Final
Second Five-Year Review Report
Fort Ord Superfund Site
Monterey, California

September 10, 2007

Department of the Army
U.S. Army Corps of Engineers, Sacramento District
1325 J Street
Sacramento, California 95814-2922

Signature Sheet for the Second Five-Year Review Report for the Former Fort Ord

This document has been reviewed and approved by representatives of the United Stated Environmental Protection Agency. The California Environmental Protection Agency, Department of Toxics Substances Control and the Regional Water Quality Control Board Central Coast Region have reviewed the document and have no further comment.

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TABLE OF CONTENTS

TABLE OF CONTENTS (CONT.)

TABLES

PLATES

APPENDIX

ACRONYMS AND ABBREVIATIONS

AAFES	Army and Air Force Exchange Service
AGSC	AHTNA Government Service Corporation
ARAR	Applicable or Relevant and Appropriate Requirements
Army	U.S. Department of the Army
AST	aboveground storage tank
BCT	BRAC Cleanup Team
BRA	Baseline Risk Assessment
bgs	below ground surface
BLM	Bureau of Land Management
BRAC	Base Realignment and Closure
CAMU	Corrective Action Management Unit
CAO	Cleanup and Abatement Order
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminants of Concern
CRP	Community Relations Plan
CRUP	Covenant to Restrict Use of Property
COPC	Contaminants of Potential Concern
CT	carbon tetrachloride
CTS	California Tiger Salamander
cy	cubic yards
DCA	dichloroethane
DCE	dichloroethene
DEH	Directorate of Engineering and Housing
DOL	Directorate of Logistics
DRMO	Defense Reutilization and Marketing Office
DRO	Del Rey Oaks
DTSC	Department of Toxic Substance Control
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
ERA	Ecological Risk Assessment
ESD	Explanation of Significant Differences
EW	extraction wells
FAAF	Fritzsche Army Airfield
FDA	Fire Drill Area
FONR	Fort Ord Natural Reserve
FORA	Fort Ord Reuse Authority
FOST	Finding of Suitability to Transfer
FS	Feasibility Study
GAC	Granular Activated Carbon
gpm	gallons per minute
GWETS	groundwater extraction and treatment system
GWTP	groundwater treatment plant
HA	historical area
HCPP	Hydraulic Control Pilot Project
HGL	HydroGeoLogic, Inc.

ACRONYMS AND ABBREVIATIONS (CONT.)

HLA	Harding Lawson Associates
HMX	cyclotetramethylenetetranitramine
IA	Interim Action
IAROD	Interim Action ROD
IT	International Technology Group
JMM	James M. Montgomery Consulting Engineering
MCL	Maximum Contaminant Level
MEC	munitions and explosives of concern
mg/kg	milligrams per kilogram
MGSTP	Main Garrison Sewage Treatment Plant
MR	Munitions Response
MRS	Munitions Response Site
MW	monitoring well
NCP	National Contingency Plan
NoA	No Action
NPDES	National Pollutant Discharge Elimination System
NRMA	natural resource management area
OE	Ordnance and Explosives
OF	outfall
O&M	operations and maintenance
OU 1	Operable Unit 1
OU 2	Operable Unit 2
OUCTP	Operable Unit Carbon Tetrachloride Plume
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
ppbv	parts per billion by volume
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylenetrinitramine
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SCA	Special Case Areas
Sites 2/12	Sites 2 and 12
SPRR	Southern Pacific Railroad Spur
SRU	Soil Remedial Unit
SVE	Soil Vapor Extraction System
SVOC	semi-volatile organic compound
SWOI	Surface Water Outfall Investigation
SWMU	Solid Waste Management Unit
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
TPH	total petroleum hydrocarbon
TPHd	TPH as diesel
TTU	thermal treatment unit

ACRONYMS AND ABBREVIATIONS (CONT.)

µg/L	micrograms per liter
UST	underground storage tank
UV-Ox	ultraviolet chemical oxidation
USACE	United States Army Corps of Engineers
UXO	unexploded ordnance
VOC	Volatile Organic Compound

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: Fort Ord		
EPA ID *(from WasteLAN)*: CA7210020676		
Region: 9	**State: CA**	**City/County: Monterey/Monterey**
SITE STATUS		
NPL status: **X** Final □ Deleted □ Other (specify)		
Remediation status (choose all that apply): **X** Under Construction **X** Operating **X** Complete		
Multiple OUs?* **X** YES □ NO	**Construction completion date:** ___ / ___ / 2015	
Has site been put into reuse? **X** YES □ NO		
REVIEW STATUS		
Lead agency: □ EPA □ State □ Tribe **X** Other Federal Agency – U.S. Army		
Author name: U.S. Army		
Author title:	**Author affiliation:**	
Review period:** 5 / 17 / 02 to 7 / 06 / 07		
Date(s) of site inspection: 11 / 10 / 06 through 2 / 28 / 07		
Type of review: **X** Post-SARA □ Pre-SARA □ NPL-Removal only □ Non-NPL Remedial Action Site □ NPL State/Tribe-lead □ Regional Discretion		
Review number: □ 1 (first) **X** 2 (second) □ 3 (third) □ Other (specify)		
Triggering action: □ Actual RA Onsite Construction at OU #____ **X** Actual RA Start at OU#2 □ Construction Completion □ Previous Five-Year Review Report □ Other (specify)		
Triggering action date *(from WasteLAN)*: 5 / 17 / 97		
Due date *(five years after triggering action date)*: 2007 (1st Five-Year Review was completed in 2002)		

* ["OU" refers to operable unit.]

** [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

FIVE-YEAR REVIEW SUMMARY FORM

1.0 ISSUES

The following sections summarize the issues identified during the five-year review. A listing of the issues is presented in Table 1.

1.1 OU 1

Trichloroethene (TCE) in groundwater has been identified outside the capture area of the Operable Unit 1 (OU 1) remedy. TCE above the aquifer cleanup level is present off site in a narrow plume extending approximately 400 feet downgradient of the existing line of extraction wells (EW) located at the former Fort Ord property boundary. Concentrations of TCE in downgradient locations exceed the aquifer cleanup levels specified in the OU 1 Record of Decision (ROD) and will require remediation to be compliant with the ROD objectives and applicable or relevant and appropriate requirements (ARAR).

1.2 OU 2

1.2.1 Landfill Cap

The landfill has not been closed, but an impermeable cover has been placed on each of the cells where wastes were placed. Final closure of the landfill is scheduled after excavated soil from Site 39 is placed within Cell E of the landfill.

1.2.2 Groundwater Treatment

The expanded Operable Unit 2 (OU 2) groundwater remedy is operating at the designed flow rates. Based on monitoring performed since system modification, it appears to have achieved hydraulic capture of the groundwater containing Containment of Concerns at concentrations above aquifer cleanup levels except at the eastern edge of the plume where two additional wells have been installed for capture. The groundwater contaminant mass within the hydraulic capture area is expected to be adequately addressed by the existing remedy.

1.4 Site 31

U.S. Environmental Protection Agency (EPA) and the Department of Toxic Substances Control (DTSC) concurred that no further remedial action is necessary in letters dated September 20, 1999, and June 28, 2006, respectively. In its letter, the DTSC requested long-term management in the form of a land use covenant prohibiting excavation, exposure of the soil, or use of the area as part of any residential development be completed on a section of the site on the north face of the ravine and under the power transmission lines. At DTSC's request, a covenant to restrict use of property (CRUP) is being prepared.

1.5 Site 39

Based on the results of the Basewide Range Assessment and the Ecological Risk Assessment (ERA) additional areas have been proposed for remediation. The proposed volume of soil to be excavated has increased substantially and will require a ROD Amendment for the Site 39 section of the Basewide Remedial Investigation (RI) Sites ROD. In addition, seven ranges within Site 39 cannot be investigated until the munitions and explosives of concern (MEC) removal is complete.

1.7 Site 3

The need for continued future ecological monitoring needs to be determined after evaluating data collected in 2007.

1.8 Interim Action Sites Munitions Response ROD

MEC has not been remediated at Range 30A nor in the subsurface in special case areas SCA within Ranges 43-48.

2.0 RECOMMENDATIONS

The following sections summarize the recommendations identified during the five-year review. A list of recommendations and follow-up actions is presented in Table 2.

2.1 OU 1

Appropriate follow up actions will be taken to expand the original groundwater remedy. To achieve the objectives specified in the OU 1 ROD, operation of the expanded groundwater remedy should continue until aquifer cleanup levels have been achieved and maintained within the designed capture area. To address the Off-Post contamination the groundwater remedy should be expanded and alternative technologies should be evaluated as enhancement or substitution for the conceptual design.

2.2 OU 2

2.2.1 Landfill Cap

Continue operation of the landfill gas treatment system to maintain landfill gas levels below regulatory standards. Continue to inspect and monitor the OU 2 Landfills in accordance with the *Preliminary Draft Closure Operation and Maintenance Plan, Operable Unit 2 Landfills* (Shaw, 2006a).

2.2.2 Groundwater

The OU 2 Groundwater Remedy should continue to be implemented as designed until either aquifer cleanup levels are reached or the next technical assessment is conducted.

2.3 Sites 2/12

The Sites 2/12 Groundwater Remedy should continue to operate as designed until either aquifer cleanup levels are reached or subsequent evaluation indicates that a modification is in order.

2.4 Site 31

The remedy is functioning as intended, therefore, no follow-up actions are recommended. Beyond the remedy, the CRUP will be implemented if and when the property is transferred.

2.5 Site 39

The ROD Amendment for the Site 39 section of the Basewide RI Sites ROD should be completed. A remedial action work plan should be prepared and implemented. Any additional areas identified following

completion of the MEC response actions should be remediated using the ecological screening values identified in the Site 39 ROD Amendment.

2.6 Site 3

In November 2006, the US Department of the Army (Army) issued the *Post-Remediation Ecological Habitat Sampling and Analysis Plan* (Shaw, 2006d). Data collected under this plan should be used to evaluate the need for continued future monitoring and should be reported during the next five year review.

2.7 OUCTP ROD

The Operable Unit Carbon Tetrachloride (CT) Plume ROD should be finalized and the remedy should be implemented.

2.8 Track 0 ROD

In the future, should any ordnance-related items be found within any of the areas addressed in the Track 0 ROD, the Army should take appropriate immediate action (i.e., removing the found item, recording the incident), and within 90 days of the discovery, submit a plan for appropriate follow-on action to EPA and DTSC for consultation.

2.9 Track 1 ROD

As described in the Track 1 ROD, at the time of the next five-year review (2012), the Army should assess whether the MEC safety education program should continue. If information indicates that no MEC items have been found in the course of development or redevelopment of the site, it is expected that the education program may, in consultation with the concurrence of the regulatory agencies, be discontinued, subject to reinstatement if a MEC item is encountered in the future.

2.10 Parker Flats Munitions Response Area, Track 2 ROD

The Parker Flats Munitions Response (MR) Area, Track 2 ROD should be finalized.

2.11 Interim Action Sites Munitions Response ROD

The remaining explosive risks at SCA at MR Site-Ranges 43-48 should be evaluated under the MR Remedial Investigation/Feasibility Study (RI/FS) program. MEC remediation at Range 30A should be evaluated as a component of the Track 3 MR RI/FS.

