conditions with no remediation), as well as risk reduction based on various potential remediation scenarios. The baseline ecological risks range from a Hazard Quotient (HQ) of 1 to 13. An HQ greater than 1 does not necessarily mean a receptor is being harmed. An HQ of less than 1 means harmful effects are not likely. These remediation scenarios were developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs. These remediation scenarios are equivalent to the remedial alternatives described below.

Three different remediation approaches for the Site 39 Inland Ranges were developed based on: (1) the results of the Basewide RI/FS HHRA for human health; (2) the results of the ERA for ecological receptors based on the BRA investigation data; (3) the remedial action objectives and applicable or relevant and appropriate requirements (ARARs) identified in the FS Addendum that are presented in Appendix A; and (4) discussions with regulatory agency representatives participating in review of the BRA and ERA at Base Realignment and Closure (BRAC) Cleanup Team (BCT) meetings. The remediation approaches defined in the FS Addendum considered habitat types and quality identified at the ranges during remediation mapping and different cleanup level approaches used to define the associated soil volumes and areas. The COCs detected in soil and cleanup levels are presented in Table 1.

The response action selected in this ROD Amendment is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

Remediation to Human Health Based Levels of Concern for Lead and Constituents of Explosives

The rationale for this approach is to remediate the ranges to address risks to human health only in areas where human health-based levels of concern were exceeded as defined in the Basewide ROD (*Army, 1997a*) for metals and constituents of explosives for reuse of the areas as a habitat reserve. Because this approach only addresses areas of high spent small arms bullets distribution and where metals and constituents of explosives are present at concentrations above human health-based levels of concern for reuse of the areas as a habitat reserve, it would minimize the amount of habitat destruction that would

occur if all areas were remediated to ecological cleanup levels defined since the time the Basewide ROD for human health was finalized.

Summary of Chemicals of Concern and Cleanup Goals

The following human health-based levels of concern for reuse of the areas as a habitat reserve are defined as cleanup goals under this approach: 1,860 mg/kg for lead and 2.8 mg/kg for beryllium as defined in the Basewide ROD (*Army, 1997a*). For RDX, the Basewide ROD included a human health level of concern of 0.5 mg/kg based on limited toxicity data and risk assessments conducted in 1997, which was based on a habitat worker onsite 250 days per year for 25 years. However, based on more recent toxicity data and a residential scenario which considers a resident onsite 350 days per year for 30 years, the current EPA Residential Soil RSL for RDX of 4.4 mg/kg (*EPA, 2008*) would be used under this approach.

Summary of Remediation Areas and Soil Volumes

For the human health-based level of concern remediation approach for reuse of the areas as a habitat reserve for the Site 39 Inland Ranges, the estimated total remediation area is approximately 41 acres to depths ranging from approximately 1 to 2 feet bgs, and the total volume of contaminated soil is estimated at approximately 81,000 cubic yards based on current data.

Remediation to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors

The rationale for this approach is to minimize the removal of very high quality habitat, and to aid in post-remediation habitat restoration efforts by leaving “islands “of very high quality habitat within the remediation areas to establish a vegetative base for regrowth, with special considerations for ecological receptors. This approach is as follows: (1) remediation to range-wide weighted averages for lead, (2) remediation to ecological screening levels for constituents of explosives; and (3) based on the results of the ERA, range-specific considerations such as vegetation types and areas near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40) where all sample locations with lead concentrations above the ecological cleanup level would be removed. For ranges with large areas of very high quality chaparral habitat (Range 19), remediation areas also include the target and firing lanes and all areas with greater than 10 percent spent small arms bullets cover.

Summary of Chemicals of Concern and Ecological Cleanup Levels

The following ecological cleanup levels were identified using a range-wide weighted average of 225 mg/kg for lead, and the following cleanup levels for constituents of explosives: 5.9 mg/kg for TNT, 3.1 mg/kg for RDX, and 2.7 mg/kg for HMX (*MACTEC/ABBL, 2007*). It would also include additional considerations for ranges near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40), where all sample locations with lead concentrations above 225 mg/kg would be removed, and the range-wide weighted averages for constituents of explosives would be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX.

Summary of Remediation Areas and Soil Volumes

For the range-wide weighted average remediation approach for the Site 39 Inland Ranges, the estimated total remediation area is approximately 53 acres to depths ranging from approximately 1 to 2 feet bgs, and the total volume of contaminated soil is estimated at approximately 125,000 cubic yards based on current data.

Remediation to Fort Ord Background Level for Lead and Non-Detectable for Constituents of Explosives

The rationale for this approach is to remove all soil contamination. This approach would result in significant destruction of critical habitat, including rare, threatened, and endangered species. This approach assumes remediation to the background level (concentrations found in native soils) for lead, and to non-detectable concentrations for explosives compounds, for which background levels are not available.

Summary of Chemicals of Concern and Background Levels

The following background levels were identified: the Fort Ord background level of 50 mg/kg for lead as defined in the *Basewide Background Soil Investigation* (*HLA, 1993*), and laboratory detection limits (that are lower than RSLs) for HMX, RDX, and TNT.

Summary of Remediation Areas and Soil Volumes

For the background remediation approach for the Site 39 Inland Ranges, the estimated total remediation area is approximately 134 acres to depths ranging from approximately 1 to 3 feet bgs, and the total volume of contaminated soil is estimated at approximately 242,000 cubic yards based on current data.

2.9 Description of Alternatives

Remedial alternatives for the Site 39 Inland Ranges, which were evaluated in the Feasibility Study Addendum (*MACTEC, 2008*), are summarized in the Proposed Plan (*Army, 2008a*). The remedial alternatives that were developed to address risks to human health and the environment for the Site 39 Inland Ranges in the FS Addendum consisted of three different approaches to define cleanup levels and soil volumes that would be excavated under the selected remedy for implementation in the Basewide RI/FS and Basewide ROD (*HLA, 1995a; Army, 1997a*) and managed under the treatment/disposal component of the remedy—*Excavation and Onsite Placement at the Operable Unit 2 (OU2) Landfill Beneath a Cap*. The remedial action objectives (RAOs) identified for the Site 39 Inland Ranges in the Basewide ROD have not changed, only the remedial approaches for achieving the RAOs have been modified as described herein. A remedial technology screening presented in the FS Addendum confirmed this component of the selected remedy should be retained for implementation at the Site 39 Inland Ranges for the volume and extent of soils identified in the BRA and ERA.

The four remedial alternatives considered for the Site 39 Inland Ranges include:

- Remedial Alternative 1 – No Action.
- Remedial Alternative 2 – Remediation to Human Health Based Levels of Concern for Lead and Constituents of Explosives.
- Remedial Alternative 3 – Remediation to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors.
- Remedial Alternative 4 – Remediation to the Fort Ord Background Level for Lead and Non-Detectable for Constituents of Explosives.

All of the alternatives except the No Action Alternative (Remedial Alternative 1) include this common component summarized as follows:

- Excavation of soil and spent small arms bullets and placement of the excavated material on top of the OU2 Landfill (Area E cell) above the existing geomembrane cover as described in the *Technical Memorandum, OU2 Landfills Vertical Expansion at Area E* presented in Appendix B of the FS Addendum (*MACTEC, 2008*). The excavated material would be placed over approximately 15 acres of the Area E cell as a foundation layer, and a new cover consisting of a low permeability geomembrane and vegetative layer would be placed over the foundation layer.

Details associated with implementation of the range-specific remedial approaches identified in the selected remedy will be provided in the Remedial Action Work Plan (RAWP) that will be prepared for the Site 39 Inland Ranges. A description of revegetation and restoration efforts associated with the post-remediation cleanup for the ranges are included in the Habitat Restoration Plan for the Site 39 Inland Ranges (HRP) (*Duffy/Shaw, 2007*). Habitat and wetland monitoring procedures will be conducted in accordance with the *Vegetation Monitoring Plan* and *Wetlands Restoration Plan* (*Burleson, 2007, 2006*). Results of monitoring will be documented in annual reports submitted to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). Range-specific details regarding vegetation regrowth monitoring and restoration activities are described in detail in the HRP, which includes an assessment of the restoration potential for each range and identifies the specific HMP species that occur.

The unique components of the remedial alternatives are summarized as follows:

Remedial Alternative 1 – No Action

Alternative 1 would take no further action to treat, contain, or remove impacted soil or spent small arms bullets. This alternative is required for consideration under CERCLA as a baseline against which to compare other alternatives. If no action is taken, it is likely that land use and access restrictions over much of the Site 39 Inland Ranges would be necessary to prevent future use of the site due to the presence of concentrations of COCs at levels that pose a risk to human health, and the potential ecological risks would not be addressed. The ecological risk would remain the same as the baseline ecological risk that had an HQ ranging from 1 to 13. The baseline scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs.

There are no costs associated with the No Action Alternative; minimal costs associated with maintaining the existing land use and access restrictions at the Ranges are included under the existing basewide program.

Remedial Alternative 2 – Remediation to Human Health Based Levels of Concern for Lead and Constituents of Explosives

The rationale for this approach is to remediate the ranges to address risks to human health only in areas where human health based levels of concern were exceeded as defined in the Basewide ROD (*Army, 1997a*) for metals and constituents of explosives for reuse of the areas as a habitat reserve. Because this approach only addresses areas of high small arms bullet distribution and where metals and constituents of explosives are present at concentrations above human health based cleanup levels of concern, it would minimize the amount of habitat destruction that would occur if all areas were remediated to ecological cleanup levels defined since the time the Basewide ROD for human health was finalized.

Alternative 2 would consist of remediation of the ranges to the human health-based level of concern for reuse of the areas as a habitat reserve of 1,860 mg/kg for lead and 2.8 mg/kg for beryllium as defined in the Basewide ROD (*Army, 1997a*), and the EPA's RSL for RDX of 4.4 mg/kg (*EPA, 2008*).

This alternative includes excavation and removal of: (1) areas with greater than 10 percent bullet fragment cover; and (2) soil with concentrations above the human health-based levels of concern, and placement of the soil in the OU2 landfill beneath a cap. This alternative would require the removal of approximately 81,000 cubic yards of soil estimated based on current data, to depths ranging from approximately 1 to 2 feet below ground surface (bgs) over a total estimated remediation area of approximately 41 acres. Except for the No Action alternative, implementation of this alternative would result in the least disturbance of the critical habitat, including rare, threatened, and endangered species. The approximate range-wide weighted average concentrations of lead that would remain onsite under this alternative after remediation of the 17 Range Areas varies from 86 to 417 mg/kg.

Potential human health risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the HHRA using data collected at the ranges (*Basewide RI/FS, Volume II; HLA, 1995a*). The HHRA addressed potential risks posed by chemicals detected at the Site 39 Inland Ranges to future onsite workers and site visitors.

The potential for ecological risk from exposure to chemical compounds found within the Site 39 Inland Ranges was evaluated in the ERA (*MACTEC/ABBL, 2007*). An HQ of less than 1 means harmful effects are not likely. Under this alternative, the ecological risk would be reduced to an HQ ranging from less than 1 to 6. This remediation scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*) which provides additional detail on range-specific assessments and HQs.

Costs for excavation and placement of approximately 81,000 cubic yards of contaminated soils at the OU2 landfill beneath a cap, and monitoring and restoration of habitat as necessary in excavated areas are estimated at approximately $14,676,000.

Remedial Alternative 3 – Remediation to Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors

The rationale for this approach is to balance the need for remediation to address potential risks while maintaining high quality habitat, and to aid in post-remediation habitat restoration efforts by leaving "islands "of very high quality habitat within the remediation areas to establish a vegetative base for regrowth, with special considerations for ecological receptors.

Alternative 3 would consist of remediation of the ranges to the ERA cleanup level of a range-wide weighted average of 225 mg/kg for lead, 5.9 mg/kg for TNT, 3.1 mg/kg for RDX, and 2.7 mg/kg for HMX. This alternative would also include special considerations for ranges near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40) where all sample locations with lead concentrations above 225 mg/kg would be removed, and the range-wide weighted average for constituents of explosives would be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX. For Range 19, which contains large areas of very high quality chaparral habitat, this alternative includes remediating the target and firing lanes and all areas with greater than 10 percent spent small arms bullets cover.

This alternative would require the removal of approximately 125,000 cubic yards of soil estimated based on current data, to depths ranging from approximately 1 to 2 feet bgs over a total estimated remediation area of approximately 53 acres, and placement of the soil in the OU2 landfill beneath a cap.

Implementation of this alternative would result in a moderate amount of disturbance to the critical habitat including rare, threatened, and endangered species; however, it incorporates special considerations to minimize destruction of potential California tiger salamander reproductive habitat and high quality habitat. The approximate range-wide weighted average concentrations of lead that would remain onsite under this alternative after remediation of the 17 Range Areas vary from 50 to 190 mg/kg, except for Range 19, which would result in a range wide weighted average of 355 mg/kg.

Potential human health risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the HHRA using data collected at the ranges (*Basewide RI/FS, Volume II; HLA, 1995a*). This alternative would be protective of human health because:

- The range-wide weighted average cleanup level for lead of 225 mg/kg is lower than: (1) the human health-based level of concern of 1,860 mg/kg for lead identified in the Basewide ROD for reuse of the areas as a habitat reserve (*Army, 1997a*), and (2) the EPA Residential Soil RSL for lead of 400 mg/kg (*EPA, 2008*); and

- The range-wide weighted average cleanup levels for constituents of explosives are lower than the human health-based level of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve (*Army, 1997a*) or are equal to or lower than regulatory screening levels.

The potential for ecological risk from exposure to chemical compounds found within the Site 39 Inland Ranges was evaluated in the ERA (*MACTEC/ABBL, 2007*). An HQ of less than 1 means harmful effects are not likely. Under this alternative, the ecological risk would be reduced to an HQ less than 1. This remediation scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs.

Costs for excavation and placement of approximately 125,000 cubic yards of contaminated soils at the OU2 landfill beneath a cap, and monitoring and restoration of habitat as necessary in excavated areas are estimated at approximately $17,713,000.

Alternative 4 – Remediation to Fort Ord Background Level for Lead and Non-Detectable for Constituents of Explosives

The rationale for this approach is to remove soil contamination containing metals exceeding background levels and detectable concentrations of constituents of explosives. This would result in significant destruction of critical habitat, including rare, threatened, and endangered species.

Alternative 4 would consist of remediation of the ranges to the Fort Ord background level of 50 mg/kg for lead as defined in the *Basewide Background Soil Investigation* (*HLA, 1993*), and non-detectable concentrations (below laboratory detection levels) for the explosives compounds HMX, RDX, and TNT, and placement of the soil in the OU2 landfill beneath a cap.

This alternative would require the removal of approximately 242,000 cubic yards of soil estimated based on current data, to depths ranging from approximately 1 to 3 feet below ground surface (bgs) over a total estimated remediation area of approximately 134 acres. Implementation of this alternative would result in a significant amount of disturbance to the critical habitat including rare, threatened, and endangered species, and is expected to require an extensive level of vegetation restoration that may not be sufficient in some areas for the habitat to recover. The approximate range-wide weighted average concentrations of lead that would remain onsite under this alternative after remediation of the 17 Range Areas vary from 33 to 50 mg/kg.

Potential human health risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the HHRA using data collected at the ranges (*Basewide RI/FS, Volume II; HLA, 1995a*). This alternative would be protective of human health because:

- The background cleanup level for lead of 50 mg/kg and beryllium of 0.56 mg/kg, respectively, are lower than the human health-based levels of concern for reuse of the areas as a habitat reserve of 1,860 mg/kg for lead and 2.8 mg/kg for beryllium identified in the Basewide ROD (*Army, 1997a*);

- The background cleanup level for lead of 50 mg/kg is lower than the EPA Residential Soil RSL of 400 mg/kg for lead (*EPA, 2008*); and

- The background cleanup levels for constituents of explosives are non-detectable (i.e., "0 mg/kg" based on laboratory detection limits) concentrations that are lower than the human health-based levels of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve (*Army, 1997a*), or are equal to or lower than regulatory screening levels.

The potential for ecological risk from exposure to chemical compounds found within the Site 39 Inland Ranges was evaluated in the ERA (*MACTEC/ABBL, 2007*). An HQ of less than 1 means harmful effects are not likely. Under this alternative, the ecological risk would be reduced to an HQ less than 1. This remediation scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs.

Costs for excavation and placement of approximately 242,000 cubic yards of contaminated soils at the OU2 landfill beneath a cap, and monitoring and restoration of habitat as necessary in excavated areas are estimated at approximately $29,062,000.

2.10 Principal Threat Wastes

The source material constituting the principal threats in the Site 39 Inland Ranges is soil containing lead and constituents of explosives at concentrations that exceed the Basewide ROD human health-based levels of concern for reuse of the areas as a habitat reserve, and ecological cleanup levels for protection of human health and the environment. The selected remedy will address the threat through excavation and placement of contaminated soils at the OU2 landfill beneath a cap.

2.11 Selected Remedy

2.11.1 Summary of the Rationale for the Selected Remedy

This section summarizes and presents the rationale for selection of the selected remedy for implementation at the Site 39 Inland Ranges based on the evaluation and comparison of alternatives presented in the FS Addendum (*MACTEC, 2008*).

Each alternative was assessed against the nine EPA evaluation criteria. Using the results of this assessment, the Army compared the alternatives and selected a remedy for the Site 39 Inland Ranges.

Remedial Alternative 3—Remediation to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors is the selected remedy for implementation at the Site 39 Inland Ranges. This alternative was selected as the alternative that would best meet the cleanup requirements with the least impacts to ecological receptors, while complying with all ARARs presented in Appendix A. In addition, excavation and onsite placement of the contaminated

soils at the OU2 Landfill was chosen as the selected remedy for many reasons, including the costs and short term risks associated with offsite disposal.

Remedial Alternative 3 is the remedy that best meets the nine EPA evaluation criteria as follows:

Overall Protection of Human Health and the Environment

This alternative would be protective of human health in the long term for the receptors assumed to reuse the site recreationally or during habitat management and monitoring activities under the HMP and Related Requirements. It also will minimize impacts to the critical habitat including rare, threatened, and endangered species with special considerations for ecological receptors, and will achieve both the Basewide ROD human health-based levels of concern for reuse of the areas as a habitat reserve, and ecological cleanup levels that are lower than human-health based levels of concern.

This alternative would be protective of human health because the range-wide weighted average cleanup level for lead of 225 mg/kg is lower than: (1) the human health-based level of concern for lead of 1,860 mg/kg identified in the Basewide ROD for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor) (*Army, 1997a*), and (2) the EPA Residential Soil RSL for lead of 400 mg/kg (*EPA, 2008*). The range-wide weighted average cleanup level for beryllium of 0.56 mg/kg is lower than the human health-based level of concern of 2.8 mg/kg identified in the Basewide ROD (*Army, 1997a*). The range-wide weighted average cleanup levels for constituents of explosives are lower than the human health-based level of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve or are equal to or lower than regulatory screening levels.

This alternative would be protective of ecological receptors because potential ecological risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the ERA (*MACTEC/ABBL, 2007*), with an HQ of less than 1 meaning harmful effects are not likely. Under this alternative, the ecological risk would be reduced to an HQ less than 1, which would fully address risks to ecological receptors from chemical compounds in soil. However, an HQ greater than 1 does not necessarily mean a receptor is being harmed. This remediation scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs.

It should be noted that the estimated human health and ecological risks posed by chemicals of concern in soil are based on long term exposure to residual contamination over many years under the planned habitat management and monitoring activities and recreational reuses of the site within habitat reserve areas.

Compliance with ARARs

It is the only alternative that would be implemented in compliance with the ARARs presented in Appendix A related to protection of human health and the environment, including the HMP and Related Requirements. In addition, it includes special considerations for ecological receptors and preservation of very high quality habitat. This alternative would be implemented in a manner that complies with the substantive requirements of all ARARs related to placement and continued management by the Army of contaminated soil in the OU2 Landfill, including:

- California Code of Regulations (CCR) and Title 22 Sections 66264.550 and 66264.551 which identify certain CAMUs that are grandfathered and may continue to accept material pursuant to the 1993 CAMU regulations.

- Standards under CCR Title 23 Sections 2511(d) and 2520(a)(1) which allow hazardous waste to be placed within an existing landfill pursuant to an action taken under the direction of a public agency.

Short-Term Effectiveness

It would be effective in the short term related to impacts to workers or the adjacent community. Short-term risks to workers and the public from excavation, transportation, and placement and capping activities at the OU2 landfill would be mitigated by compliance with ARARs and the use of standard operating procedures successfully implemented for similar activities at the former Fort Ord. Some particulate emissions from excavation activities and placement of soil at the landfill are anticipated during implementation; however, dust control methods would reduce this risk as it has with previous work at the landfill. Details regarding the design and construction of the selected remedy (including dust control and other measures to mitigate impacts to nearby residents during construction of the cap for the portion of the OU2 Landfill where Site 39 Inland Ranges soils will be placed) will be presented in the Remedial Design/Remedial Action Work Plan (RD/RAWP), which will be available for public review and regulatory agency review and approval following approval of this ROD Amendment. These measures will include appropriate engineering measures to control dust during excavation, hauling, and grading at both the Site 39 Inland Ranges and at Area E of the OU2 Landfill. Dust emissions will be monitored during work at both areas, and measurements will be compared against risk-based action levels. Monitoring will be conducted around the perimeter of both areas upwind and downwind of ongoing field activities, to provide data to confirm that unacceptable amounts of dust are not leaving the work areas. Additional engineering controls such as water suppression will be applied as necessary to reduce dust and visible emissions, and field activities will be suspended if engineering controls cannot maintain readings below the action levels. The activities related to the proposed remediation are anticipated to be completed in three years based on the availability of funding. In addition, it would be effective in the short term related to the environment, because it: (1) would remove all contaminated soils containing metals and constituents of explosives at concentrations that exceed ecological cleanup levels; (2) includes additional special considerations for ecological receptors and preservation of very high quality habitat; and (3) would allow for safe recreational reuse and implementation of the full scope of habitat management to be implemented under the HMP and Related Requirements.

Long-Term Effectiveness and Permanence

It is the only alternative that would provide long-term effectiveness and permanence in regards to protection of both human health and the environment. Regarding the magnitude of post-remediation residual risks to human health, risks would be lower under this alternative than those considered protective as described under Alternative 2 (based on remediation to human health based levels of concern for reuse of the areas as a habitat reserve). Regarding the magnitude of post-remediation residual risks to ecological receptors, potential ecological risks from exposure to chemical compounds found within the Site 39 Inland Ranges were evaluated in the ERA, with an HQ of less than 1 meaning harmful effects are not likely. Under this alternative, the ecological risk would be reduced to an HQ less than 1. This remediation scenario was developed from an assessment of habitat quality including pond environments, and known contaminant levels and distributions as presented in the ERA (*MACTEC/ABBL, 2007*), which provides additional detail on range-specific assessments and HQs. In terms of the long term effectiveness and permanence of this alternative in regards to placement of soils in the landfill, it would be similar to other successful remedial actions at the former Fort Ord that utilized the OU2 Landfill as part of the action. Most of the landfill was capped in 1998 (with a small portion completed in 2002) and the landfill cap has been functioning properly and effectively. The landfill is inspected quarterly by the Monterey County Department of Health and no problems have been noted.

Reduction of Toxicity, Mobility, or Volume Through Treatment

Although it does not include treatment, placement of excavated soils beneath a cap at the OU2 Landfill would be equally protective of human health and the environment as treatment. It would significantly reduce mobility and isolate the toxic components and volume of the waste through placement in the OU2 Landfill beneath a cap.

Implementability

It would be feasible to implement from an administrative perspective, because it is the only alternative that would comply with the HMP and Related Requirements, for which the necessary approvals could be readily obtained**.** The necessary services, equipment, and skilled workers to implement this alternative are readily available, and there is available capacity for placement of excavated soils at the OU2 Landfill. The technologies that will be used during implementation of this alternative are proven and reliable in full-scale applications under previous successful remedial actions at the site and the OU2 Landfill. It would require a high level of effort to implement from a technical perspective.

Cost

It has a moderate estimated cost associated with its implementation, approximately $17,713,000, as compared to the other remedial action alternatives. The cost breakdown is presented in Appendix A of the FS Addendum (*MACTEC, 2008)*.

State and Community Acceptance

The State and support agencies have expressed their support for Remedial Alternative 3 as the selected remedy because: (1) it takes action both in the short and long term to mitigate potential risks to both human and ecological receptors under planned reuses, with additional special considerations for ecological receptors and preservation of very high quality habitat; and (2) it would be implemented in a manner that complies with the substantive requirements of all ARARs, including those related to placement and continued management by the Army of contaminated soil in the OU2 Landfill.

During the public comment period, the community expressed its support of the selected remedy. Public comments received are addressed in the responsiveness summary (Section 3.0).

2.11.2 Description of the Selected Remedy

Remedial Alternative 3, which was identified in the Proposed Plan as the preferred remedial alternative, has been selected. Plate 3 shows the proposed excavation areas for the selected remedy, which is summarized as follows:

Remedial Alternative 3 – Remediation to Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors.

- Excavation of soil containing concentrations above the following ERA cleanup levels: a range-wide weighted average of 225 milligrams per kilogram (mg/kg) for lead, 5.9 mg/kg for TNT, 3.1 mg/kg for RDX, and 2.7 mg/kg for HMX. These cleanup levels are lower than human health-based levels of concern identified in the Basewide ROD for reuse of the areas as a habitat reserve, and are protective of human health and ecological receptors, with incorporation of special considerations to minimize destruction of potential California tiger salamander reproductive habitat and high quality habitat. In an effort to address specific habitat concerns, the remedial design will include the following provisions:

- Special considerations for ranges near ponds which may provide reproductive habitat for the California tiger salamander (Ranges 28, 37 and 39/40), where all sample locations with lead concentrations above 225 mg/kg will be removed, and the range-wide weighted averages for constituents of explosives would be 0.59 mg/kg for TNT, 2.4 mg/kg for RDX and 2.7 mg/kg for HMX.

- Special considerations for ranges with large areas of very high quality chaparral habitat (Range 19) that includes remediation of the target and firing lanes and all areas with greater than 10 percent spent small arms bullets cover.

- The approximate range-wide weighted average concentrations of lead that will remain onsite under the selected remedy varies from 50 to 190 mg/kg, except for Range 19, which would result in a range wide weighted average of 355 mg/kg.

- Excavation of approximately 125,000 cubic yards of soil and spent bullets over a total estimated remediation area of approximately 53 acres that will result in a moderate amount of disturbance to the critical habitat including rare, threatened, and endangered species.