2.12 Impact Area Munitions Response Area, Munitions Response Track 3 ROD

The Impact Area MR Area, MR Track 3 ROD should be finalized.

2.13 Del Rey Oaks Munitions Response Area, Track 2 ROD

The Del Rey Oaks (DRO) MR Area, Track 2 ROD should be finalized.

3.0 PROTECTIVENESS STATEMENT

Protectiveness statements for each site are presented in the individual section of the Five-Year Review document.

1.0 INTRODUCTION

The purpose of the five-year review is to determine whether the remedy at a site continues to be protective of human health and the environment after a period of 5 years from the time the remedy was implemented (or from the time of a previous five-year review). The methods, findings, and conclusions of the five-year review are documented in a Five-Year Review report. In addition, the Five-Year Review report documents any site-related data or issues identified during the review, and recommendations to address them as appropriate.

The U. S. Department of Army (Army) is preparing this Five-Year Review report pursuant to Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). CERCLA §121 states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The US Evironmental Protection Agency (EPA) interpreted this requirement further in the NCP; 40 Code of Federal Regulations §300.430(f)(4)(ii) which states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The Army conducted the five-year review of all remedies implemented at the Fort Ord Superfund Site in Monterey County, California (Plate 1). This document was developed during the period from October 2006 through May 2007. This report documents the results of the review of remedies implemented at Fort Ord documented in Records of Decision (RODs) and other areas shown on Plates 2 through 4 and summarized below:

- Operable Unit 1 (OU 1) ROD — Fritzsche Army Airfield
- Operable Unit 2 (OU 2) ROD — Fort Ord Landfills
- Basewide RI Sites ROD
  - Sites 2/12 (Site 2: Main Garrison Sewage Treatment Plant (MGSTP); Site 12: Lower Meadow Disposal Area, Department of Logistics (DOL) Automotive Yard, Cannibalization Yard and Industrial Area, Southern Pacific Railroad (SPRR) Spur, Outfall (OF) 31 Area
  - Sites 16 and 17 (Site 16: DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension; Site 17: Disposal Area and Other Areas)
  - Site 31 (Former Dump Site)
  - Site 39 (Inland Ranges)

  - Surface Water OFs (OF-1 through OF-14; OF-16 through OF-30; OF-32, OF-33)
  - Site 25 (Equipment Storage Area)
  - Site 33 (Golf Course Maintenance Area)
- Site 3 Interim ROD — Beach Trainfire Ranges
- No Action (NoA) Sites ROD
- Interim Action (IA) Sites ROD
- Operable Unit Carbon Tetrachloride Plume (OUCTP) ROD (in progress)
- Track 0 ROD
- Track 1 ROD
- Parker Flats MR Area, Track 2 ROD (in progress)
- Interim Action Site MR ROD
- Impact Area MR Area, Track 3 ROD (in progress)
- Del Rey Oaks MR Area, Track 2 ROD (in progress)
- Munitions Response (MR)
- Other Investigations (not addressed under one of the RODs above)
  - Resource Conservation and Recovery Act (RCRA) Closures
  - Basewide Range Assessment

The first Five-Year review was triggered by the remedial action at the OU 2 Landfill on May 17, 1997. This second Five-Year review includes the OUs, plus areas with MEC (MEC). The five-year review is required since hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

1.1 Five-Year Review Report Organization

This Five-Year Review Report is organized as follows:

Section 1 – Introduction. Describes the purpose and scope of the Five-Year Review report and summarizes its organization.

Section 2 – Site Chronology Table. Summarizes the chronology of cleanup-related events at Fort Ord that are reviewed in this report.

Section 3 – Fort Ord Background. Describes the general physical characteristics and land uses including land transfers at Fort Ord; the history of contamination; initial responses to the presence of contamination; and the basis for actions taken to address the contamination.

Section 4 – Five-Year Review Process. Summarizes the components of the second Five-Year Review process, including administrative and community involvement components; and data review, site inspection, and interview procedures.

Section 5 – OU 1 ROD Fritzsche Army Airfield. Presents background information on OU 1 — Fritzsche Army Airfield (FAAF); a summary of remedial actions, a technical assessment of the actions

taken at the site, and progress since the last five-year review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 6 – OU 2 ROD - Fort Ord Landfills. Presents background information on OU 2 — Fort Ord Landfills; a summary of remedial actions, a technical assessment of the actions taken at the site, and progress since the last five-year review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 7 – Basewide Remedial Investigation Sites ROD. Presents background information on the Basewide RI sites; a summary of remedial actions, a technical assessment of the actions taken at these sites, and progress since the last five-year review; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 8 – Site 3 Interim ROD. Presents background information on the Site 3 Interim ROD; a summary of remedial actions, a technical assessment of the actions taken at this site, and progress since the last five-year review; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedy.

Section 9 – No Action Sites ROD. Presents background information on the NoA Sites ROD and a summary of remedial actions.

Section 10 – Interim Action Sites ROD. Presents background information on the IA Sites ROD; a summary of remedial actions and a technical assessment of the actions taken at these sites, and progress since the last five-year review; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 11 – Operable Unit Carbon Tetrachloride Plume (OUCTP) ROD (in progress). Presents background information on the CT plume; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 12 – Track 0 ROD. Presents background information on the Track 0 (NoA) ROD regarding MR; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 13 – Track 1 ROD. Presents background information on the Track 1 ROD regarding MR; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 14 – Parker Flats Munitions Response Area, Track 2 ROD (in progress). Presents background information on the Parker Flats MR Area, Track 2 MR ROD (Parker Flats ROD); a summary of preferred remedial alternative; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 15 – Interim Action Site Munitions Response ROD. Presents background information on the IA sites MR ROD; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 16 – Impact Area Munitions Response Area, Track 3 ROD (in progress). Presents background information on the Impact Area MR Area, Track 3 MR (RI/FS) a summary of preferred remedial alternative; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 17 – Del Rey Oaks Munitions Response Area, Track 2 ROD (in progress). Presents background information on the Del Ray Oaks MR Area, Track 2 MR RI/FS; a summary of preferred remedial alternative; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

Section 18 – Status of Other Investigations. Provides background information and status reports on other investigations at Fort Ord not addressed under one of the RODs described above.

Section 19 – Next Review. Describes the schedule for the next Five-Year Review to be conducted at Fort Ord.

Section 20 – References. Provides a list of references to pertinent documents cited in the report.

2.0 SITE CHRONOLOGY TABLE

The table below presents a summary of the chronology of cleanup-related events at Fort Ord.

Event	Date
Pre-NPL Responses	
OU 1 (Fritzsche Army Airfield Fire Drill Area) Investigation	1984
OU 2 (Fort Ord Landfill) Investigation	1986
NPL Listing	2/1990
Federal Facility Agreement signed	7/1990
Base Realignment and Closure (BRAC) Listing	7/1991
Panetta Legislation (Public Law 102-190)	12/1991
Interim Action ROD (IAROD)	3/1994
OU 2, Fort Ord Landfills, Record of Decision (ROD)	8/1994
No Action Plug-In ROD	4/1995
OU 1, Fritzsche Army Airfield, ROD	9/1995
OU 2 Explanation of Significant Differences (ESD) #1	8/1995
Remedial Investigation/Feasibility Study Completed	10/1995
OU 2 ESD #2	8/1996
OU 2 ESD #3	1/1997
Interim ROD, Site 3 Beach Trainfire Ranges	1/1997
Basewide Remedial Investigation Sites ROD	1/1997
No Action MR ROD, Track 0	6/2002
Interim Action MR ROD for Ranges 43-48, Range 30A, and Site OE-16	9/2002
Site 39 ESD	12/2003
Track 1 MR RI/FS Completed	6/2004
No Further Action ROD for Track 1 Sites and for Site 3 (MRS-22) with Monitoring	4/2005
Track 0 ESD	4/2005
OU 2 ESD #4	8/2006
Operable Unit Carbon Tetrachloride Plume Proposed Plan	5/2006
Track 2 Parker Flats MRA MR RI/FS Completed	8/2006
Draft Final Comprehensive Basewide Range Assessment Report	11/2006
Track 3 Impact Area MRA MR RI/FS (draft final)	1/2007
Track 2 Parker Flats MRA Proposed Plan	2/2007
Track 2 Del Rey Oaks MRA MR RI/FS (draft)	3/2007
FS Addendum, Site 39 Ranges (draft)	5/2007
Track 3 Impact Area MRA MR Proposed Plan	6/2007

3.0 FORT ORD BACKGROUND

This section describes the general physical characteristics and land uses at Fort Ord; the history of contamination; initial responses to the presence of contamination; and the basis for actions taken to address the contamination.

3.1 Physical Characteristics

Fort Ord is adjacent to Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco (Plate 1). The base consists of approximately 28,000 acres adjacent to the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and Marina to the north. The Southern Pacific Railroad and Highway 1 pass through the western part of Fort Ord, separating the beachfront portions from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively.

3.1.1 History

Beginning with its founding in 1917, Fort Ord served primarily as a training and staging facility for infantry troops. From 1947 to 1975, Fort Ord was a basic training center. After 1975, the 7th Infantry Division occupied Fort Ord. The 7th Infantry Division was converted to a light division in 1983. Light infantry troops operate without heavy tanks, armor, or artillery. In 1991 Fort Ord was selected for closure and the post was officially closed in 1994. RIs and cleanup actions at the former Fort Ord have been performed and documented since 1986.

In 1917, the Army bought the present day East Garrison and nearby lands on the east side of Fort Ord to use as a maneuver and training ground for field artillery and cavalry troops stationed at the Presidio of Monterey. Before the Army's use of the property, the area was agricultural, as is much of the surrounding land today. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed.

In 1938, additional agricultural property was purchased for the development of the Main Garrison. At the same time, the beachfront property was donated to the Army. The Main Garrison was constructed between 1940 and the 1960s, starting in the northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, a small airfield within the Main Garrison was present. In the early 1960s, construction of the FAAF (FAAF) was completed. The Main Garrison airfield was then decommissioned and its facilities were redeveloped as motor pools and other facilities.

3.2 Land Use

Fort Ord consists of both developed and undeveloped land. The three principal developed areas at the time of base closure were the East Garrison, the FAAF, and the Main Garrison; these areas collectively comprised approximately 8,000 acres. The remaining 20,000 acres are largely undeveloped areas. Land uses in both the developed and undeveloped areas are described below

3.2.1 Developed Land

With the presence of up to 15,000 active duty military personnel and 5,100 civilians during its active history, developed areas at Fort Ord resembled a medium-sized city, with family housing, medical

facilities, warehouses, office buildings, industrial complexes, and gas stations. Individual land use categories were as follows:

- Residential areas included military housing, such as training and temporary personnel barracks, enlisted housing, and officer housing.
- Local services/commercial areas provided retail or other commercial services, such as gas stations, mini-markets, and fast food facilities.
- Military support/industrial areas included industrial operations, such as motor pools, machine shops, a cannibalization yard (area where serviceable parts are removed from damaged vehicles), and the FAAF.
- Mixed land use areas combined residential, local services/commercial, and military support operations.
- Schools included the Thomas Hayes Elementary, Roger S. Fitch Junior High, General George S. Patton Elementary, and Gladys Stone schools. High school students attended Seaside High, outside Fort Ord's southwest boundary.
- Hospital facilities included the Silas B. Hayes Army Hospital, medical and dental facilities, and a helipad.
- Training areas included a central running track and athletic field, firing ranges, and obstacle courses.
- Recreational areas included a golf course and club house, baseball diamonds, tennis courts, gymnasiums, and playgrounds.