- The Army will continue to conduct characterization of metals and constituents of explosives in soil within the Site 39 Inland Ranges that are associated with former military munitions range uses, as munitions responses are completed within the Impact Area MRA. The Army will evaluate the data in a timely manner to determine whether sampling is required to characterize an area further with respect to potential soil contamination from military munitions. If there is evidence that military munitions recovered from the subsurface have degraded and released constituents of explosives or metals into soils, these specific locations will be evaluated to determine if additional sampling or remediation for constituents of explosives or metals is necessary.

- Placement of the excavated soil and spent bullets on top of the OU2 Landfill (Area E cell) above the existing geomembrane cover as described in the Technical Memorandum, OU2 Landfills Vertical Expansion at Area E presented in Appendix B of the FS Addendum (*MACTEC, 2008*). The estimated soil volume of approximately 125,000 cubic yards would be placed over approximately 15-acres of the Area E cell as a foundation layer, and a new cover consisting of a low permeability geomembrane and vegetative layer would be placed over the foundation layer.

After remediation is completed under this alternative, no access management measures or land use restrictions would be required related to residual chemical contamination in soil, which was determined not to pose a risk to human health or the environment based on the results of the BRA, ERA, and FS Addendum that have been conducted since the Basewide ROD was signed in 1997. This alternative would eliminate the need for the residential use restriction that was required in the Basewide ROD. However, as described in the Impact Area MRA ROD, there are explosive hazards posed by MEC within the Site 39 Inland Ranges. The Army will implement land use restrictions to address MEC as identified as part of the selected remedy in the Impact Area MRA ROD (*Army, 2008b*).

Details associated with implementation of the range-specific remedial approaches identified in the selected remedy will be provided in the Remedial Action Work Plan (RAWP) that will be prepared for the Site 39 Inland Ranges. A description of revegetation and restoration efforts associated with the post-remediation cleanup for the ranges are included in the Habitat Restoration Plan for the Site 39 Inland Ranges (HRP) (*Duffy/Shaw, 2007*). Habitat and wetland monitoring procedures will be conducted in accordance with the *Vegetation Monitoring Plan* and *Wetlands Restoration Plan* (*Burleson, 2007, 2006*). Results of monitoring will be documented in annual reports submitted to the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG). Range-specific details

regarding vegetation regrowth monitoring and restoration activities are described in detail in the HRP, include an assessment of the restoration potential for each range, and identify the specific HMP species that occur.

2.11.3 Summary of the Estimated Remedy Costs

Capital costs associated with excavation and placement of approximately 125,000 cubic yards of contaminated soils at the OU2 landfill beneath a cap, and monitoring and restoration of habitat as necessary in excavated areas are estimated at approximately $17,713,000. The operations and maintenance costs for the cap, monitoring, and reporting are included under the OU2 Landfill program. A detailed, activity-based breakdown of the estimated costs associated with implementing and maintaining the remedy is provided in Appendix A of the FS Addendum (*MACTEC, 2008*).

2.11.4 Expected Outcomes of Selected Remedy

The expected outcomes of implementing the selected remedy of *Remedial Alternative 3—Remediation to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors* would be protection of human health and the environment through remediation of lead and constituents of explosives in soil to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors. As described above, after remediation is completed under the selected remedy, no access management measures or land use restrictions would be required related to residual chemical contamination in soil, which was determined not to pose a risk to human health or the environment based on the results of the BRA, ERA, and FS Addendum that have been conducted since the Basewide ROD was signed in 1997.

2.12 Statutory Determinations

The selected remedy satisfies the requirements of Section 121 of CERCLA:

- Protection of Human Health and the Environment: The selected remedy provides the greatest degree of protection for both human health and the environment compared to the other alternatives, because it is the only alternative that would minimize impacts to the critical habitat including rare, threatened, and endangered species while achieving the Basewide ROD human health-based levels of concern for reuse of the areas as a habitat reserve, and ecological cleanup levels that are lower than human-health based levels of concern.

- Compliance with Applicable or Relevant and Appropriate Requirements: The selected remedy is the only alternative evaluated that would be implemented in compliance with the ARARs presented in Appendix A related to protection of human health and the environment, including the HMP and Related Requirements. In addition, it includes special considerations for ecological receptors and preservation of very high quality habitat. In addition, the Army's proposal to expand the volume of material within the footprint of the OU2 Landfill under the selected remedy complies with the substantive requirements of ARARs related to placement of contaminated soils in the OU2 Landfill. The Army will continue to manage the contaminated soil from Site 39 Inland Ranges to be placed in OU2 Landfill in compliance with all ARARs including:

  -- CCR and Title 22 Sections 66264.550 and 66264.551 which identify certain CAMUs that are grandfathered and may continue to accept material pursuant to the 1993 CAMU regulations.

  The proposed liner system will effectively prevent migration of lead from the soil and the construction phase will comply with all applicable air regulations.

-- Standards under CCR Title 23 Sections 2511(d) and 2520(a)(1) which allow hazardous waste to be placed within an existing landfill pursuant to an action taken under the direction of a public agency.

The Army has demonstrated that the particular waste constituents from the Site 39 Inland Ranges that will be placed in the OU2 Landfill (i.e., metals such as lead, and munitions-related compounds in soil) presents a lower risk of water quality degradation (HLA, 1997) than indicated by its classification (i.e., hazardous waste, for which the landfill does not meet all the criteria of a Class I unit).

- Cost Effectiveness: The selected remedy is a cost-effective solution for reducing risks to human health and the environment. There are no costs associated with implementation of the No Action alternative (Alternative 1). The estimated cost of the selected remedy is approximately $17.71 million, which is commensurate with the higher level of protection of human health and the environment. The estimated cost of the selected remedy (Alternative 3) is well below the estimate for Alternative 4 ($29.06 million) and somewhat higher than Alternative 2 ($14.68 million).

- Utilization of Permanent Solutions and Alternative Treatment (or Recovery) Technologies to the Maximum Extent Practicable (MEP): The selected remedy will have the greatest long-term effectiveness and permanence because it is the only alternative that would provide long-term effectiveness and permanence in regards to protection of human health and the environment. Alternatives 2 and 4 are not anticipated to have significant long-term effectiveness and permanence in regards to the environment, because Alternative 2 would leave contamination in place that would pose a risk to ecological receptors, and Alternative 4 would cause the most significant amount of disturbance to the critical habitat including rare, threatened, and endangered species in the long term, and is expected to require an extensive level of vegetation restoration over a period of several years or decades, that may not be sufficient in some areas for the habitat to recover. In terms of the long term effectiveness and permanence of this alternative in regards to placement of soils in the landfill, it would be similar to other successful remedial actions at the former Fort Ord that utilized the OU2 Landfill as part of the action. Most of the landfill was capped in 1998 (with a small portion completed in 2002) and the landfill cap has been functioning properly and effectively. The landfill is inspected quarterly by the Monterey County Department of Health and no problems have been noted.

- Preference for Treatment as a Principal Element: Although the remedy does not include treatment for which there is a statutory preference as a principal element of the remedy (i.e., reduction of the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment), placement of excavated soils beneath a cap at the OU2 Landfill would be equally protective of human health and the environment as treatment. The remedy would provide significant reduction of mobility and isolate the toxic components and volume of the waste through placement in the OU2 Landfill beneath a cap.

- Five-Year Review Requirements: The selected remedy will result in chemical contamination remaining within the Site 39 Inland Ranges below levels that require use restrictions. Therefore, a statutory review within five years after initiation of the remedial action related to chemical contamination is not necessary to ensure the remedy is, or will be, protective of human health and the environment. After remediation is completed under the selected remedy, no access management measures or land use restrictions would be required related to residual chemical contamination in soil. However, as described in the Impact Area MRA ROD, there are explosive hazards posed by MEC within the Site 39 Inland Ranges. The Army will implement land use restrictions to address MEC as identified as part of the selected remedy in the Impact Area MRA ROD (*Army, 2008b*). A statutory review of the protectiveness of the selected remedy for MEC for the Site 39 Inland Ranges will be conducted within five years after initiation under the Impact Area MRA ROD (*Army, 2008b*).

2.13 Documentation of Significant Changes from Preferred Alternative of Proposed Plan

The Proposed Plan for the Site 39 Inland Ranges was released for public comment on April 1, 2008, and a public meeting was held on April 10, 2008. The Proposed Plan identified a preferred remedial alternative for the Site 39 Inland Ranges, which is documented as the selected remedy in this ROD Amendment. Comments collected over the public review period between April 1 and June 1, 2008, did not necessitate any significant changes to the conclusions or procedures outlined in the Site 39 Inland Ranges FS Addendum and Proposed Plan.

3.0 RESPONSIVENESS SUMMARY

This Responsiveness Summary is organized as follows:

Section 3.1 — Overview

Section 3.2 — Background on Community Involvement

Section 3.3 — Summary of Comments Received During the Public Comment Period and Department of the Army Responses

(A) Overall Community Concerns

(B) Technical Issues

(C) Regulatory Issues

3.1 Overview

In the *Final Feasibility Study Addendum, Site 39 Inland Ranges, Former Fort Ord, California*, dated March 28, 2008, and the Proposed Plan for the Site 39 Inland Ranges, dated April 1, 2008, the Army identified a preferred remedial alternative, *Remedial Alternative 3—Remediation to a Range-Wide Weighted Average for Lead and Constituents of Explosives, With Special Considerations for Ecological Receptors*, that is documented as the selected remedy in this ROD Amendment.

Public comments on the Proposed Plan were received at a public meeting held on April 10, 2008, with written comments received from the public, community organizations, and government agencies during the 60-day public comment period. The 30-day public comment period, which was initially scheduled for April 1 to May 1, 2008, was extended by 30 days at the request of the public, ending on June 1, 2008.

Public comments were submitted by members of the public, including the Fort Ord Environmental Justice Network (FOEJN) and their technical advisor with Environmental Stewardship Concepts (ESC), and two government agencies: (1) the California Integrated Waste Management Board (CIWMB); and (2) the Monterey County Health Department, Local Enforcement Agency (LEA).

The majority of the public comments received on the Army's Proposed Plan identified concerns about the portion of the Proposed Plan that includes placement of excavated soils at the OU2 Landfill beneath a cap. While members of the public support the Army's plan to remove lead-containing soils from the Site 39 Inland Ranges to address human health and ecological risks, they were concerned about the potential effects of placing the remediation waste on the existing landfill cap. Agency comments received supported the overall approach of the preferred remedial alternative presented in the Proposed Plan, but identified some issues that required clarification related to landfill operations and maintenance regulations.

The following issues and concerns expressed in the comments are categorized below. The Army's responses are provided in Section 3.3.

A. Overall Community Concerns. Members of the public support the component of the proposed cleanup approach related to removing lead-containing soils from the Site 39 Inland Ranges to address risks to humans and ecological receptors at the site. However, concerns were identified about the use of the 1997 Basewide ROD's selected remedy as the basis for the proposed amendment to the selected

remedy for the Site 39 Inland Ranges as it relates to potential human health risks from lead and placement of excavated soils at the OU2 Landfill beneath a cap. Requests were also made for a 30-day extension of the public comment period in order to give the public more time for consideration of the Proposed Plan.

B. Technical Issues. Technical concerns were identified related to the component of the preferred alternative presented in the Proposed Plan that includes placement of excavated soils at the OU2 Landfill beneath a cap. These concerns included questions about the potential effects of the vertical expansion of Cell E at the OU2 Landfill on the existing waste and cap system over which the remediation waste and new cap would be constructed, and whether the Feasibility Study Addendum provided sufficient technical design information for the public review and decision making process.

C. Regulatory Issues. Regulatory concerns were identified related to the component of the preferred alternative presented in the Proposed Plan that includes placement of excavated soils at the OU2 Landfill beneath a cap. These concerns included use of the 1997 Basewide ROD's selected remedy of designating the OU2 Landfill as a Corrective Action Management Unit (CAMU) as the basis for the proposed amendment to the selected remedy for the Site 39 Inland Ranges as it relates to current landfill regulations.

3.2 Background on Community Involvement

In 1991, the former Fort Ord was added to the BRAC List. The economic impact of the former Fort Ord's closure has created much community interest relative to the potential economic reuse of portions of the former Fort Ord. The Site 39 Inland Ranges will primarily be managed and maintained as habitat reserve.

Focused community involvement regarding the Proposed Plan has most recently involved the public's review of the Army's Proposed Plan for the Site 39 Inland Ranges. A 30-day public comment period began April 1, 2008 and was extended to 60 days at the request of the public, closing on June 1, 2008.

This Responsiveness Summary responds to written comments received during the public comment period as well as oral comments expressed during the public meeting conducted on April 10, 2008.

3.3 Summary of Comments Received During the Public Comment Period and Department of the Army Responses

Comments received during the Site 39 Inland Ranges Proposed Plan public comment period, and Army responses, are summarized below according to the topics identified in Section 3.1 (Overview):
A) Overall Community Concerns, B) Technical Issues, and C) Regulatory Issues.

A. Overall Community Concerns

Members of the public raised concerns about the components of the preferred remedial alternative presented in the Proposed Plan related to human health risks and placement of excavated soils at the OU2 Landfill beneath a cap, and requested an extension of the Proposed Plan public comment period, as summarized below.

Summary Public Comment A1: Members of the public requested a 30-day extension to the public comment period in order to give the public more time to consider the Army's Superfund Site 39 Inland Ranges Proposed Plan.

Army Response: A 30-day public comment period began April 1, 2008, and was extended to 60 days at the request of the public, closing on June 1, 2008. Comments made during the public comment period

and at the Proposed Plan public meeting are addressed within this Responsiveness Summary. Copies of the comments and the transcript of the public meeting are available in the former Fort Ord Administrative Record, and on the web site www.fortordcleanup.com.

Summary Public Comment A2: Members of the public support the Army's plans to remove lead-containing soils from the Site 39 Inland Ranges to address human health and ecological risks. However, comments were received requesting the Army consider other options for treatment and/or disposal of the excavated soils than placing the soils at the OU2 Landfill. Other methods that were evaluated in the Feasibility Study Addendum and shown to be effective at reducing lead concentrations in Site 39 soils - specifically soil washing and dry separation treatment methods — were considered potentially safer and/or more cost effective and worthy of further consideration. The Army's reason for not selecting these technologies, that they have not been demonstrated in a full-scale field test, was not considered a sufficient reason to eliminate them from consideration, since they have been used at other sites. In addition, the Feasibility Study Addendum did not provide sufficient information to properly evaluate the alternatives presented, and did not consider treating soil to reduce the risks from lead prior to placing it at the OU2 Landfill.

Army Response: The Feasibility Study Addendum for the Site 39 Inland Ranges included a remedial technology screening conducted to reassess the selected remedy for Site 39 soils in the Basewide RI/FS and ROD—*Excavation and Onsite Placement at the OU2 Landfill Beneath a Cap*. The purpose of the screening was to confirm that the selected remedy would still best meet the EPA evaluation criteria since additional investigations under the Basewide Range Assessment (BRA) and the Ecological Risk Assessment (ERA) were conducted that required re-evaluation of the areas and volumes of soil requiring remediation. Four options for treatment and/or placement of excavated soils were evaluated, including two treatment technologies that the Army evaluated in pilot-scale studies prior to conducting the Feasibility Study Addendum: Dry Separation; Soil Washing; Offsite Disposal; and Onsite Placement at the OU2 Landfill Beneath a Cap. These four options were evaluated to factor in new data and technologies collected since the time of the Basewide RI/FS and ROD, and were evaluated based on the screening criteria of effectiveness, relative cost, and implementability.

Based on the screening, *Excavation and Onsite Placement at the OU2 Landfill Beneath a Cap* was retained as the preferred alternative for the volume and extent of soils identified in the Feasibility Study Addendum and presented in the Proposed Plan. This technology has proven full-scale site-specific effectiveness and implementability for the entire volume of soil estimated based on current data and the results of previous remedial actions, and has a lower or similar relative cost compared to the other technologies evaluated in the screening. Each of the other technologies evaluated in the screening were not identified as better able to meet the screening and evaluation criteria overall for several reasons. In addition to not having the same full-scale proven effectiveness as cited in the comment, they also would either: not be effective in achieving cleanup levels for the entire volume of soil estimated based on current data; and/or would require a higher level of effort to implement; and/or or would have a higher relative cost.

In regards to the comment that dry separation or soil washing could potentially be safer options than direct placement of excavated soils at the OU2 Landfill, potential exposures to lead-containing soils would be prevented by managing the soils in accordance with the substantive requirements of all Applicable or Relevant and Appropriate Requirements (ARARs), including health and safety requirements, standard operating procedures, and engineering controls as performed during previous remedial actions at the Site 39 Inland Ranges and OU2 Landfill. Details regarding the design and construction of the selected remedy (including dust control and other measures to mitigate impacts to nearby residents during construction of the cap for the portion of the OU2 Landfill where Site 39 Inland Ranges soils will be placed) will be presented in the Remedial Design/Remedial Action Work Plan

(RD/RAWP), which will be available for public review and regulatory agency review and approval following approval of this ROD Amendment.

These measures will include appropriate engineering measures to control dust during excavation, hauling, and grading at both the Site 39 Inland Ranges and at Area E of the OU2 Landfill. Dust emissions will be monitored during work at both areas, and measurements will be compared against risk-based action levels. Monitoring will be conducted around the perimeter of both areas upwind and downwind of ongoing field activities, to provide data to confirm that unacceptable amounts of dust are not leaving the work areas. Additional engineering controls such as water suppression will be applied as necessary to reduce dust and visible emissions, and field activities will be suspended if engineering controls cannot maintain readings below the action levels.

Summary Public Comment A3: Members of the public support the Army's plans to remove lead-containing soils from the Site 39 Inland Ranges to address human health and ecological risks. However, several recent health studies on exposure to lead posing serious health problems were cited and provided as references, raising concerns on how the health risks to the neighboring community posed by lead in excavated soils proposed for placement at the OU2 Landfill would be addressed. Because the OU2 Landfill is located near residential and student housing and already contains remediation waste from numerous cleanup sites at the former Fort Ord that was capped and closed in 2002, placing remediation waste from the Site 39 Inland Ranges on top of the existing cap covering Cell E of the OU2 Landfill that contains high levels of lead would pose unacceptable risks to the public. The Proposed Plan indicates that blood lead levels are of concern from the particles of lead in the soil that can be inhaled or absorbed through the skin by nearby receptors. The public has been concerned about the serious potential health effects from lead exposure during cleanups at the former Fort Ord for many years. In addition, concerns were raised about the effects on the community from lead at the landfill leaching into underlying groundwater used as a drinking water source. Due to these concerns, it was suggested that the remediation waste excavated from the Site 39 Inland Ranges should be treated and/or disposed away from the OU2 Landfill and nearby residential areas and drinking water sources.

Army Response: The Army acknowledges the public's concerns regarding the potentially serious health effects that can occur from exposure to lead as cited in the studies provided with the comments and other available data. The Human Health Risk Assessment (HHRA) conducted in the Basewide RI/FS and ROD evaluated the risks posed by lead based on toxicity data and regulatory guidance for the human receptors (e.g., habitat monitors and maintenance workers) that would spend time at the Site 39 Inland Ranges. The human health-based level of concern for lead was developed to be protective of these receptors. The ecological cleanup levels developed in the Ecological Risk Assessment (ERA) and used as the basis for the preferred alternative presented in the Proposed Plan are also protective of human health, because they are: (1) lower than the Basewide ROD human health-based levels of concern for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor), and (2) equal to or lower than current human health based regulatory screening levels. Regarding the concerns raised about health impacts and nearby residents' potential exposure to lead during placement of excavated soils and capping of the OU2 Landfill, please see Response to Comment A2 that states potential exposures to lead-containing soils during cap construction would be prevented by managing the soils in accordance with the substantive requirements of all ARARs.

Prior to placement of remediation waste at the OU2 Landfill under the Basewide RI/FS and ROD, the Army evaluated the potential for chemicals of concern in soils to leach into groundwater if placed at the landfill, and conducted leachability modeling as summarized in the *Technical Memorandum, RI and IA Sites Waste Compatibility, OU 2 Landfill (HLA, 1997).* The results of the evaluation and modeling indicated metals would not migrate or leach within the OU2 Landfill environment. The modeling results were valid for metals such as lead whether in the form of spent ammunition or as residual lead in soil at

maximum concentrations consistent with those found at the Site 39 Inland Ranges. The Army continually monitors groundwater within OU2 for organic chemicals of concern. In addition, although the results of the evaluation and modeling indicated metals would not migrate or leach within the OU 2 Landfill environment, the Army analyzes groundwater samples collected from four wells adjacent to the OU2 Landfill for lead and other metals identified as chemicals of concern in remediation wastes placed at the landfill. The results of groundwater monitoring at OU2 for lead and other metals are published in the Army's quarterly and annual groundwater monitoring reports for OU2.

Statistical evaluation of data obtained from OU2 treatment system influent samples indicates that concentrations of chemicals of concern are generally decreasing over time, and groundwater contamination within OU2 has not been affected by the placement and capping of remediation wastes since 1997. The influent chemistry data indicates that the OU2 groundwater remedy is effectively reducing the total mass of chemicals of concern in groundwater, and is functioning in accordance with the objectives stated in the OU2 Landfill ROD (*Army, 1994*). The existing groundwater remedy for OU2 will continue to capture and remediate the groundwater contaminant mass within OU2. The Army will continue operating the system until the aquifer cleanup levels are achieved. Please see Response to Comment A2 regarding the other treatment and placement options that were evaluated for excavated soils in the Feasibility Study Addendum.

Summary Public Comment A4: The public expressed concerns that the OU2 Landfill was not originally designed to accept hazardous wastes, and is already the source of contamination to an operable unit (OU2) that is contaminating groundwater and the drinking water aquifer from the original landfill waste trenches that do not have an underlying liner to contain the contamination. Since the OU2 Landfill is already failing to function on par with hazardous waste landfills that are designed and constructed today under current regulations, the soil that is being removed from the Site 39 Inland Ranges should not be placed there, but should be disposed of in a properly designed hazardous waste landfill. In addition, concerns were raised whether the weight from placement and capping of the Basewide RI/FS sites remediation waste in the OU2 Landfill in 2002 could have caused additional groundwater contamination by putting pressure on the unlined trenches containing the suspected source of groundwater contamination within OU2. In reference to the previous relocation of Area A at the OU2 Landfill, a question was raised whether the Army plans to move any of the landfill cells again. If there is a time in the future when Area E may need to be moved, placing remediation waste on top of Cell E with another cap would complicate that process.

Army Response: The OU2 Landfill cap that was completed in 2002 was designed in accordance with the substantive requirements of all ARARs related to hazardous waste landfill construction, operations, and maintenance. The design and construction of the landfill cap included placing and sealing liners around the waste to keep rainwater and surface water from passing through the waste that could potentially leach contaminants into groundwater, and installing and operating a landfill gas collection and treatment system in areas where soil gas accumulates from decomposition of the wastes. In regards to the comments expressing concerns about groundwater contamination from the OU2 Landfill, please see Response to Comment A3 regarding the results of leachability studies and the Army's ongoing groundwater monitoring and remediation program for OU2 that indicate groundwater contamination within OU2 has not been affected by the placement and capping of remediation wastes in 2002. The Army does not plan to relocate Cell E or any of the cells that were permanently capped in 2002. Area A was originally separated from the other landfill cells by a roadway and different property reuse designations, so that waste was relocated in order to consolidate all the OU2 Landfill waste in one contiguous area prior to capping.

Summary Public Comment A5: Members of the public support the additional investigations under the Basewide Range Assessment (BRA) and the Ecological Risk Assessment (ERA) conducted by the Army

since the time of the 1997 Basewide RI/FS and ROD to assess ecological risks from lead-containing soils at the Site 39 Inland Ranges and to develop ecological cleanup levels and a remediation approach that is protective of plants and animals within the habitat reserve area of the Site 39 Inland Ranges. However, concerns were raised in regards to the Army's use of the Basewide ROD human health-based level of concern for lead of 1,860 mg/kg for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor) for comparison purposes in the Feasibility Study Addendum. In the 10 years since the time of the Basewide RI/FS and ROD, numerous additional public health studies on exposure to lead posing serious health problems have been published, and were cited and provided as references. Although the human health-based level of concern for lead for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor) used to develop one of the four remedial alternatives evaluated and compared in the Feasibility Study Addendum and presented in the Proposed Plan was not selected as the preferred alternative, concerns were raised that the 10-year old human health-based level of concern was not updated based on more recent data and regulatory screening levels. Therefore, its inclusion as the basis for one of the remedial alternatives in the Feasibility Study Addendum was interpreted as outdated, and should not have been used in the decision-making process for the Site 39 Inland Ranges because it would leave unacceptable risks from soil contamination onsite, and create additional risks to water supplies. In addition, the Army's statements that the ecological cleanup level for lead under the preferred alternative presented in the Proposed Plan is much lower than the human health-based level of concern, and therefore more protective of human health, was not considered to be relevant to the need for updates.

Army Response: Remedial Alternative 2 was based on remediation to the human health-based levels of concern for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor) that were identified in the 1997 Basewide RI/FS and ROD. This alternative was included in the evaluation and comparison of remedial alternatives in the Feasibility Study Addendum in order to compare the potential impacts on ecological receptors and habitat reserve at the Site 39 Inland Ranges to those identified for the ecological cleanup approach developed since the time of the Basewide ROD. The human health-based levels of concern designated in the Basewide ROD were revisited during development and completion of the Feasibility Study Addendum in coordination with the regulatory agencies. Any levels that were developed at the time of the Basewide ROD based on limited toxicity data or risk exposure assumptions were updated based on current regulatory screening levels as described in the Feasibility Study Addendum and Proposed Plan. The ecological cleanup levels used as the basis for the preferred alternative presented in the Proposed Plan are also protective of human health, because they are: (1) lower than the human health-based levels of concern, and (2) equal to or lower than current human health based regulatory screening levels. Implementation of the selected remedy will be protective of both human health and the environment, and will not leave unacceptable risks from soil contamination onsite or create additional risks to water supplies as described in Response to Comment A3.

B. Technical Issues

Members of the public raised technical concerns about the component of the preferred remedial alternative presented in the Proposed Plan that includes placement of excavated soils at the OU2 Landfill beneath a cap, as summarized below.

Summary Public Comment B1: Members of the public raised concerns that the Army's engineering designs for the landfill expansion do not provide evidence that the expansion can be safely performed, and that the Feasibility Study Addendum did not provide an examination of the feasibility of engineering an additional cell on top of the existing waste in Cell E of the OU2 Landfill. Concerns were raised that if the plan is approved and subsequent evaluations show structural failures and/or environmental releases

may occur, the community would have little recourse without taking action outside the CERCLA framework.

Army Response: The design of the vertical expansion will be presented in the Remedial Design/Remedial Action Work Plan (RD/RAWP), which will be available for public review and regulatory agency review and approval following approval of this ROD Amendment. The vertical expansion design will comply with substantive requirements of the ARARs under CERCLA.