The three principal developed areas are described below.

East Garrison: The East Garrison is on the northeast side of the base, adjacent to undeveloped training areas (Plate 2). Military/industrial support areas at the East Garrison included tactical vehicle storage facilities, defense recycling and disposal areas, a sewage treatment plant, and a small arms range. The East Garrison also contained recreational open space, including primitive camping facilities, baseball diamonds, a skeet range, and tennis courts. Recreational open space comprised 25 of the approximately 350 acres of the East Garrison.

Fritzsche Army Airfield: The former FAAF is in the northern portion of Fort Ord, on the north side of Reservation Road and adjacent to the city limits of Marina (Plate 2). The primary land use was for military/industrial support operations; facilities included air strips, a motor park, aircraft fuel facilities, a sewage treatment plant, aircraft maintenance facilities, an air control tower, a fire and rescue station, and aircraft hangars.

Main Garrison: The Southern Pacific Railroad right-of-way and Highway 1 separate the coastal zone from Fort Ord's Main Garrison (Plate 2). The Main Garrison consisted of a complex combination of the various land use categories. Facilities include schools; a hospital; housing; commercial facilities including a dry cleaner and a gasoline service station; and industrial operations including motor pools and machine shops.

3.2.2 Undeveloped Land

Coastal Zone: A system of sand dunes lies between Highway 1 and the shoreline (Plate 2). The western edge of the dunes has an abrupt drop in elevation of 40 to 70 feet, and the dunes reach an elevation of 140 feet above mean sea level on the gentler, eastern slopes. The dunes provide a buffer zone that isolated the Beach Trainfire Ranges (RI Site 3) from the shoreline to the west. In some areas, spent ammunition accumulated on the dune slopes as the result of years of range operation. Stilwell Hall

(previously used as a recreation center), numerous former target ranges and ammunition storage facilities, and two inactive sewage treatment facilities existed east of the dunes. Stilwell Hall was demolished between August 2003 and February 2004 due to coastal bluff erosion, building deterioration, and weathering.

Because of the presence of rare threatened and/or endangered species and because of its visual attributes, Monterey County has designated Fort Ord's coastal zone an environmentally sensitive area. The California Natural Coordinating Council and the Heritage Conservation and Recreation Service have identified the dunes at Fort Ord as among the best coastal dunes in California.

Inland Areas: Undeveloped land in the inland portions of Fort Ord included infantry training areas and open areas used for livestock grazing and recreational activities such as hunting, fishing, and camping. A large portion of this undeveloped land is occupied by the former Inland Trainfire Ranges (part of Site 39); this area was used for advanced military training operations.

These undeveloped areas occur primarily in their natural state, and typically do not contain developed facilities.

3.2.3 Transferred Land

Over 15,000 acres of former Ford Ord property has been transferred. Parcel sizes ranged from 0.1 acre to over 4,900 acres. The major property recipients have been the Bureau of Land Management (BLM), California Department of Parks and Recreation, California State University Monterey Bay, the Fort Ord Reuse Authority (FORA), University of California, the City of Marina and the City of Seaside. Table 3 lists parcels transferred as of January 1, 2007.

3.3 History of Contamination

The history of contamination is discussed on a site-by-site basis in Sections 5.0 through 18.0.

3.4 Initial Responses

After completion of the first phase of RI/FS field work, it was evident that the Installation Restoration Program sites could be categorized based on: (1) whether a release was identified at a site and (2) if a release had occurred, the nature and extent of the release. Therefore, using the initial site characterization information and existing pre-RI/FS data, the 43 sites were categorized as: (1) Basewide RI sites, (2) IA sites, or (3) NoA sites (Plate 2). These three categories are defined as follows; the individual RI, NoA, and NoA sites are listed in Sections 7.0, 9.0, and 10.0, respectively:

- RI Sites: RI sites have sufficient contamination to warrant a full RI, Baseline Risk Assessment (BRA), ERA, and Feasibility Study (FS)

- NoA Sites: NoA sites do not warrant remedial action under CERCLA

- IA Sites: IA sites have limited volume and extent of contaminated soil and, as a result, are easily excavated, as an IA

To accelerate the cleanup process, IA and NoA sites were addressed in separate remedial categories from the RI sites and were supported by their own RODs. These RODs provided a process for accelerated transfer of NoA sites and cleanup of IA sites under Base Realignment and Closure (BRAC), rather than delaying cleanup or transfer actions until a final ROD for Fort Ord is signed. The NoA ROD was signed

in April 1995, and the IA ROD (IAROD) was signed in March 1994. The RI sites ROD was signed in January 1997, and addressed cleanup of a range of sites for which full RI/FSs were deemed necessary.

In addition to the RI, NoA, and IA sites RODs, two operable units at Fort Ord (OU 1, the FAAF Fire Drill Area (FDA), and OU 2, the Fort Ord Landfills; Plate 2) were also supported by their own RODs and follow individual paths to the final ROD for Fort Ord. The ROD for OU 1 was signed in September 1995 and the OU 2 ROD was signed in August 1994.

Three separate RODs were prepared to address MR sites. The Army has been investigating and cleaning up MEC at the former Fort Ord since 1993. Information gained from these actions formed the basis for developing RI/FSs that supported these RODs. A NoA MR ROD was signed in September 2002 for the Track 0 areas. Also in 2002, an IA MR ROD was signed in for Ranges 43-48, Range 30A, and Site Ordnance and Explosives (OE)-16. A No Further Action ROD for Track 1 sites and ecological monitoring at Site 3 (MRS-22) was signed in April 2005. RODs will also be prepared for Track 2 and Track 3 sites.

3.5 Basis for Action

The basis for the action is discussed on a site-by-site basis in Sections 5.0 through 18.0.

4.0 FIVE-YEAR REVIEW PROCESS

This section summarizes the components of the Five-Year Review process, including administrative and community involvement components; and data review, site inspection, land transfer, incidental military munitions discoveries, and interview procedures.

4.1 Administrative Component

Members of the BRAC Cleanup Team (BCT) were notified of the initiation of the five-year review on October 2006. The Fort Ord Five-Year Review team was led by Gail Youngblood, the BRAC Environmental Coordinator, and the team included members from the United States Army Corps of Engineers (USACE) staff and its contractors, with expertise in hydrogeology, geology, treatment system operations and risk assessment.

4.2 Community Involvement

Activities to involve the community in the five-year review were initiated with an announcement that was made available at the Community Involvement Workshop, Technical Review Committee meeting and on the Fort Ord web page in January 2007.

4.3 Data Review

This second five-year review consisted of a review of relevant documents including operations and maintenance (O&M) records and monitoring data; RODs; Explanation of Significant Differences (ESD) to the RODs, where appropriate; confirmation reports; closure reports; applicable groundwater cleanup standards; Preliminary Remediation Goals (PRGs); and others reports listed in Section 20.0 (References) and referenced herein. Table 4 presents a summary of the status of all Fort Ord sites.

4.4 Site Inspections

Inspections at the sites were conducted between November 10, 2006, and February 28, 2007, for the purpose of assessing the protectiveness of the remedies. The Army and its contractors conducted the site inspections. OU 1; FAAF is routinely inspected as part of the groundwater treatment system operation and was not included in the site inspection.

4.4.1 OU 2 Landfill

The landfill cells are maintained by the USACE and its contractors. The landfills have been capped and the vegetation is well established.

The OU 2 groundwater treatment system, operated under a USACE contract, is regularly inspected and is operating properly. No new uses of groundwater within the OU 2 plume area were observed.

4.4.2 RI Sites

Sites 2/12 – The excavation area at Lower Meadow at Site 12 was transferred to the City of Marina and development of the area is underway. The 2/12 groundwater treatment system is operated under a USACE contract, regularly inspected by the USACE and is operating properly. No new uses of groundwater within the 2/12 plume area were observed.

Site 31 – The excavation area at Site 31 is revegetated and there are no signs of erosion or other activities on the excavated slope.

Site 33 – There were no residential development noted at Site 33 where restrictions limit the reuse for other than residential-type uses. The site is continuing to be used as a golf course maintenance area.

Site 39 – This site was not inspected because the remedial actions are in progress for soil contamination and MEC cleanup activities are in progress.

4.4.3 Site 3

The remediation areas at Site 3 are revegetated and there are no signs of erosion.

4.5 Transfer CRUP

Land use restrictions are required on some former Fort Ord property to ensure protection of human health and the environment. These land use restrictions are based on environmental evaluations of the property and were agreed upon by the property stakeholders. The land use restrictions are included in the deed, which is provided to the property recipient at the time of property transfer. As part of the five-year review deeds associated with transferred property were reviewed and any deed restrictions were identified. Table 3 includes a list of all transferred Fort Ord property listed by USACE parcel number, USACE deed tracking number, a reference to the Finding of Suitability to Transfer (FOST) or Finding of Suitability for Early Transfer document that included the particular parcel (if applicable), and any applicable deed notices that were determined to be necessary. Table 5 lists the deed restrictions by site. Land use restrictions that may be applicable to transferred former Fort Ord property include prohibitions on the installation of groundwater wells, restrictions on residential use, restrictions on soil excavation and disturbance and other parcel –specific reuse restrictions.

4.6 Incidental Military Munitions

Records documenting the discovery of incidental military munitions were reviewed to determine if any of the discoveries had occurred on transferred property. The incident reports are compiled by the Fort Ord BRAC Office as part of the MRS Security Program in response to private citizens, contractors and BLM employees who made the discovery. The reports contain information on the item found including a description and location, as well as the date of the discovery, who made the discovery, the date and time of the response, status of the item (e.g., MEC, munitions debris, etc.), results of a inspection of the surround area, and the final disposition of the item. Historical MEC incident data is analyzed annually in accordance with the Fort Ord MRS Security Program to determine if the location, frequency, or types of incidents indicate a need for changes in security procedures. If a change is determined appropriate, a notice is provided to regulatory agencies to include the recommended change.

A total of sixteen discoveries of incidental military munitions items were reported on transferred property over the last five years. A summary of all incidental items found is provided in Table 6. The majority of the incident reports (10 of the 16) recorded discoveries that were made on property transferred to the BLM (Parcels F1.1.1, F1.1.3, and F1.2). Nine of the 10 discoveries on BLM land were munitions debris and included practice and pyrotechnic items. The other discovery on BLM land included unfired small arms ammunition found in two ammunition storage containers.