The vertical expansion design will be based on the original landfill design and the modifications to the design implemented by the Army prior to the original landfill cover construction in 1997. The original landfill design is documented in the *Draft Final Design Analysis, Fort Ord OU2 Landfill, Final Closure, Fort Ord, California* (*HLA 1995b*) and the *Final Closure and Postclosure Maintenance Plan, Fort Ord OU2 Landfill, Final Closure* (*HLA, 1995c*). Modifications to the original landfill design that have already been implemented included constructability improvements to enhance the performance of the cover system. These improvements included flattening the sideslopes of the cover system from 3:1 to 4:1 and changing the barrier layer material (geomembrane) from high density polyethylene (HDPE) to linear low density polyethylene (LLDPE).

The present cover system constructed at Area E has incorporated remediation wastes from other Fort Ord sites into the landfill foundation layer. Approximately 374,000 cubic yards of remediation waste have been placed above the waste in Area E. The estimated 125,000 cubic yards of remediation waste from the Site 39 Inland Ranges proposed for placement at the landfill can be accommodated by placing the soil on top of the existing landfill area within the confines of the existing footprint. To preserve the existing perimeter storm drainage system and minimize damage to the existing sideslopes, the remediation waste will be placed on the flat top area of the landfill. The remediation waste will be sealed above and below by the geomembrane.

Summary Public Comment B2: Members of the public raised concerns that the vertical expansion of the landfill will place a substantial weight of material on top of the existing waste and geomembrane cover liner that may not have been selected to function as a bottom liner for this remediation waste. Therefore, it is unknown whether the existing cover liner may become unstable under the additional load of soils when it serves as a bottom liner for the new waste. In addition, concerns were raised that the Army has not specified the proposed slope of the additional capped materials that would provide controlled rainwater runoff flow, or described plans for collection and management of rainwater runoff or how the new cap will tie into the older cap or be finished at the toe of the slope. A request was made that the Army demonstrate the construction of the vertical expansion will not cause failure of the existing geomembrane layers or disturb the potentially hazardous waste in the original landfill. One of the major concerns identified for the vertical expansion of landfills is the stress from vertical sheer on liners resulting from differential settlement as described in an article by Stulgis et al, 1996 *[sic: Use of Geosynthetics in `Piggyback Landfills': a Case Study*].

Army Response: The design details for the vertical expansion will be presented in the RD/RAWP, which will be available for public review and regulatory agency review and approval following approval of this ROD Amendment. The RD/RAWP will also provide a summary of the original landfill design and constructability improvements that have been implemented, and an assessment of landfill cover performance.

As described in Response to Comment B1, one of the constructability improvements to the original landfill design that has been implemented was to construct the liner using a LLDPE geomembrane, which will stretch and relax to accommodate cover settlement and seismic movements. The remediation wastes will be covered with the same LLDPE geomembrane used for the existing landfill. The new LLDPE

geomembrane to be placed over the soils will be welded to the existing LLDPE system to provide additional structural system integrity. The vertical expansion will be designed to address vertical and sideslope geomembrane stress.

During the 10-year period since the first area was covered in 1997, the OU2 Landfill has been subjected to unusually high rainfall events and earthquakes. The original design of the landfill has been effective in maintaining the structural integrity of the cap system; no major damage has occurred to the geomembrane or the slopes of the OU2 Landfill.

Summary Public Comment B3: A comment was made that the Army mentioned slope failure as an issue of concern in *Appendix B: Technical Memorandum, OU2 Landfills Vertical Expansion at Area E* of the *Final Feasibility Study Addendum, Site 39 Inland Ranges, Former Fort Ord, California*. Concerns were identified regarding an earthquake's effect on the new cap's structural stability or potential slope failure compared to the underlying waste.

Army Response: As part of the original landfill design analysis, a slope stability analysis was performed for the static and pseudo-static conditions for the edge of the landfill cover (*HLA, 1995b*). The results of this analysis concluded that the maximum exterior sideslope should not exceed or not be steeper than 3 horizontal to 1 vertical (3:1). As described in Response to Comment B1, the landfill sideslopes were flattened from 3:1 to 4:1 as part of constructability improvements to provide a higher factor of safety than the original design of 3:1 sideslopes. The sideslope design for the vertical expansion will be presented in the RD/RAWP.

As described in Response to Comment B2, the original landfill design has been effective in maintaining the structural integrity of the cap system; no major damage has occurred to the geomembrane or the slopes of the OU2 Landfill.

Summary Public Comment B4: A comment was made that the underlying construction of Cell E of the landfill suggests that significant differential settlement could occur. The trenches that form the bottom layer of the landfill could undergo differential settling as waste within the trench can undergo greater consolidation than the soils around it. Placing remediation waste from the Site 39 Inland Ranges on top of the existing cap covering Cell E of the landfill could disturb the contents of the original waste trenches. Concerns were raised about how the additional weight and structure of the new cap could potentially affect the original waste trenches that are the source of the OU2 groundwater and soil gas contamination.

Army Response: Decomposable waste was placed in Area E from 1966 to 1975 utilizing a trench landfill process. Typically, large waste settlement is expected to occur in the first five years as decomposition over time reduces the waste volume. Therefore, the majority of the long term settlement in the waste trenches had already occurred before cap construction was initiated in 1997.

As part of the closure monitoring activities, settlement monuments were installed at the OU2 Landfill after placement of remediation waste and construction of the landfill cover. In the 10-year period following placement of the waste and construction of the landfill cover at the OU2 Landfill, settlement ranged from 0.19 to 0.70 feet with an average of 0.39 feet. In the portion of Area E covered in 1998, the landfill settled an average of approximately 0.5 feet. The limited amount of settlement indicates that the design of the landfill, together with stringent quality control requirements, has not caused adverse impacts related to settlement. These same quality control requirements will be met as part of the design and construction of the vertical expansion for placement of remediation waste from the Site 39 Inland Ranges.

Summary Public Comment B5: Concerns were identified about how the weight of the remediation waste from the Site 39 Inland Ranges to be placed on top of the existing waste would affect the ongoing

treatment systems for chemicals of concern that are ongoing for OU2. Questions were raised whether the continued spread of the OU2 groundwater plume may be due in part to the weight of remediation waste placed at Cell E of the landfill since the 1997 Basewide ROD. This weight could have created additional pressure on the contents of the original waste trenches in the bottom of the landfill, which are the source of groundwater and soil gas contamination at OU2. Concerns were raised that the placement of remediation waste from the Site 39 Inland Ranges on top of the landfill could exacerbate the problem if it is in fact occurring, or increase the chances of it occurring in the future. In addition, questions were identified as to whether there have been studies done on the impact to landfill gases and/or groundwater contamination where there are leaks found in the landfill liners.

Army Response: Please see Response to Comment B4 which states that most of the long term settlement in the waste trenches had already occurred before cap construction was initiated in 1997 as evidenced by settlement monitoring results. Please see Responses to Comments A3 and B4 regarding the placement of remediation waste on top of the landfill that is not anticipated to have an impact on groundwater contamination within OU2.

Landfill gas probes have been installed at the landfill boundary as part of closure requirements. Perimeter probes installed along the landfill boundary were first monitored in June 2000 and continue to be monitored on an annual basis. To date, after placement of approximately 460,000 cubic yards of material on Area E, landfill gas monitoring has not identified increased methane gas concentrations in soil above the regulatory limits.

C. Regulatory Issues

Members of the public and two governmental agencies identified regulatory concerns about the component of the preferred remedial alternative presented in the Proposed Plan that includes placement of excavated soils at the OU2 Landfill beneath a cap, as summarized below.

Summary Public Comment C1: Public concerns were identified regarding the regulations governing placement of remediation waste at the OU2 Landfill that may have changed since it was designated as a Corrective Action Management Unit (CAMU) under the 1997 Basewide ROD selected remedy, and capped and closed under those regulations in 2002. Because the Army proposes to place remediation waste from the Site 39 Inland Ranges on top of the existing cap covering Cell E of the OU2 Landfill under the preferred alternative presented in the Proposed Plan, requests were made that the Army demonstrate that placement of the remediation waste complies with any new regulations or requirements promulgated since 2002 for landfill operations, maintenance, and closure procedures. It was also suggested that placement of remediation waste from the Site 39 Inland Ranges would not meet either the original CAMU guidelines, or the current regulations and standards of practice. The CAMU regulations were interpreted as being revoked and replaced by more stringent requirements after the capping and closure of the OU2 Landfill in 2002, because they were deemed not protective enough of human health and the environment. In addition, it was suggested the CAMU requirement that placement of waste would minimize the potential for additional environmental releases and pose no threats to public health would not be met for placement of the original remediation waste or the proposed remediation waste from the Site 39 Inland Ranges at the OU2 Landfill. Since the OU2 Landfill was not originally designed to accept hazardous wastes, and is already the source of ongoing contamination to groundwater from the underlying unlined waste trenches, it should not have even qualified for designation as a CAMU under the Basewide ROD. In addition, the Army has not been consistent over time with its application of ARARs or designations of “remediation waste” and “hazardous waste.” The Army’s proposal to ‘grandfather in’ placement of remediation waste at the OU2 Landfill under standards from over 10 years ago was considered a substandard cleanup approach aimed at performing the minimum amount of work to address the risks posed by the contamination. The ‘grandfather’ clause in the 2002 CAMU regulations

being proposed for use by the Army under the preferred alternative presented in the Proposed Plan was interpreted as not being applicable to the OU2 Landfill which was closed in 2002, but intended for use by landfills that were in operation at that time or had just submitted applications prior to development of the CAMU revisions. In addition, concerns were raised whether the weight from placement and capping of the Basewide RI/FS sites remediation waste in the OU2 Landfill in 2002 could have caused additional groundwater contamination by putting pressure on the unlined trenches containing the suspected source of groundwater contamination within OU2.

Army Response: The Army acknowledges the public's concerns regarding interpretation of the changes in regulations over time that may apply to the placement of remediation waste, construction of caps and liner systems, and ongoing operations and maintenance at the OU2 Landfill. The Army's process of assessing and identifying Applicable or Relevant and Appropriate Requirements (ARARs) related to the management of the OU2 Landfill has been approved by and developed in coordination with the regulatory agencies over the course of the investigation and cleanup activities conducted at the former Fort Ord.

As presented in the Feasibility Study Addendum and summarized in the Proposed Plan, under the Basewide ROD, three Explanation of Significant Differences (ESDs) to previous RODs documented the following modifications for the remedy identified for implementation at the Site 39 Inland Ranges:

- *Explanation of Significant Differences, Consolidation of Remediation Waste in a Corrective Action Management Unit (CAMU), Operable Unit 2 Landfill, Former Fort Ord, California (Army, 1997b)*:

  The CAMU ESD identified remediation wastes (contaminated soils and debris) excavated from the Site 39 Inland Ranges and other Basewide ROD sites as the foundation layer material at the OU2 Landfill, because evaluations indicated they could be used in lieu of procuring "clean" (uncontaminated) soils identified in the remedy originally selected in the OU2 Landfill ROD (*Army, 1994*).

- *Explanation of Significant Differences, Excavation and Segregation of Spent Ammunition from Soil, Site 39, Former Fort Ord, California (Army, 2003)*:

  The 2003 ESD eliminated segregation and recycling of spent small arms bullets from Site 39 soils prior to placement at the OU2 Landfill from the remedy originally selected in the Basewide ROD (*Army, 1997a*), because these procedures were determined to be technically and economically impractical based on full-scale implementation data and further evaluation of alternative technologies.

- *Explanation of Significant Differences, No Further Action Related to Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of CAMU Requirements as ARARs, Operable Unit 2 Landfills, Former Fort Ord, California (Army, 2006)*:

  The 2006 ESD addressed the potential presence of munitions and explosives of concern (MEC) within the Landfill Parcels; Implementation of landfill gas control measures; Alternative reuse of treated groundwater; and, Clarification that the CAMU ESD *(Army, 1997b)* is intended to designate CAMU regulations as ARARs for the OU2 Landfill, but not to designate the OU2 Landfill as a CAMU.

Contaminant concentrations in soil from the Site 39 Inland Ranges are considered hazardous wastes subject to Land Disposal Restrictions (LDRs) and therefore placement of the contaminated soil from remediation sites in the landfill must follow the CAMU regulations which allow material otherwise subject to LDRs to be managed in an onsite landfill. The 2006 ESD to the Basewide ROD clarified that the OU2 Landfill will continue to be subject to the CAMU regulations, as described in the CAMU ESD. Under the Proposed Plan, the Army will continue to manage the contaminated soil to be placed in the OU2 Landfill in compliance with all ARARs, including California Code of Regulations (CCR) and Title 22 Sections 66264.550 and 66264.551, which identify certain CAMUs that are grandfathered and

may continue to accept material pursuant to the 1993 CAMU regulations. The State revised its CAMU regulation and included the revised regulation as part of its Resource Conservation Recovery Act (RCRA) Authorization. Therefore, the State's CAMU regulation is a "Federal ARAR" for the purpose of this decision. Because the revised CAMU regulation provides for the current placement of additional quantities of similar waste in a "grandfathered" CAMU under circumstances which are similar to those at the former Fort Ord, the proposal to expand the volume of material within the footprint of the landfill complies with the substantive requirements of the ARAR. The regulations provide that a CAMU which was approved prior to January 22, 2002, or for which substantially complete applications (or equivalents) were submitted on or before November 20, 2000, may continue to accept CAMU eligible waste. The identification of the CAMU regulations as an ARAR under the Army and EPA's CERCLA remedy selection authority, including the CAMU ESD determination which allowed contaminated soil to be consolidated into the landfill, was the equivalent of a CAMU approval *(Army, 1997b)*. This ROD Amendment for the Site 39 Inland Ranges demonstrates that the proposed liner system will effectively prevent migration of lead from the soil, and the construction phase will need to comply with all applicable air regulations.

In addition, the placement of the contaminated soil in the OU2 Landfill as set forth in the Proposed Plan will comply with the standards under CCR Title 23 Sections 2511(d) and 2520(a)(1) which allow hazardous waste to be placed within an existing landfill pursuant to an action taken under the direction of a public agency. The contaminated soil is classified as a hazardous waste and the landfill does not meet all the criteria of a Class I unit. However, CCR Title 23 Section 2520(a)(1) allows the Army to determine/demonstrate that a particular waste constituent or combination of constituents presents a lower risk of water quality degradation than indicated by its classification and to contain the waste in a less restrictive unit. The particular waste to be placed in the OU2 Landfill presents a lower risk of water quality degradation than indicated by its classification because the waste does not tend to be mobile, the disposal method is sufficiently protective for the type of waste, and the past and current monitoring data supports the conclusion that the landfill is protective of water quality. The placement of the waste in the OU2 Landfill, therefore, complies with CCR Title 23.

In regards to the comment expressing concerns that the existing OU2 Landfill cap would not meet current regulations or be consistent in defining remediation waste versus hazardous waste, please see Response to Comment A4 that states the OU2 Landfill cap that was completed in 2002 was designed in accordance with the substantive requirements of all ARARs related to hazardous waste landfill construction, operations, and maintenance. In regards to the comment expressing concerns about groundwater contamination from the OU2 Landfill, please see Response to Comment A3 regarding the results of leachability studies and the Army's ongoing groundwater monitoring and remediation program for OU2 that indicate groundwater contamination within OU2 has not been affected by the placement and capping of remediation wastes in 2002.

Summary Public Comment C2: Comments regarding regulations governing placement of remediation waste from the Site 39 Inland Ranges at the OU2 Landfill under the Proposed Plan were received from the California Integrated Waste Management Board (CIWMB) and the Monterey County Health Department, Local Enforcement Agency (LEA). Both agencies provided comments that the placement of remediation waste from the Site 39 Inland Ranges, and the closure and management of the OU2 Landfill, are subject to current CCR Title 27 requirements. Both agencies requested clarification from the Army on the current closure status of the OU2 Landfill. In addition, they requested documentation be provided for their review and approval that the placement of remediation wastes under the preferred alternative presented in the Proposed Plan for the Site 39 Inland Ranges meets the State's current requirements.

Army Response: The Army acknowledges the concerns expressed in the CIWMB and LEA comments, and responded by providing the clarifications requested in subsequent meetings between these agencies,

the Army, and the regulatory agencies participating in the cleanup and decision-making process (EPA, DTSC, and RWQCB). These comments were resolved through discussions that clarified under the Army's CERCLA Superfund authority for the former Fort Ord, placement of the remediation waste and closure, operations, and maintenance requirements will be managed in accordance with the substantive requirements of all Applicable or Relevant and Appropriate Requirements (ARARs), including health and safety requirements, standard operating procedures, and engineering controls as performed during previous remedial actions at the Site 39 Inland Ranges and OU2 Landfill.

The request for CIWMB and LEA review of the design and construction documents to assess their compliance with the State's CCR Title 27 requirements under the selected remedy will be managed by the DTSC as the lead State regulatory agency for the former Fort Ord. The details of the landfill design and its compliance with substantive requirements of all ARARs will be presented in the Remedial Design/Remedial Action Work Plan (RD/RAWP), which will be available for public review and regulatory agency review and approval following approval of this ROD Amendment.

4.0 REFERENCES

Burleson Consulting, Inc. (Burleson), 2006. *Wetlands Monitoring and Restoration Plan, Former Fort Ord, California.* September 27.

_____, 2007. *Protocol for Conducting Vegetation Monitoring in Compliance with the Installation-Wide Multispecies Habitat Management Plan at Former Fort Ord, California*. January.

Denise Duffy and Associates & Shaw E&I, Inc.(Duffy/Shaw), 2007. *Draft Habitat Restoration Plan, Site 39 Inland Ranges, Former Fort Ord, California.* Revision C. December 17.

Fort Ord Reuse Authority (FORA), 1997. *Fort Ord Base Reuse Plan*. March.

Harding Lawson Associates (HLA; now MACTEC), 1999a. *Pilot Study, Site 39 Small Arms Ranges, Former Fort Ord, Monterey, California*. October 14.

_____, 1999b. *Draft Final Additional Soil Characterization – Site 39, Work Plan, Former Fort Ord, California*. April 23.

_____, 1997. *Technical Memorandum, RI and IA Sites Waste Compatibility, OU 2 Landfill Former Fort Ord, California*. April.

_____, 1995a. *Final Basewide Remedial Investigation/Feasibility Study, Fort Ord, California. Volumes I-V.* October.

_____, 1995b. *Draft Final Design Analysis, Fort Ord OU2 Landfill, Final Closure, Fort Ord, California*. December.

_____, 1995c. *Final Closure and Postclosure Maintenance Plan, Fort Ord OU2 Landfill, Final Closure Fort Ord, California*. December.

_____, 1994. *Draft Work Plan, Site Characterization, Site 39A – East Garrison Ranges, Fort Ord, California.* November.

_____, 1993. *Basewide Background Soil Investigation, Fort Ord, California.* November.

_____, 1992. *Draft Basewide Biological Inventory, Fort Ord, California.* April.

Harding ESE (now MACTEC) and IT Corporation (IT), 2001. *Final Basewide Range Assessment Work Plan and Contractor Quality Control Plan for Small Arms and Multi-Use Ranges, Former Fort Ord, California* (BRAWP).

IT Corporation (IT), 2000. *Final Remedial Action Confirmation Report and Post-Remediation Risk Assessment, Site 3 Remedial Action, Basewide Remediation Sites, Former Fort Ord, California. Volumes I and II*. August.

_____, 2002. *Draft Final Remedial Action Confirmation Report, Site 39, Ranges 24 And 25 And Post-Remediation Risk Assessment Site 39, Ranges 24, 25, 26, Fort Ord, California.* September 1.

_____, 2003. *Draft Final Remedial Action Confirmation Report, Site 39, Ranges 21 And 46, Basewide Remediation Sites, Former Fort Ord, California.*

_____, 2005. *Draft Final Remedial Action Confirmation Report, Site 39, Ranges 18 and 19, Basewide Remediation Sites, Former Fort Ord, California*. Revision 0. February 25.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2008. *Final Feasibility Study Addendum, Site 39 Inland Ranges, Former Fort Ord, California.* Prepared for Shaw Environmental, Inc. Revision 1. March 28.

MACTEC and ARCADIS, Blasland, Bouck, and Lee, Inc (MACTEC/ABBL), 2007. *Revision 1, Ecological Risk Assessment for Site 39 Ranges, Habitat Areas, Impact Area, Former Fort Ord, California*. Prepared for Shaw Environmental, Inc. October 31.

MACTEC/Shaw, 2003. *Draft Final Sampling and Analysis Plan, Characterization of Small Arms and Multi-Use Ranges, Former Fort Ord, California*. January.

Shaw Environmental (Shaw), 2007. *Draft Final Report, Remediation Areas and Habitat Mapping, Small Arms Ranges, Impact Area, Former Fort Ord, California*. Rev 0. April.

_____, 2006. *Field Work Variance TII-117 to Basewide Range Assessment Work Plan (BRAWP) and Quality Control Plan, Small Arms and Multi-Use Ranges, Fort Ord, California.* December 4.

_____, 2005. *Memorandum Regarding Revised Estimated Range of Costs for Remediation of Small Arms Ranges.* March 18.

_____, 2004. *Draft Final Work Plan, Remediation Areas and Habitat Mapping, Impact Area, Former Fort Ord, California.*

_____, 2003. *Draft Remedial Action Confirmation Report Site 39, Ranges 18 and 19 Basewide Remediation Sites, Former Fort Ord, California.* April 23.

_____, 2002. *Sampling and Analysis Plan, Characterization and Remediation Confirmation, Site 39, Ranges 18 and 19, Former Fort Ord, California.* August 1.

Shaw/MACTEC, 2006. *Comprehensive Basewide Range Assessment Report, Former Fort Ord, California*. Prepared for Shaw Environmental, Inc. Revision 0. May 31.

U.S. Bureau of Land Management (BLM) and U.S. Army (Army), 2004. *Memorandum of Understanding Concerning the Proposed East Garrison/Parker Flats Land-Use Modification Between the Fort Ord Reuse Authority, Monterey Peninsula College, County of Monterey.* August.

U.S. Department of the Army (Army), 1994. *Record of Decision, Operable Unit 2 Landfill, Fort Ord, California*. August 23.

_____, 1997a. *Record of Decision, Basewide Remedial Investigation Sites, Fort Ord, California*. January 13.

_____, 1997b. *Explanation of Significant Differences, Consolidation of Remediation Waste in a Corrective Action Management Unit (CAMU), Operable Unit 2 Landfill, Former Fort Ord, California.* January 13.

_____, 2003. *Explanation of Significant Differences, Excavation and Segregation of Spent Ammunition from Soil, Site 39, Former Fort Ord, California.* November 11.

_____, 2006. *Explanation of Significant Differences, No Further Action Related to Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of CAMU Requirements as ARARs, Operable Unit 2 Landfills, Former Fort Ord, California.* August 15.

_____, 2008a. *Superfund Proposed Plan, Amendment to Selected Remedy for Site 39 Inland Ranges, Former Fort Ord, California*. April 1.

_____, 2008b. *Record of Decision, Impact Area Munitions Response Area, Track 3 Munitions Response Site, Former Fort Ord, California.* April 11.

U.S. Army Corps of Engineers (USACE), 1995. *Site Use Management Plan (SUMP) for Land Transfer and Reuse of the Multi-Range Area, Fort Ord, California*. Prepared by U.S. Army and U.S. Department of the Interior, Bureau of Land Management. July 25.

_____, 1997. *Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California*. Prepared for USACE. April.

_____, 2005. Revised Attachment A – Habitat Management Plan Map for Former Fort Ord. April.

U.S. Department of the Interior, Fish and Wildlife Service (USFWS), 1993. *Biological Opinion for the Disposal and Reuse of Fort Ord, Monterey County, California*. (I-8-93-F-14). October.

_____, 1997a. *Biological and Conference Opinion on the Closure and Reuse of Fort Ord (1-8-97-F/C-13)*. January.

_____, 1997b. *Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-97-F/C-23R)*. April.

_____, 1999. *Biological and Conference Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R).* Response to Army letter dated 11/11/98 to reinitiate formal consultation in accordance with Section 7 of Endangered Species Act of 1973. March.

_____, 2002. *Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California, as it affects Monterey Spineflower Critical Habitat, (1-8-01-F-70R)*. October.

_____, 2005. Cleanup and Reuse of Former Fort Ord, Monterey County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R). March.

U.S. Environmental Protection Agency (EPA), 1988. *Guidance for Conducting Remedial Investigation/Feasibility Studies Under CERCLA. Interim Final*. EPA 540/G-89/001. October.

_____, 2002. *Currently Recommended U.S. Environmental Protection Agency (USEPA) Region 9 Biological Technical Assistance Group (BTAG) Mammalian and Avian Toxicity Reference Values (TRVs)*. Revision Date November 21.

_____, 2008. *U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs)*. September 12.

Zander and Associates, 2002. *Assessment East Garrison - Parker Flats Land Use Modifications, Fort Ord, California.* May.