Four of the sixteen discoveries occurred in areas that were evaluated under the former Fort Ord MR RI/FS program and were determined to be Track 0 (Parcels E2b.1.1.1, E4.3.1.1, L20.13.5, and L23.3.2.1). The Track 0 process addresses single or grouped areas of land at the former Fort Ord that have no history of

military munitions-related use and for which NoA is necessary to protect human health and the environment (Army, 2002a). Two of the four items found in Track 0 areas (Parcels E2b.1.1.1 and L20.13.5) were evaluated previously and documented in the NoA Track 0 ROD and the Group C Parcels Track 0 Plug-In Approval Memorandum (Army, 2002a and 2005e). The other two items discovered in Track 0 areas (Parcels E4.3.1.1 and L23.3.2.1) were found during recent construction activities.

The remaining two of the sixteen military munitions items were found on land (Parcels L29 and S1.2.1) that was evaluated as part of former Fort Ord Literature Review. No evidence of training with MEC items was identified in these parcels (HLA, 2000).

4.7 Interviews

The Army has conducted outreach efforts to the general community. For example, the quarterly Community Involvement Workshops, guided public tours of Ft Ord, and the participation of Ft Ord personnel in local fairs have maintained contact with the general community. Another very tangible effort has been to inform and involve the community during burning as part of MEC cleanup. During 2005, there were 42 significant outreach events reaching more than 3,000 individuals in the Monterey Bay Salinas Valley community.

Community surveys and interviews were conducted as part of the fourth update to the Fort Ord Community Relations Plan (CRP) during 2005 and ending in December 2005, just prior to initiating the Fort Ord Five Year review. The survey from the 2001 CRP update was used, which was developed in cooperation with the EPA and DTSC. The survey and invitation to interview was emailed to community leaders using an updated list from the previous CRP. In addition, the survey was included in the Fort Ord Annual report which was mailed to more than 52,000 households throughout the surrounding Monterey Bay - Salinas Valley communities. Documentation of the interviews and surveys is included in the Fort Ord CRP dated June 2006 (Army, 2006d). This report is available on line at www.fortordcleanup.com.

The 2005 interviews were structured using EPA guidance and allowing participants to discuss their interests and concerns fully and openly. Interview participants were encouraged to express their perspective and knowledge of community interests and concerns, environmental issues, and the needs of the community in relation to the cleanup. In 2005, 17 interviews were conducted. The breakdown of interviews is as follows: three city officials, one county official, five local regulatory agency representatives, and eight community group representatives/individuals. Interview names are kept confidential.

Information gathered during interviews indicates that the majority of community members are comfortable with their level of participation in the cleanup decision process and that they were confident that the cleanup was being conducted thoroughly. Of the 17 interviewees expressing interest or concern about community relations issues, during the interview process, 3 of 17 describe the cleanup information available to the community as not complete, distorted or too technical. Conversely, 14 comments on community relations issues endorsed or complimented existing outreach programs.

Cleanup documents concerning remedy selection are maintained in the Administrative Record. Public comments pertaining to the Fort Ord Cleanup are included in the Administrative Record. Community comments on documents are included in the response to comments section of documents. An example of a community comment letter in the Administrative Record is available at the following link http://www.fortordcleanup.com/adminrec/ar_pdfs/AR-OE-0613B/OE-0613B.pdf. The comments in this letter and the Army's responses have also been included in the response to comments section of the document available at: http://www.fortordcleanup.com/adminrec/ar_pdfs/AR-OE-0613E/RTC.pdf.

The public may review the documents contained in the record on-site or on-line. The Administrative Record is located in the BRAC Office, Building 4463 Gigling Road, Ord Military Community (former Fort Ord). In addition, the Fort Ord BRAC Office administers the Fort Ord environmental cleanup web site (www.fortordcleanup.com). The site provides background information, a description of current activities, documents available for public comment, maps, notices, Community Involvement Workshop agendas and summaries, Administrative Record index and documents and references for further cleanup and environmental information through EPA, DTSC, Army, and related agency web sites.

5.0 OU 1 ROD – FRITZSCHE ARMY AIRFIELD FIRE DRILL AREA

This section presents background information on OU 1, former FAAF FDA; a summary of remedial actions and a technical assessment of the actions taken at the site; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

5.1 OU 1 Background

The FDA was established in 1962 as a training area for the Fort Ord Fire Department (Plate 2). As part of training activities, fuel was discharged from an onsite storage tank into a pit, ignited, and then extinguished. Training activities at the FDA were discontinued in 1985 and the associated structures (pipeline and storage tank) were removed. Fort Ord's first site investigation was conducted at the FDA, and concluded that soil and groundwater cleanups were required in this area. In 1987, about 4,000 cubic yards (cy) of contaminated soil was removed from the FDA, and the area was then backfilled with clean fill (soil). Groundwater monitoring has been on-going since January 1986. Groundwater extraction and treatment system (GWETS) began in 1988 to remediate trichloroethylene (TCE) and continued through February 2006. The GWETS is currently off-line pending completion of a rebound evaluation study.

The OU 1 ROD stated that remediation of the contaminated soils at the FDA was complete (Army, 1995b). The OU 1 ROD defined groundwater extraction and treatment as the selected remedial action for OU 1 groundwater. The primary remediation objectives specified in the OU 1 ROD are 1) hydraulic control and containment of contaminated groundwater and 2) extraction and treatment of groundwater exceeding aquifer cleanup levels (see Table 7). The second objective is expressed in terms of aquifer concentrations for ten specific contaminants of concern (COC), all of which are volatile organic compounds (VOC).

The GWETS was constructed in 1988 in order to remediate TCE and other related groundwater contaminants within the FDA and the plume boundary as defined at that time. This remediation system is identified herein as the "source area GWETS" to distinguish it from subsequent construction of additional EW and treatment facilities that expanded the extent of plume capture (see Section 5.2).

Since 1986, groundwater monitoring has been conducted to characterize groundwater conditions and delineate the nature and extent of the OU 1 plume. Monitoring results indicate that the VOC plume migrated beyond the capture zone of the source area GWETS and has traveled beyond the northwest boundary of the Former Fort Ord. In July 2003, the contaminant plume was believed to cover an elongated area extending approximately 2,700 feet from the FDA in the direction of groundwater flow with a width of approximately 600 feet.

Late in 2004, TCE was detected at the northwestern boundary of the Former Fort Ord in monitoring well (MW) B-10-A at a concentration exceeding the aquifer cleanup level. Samples from additional wells installed up-gradient from and along the Former Fort Ord northwestern boundary confirmed that the contaminant plume was present at the northwestern boundary of the Former Fort Ord, within an elongated area extending more than 3,500 feet from the FDA in the general direction of groundwater flow with a width of approximately 600 feet.

The Hydraulic Control Pilot Project (HCPP) was constructed to prevent further off-Post migration of contaminated groundwater. This pilot project, which began operation in July 2006, is one component of the planned GWETS expansion that will comprise the overall remedy for the OU 1 plume within the

Former Fort Ord boundary (See Section 5.2). Additional investigations are underway by the Army to assess the extent of contaminated groundwater beyond the northwest boundary of the Former Fort Ord. The groundwater plume as of July 2006 is shown on Plate 3.

5.2 Remedial Actions

5.2.1 Remedy Selection

The following three remedial alternatives were evaluated in the OU 1 RI/FS (HLA, 1987) are as follows:

- Alternative 1: Air stripping of groundwater with vapor phase carbon treatment of effluent and biodegradation of soil.
- Alternative 2: Air stripping of groundwater with vapor phase carbon off-gas treatment, aqueous carbon polishing of effluent and biodegradation of soil.
- Alternative 3: Aqueous carbon effluent treatment of groundwater and biodegradation of soil.

5.2.2 Remedy Implementation

Alternative 3 was selected as the appropriate remedial action for groundwater at OU 1. The OU 1 groundwater GWETS was installed in 1988 and consisted of two EW (EW-OU1-17-A and EW-OU1-18-A) and an activated carbon treatment system. Treated water from the system was used to bioremediate contaminated soils at the site. Treated water enhanced with nutrients was sprayed on the soils overlying the contaminated groundwater. Soils treatment was completed in August 1991. Treated water continued to be discharged in the same location until 2006.

5.2.3 System Operations and Maintenance

The GWETS operated nearly continuously from the time of initial start-up until the start of the rebound evaluation in February 2006 except for a five-month shutdown in 1989 to modify the treatment system. There have been no design changes to the system other than a 33 percent increase in pumping capacity installed during the 1989 shutdown. The system configuration has been unchanged – two 33-cubic-foot (1,000 pound) carbon vessels are connected in series with a third off-line unit (available for replacement of spent carbon). Declining VOC concentrations in the influent have extended the operating cycle of the system. Before the shut-down for the rebound evaluation, carbon change-outs were needed approximately every other year. In 2006, groundwater quality in all MWs within the GWETS capture zone met the remediation cleanup targets and both EW were shut down in February 2006 to conduct a rebound evaluation study (HGL, 2006c). The rebound evaluation is still underway and both wells remain off-line.

5.2.3.1 OU 1 Groundwater Monitoring Within Former Fort Ord

Quarterly sampling of groundwater from selected MWs within the long-term monitoring began in 1988 and continued during this second five-year review period. The sampling frequency at some wells was decreased to a semi-annual or annual cycle in response to improving or stable groundwater quality. Some new wells installed during the 2004 – 2006 period were added to the long-term monitoring network.

The quarterly groundwater sampling data was presented in annual reports for the years 2002 through 2005 and shows long-term trends of system operation (HGL, 2006a, 2005; AGSC 2003, 2005). Quarterly letter reports have been prepared through the third quarter of 2006 (HGL, 2006b, 2007a, and 2007b) as of the

date of this Draft Five-Year Review. As of October 2006, the long-term MW network included 60 MWs that are sampled routinely (HGL, 2006a).

5.2.3.2 Off-Post Groundwater Monitoring

Characterization of the OU 1 TCE groundwater plume beyond the boundary of the former Fort Ord was started in 2006, indicating that the plume has migrated off the former Fort Ord boundary onto the Armstrong Ranch. Seven MWs were installed to better delineate the OU 1 TCE groundwater plume. TCE was detected in three of the MWs in the estimated centerline of the groundwater plume. TCE has only been detected in one MW above the aquifer cleanup level, approximately 400 feet downgradient of the HCPP extraction system. Additional characterization is planned to define the extent of the contamination, and groundwater samples will be collected and analyzed on a quarterly basis. Once the extent of the plume is identified the Army will provide a remedial approach to address the offsite contamination.

5.2.4 Progress Since the Last Five Year Review

Sampling of OU 1 MWs in 2002 revealed that VOC contaminants were present in the A-Aquifer downgradient from the capture zone of the GWETS at concentrations greater than their respective aquifer cleanup levels. The 1995 OU 1 ROD acknowledged that future system modifications may be necessary to achieve the cleanup objectives. A pilot study was conducted to evaluate the potential effectiveness of in-situ reductive chlorination to supplement the remediation of downgradient areas. In December of 2003 the existing GWETS was expanded to complete the OU 1 remediation – this component of the overall OU 1 ROD is identified as the "GWETS Expansion" for ease of reference.