_____, 2006. *Draft Installation-Wide Multispecies Habitat Conservation Plan for Former Fort Ord, California*. October.

TABLES

Table 1. Summary of Cleanup Levels for Chemicals of Concern in Soil
Site 39 Inland Ranges, Record of Decision Amendment,
Former Fort Ord, California

Summary of Cleanup Levels [a] (mg/kg)			
Chemical	**Human Health Based Levels of Concern [b]**	**Ecological Based Range-Wide Weighted Average Cleanup Levels [c]**	**Fort Ord Background Cleanup Levels [d]**
Lead	1,860	225	50
Beryllium	2.8 [j]	NA	0.56
RDX	4.4 [i]	3.1	ND
TNT	NA	5.9	ND
HMX	NA	2.7	ND
Summary of Most Protective Constituents of Explosives Screening Levels (mg/kg)			
Chemical	**Maximum Detected Concentration [e]**	**Proposed Cleanup Level – No Ponds (LOAEL-based) [f]**	**Proposed Cleanup Level – Ponds (Agency LOAEL-based) [f]**
TNT	145 [j]	5.9	0.59 [g]
RDX	82.2 [j]	3.1	2.4
HMX	192 [j]	2.7	2.7
NG	8.1	43.3	43.3
1.3.5-TNB	0.14	16.6	16.6
Tetryl	1.99	20	21
2-Am-DNT	1.2	156	80 [h]
4-Am-DNT	1.5	178	80 [h]
2,4-DNT	0.066	0.1	0.1
Nitrobenzene	0.44	121	16

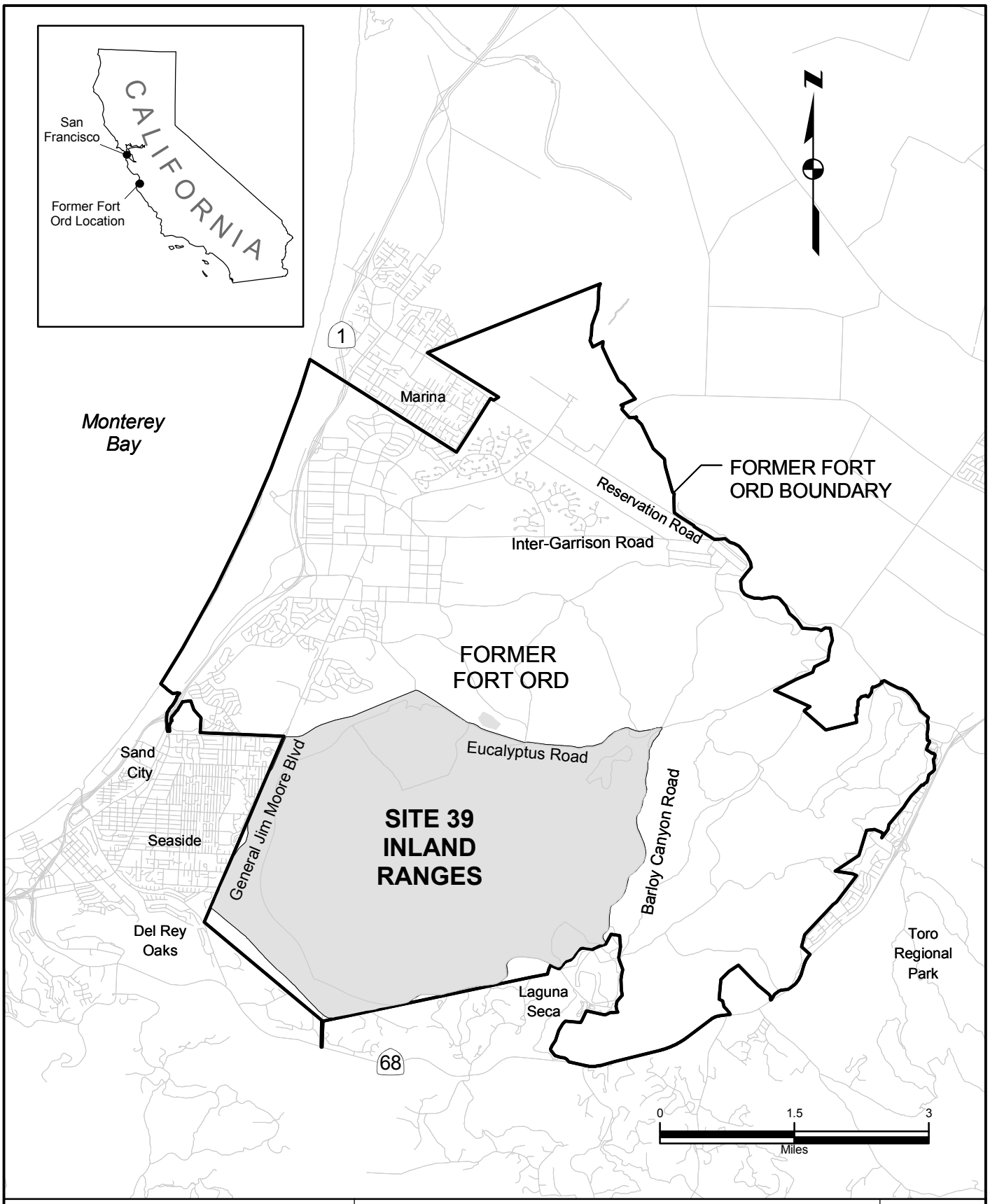
Acronyms:

Am-DNT = aminodinitrotoluene
HMX = cyclotetramethylene tetranitramine
LOAEL = lowest-observed-adverse-effects-level
NA = not applicable based on remedial approach developed in FS Addendum (*MACTEC, 2008*).
mg/kg = milligrams per kilogram
ND = not detected
NG = nitroglycerine
RDX = cyclotrimethlene trinitramine
TNB = trinitrobenzene
TNT = trinitrotoluene
TRV = Toxicity Reference Value

Footnotes:

[a] FS Addendum remedial approaches used in the development of Remedial Alternatives 2, 3, and 4 (*MACTEC, 2008*).
[b] Basewide ROD human health-based levels of concern for reuse of the areas as a habitat reserve (based upon risks to a habitat management worker and site visitor) (*Army, 1997a*).
[c] ERA cleanup levels for ecological receptors (*MACTEC/ABBL, 2007)*. Would also include special considerations for ranges near ponds, which may provide reproductive habitat for the California tiger salamander where all sample locations with lead concentrations above 225 mg/kg would be removed, and the range-wide weighted average for constituents of explosives would be 0.77 mg/kg for TNT, 1.23 mg/kg for RDX and 0.4 mg/kg for HMX.
[d] Basewide Background Soil Investigation level for lead (*HLA, 1993*); non-detectable for all other chemicals of concern.
[e] For all data evaluated in the ERA (*MACTEC/ABBL, 2007)*.
[f] Levels selected were the lowest LOAEL-based screening level of all receptors, including the bushtit. Most were based on wildlife receptors (except where noted). For EPA Region 9 TRVs for Wildlife, the lowest LOAEL was selected when there were differences (*EPA, 2002*; Appendix C of ERA (*MACTEC/ABBL, 2007*)).
[g] Based on protection of California tiger salamander (Appendix C of ERA (*MACTEC/ABBL, 2007*).
[h] Based on protection of plants (Appendix C of ERA (*MACTEC/ABBL, 2007*)).
[i] Based on EPA Regional Screening Level (*EPA, 2008*).
[j] The current EPA Regional Screening Level (*EPA, 2008*) for beryllium = 150 mg/kg; for 2,4,6-TNT = 16 mg/kg; for RDX =4.4 mg/kg; and for HMX = 3,100 mg/kg.

PLATES



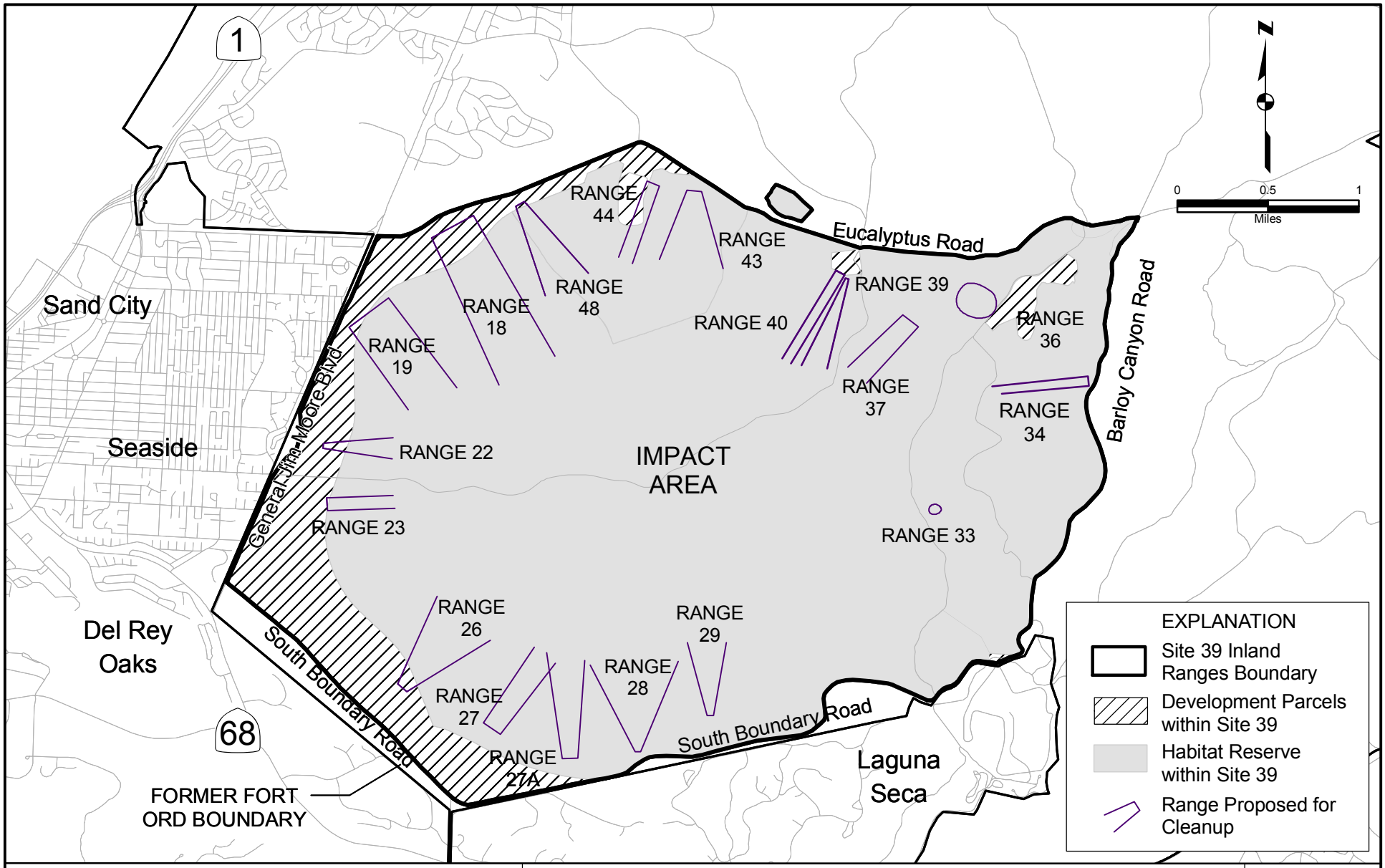
MACTEC

Former Fort Ord Location Map
Site 39 Inland Ranges
Record of Decision Amendment
Former Fort Ord, California

PLATE
1

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
TJH	4088053168 04.4	MS	12/2007	EJT	12/2007

Site39ROD-Plate1.mxd - 12/13/07



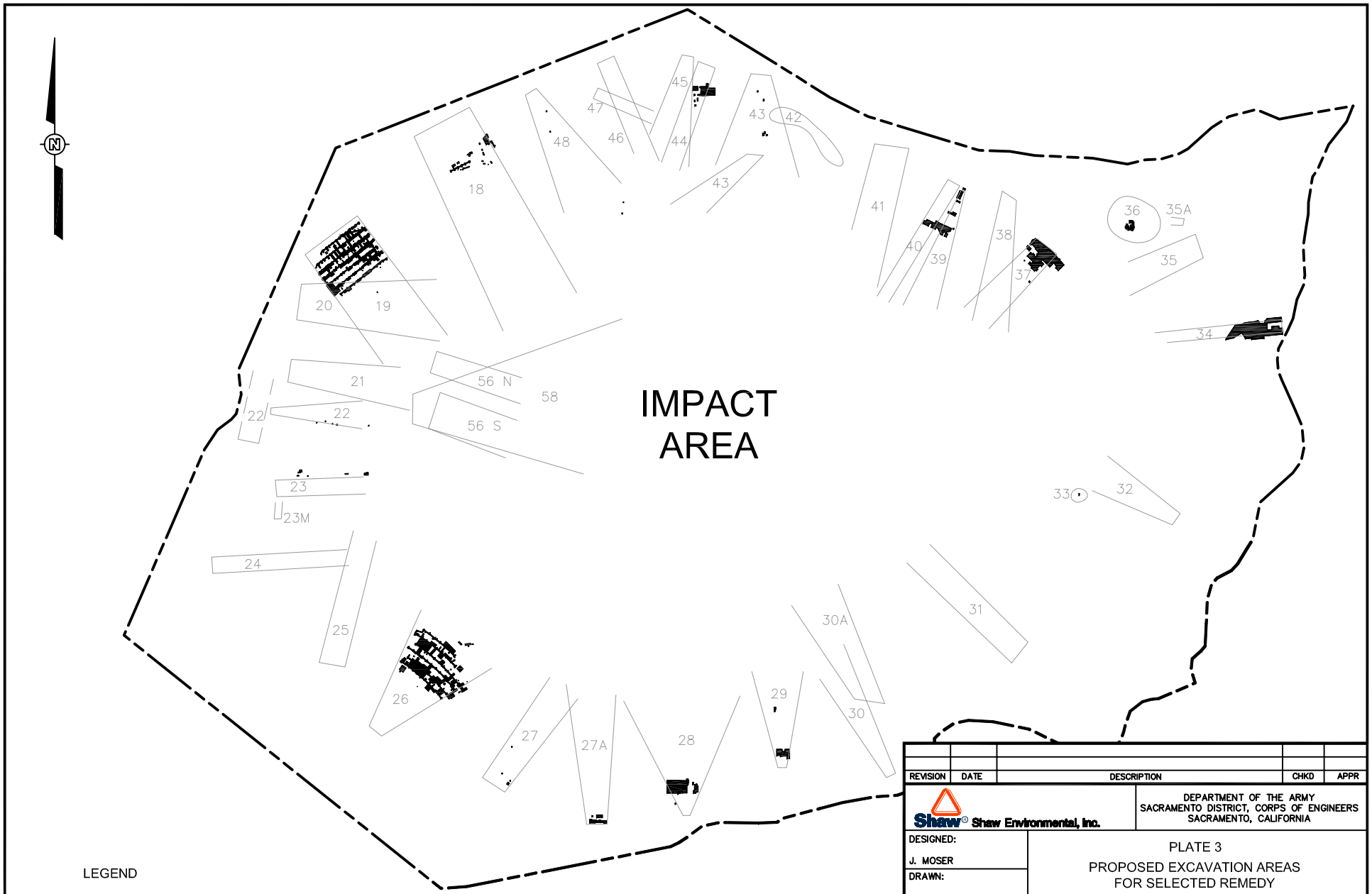
MACTEC

Site 39 Inland Ranges
Site 39 Inland Ranges
Record of Decision Amendment
Former Fort Ord, California

PLATE
2

DRAWN	JOB NUMBER	CHECKED	CHECKED DATE	APPROVED	APPROVED DATE
TJH	4088053168 04.4	MS	12/2007	EJT	12/2007

Site39ROD-Figure2.MXD - 12/13/07


IMPACT AREA
18
19
20
21
22
22
23
23M
24
25
26
27
27A
28
29
30
30A
31
32
33
34
35
35A
36
37
38
39
40
41
42
43
43
44
45
46
47
48
56 N
56 S
58
LEGEND
PROPOSED EXCAVATION AREAS FOR THE SELECTED REMEDY: REMEDIAL ALTERNATIVE 3 - REMEDIATION TO RANGE-WIDE WEIGHTED AVERAGE FOR LEAD AND CONSTITUENTS OF EXPLOSIVES, WITH SPECIAL CONSIDERATIONS FOR ECOLOGICAL RECEPTORS
SCALE – FEET
0
3,000
6,000
REVISION
DATE
DESCRIPTION
CHKD
APPR
Shaw Environmental, Inc.
DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
SACRAMENTO, CALIFORNIA
DESIGNED:
J. MOSER
DRAWN:
K. BLACK
CHECKED:
P. KELSALL
PLATE 3
PROPOSED EXCAVATION AREAS
FOR SELECTED REMEDY
SITE 39 INLAND RANGES
FORMER FORT ORD, CALIFORNIA
SUBMITTED:
DATE APPROVED:
SCALE:
SPEC. No.
SHEET
–
FILE No.
783751SJ–A273

APPENDIX A

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR THE SELECTED REMEDY

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Source or Authority	Requirement, Standard, or Criterion	Applicable or Relevant and Appropriate	Description	Remarks
Chemical-Specific Requirements				
Identification and Listing of Hazardous Waste	Title 22 CCR, Division 4.5, Chapter 11	Relevant and Appropriate	Establishes/defines procedures and criteria for identification and listing of Resource Conservation Recovery Act (RCRA) and non-RCRA hazardous wastes. Chemicals regulated as hazardous waste, and the levels at which they are hazardous, are identified in these regulations.	Depending on the concentrations of contaminants present, soils and spent small arms bullets must be managed as a characteristic waste under the Federal hazardous waste program (RCRA), which is now regulated by the State of California. Listed and characteristic hazardous wastes are identified and defined in Title 22 CCR, Division 4.5, Chapter 11. Remedial actions involving excavation and placement of contaminated soils in the OU2 landfill that meet the criteria for identification and listing of RCRA and non-RCRA hazardous wastes will be managed by the Army in compliance with the substantive requirements of these procedures, as specified under the action-specific requirements described below.
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Regulation II (New Sources) and Regulation X, Rule 207 (Toxic Air Contaminants)	Relevant and Appropriate; Also an Action-Specific Requirement	The MBUAPCD regulates new sources (Regulation II) and toxic air contaminants (Regulation X, Rule 207), and restricts specific discharges of organic compounds to the atmosphere through remedial actions in accordance with Regulation X. The MBUAPCD requirements may limit emissions of total and individual organic compounds on a site-specific basis and/or may require emission controls.	Under Rule 110, dust emissions are generally restricted to those chemical-specific levels identified based on a risk screening using Best Available Control Technology (BACT). In addition, the MBUAPCD regulates releases of certain identified or potential air toxics at levels determined to be "appropriate for review." In some cases, a risk assessment may be required. The MBUAPCD requirements are potential ARARs for managemnt of soils and spent small arms bullets by methods generating emissions. Remedial actions involving excavation and handling of contaminated soils and placement in the OU2 landfill will be designed to ensure compliance with this ARAR.

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Location-Specific Requirements				
Endangered Species Act (ESA)	16 United States Code (U.S.C.) §1531 et seq.	Relevant and Appropriate	Federal agencies are required under the ESA to ensure their actions do not jeopardize the continued existence of a listed species or result in destruction of or adverse modification of its critical habitat. If the proposed action may affect the listed species or its critical habitat, consultation with the US Fish and Wildlife Service (USFWS) and/or California Department of Fish and Game may be required. Additionally, the ESA prohibits the illegal taking of a listed species.	The Army has completed an endangered species, Section 7 consultation, and the USFWS has issued a Biological Opinion for Army disposal and reuse actions at Fort Ord. Endangered plant and animal species and critical habitats are present at Fort Ord. Each reuse area will be screened for potential impacts to any endangered species identified in the April 1997 Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California (HMP) (*USACE, 1997*) and additional reports that identify requirements regarding habitat management (*USACE, 2005; USFWS, 1999, 2002, 2005; BLM, Army; 2004; Zander, 2002*). The provisions of the HMP satisfy the requirements of the ESA. The Site 39 Inland Ranges occur within the Impact Area that is designated as Habitat Reserve in the HMP, and contain areas that have specific resources of concern. Potential locations for siting of remedial staging areas will be screened for potential environmental impacts to any endangered species identified in the HMP. The HMP and additional reports recommend measures, as necessary, to ensure compliance with this ARAR for any remedial actions implemented at the former Fort Ord.
California Endangered Species Act	Fish and Game Code §2050 et seq.	Relevant and Appropriate	Provides for the recognition and protection of rare, threatened, and endangered species of plant and animals (in conjunction with State authorized or funded actions).	The Site 39 Inland Ranges contains areas that have specific resources of concern. Potential locations for siting of remedial staging areas will be screened for potential environmental impacts to any endangered species identified in the HMP. The HMP and additional reports recommend measures, as necessary, to ensure compliance with this ARAR for any remedial actions implemented at the former Fort Ord.
Migratory Bird Treaty Act	16 U.S.C. §§703-712	Relevant and Appropriate	The statute sections prohibit the taking, possession of, buying, selling, purchasing, or bartering of any migratory bird, including feathers or other parts, nest eggs, or products, except as allowed by regulations.	Migratory birds may be present within the Site 39 Inland Ranges area. Potential locations for siting of remedial staging areas will be screened for potential impacts to migratory bird species to ensure compliance with this ARAR for any remedial actions implemented at the former Fort Ord.

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Source or Authority	Requirement, Standard, or Criterion	Applicable or Relevant and Appropriate	Description	Remarks
Standards for the Management of Wastes Discharged to Land	Title 23 CCR, Division 3, Chapter 15, Article 2 (Waste Classification and Management), §2511(d), Title 27 CCR, Division 2, §20090(d)	Relevant and Appropriate	Establishes standards for the management of waste discharged to land and provides exemptions to these requirements for cleanups taken at the direction of public agencies, as long as requirements of Article 2 are met for waste that is removed from the point of release under any remedial alternatives and disposed untreated.	Contaminated soils from the Site 39 Inland Ranges would not be discharged to land untreated, but would be properly managed and disposed in accordance with other ARARs. Remedial actions involving the placement of contaminated soils from the Site 39 Inland Ranges in the OU2 Landfill will comply with the standards under CCR Title 23 Sections 2511(d) and 2520(a)(1) which allow hazardous waste to be placed within an existing landfill pursuant to an action taken under the direction of a public agency. The contaminated soil is classified as a hazardous waste and the landfill does not meet all the criteria of a Class I unit. However, Title 23 Section 2520(a)(1) allows the Army to determine/demonstrate that a particular waste constituent or combination of constituents presents a lower risk of water quality degradation than indicated by its classification and to contain the waste in a less restrictive unit. The particular waste to be placed in the OU2 Landfill presents a lower risk of water quality degradation than indicated by its classification because the waste does not tend to be mobile, the disposal method is sufficiently protective for the type of waste, and the past and current monitoring data supports the conclusion that the landfill is protective of water quality. The placement of the waste in the OU2 Landfill, therefore, complies with CCR Title 23.
Fish and Wildlife Coordination Act	16 U.S.C. §661 et seq.	To-Be-Considered	Requires fish and wildlife to be protected if remedial actions modify the drainage channel or other features of surface waters such as streams and rivers.	No foreseeable remedial action at the Site 39 Inland Ranges would modify a drainage channel or other surface water feature. However, potential locations for siting of remedial staging areas will be screened for potential environmental impacts to fish or wildlife to ensure compliance with this Act for any remedial actions implemented.
Coastal Zone Management Act and California Coastal Act of 1976	16 U.S.C. §1456 et seq./ Public Resources Code §3000 et seq.	To-Be-Considered	Requires activities conducted within the coastal zone to be conducted in a manner consistent with the State-approved management program.	Former Fort Ord is located in a coastal area, but the Site 39 Inland Ranges are not directly adjacent to the coast; therefore, these standards do not apply to remedial activities at the site.

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Source or Authority	Requirement, Standard, or Criterion	Applicable or Relevant and Appropriate	Description	Remarks
Action-Specific Requirements				
National Primary and Secondary Ambient Air Quality Standards (NAAQS)	40 CFR 150, federal Clean Air Act, §109, 42 USCA 7401-7642	Relevant and Appropriate	Establishes enforceable limits for chemicals that may affect air quality. For the region of California in which the former Fort Ord is located, the Monterey Bay Unified Air Pollution Control District (MBUAPCD) requirements are applicable instead because they incorporate NAAQSs, and in some cases, more stringent requirements specific to the Monterey Bay Area.	Remediation wastes that may potentially contain chemicals that may affect air quality will be managed by the Army in compliance with the substantive requirements of these procedures, as specified under the MBUAPCD chemical-specific requirements described below.
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Regulation II (New Sources) and Regulation X, Rule 207 (Toxic Air Contaminants)	Relevant and Appropriate; Also a Chemical-Specific Requirement	The MBUAPCD regulates new sources (Regulation II) and toxic air contaminants, (Regulation X, Rule 207), and restricts specific discharges of organic compounds to the atmosphere through remedial actions in accordance with Regulation X. The MBUAPCD requirements may limit emissions of total and individual organic compounds on a site-specific basis and/or may require emission controls.	Under Rule 110, dust emissions are generally restricted to those chemical-specific levels identified based on a risk screening using Best Available Control Technology (BACT). In addition, the MBUAPCD regulates releases of certain identified or potential air toxics at levels determined to be "appropriate for review." In some cases, a risk assessment may be required. The MBUAPCD requirements are potential ARARs for managemnt of soils and spent small arms bullets by methods generating emissions. Remedial actions involving excavation and handling of contaminated soils and placement in the OU2 landfill will be designed to ensure compliance with the substantive requirements of this ARAR.

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Source or Authority	Requirement, Standard, or Criterion	Applicable or Relevant and Appropriate	Description	Remarks
Land Disposal Restrictions	CCR Title 22, Chapter 18	Relevant and Appropriate	Prohibits land disposal of specified untreated hazardous wastes and provides special requirements for handling such wastes. Requires laboratory analysis of wastes intended for landfill disposal to establish the waste is not restricted from landfill disposal.	As identified in the Basewide ROD, contaminant concentrations in soil from portions of the Site 39 Inland Ranges are considered hazardous wastes subject to Land Disposal Restrictions (LDRs). Therefore, placement of the contaminated soil from remediation sites in the landfill must follow the CAMU regulations which allow material otherwise subject to LDRs to be managed in an onsite landfill. The 2006 ESD *(Army, 2006*) clarified that the OU2 Landfill will continue to be subject to the CAMU regulations, as described in the CAMU ESD (*Army, 1997b*). In addition to the existing contaminated soil from remediation sites previously placed in the OU2 Landfill, any additional contaminated soil from the Site 39 Inland Ranges that is proposed for placement in the landfill under the selected remedy will continue to be managed by the Army in compliance with all ARARs, including CCR and Title 22 Sections 66264.550 and 66264.551 which identify certain CAMUs that are grandfathered and may continue to accept material pursuant to the 1993 CAMU regulations. The State revised its CAMU regulation and included the revised regulation as part of its RCRA Authorization. Therefore, the State's CAMU regulation is a "Federal ARAR" for the purpose of this ARARs analysis. Because the revised CAMU regulation provides for the current placement of additional quantities of similar waste in a "grandfathered" CAMU under circumstances which are similar to those at the former Fort Ord, the proposal to expand the volume of material within the footprint of the landfill under the selected remedy will comply with the substantive requirements of the ARAR. The regulations provide that a CAMU which was approved prior to January 22, 2002, or for which substantially complete applications (or equivalents) were submitted on or before November 20, 2000, may continue to accept CAMU eligible waste. The identification of the CAMU regulations as an ARAR under the Army and EPA's CERCLA remedy selection authority, including the CAMU ESD determination which allowed contaminated soil to be consolidated into the landfill, was the equivalent of a CAMU approval *(Army, 1997b)*.

APPENDIX A
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) FOR THE SELECTED REMEDY

Source or Authority	Requirement, Standard, or Criterion	Applicable or Relevant and Appropriate	Description	Remarks
Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	CCR Title 22, Chapter 14, §66171-66264, et.seq.	Relevant and Appropriate	Standards for use, management, and conditions of containers and closure requirements for containers and miscellaneous units containing hazardous waste. Remedial measures in which hazardous levels of chemical constituents remain in place may be subject to these regulations.	Remedial actions involving excavation and handling of contaminated soils and placement in the OU2 landfill will be designed to ensure compliance with the substantive requirements of these standards.