One component of the overall GWETS expansion is the construction of wells to prevent the plume from continuing to migrate beyond the Former Fort Ord northwest boundary road. Four EW were installed along the northwest boundary such that the combined capture zones of the individual wells encompasses more than the full width and thickness of the TCE plume. Extracted groundwater is pumped through granulated activated carbon (GAC) tanks arranged in sequence to remove VOCs. The treated water is returned to the A-Aquifer via infiltration trenches installed in the grassland area northeast of the OU 1 plume. System operation began on July 2, 2006.

The locations of the additional groundwater EW are intended to expedite the cleanup of that portion of the VOC plume that is found downgradient from the source area GWETS and up-gradient from the HCPP system. This component of the GWETS Expansion is identified as the Fort Ord Natural Reserve (FONR) System. Extracted groundwater will be conveyed to the HCPP treatment plant to remove VOC contaminants and returned to the A-Aquifer through additional infiltration trenches and through two injection wells (IW-OU1-73A and IW-OU1-74A). These recharge facilities are located outside the 1.0 micrograms per liter (µg/L) TCE concentration contour.

5.3 Technical Assessment

O&M are described in the O&M Manual (HLA, 1996l) prepared for the source area GWETS. Details regarding operation and system performance are presented in the annual groundwater monitoring reports (HGL, 2005, 2006a; AGSC 2003, 2005) for 2002 through 2005 and quarterly letter reports for the first three quarters of 2006 (HGL, 2006b, 2007a, and 2007b).

5.3.1 Question A

Is the remedy functioning as intended by the decision document?

With regard to the area within the boundary of the Former Fort Ord, the groundwater remedy, comprised of the source area GWETS and the HCPP system, is continuing to effectively reduce the total mass and concentration of COCs in groundwater. Groundwater samples from all A-Aquifer MWs within the capture zone of the source area GWETS met the clean-up targets in the December 2005 event. Operation of the source area GWETS was suspended in February 2006 to conduct a rebound evaluation study and determine if the system can be permanently shut down.

At the northwestern property boundary, the initiation of pumping from the HCPP during July 2006 is intended to halt the migration of the VOC plume beyond the property boundary. Although the HCPP has not been operating or monitored long enough to reach definitive conclusions regarding performance, the initial data suggest that the desired hydraulic control of the plume has been established along the northwest property boundary.

With regard to the area downgradient from the northwest property boundary of the Former Fort Ord, MW data from early 2007 show that concentrations of TCE exceeding the aquifer cleanup level extend approximately 400 feet beyond the boundary of the former Fort Ord. This part of the plume is not being captured by the HCPP system, although the HCPP system will prevent further migration beyond the property line. The Army is characterizing the extent of the contamination and evaluating options for addressing the plume beyond the property line.

Monterey County Ordinance 4011 has been put into effect that regulates water well installation within either the "Groundwater Prohibition Zone" or "Groundwater Consultation Zone," which includes the known groundwater plumes at the former Fort Ord. In addition, the Army has included groundwater use restriction in the federal deed and has executed a Covenant To Restrict Use Of Property (CRUP) (recorded with the deed) for all transferring parcels that are located over the groundwater plume. The deed restriction and the CRUP will prohibit construction of wells for injection or extraction of any groundwater until the aquifer cleanup levels are attained.

5.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Land use within the limits of the groundwater plume is consistent with the exposure assumptions used for the development of the aquifer cleanup levels specified in the OU 1 ROD. The standards for site aquifer cleanup levels were based on state and federal maximum contaminant level (MCL) except where more stringent values were developed from the human health risk assessment. The MCLs for the OU 1 COCs have not changed since the OU 1 ROD was signed, thus the aquifer cleanup levels are still in compliance with, or more conservative than, federal standards. Maximum COC concentrations detected in the OU 1 groundwater monitoring network since the OU 1 ROD was signed are less than the maximums identified in the OU 1 ROD.

5.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

As described in above, MW data from early 2007 show that concentrations of TCE exceeding the aquifer cleanup level extend approximately 400 ft beyond the boundary of the former Fort Ord. The existing extraction system is not able to capture this part of the plume and the Army is evaluating options to address this portion of the plume. The HCPP system will prevent further migration beyond the property line.

5.4 Issues

The source area GWETS is currently not operating while a rebound evaluation study is being conducted to determine if the cleanup standards have been achieved in the area of the former FDA. The results of this study will be presented to the BCT and the appropriate follow-up actions will be identified and implemented.

The HCPP component of the GWETS Expansion has been operating at OU-1 since startup on July 1, 2006. Groundwater quality and elevation data collected during the first six months of system operation were evaluated to assess the effectiveness of the HCPP with respect to control of plume migration and groundwater cleanup. The *Draft Interim Hydraulic Control Pilot Project Evaluation Report, Operable Unit 1, Fritzsche Army Airfield Fire Drill Area* (HGL, 2007c) documents the data collected during the first six months of HCPP operation and provides an evaluation of HCPP operation compared to the original modeled design. The results of this evaluation revealed that the system is performing as well or better than initial design projections.

The existing groundwater remedy is protective over the area for which it was designed but cannot remediate contamination downgradient of the property boundary without modification. If remediation of this downgradient contamination is necessary, then expansion of the existing system or alternative remediation methods will need to be implemented to apply the cleanup standards specified in the OU 1 ROD to the entire area of the plume.

5.5 Recommendations and Follow-Up Actions

The rebound evaluation for the source area GWETS should be completed by the summer of 2007 and appropriate follow-up actions will be recommended at the end of the rebound evaluation period. Operation of the HCPP system should continue until aquifer cleanup levels have been achieved and maintained within the FONR. Construction of the remaining facilities in the GWETS Expansion (the FONR System) is planned for completion and operation should begin during the late summer/fall of 2007.

The Army is evaluating remedial alternatives to capture TCE that has migrated beyond the former Fort Ord boundary. The HCPP that has been installed is an effective barrier to prevent further migration across the property boundary.

5.6 Protectiveness Statement

The remedy will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled because of the presence of Monterey County Ordinance 4011 and the CRUP.

6.0 OU 2 ROD – FORT ORD LANDFILLS

This section presents background information on OU 2 — Fort Ord Landfills; a summary of remedial actions and a technical assessment of the actions taken at the site; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

6.1 OU 2 Background

Operable Unit 2 (OU 2), the Fort Ord Landfills site, consists of landfills covering approximately 150 acres, the immediate surrounding area, and the underlying contaminated groundwater (Plate 2).

The landfills were used for over 30 years for residential and commercial waste disposal. The landfills include six cells, Cells A through F. Cell A was located north of Imjin Road and Cells B through F are located south of Imjin Road. Cell A operated from 1956 to 1966. Cells B through F operated from 1960 until 1987, and may have received a small amount of chemical waste along with household and commercial refuse. The landfill stopped accepting waste for disposal in May 1987 because of the initiation of interim closure of the facility.

As a result of detections of VOCs in Fort Ord and Marina County Water District water supply wells, the Regional Water Quality Control Board (RWQCB) issued Cleanup and Abatement Order (CAO) 86-87 that required Fort Ord to initiate studies of soil and groundwater to assess the potential impact of the Fort Ord Landfills on underground water resources. The RWQCB also issued CAO Nos. 86-317 and 88-139 for the investigation and cleanup of groundwater contamination caused by the landfills and Waste Discharge Report No. 87-153 requiring landfill closure by 1989. The Army initiated studies (HLA, 1988) to evaluate whether chemicals from the landfills had affected either soil beneath the landfills or the quality of groundwater beneath the sites, or both.

The *Final Remedial Investigation Report* (Dames and Moore, 1993a) indicated the presence of low levels of semi-volatile organic compounds (SVOC) and pesticides in soil at maximum total detected concentrations of 5.6 milligrams per kilogram (mg/kg) and 0.12 mg/kg, respectively. Metals were also detected in all soil samples. Soil gas sampling detected VOCs and methane, and VOCs were also detected in groundwater samples collected from both the A-Aquifer and the 180-Foot Aquifer. TCE was the most frequently detected chemical in groundwater with a maximum concentration of 80 µg/l. Other VOCs detected in groundwater samples included: tetrachloroethene (PCE), benzene, cis-1,2-dichloroethene (DCE), and dichloromethane. Recent data indicates that a portion of the CT plume described in Section 11 has migrated to the southeast where it commingles with the OU 2 plume.

6.2 Remedial Actions

6.2.1 Remedy Selection

The following five remedial alternatives were evaluated in the FS (Dames and Moore, 1993a):

- Alternative 1: NoA
- Alternative 2: Containment
- Alternative 3: A-Aquifer Cleanup and Landfill Capping.
- Alternative 4: A-Aquifer Cleanup and Landfill Capping – IA on the 180-Foot Aquifer

- Alternative 5: A-Aquifer Cleanup and Removal, Treatment, and Disposal of Landfill Waste – IA on 180-Foot Aquifer

Selected Remedy

The selected remedy was Alternative 4: Upper Aquifer Cleanup and Landfill Capping - IA on the 180-Foot Aquifer (Army, 1994b). The alternative includes groundwater EW that are screened only in the A-Aquifer, with a system designed to achieve groundwater and chemical removal as well as containment in the A-Aquifer. This alternative also includes construction of a landfill cap to minimize exposure, and reuse or recharge of treated water to the subsurface. In addition, this alternative includes removal and treatment of groundwater and chemicals from the 180-Foot Aquifer. The aquifer cleanup levels are listed in Table 7.

The following documents identified additional remediation criteria that were not specified in the OU 2 ROD:

Explanation of Significant Differences (ESD) 1

In August, 1995, the *Explanation of Significant Differences, Operable Unit 2, Fort Ord Landfills* (Army, 1995c) was signed. This ESD finalized the 180-Foot Aquifer cleanup goals consistent with those established for the A-Aquifer in the OU 2 ROD.

ESD 2

In August, 1996, the *Explanation of Significant Differences, Area A, Operable Unit 2, Fort Ord Landfills* (Army, 1995d) was signed. This ESD addressed the identification of cleanup criteria for areas outside the main landfill that would be excavated and consolidated within the main landfill boundaries.

ESD 3

In January 1997 the *Explanation of Significant Differences, Consolidation of Remediation Waste in a Corrective Action Management Unit (CAMU), Operable Unit 2, Fort Ord Landfills* (Army, 1997a) was signed. This ESD addressed soil and debris (remediation waste) that would be excavated from remediation areas at Fort Ord and consolidated within the main landfill boundaries.

ESD 4

In August 2006 the *Explanation of Significant Differences, No Further Action for Munitions and Explosives of Concern, Landfill Gas Control, Reuse of Treated Groundwater, Designation of Corrective Action Management Unit (CAMU) Requirements as Applicable or Relevant and Appropriate Requirements (ARARs), Operable Unit 2, Fort Ord Landfills, Former Fort Ord, California* (Army, 2006e) was signed. This ESD addressed that no further action regarding MR within the landfill is required, implementation of landfill gas control measures and reuse of treated groundwater. This ESD clarified that the intent and purpose of ESD 3 (Army, 1997a) was to designate the substantive requirements for a Corrective Action Management Unit (CAMU), as defined in California Code of Regulations (CCR) Title 22 and RCRA, as ARARs for the Fort Ord Landfills. Furthermore, ESD 4 clarified that it was not the intent of the Army, EPA, DTSC, and RWQCB to designate the Fort Ord Landfills as a CAMU, as suggested by ESD 3.

6.2.2 Remedy Implementation

Landfill Cap

A cap has been constructed over the main portion of the landfill containing debris. An approximate 25-acre area of the landfill (Cell A) was excavated and transferred to the main portion of the landfill to consolidate the debris in one area. This soil consolidation action allowed for clean closure of Cell A,

which is now available for unrestricted use (IT, 2001a). The remaining areas of the landfill (Cells B, C, D, E and F) have been covered by a landfill cap constructed after consolidation activities were completed. A seven-acre portion of Cell E (Interim Cell E) was kept open to allow the placement of additional waste from other Fort Ord remediation sites (Army, 1997a). The landfill cap was placed over the Interim Cell E in December 2002.

Groundwater Treatment

A groundwater treatment facility was constructed in 1995 to remediate groundwater underlying the landfill. Remediation is expected to take about 30 years. During the operation of the treatment system, groundwater is sampled to confirm that the treatment system is operating effectively. Since 1995, water samples and water levels from groundwater MWs have been collected every three months. This information has been compiled into quarterly and annual reports to show the long-term trends of system operation. The groundwater plume as of July 2006 is shown on Plate 3.

6.2.3 System Operations and Maintenance

Landfill Cap

O&M of the landfill includes inspection and maintenance of the landfill cover (vegetative cover and geomembrane), slope stability, survey monuments, settlement plates, erosion and drainage control, and security fence. Landfill gas monitoring to evaluate subsurface landfill gas migration in the perimeter probes has been ongoing since June 2000.

Groundwater Treatment

O&M have kept the OU 2 groundwater treatment system functioning in accordance with design parameters since the inception of operations in 1995. The OU 2 groundwater remedy is operated in accordance with the *Operation and Maintenance, Groundwater Treatment Systems, Former Fort Ord, California* (Harding ESE/IT, 2001a) and *Sampling and Analysis Plan, Operable Unit 2, and Sites 2 and 12 Groundwater Treatment Systems, Former Fort Ord, California* (AGSC, 2004). O&M activities are summarized annually in treatment system data summary reports. The most recent annual report describing OU 2 O&M is the *Annual Groundwater Treatment Systems Operation Data Summary Report, January through December 2005, Operable Unit 2 and Sites 2/12, Former Fort Ord, California* (AGSC, 2007). To date, the system has processed over 3.35 billion gallons of water and removed over 496 pounds of COCs, of which approximately 98 percent are TCE, cis-1,2- DCE, 1,1- dichloroethane (DCA), PCE, and chloroform. In 2005, all COCs were below the allowable treated water discharge limits in samples obtained from OU2 groundwater treatment plant (GWTP) effluent stream for the entire reporting period. The system operates continuously except for periods of routine maintenance, carbon servicing, and replacement of worn equipment. To date, the system has been in operation approximately 99.5 percent of the time. Carbon replacement in the system has occurred approximately every 4 to 6 months since operation began.

The OU 2 groundwater treatment system originally consisted of carbon adsorption followed by catalyzed ultraviolet chemical oxidation (UV-Ox) polishing. The carbon adsorption was accomplished using two 20,000-pound carbon vessels connected in series. The original system extracted water from two Upper 180-Foot Aquifer EW and 13 A-Aquifer EW to produce a total flow of approximately 765 gallons per minute (gpm). Following treatment, the extracted water was injected back into either the A-Aquifer or Upper 180-Foot Aquifer.

Expansion of the OU 2 treatment system was initiated following discovery that the aquifer area with COCs greater than aquifer cleanup levels was larger than originally recognized during the groundwater treatment system design. Hydraulic capture of the resulting plume by the original system was not complete, and a system expansion was initiated to enable complete plume capture and fulfill the

remediation objectives of the OU 2 ROD. Groundwater monitoring is conducted throughout the OU 2 treatment area and within all the effected aquifers to evaluate changes that may result from the expanded system and to monitor the effectiveness of the remedy.

System modifications were completed in April 2001, in accordance with the *Groundwater Remedial Action Work Plan, Operable Unit 2 Groundwater Remedy System Expansion* (IT, 1999d). Modifications included removal of the UV-Ox system, installation of a second set of two additional 20,000-pound carbon vessels connected in series and operated in parallel with the original carbon vessels, and installation of seven additional EW. A pipeline was constructed to transfer a portion of the OU 2 effluent to the Sites 2/12 area for injection with the Sites 2/12 effluent.

A further expansion of the OU2 treatment system has been constructed in 2006/2007, with the addition of two new extraction well in the Upper 180-Foot Aquifer connected by a new pipeline to the treatment system. One of these wells became operational in July 2007; the second well may be brought into operation later depending on monitoring data.

6.2.4 Progress Since the Last Five-Year Review

Groundwater Treatment

After system modification in 2001, the parallel treatment train effectively doubled the potential throughput capacity of the GWTP to above 1,200 gpm. However, water flow into the GWTP has been limited because of pipeline flow capacity limitations. A water flow restriction study was conducted and revealed that a pump or pumps could be placed to increase the flow capacity.

A 1,200 gpm in-line pump was installed in 2006 and is in the process of being incorporated into daily operations at the GWTP. In addition, two new EW have been installed in the Upper 180-Foot Aquifer.

Landfill Gas Treatment

A landfill gas extraction and treatment system was installed in 2001 to prevent migration of landfill gas away form the eastern side of Cell F where residential housing is located closest to the landfill. The system was composed of eleven EW with the landfill gas treated with GAC to remove VOCs and potassium permanganate to remove vinyl chloride. This extraction and treatment system maintained methane concentrations along the fence line adjacent to the eastern side of Cell F to less than five percent by volume. During operation of this system, physical and chemical data, especially landfill gas flow rate and composition were evaluated to determine advantages, disadvantages, and cost effectiveness of different treatment technologies.

Expansion of the landfill gas extraction and treatment system was completed in 2006. The landfill gas expansion consists of adding vertical EW along the perimeter and interior of Cell F and replacing the existing treatment system with a thermal treatment unit (TTU). The new extraction and treatment system will continue to prevent migration of landfill gas towards housing, and will also reduce the migration of VOCs from Cell F to the underlying groundwater and reduce emissions of VOCs and methane to the atmosphere.

The TTU started intermittent operation as part of the start-up shakedown in April 2006 and full-time operation on August 2, 2006.

6.3 Technical Assessment

6.3.1 Question A

Is the remedy functioning as intended by the decision document?

Landfill Cap

The landfill cap is functioning as intended.

Groundwater Treatment

The OU 2 groundwater remedy is functioning as intended. Both the original system installed in 1995 and the expanded system completed in 2001 achieved the groundwater extraction and treatment design parameters described in design documents. System operation has been relatively constant since system startup in 1995. Details regarding operation and system performance are described in the *Annual Groundwater Treatment Systems Operation Data Summary Report, January through December 2005, Operable Unit 2 and Sites 2/12, Former Fort Ord, California* (AGSC, 2007).

Statistical evaluation of data obtained from OU 2 treatment system influent samples indicate that concentrations are generally decreasing over time. The influent chemistry data indicates that the OU 2 groundwater remedy is effectively reducing the total mass of COCs in groundwater, and is functioning in accordance with the objectives stated in the OU 2 ROD (Army, 1994b).

The expanded OU 2 groundwater remedy is operating at the designed flow rates. Based on monitoring performed since system modification, it appears to have achieved hydraulic capture of the groundwater containing COCs at concentrations above aquifer cleanup levels except at the eastern edge of the plume where two additional wells have been installed for capture. The groundwater contaminant mass within the hydraulic capture area is expected to be adequately addressed by the existing remedy.

Opportunities for future system optimization include discontinued groundwater pumping from individual wells where cleanup goals (aquifer cleanup levels) have been attained. Ending extraction at an individual well will allow for increased extraction from other existing wells and will reduce O&M costs associated with the well.

Monterey County Ordinance 4011 has been put into effect that regulates water well installation within either the "Groundwater Prohibition Zone" or "Groundwater Consultation Zone," which includes the known groundwater plumes at the former Fort Ord. In addition, the Army has included groundwater use restriction in the federal deed and has executed a CRUP (recorded with the deed) for all transferring parcels that are located over the groundwater plume. The deed restrictions and the CRUP will prohibit construction of wells for injection or extraction of any groundwater until the aquifer cleanup levels are attained.

6.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs *used at the time of the remedy selection still valid?*

Landfill Cap

The exposure and toxicity criteria used to evaluate human health risks are still valid.

Groundwater Treatment

The property in and around the OU 2 plume area has been transferred. Land use has not changed sufficiently to alter the exposure assumptions that were used during the original risk assessment and development of aquifer cleanup levels. The aquifer cleanup levels for the COCs identified in the OU 2 ROD were based on State or federal MCLs with the exceptions of chloroform, 1,2-dichloropropane, PCE, and vinyl chloride, for which the aquifer cleanup levels are lower than State or federal MCLs. The lower aquifer cleanup levels were based on risk calculations for each COC that estimated a combined excess cancer risk of 6 $x10^{-5}$ (Dames and Moore, 1993c). Since the original risk assessment, the State or federal MCLs that were selected as aquifer cleanup levels have not changed, and toxicity values for the additional calculated aquifer cleanup levels have not changed, with the exception of vinyl chloride. The toxicity values for vinyl chloride are still within the parameters used for the original risk calculations, and the aquifer cleanup levels designated for OU 2 remain protective of human health and the environment.

Current development plans for the surrounding area adjacent to the landfill include mixed use retail, residential, and commercial. A soil gas program to evaluate the potential risks from the groundwater contamination will be developed based on actual use of the land.

6.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

Landfill Cap

When first installed, perimeter gas probes indicated that landfill gas concentrations exceeded the regulatory standards along the eastern boundary of Cell F. Migration of landfill gas is addressed by California Integrated Waste Management Board regulations for Solid Waste Landfills, Title 14 CCR, Chapter 3, Article 7.8 – an ARAR as identified in the OU 2 ROD. To mitigate migration, a landfill gas extraction and treatment system composed of GAC/potassium permanganate was installed in 2001. An expanded system composed of additional perimeter and interior wells and a TTU was installed in 2006. The expanded system has been successfully remediating landfill gas.

Groundwater Treatment

The OU 2 groundwater remedy has consistently operated in accordance with either the original design or the more recent system expansion design. Current system operation is compliant with the objectives of the OU 2 ROD, and is protective of human health and the environment. To date, the system has processed over 3.35 billion gallons of water and removed over 496 pounds of contaminants. In the five years of operation a trend of decreasing concentrations of COCs appears to be continuing.

6.4 Issues

Landfill Cap

The landfill has not been closed, but an impermeable cover has been placed on each of the cells where wastes were placed. Final closure of the landfill is scheduled after excavated soil from Site 39 is placed within Cell E of the landfill.

Groundwater Treatment

The expanded OU 2 groundwater remedy is operating at the designed flow rates. Based on monitoring performed since system modification, it appears to have achieved hydraulic capture of the groundwater containing COCs at concentrations above aquifer cleanup levels except at the eastern edge of the plume where an additional well has been installed for capture. The groundwater contaminant mass within the hydraulic capture area is expected to be adequately addressed by the existing remedy.

6.5 Recommendations and Follow-Up Actions

Landfill Cap

Continue operation of the landfill gas treatment system to maintain landfill gas levels remain below regulatory standards. Continue to inspect and monitor the OU 2 Landfills in accordance with the *Preliminary Draft Closure Operation and Maintenance Plan, Operable Unit 2 Landfills* (Shaw, 2006a).

In the FS Addendum currently in development for Site 39, consideration is being given to placing excavated soils on top of the existing cover on Cell E and then placing a new engineered cover.

Groundwater Treatment

The OU 2 Groundwater Remedy should continue to be implemented as designed until either aquifer cleanup levels are reached or the next technical assessment is conducted. Adjustments to system operation may be conducted to maximize extraction and treatment of contaminants while maintaining capture of the plume.

6.6 Protectiveness Statement

The remedy will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled because of the presence of Monterey County Ordinance 4011 and the CRUP.

7.0 BASEWIDE REMEDIAL INVESTIGATION SITES ROD

This section presents background information on the Basewide RI sites; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

7.1 Sites 2/12

7.1.1 Background

7.1.1.1 Site 2 – Main Garrison Sewage Treatment Plant (MGSTP)

The MGSTP occupied an unpaved area of approximately 28 acres west of Range Road between Trainfire Range No. 9 and Stilwell Hall (Plate 2). The MGSTP was the primary sewage treatment facility for Fort Ord, serving the majority of the housing areas and the main industrial areas from the late 1930s until May 1990 when it was decommissioned. The former treatment facility was fenced and contained several buildings and two large trickling filters. Outside of the fenced area were three unlined sewage ponding areas and 10 asphalt-lined sludge-drying beds. During operation, effluent from the MGSTP was discharged under a National Pollutant Discharge Elimination System (NPDES) permit to a storm drain that emptied onto Indianhead Beach during low tide and discharged to Monterey Bay during high tide. Sewage from Fort Ord now flows via gravity feed to a pumping station in Marina and is then pumped to the Monterey Regional Treatment Plant, also in Marina. Potential contaminants associated with the former MGSTP included metals, pesticides, and hydrocarbons.

7.1.1.2 Site 12

The four major areas of Site 12 include the Lower Meadow Disposal Area, the DOL Automotive Yard, the Cannibalization Yard, and the Southern Pacific Railroad Spur (SPRR), as described below (Plate 2).

Lower Meadow Disposal Area

The Lower Meadow was a grassy field of approximately 2 acres east of Highway 1 near the Twelfth Street gate. The site is bounded to the east by the DOL Automotive Yard and to the west by First Avenue. The Lower Meadow was approximately 5 feet lower than the DOL Automotive Yard and received runoff from it. Several drainpipes (including OF 31) are in the southeast corner and the eastern side of the site. It is uncertain if the pipes were designed as drainage lines. No buildings were present in the Lower Meadow. The Lower Meadow was previously used to dispose of waste material such as scrap metal, oil, and batteries generated by the DOL. The area also appeared to contain road construction waste. Contaminated soils and associated debris were excavated during cleanup activities at the site, and the area was backfilled with clean soil.

DOL Automotive Yard

The DOL Automotive Yard is east of Highway 1 and northeast of the SPRR that runs east from First Avenue. The 8.5-acre fenced site is bounded by Twelfth Street to the north and the Lower Meadow to the west. The site included a paint shop, two wash racks, one temporary hazardous waste container storage area, an oil/water separator, an aboveground storage tank (AST), and several buildings used for automotive repair. The site is paved and slopes gently to the west. Previous site activities included transmission repair, degreasing, engine testing, steam cleaning and washing vehicles, and petroleum/oil/

lubricant storage. A buried container, which was originally used as a muffler for exhaust from engine testing, may also have been used for liquid waste storage. Tanks and contaminated soils were excavated during cleanup activities at the site, and the area was backfilled with clean soil.

Cannibalization Yard and Industrial Area

The Cannibalization Yard is a small (0.5-acre) paved and fenced area located within the larger (18.5 acre) paved and fenced Industrial Area. The entire 18.5-acre area is bounded by Highway 1 to the west, a baseball field to the east, and Tenth Street to the south. The SPRR spur separates the Industrial Area from the DOL Automotive Yard to the north. The area included a machine shop, a furniture repair shop, a laundry facility, a temporary hazardous waste container storage area, an oil/water separator, and an AST used for storing waste oil. Beginning in 1964, the Cannibalization Yard was used to disassemble old equipment, primarily decommissioned military vehicles. Used motor oil was collected and stored onsite in 55-gallon drums. Between January 1988 and August 1988, waste oil was stored in a 450-gallon AST in the hazardous waste storage area at the machine shop adjacent to the yard. Other vehicle maintenance activities included removal and storage of the following types of fluids and parts gasoline (leaded and unleaded), diesel fuel, brake fluid, asbestos-containing brake shoes and linings, antifreeze/coolants, lead and acid from batteries, lubricating greases, and transmission fluids. Prior to the installation of the oil/water separator at the northeast corner of the yard, runoff from the site flowed down the sloped area northeast of the Cannibalization Yard toward the baseball field. The site is no longer active, and contaminated soils were excavated during cleanup activities at the site, and the area was backfilled with clean soil.

Southern Pacific Railroad (SPRR) Spur

The SPRR spur (part of Site 13), an area of approximately 0.8 acres, consisted of the right-of-way along a portion of the railroad spur that extends northward from the Southern Pacific Railroad track west of Highway 1 and curves east through an industrial complex. The portion of the railroad track discussed here extends east from the main track east of Highway 1, across First Avenue, and between the DOL Automotive Yard and the Cannibalization Yard and surrounding Industrial Area. The rest of the railroad spur was investigated during the characterization of Site 13. The relatively flat right-of-way is mostly unpaved except in the areas adjacent to loading docks and where the spur crosses First Avenue. The railroad spur was used to transport troop materials and equipment from the main rail line to storage facilities between the DOL Automotive Yard and the Industrial Area. The SPRR spur is of concern because oil or fuels may have been sprayed in this area for dust control. Contaminated soils were excavated during cleanup activities at the site, and the area was backfilled with clean soil.

7.1.2 Remedial Actions

One groundwater and three soil remedial units (SRU) were defined at Sites 2/12, as described below.

Groundwater Remedial Unit (VOC Plume at Sites 2 and 12)

The groundwater remedial unit is defined as groundwater at Sites 2/12 containing the dissolved VOCs TCE, 1,2- DCA, DCE, and PCE that exceed aquifer cleanup levels (see Table 7).

The vertical extent of the affected groundwater ranges from the top of the water table to the top of the sandy silt layer that divides the 180-Foot Aquifer into upper and lower zones. The affected water-bearing zone beneath Sites 2/12 is the Upper 180-Foot Aquifer, which is the uppermost water-bearing zone in the vicinity and has approximately 75 to 80 feet of saturated thickness. Depth to water is approximately 70 to 80 feet below ground surface (bgs) at the eastern edge of the plume (Site 12) and approximately 40 feet bgs at the western edge (Site 2). The sandy silt layer dividing the 180-Foot Aquifer appears to have limited vertical migration of dissolved VOCs. The groundwater plume as of July 2006 is shown on Plate 3.

Soil Remedial Unit 1 (Lower Meadow Disposal Area)

The Lower Meadow Disposal Area is an approximately 0.5-acre portion of the Lower Meadow on Site 12, a grassy field east of Highway 1 near the Twelfth Street Gate defined as SRU 1, which contained concrete rubble and other construction debris intermixed with total petroleum hydrocarbon (TPH)-contaminated soil.

Soil Remedial Unit 2 (Outfall 31 Area)

Soil Remedial Unit 2 was defined as the OF 31 Area east of SRU 1, a grass-covered depression that received surface runoff and storm drainage flow from OF 31 and several other pipes. It had a catch basin area that collected precipitation and rainfall runoff. The catch basin was connected to subsurface piping, which ran to the west from the OF 31 Area to OF 15. The primary contaminants in soil associated with the OF included total TPH of unknown origin (TPH-unknown) and as diesel TPH (TPHd).

Soil Remedial Unit 3 (Cannibalization Yard Area)

Soil Remedial Unit 3 was the Cannibalization Yard Area. This area was a shallow surface drainage subject to runoff from the DOL Automotive Yard, and the Industrial Area to the west and south, respectively. Surface and shallow borings near an oil/water separator and along the eastern margin of the Cannibalization Yard indicated shallow soil contained elevated concentrations (greater than 500 mg/kg) of TPH. No TPH concentrations greater than 500 mg/kg were detected in soil samples collected below 0.5 feet bgs. The vertical and horizontal limits were defined by soil borings and surface samples.

7.1.2.1 Remedy Selection

Sites 2 and 12: Description of Alternatives

The following four remedial alternatives were evaluated in the Sites 2/12 FS (HLA, 1995f).

- Alternative 1: NoA
- Alternative 2: Groundwater Extraction and Treatment by Publicly Owned Treatment Works
- Alternative 3: Groundwater extraction and treatment by granular activated carbon (GAC)
- Alternative 4: Groundwater extraction, treatment, and disposal

Selected Remedy

Alternative 4 was selected as the remedy and includes the following components:

- Groundwater extraction and treatment by GAC.
- Disposal of treated groundwater by: (1) reuse aboveground or (2) injection or infiltration of treated water back into the aquifer.
- Deed restriction on groundwater use.
- Excavation of approximately 16,000 cy of soil and debris containing TPH concentrations above the cleanup goal of 500 mg/kg from the Lower Meadow Disposal Area, and placement at the OU 2 landfill.
- Excavation of approximately 3,800 cy of soil containing TPH concentrations above the cleanup goal of 500 mg/kg from the OF Area and Cannibalization Yard, and placement at the OU 2 landfill.

7.1.2.2 Remedy Implementation

Soil Remedy

The soil component of the remedy was addressed in accordance with approved plans (HLA, 1995f) by a series of soil removal actions which were completed and are documented in *Remedial Action*

Confirmation Report and Post-Remediation Health Risk Assessment, Site 12 Remedial Action, Basewide Remediation Sites, Fort Ord, California (IT, 1999c). The soil remediation resulted in the site being available for unrestricted reuse.

Groundwater Remedy

A groundwater pump and treat system was constructed in 1999 to remediate the plume of COCs in groundwater. During the operation of the treatment system, sampling and analysis are conducted to verify that the treatment system is operating effectively. Since 1999, water samples and water levels from groundwater MWs have been collected every three months. This information has been compiled into quarterly and annual reports to show the long-term trends resulting from system operation.

The groundwater treatment system originally consisted of carbon adsorption, accomplished using two 13,000-pound carbon vessels connected in series. The original system extracted water from eight wells located at Site 12 and discharged into five Upper 180-Foot Aquifer recharge structures (2 injection wells and 3 infiltration galleries). After startup, system modifications were immediately implemented due to the presence of vinyl chloride concentrations greater than anticipated. System modification included construction of a pipeline to transport and combine treated water from OU 2 with treated water from Site 12 prior to conveyance to the aquifer recharge structures. Most recently, an air stripper has been added for treatment of vinyl chloride (Section 7.1.2.4).

7.1.2.3 System Operations and Maintenance

The Sites 2/12 groundwater treatment system has been in operation since April 1999. The Sites 2/12 groundwater remedy is operated in accordance with the *Operation and Maintenance, Groundwater Treatment Systems, Former Fort Ord, California* (Harding ESE/IT, 2001a) and *Sampling and Analysis Plan, Operable Unit 2, and Sites 2 and 12 Groundwater Treatment Systems, Former Fort Ord, California* (AGSC, 2004). O&M activities are summarized annually in treatment system data summary reports. The most recent annual report describing Sites 2/12 O&M is the *Annual Groundwater Treatment Systems Operation Data Summary Report, January through December 2005, Operable Unit 2 and Sites 2/12, Former Fort Ord, California* (AGSC, 2007). To date, the system has processed over 884 million gallons of water and removed over 334 pounds of contaminants, of which approximately 75.8 percent is TCE, cis-1,2-DCE, 1,1-DCA, PCE, and chloroform. The system operates continuously except for periods of routine maintenance, carbon servicing, and replacement of worn equipment, and has been operational approximately 95.5 percent of the time. Carbon replacement in the system has occurred approximately every 4 to 6 months since operation began.

7.1.2.4 Progress Since the last Five-Year Review

In February 2002, the Army received Regulatory Agency approval to temporarily increase the maximum discharge level for vinyl chloride to the State of California MCL of 0.5 µg/L. The RI Sites ROD (Army, 1997b) lists the discharge limit and aquifer cleanup level for vinyl chloride as 0.1 µg/L. In February 2003, the discharge level was revised to 0.3 µg/L and was effective until June 2006. The elevated discharge limit for vinyl chloride allowed the groundwater treatment system to be operated closer to the initial individual well design flow capacity.

The pilot study evaluating the effectiveness of in-situ chemical oxidation of vinyl chloride using potassium permanganate was completed in 2002. In addition to the pilot study, an evaluation of various remediation alternatives and approaches was also conducted. The treatment augmentation recommended in the *Engineering Design and Analysis Report* (Shaw, 2005b) consists of a modified low profile air stripper, with vapor treatment by a substrate impregnated with potassium permanganate. Since the

augmentation acts as a polishing step, the groundwater remedy of extraction and treatment through liquid phase GAC, as stipulated in the existing RI Sites ROD (Army, 1997b) remains the same.

Treatment Augmentation was completed in 2006, in accordance with the *Treatment Augmentation Work Plan, Sites 2 and 12 Groundwater Remedy Expansion* (Shaw, 2006b). The treatment augmentation has been operating at about 230 gpm since January 2007.

As part of the redevelopment activities, four EW (EW-12-01-180U, EW-12-01-180L, EW-12-02-180U, EW-12-02-180L) and associated pipeline were abandoned. Three replacement wells (EW-12-X1-180U, EW-12-X2-180U, and EW-12-X3-180U and associated pipelines were installed and were available for extraction in late 2006.

7.1.3 Technical Assessment

7.1.3.1 Question A

Is the remedy functioning as intended by the decision document?

The Sites 2/12 groundwater remedy is functioning as intended, and is achieving the performance goals of the original conceptual design. An analysis of system performance to date is provided in *Annual Groundwater Treatment Systems Operation Data Summary Report, January through December 2005, Operable Unit 2 and Sites 2/12, Former Fort Ord, California* (AGSC, 2007).

The Sites 2/12 system operation data indicate the system has been pumping, treating, and discharging water in accordance with the approved plans. The system has extracted water at an average rate of 282 gpm and recharged water at an average rate of approximately 595 gpm (including effluent from the OU 2 treatment system). Groundwater chemistry monitoring data indicate the contaminant plume is decreasing in size as a result of Sites 2/12 groundwater remedy operation. Evaluation of water-level data indicates the presence of hydraulic features resulting from system operation that are consistent with hydraulic capture and an inward gradient throughout the plume.

The groundwater flow modeling of system operation indicates the groundwater remedy is reversing the original hydraulic gradient between Sites 2/12 (Sites 2/12) and is hydraulically capturing the plume in this area. Recent modifications to the system will increase its efficiency by allowing treatment of vinyl chloride and higher concentrations of VOCs. It is expected that this will significantly reduce the time required to achieve treatment objectives.

Monterey County Ordinance 4011 has been put into effect that regulates water well installation within either the "Groundwater Prohibition Zone" or "Groundwater Consultation Zone," which includes the known groundwater plumes at the former Fort Ord. In addition, the Army has included groundwater use restriction in the federal deed and has executed a CRUP (recorded with the deed) for all transferring parcels that are located over the groundwater plume. The deed restrictions and the CRUP will prohibit construction of wells for injection or extraction of any groundwater until the aquifer cleanup levels are attained.

7.1.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

Land use has not changed sufficiently to alter the exposure assumptions that were used during the original risk assessment and development of aquifer cleanup levels. The aquifer cleanup levels for the COCs

identified in the Basewide RI Sites ROD were based on State or federal MCLs with the exceptions of chloroform, PCE, and vinyl chloride, for which the aquifer cleanup levels are lower than State or federal MCLs. The lower aquifer cleanup levels were based on risk calculations for each COC that estimated a combined excess cancer risk of 6×10^{-5}. Since the original risk assessment, the State or federal MCLs that were selected as aquifer cleanup levels have not changed, and toxicity values for the additional calculated aquifer cleanup levels have not changed, with the exception of vinyl chloride. The toxicity values for vinyl chloride are still within the parameters used for the original risk calculations, and the aquifer cleanup levels remain protective of human health and the environment.

7.1.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

The Sites 2/12 groundwater remedy is achieving the performance goals of the original design, reducing concentrations and the aerial extent of COCs. Current system operation is compliant with the objectives of the Basewide ROD.

7.1.4 Issues

This technical assessment did not identify any issues that could affect current or future protectiveness of the Sites 2/12 groundwater remedy. Additionally, this assessment did not identify any unresolved issues previously raised by regulatory agencies, the community, or other interested parties.

7.1.5 Recommendations and Follow-Up Actions

The Sites 2/12 groundwater remedy should continue to operate as designed until either aquifer cleanup levels are reached or subsequent evaluation indicates that a modification is in order. Opportunities for future system optimization include discontinuing groundwater pumping from individual wells where cleanup goals (aquifer cleanup levels) have been attained, and increasing pumping from additional wells that have higher COC concentrations. Ending extraction at an individual well will reduce the electricity and O&M costs associated with that well and allow for increased extraction from other existing wells.

7.1.6 Protectiveness Statement

Soil – Because the remedial actions are protective, Sites 2/12 are protective of human health and the environment.

Groundwater – The remedy will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled because of the presence of Monterey County Ordinance 4011 and the CRUP.

7.2 Sites 16 and 17

Site 16 consists of the DOL Maintenance Yard, Pete's Pond (a surface water drainage area), and Pete's Pond Extension. Site 17 consists of a Disposal Area and other areas (Plate 2). Sites 16 and 17 were combined into one site after the first phase of the RI activities because of the similar contamination identified at both sites.

7.2.1 Site Summary

The selected remedy for Sites 16 and 17 for the soils remedial units was completed and resulted in unrestricted reuse.

The groundwater is captured and treated as part of the OU 2 groundwater remediation and is not considered as a separate remedial unit for Sites 16 and 17. All transferring parcels, which are located over the groundwater plume, will include a CRUP recorded with the deed. The CRUP will prohibit construction of wells for injection or extraction of any groundwater until the aquifer cleanup levels are attained. In addition, there is a Monterey County ordinance that regulates water well installation within either the "Groundwater Prohibition Zone" or "Groundwater Consultation Zone" which include the known groundwater plumes at the former Fort Ord.

7.3 Site 31

7.3.1 Background

Site 31 is a former dump site in the southern part of the East Garrison, and is adjacent to a ravine approximately 0.2 miles southeast of the intersection of Watkins Gate Road and Barloy Canyon Road. This dump site was at the boundary of the Leadership Reaction Training Compound on the northern side of the ravine. The visible extent of disposal encompassed an approximately 500-foot-long section of the northern slope of the ravine. The dump site was reportedly used in the 1940s and 1950s. Apparently, during this time, refuse was wholly or partially incinerated in a 500-ton incinerator, which was adjacent to the ravine and the incineration waste was dumped over the side of the north side of the ravine.

The site is underlain by fine- to medium- sand to silty- or clayey-sand. Undisturbed and slightly cemented sand outcrops in several areas adjacent to, and north of the ravine, as well as at the base of the western portion of the ravine.

7.3.2 Remedial Actions

Description of Remedial Units

Groundwater

No groundwater remedial units were defined for Site 31 because no chemicals were identified in soils that pose a threat to groundwater.

Soil Remedial Unit

On the basis of the human health-based level of concern for lead (1,860 mg/kg), a single SRU was defined on the North Slope of Site 31 based on lead contamination in the soil. The area is steep (1 foot horizontal per 1 foot vertical) and heavily vegetated. Despite the heavy vegetation, the steep slope and sandy, non-cohesive soil make it unstable. The SRU consisted of shallow soil (up to 3 feet bgs) at five sample locations where lead in soil was above 1,860 mg/kg.

The remainder of the debris and soil at the site has not been shown to pose a human health risk, and therefore does not require remediation. In addition, debris removal or treatment will not be performed in these other areas of Site 31 because of (1) the steep topography and inaccessibility of the ravine and associated biological hazards (e.g., poison oak); (2) sensitive habitat that could be disturbed; (3) overhead power lines traversing the site, which would make equipment difficult to maneuver; and (4) unstable soil conditions.

7.3.2.1 Remedy Selection

The following four remedial alternatives were evaluated for Site 31 in the FS (HLA, 1995f).

- Alternative 1: NoA
- Alternative 2: Excavation, Soil Screening, and Onsite Disposal
- Alternative 3: Excavation and Onsite Disposal
- Alternative 4: Excavation, Soil Screening and Offsite Disposal

Selected Remedy

Alternative 2 is the selected remedy and includes the following components:

- Excavation and segregation of approximately 350 cy of soil and debris containing lead above the human health based level of concern of 1,860 mg/kg.
- Placement of soil and debris at the OU 2 landfill as part of the foundation layer.
- Deed restrictions.

7.3.2.2 Remedy Implementation

The selected remedy for Site 31 was completed. The post remediation human health risk assessment concluded that human health risks and hazards are unlikely to be associated with future development of Site 31 (IT, 1999b). The post remediation ERA concluded that significant risks to ecological receptors that are exposed to chemicals remaining at Site 31 are not expected (IT, 1999b).

7.3.2.3 System Operations and Maintenance

There are no ongoing activities related to the remedy that require O&M.

7.3.2.4 Progress Since the last Five-Year Review

US Environmental Protection Agency and DTSC concurred no further remedial action is necessary in letters dated September 20, 1999, and June 28, 2006, respectively. In its letter, the DTSC requested long-term management in the form of a land use covenant prohibiting excavation, exposure of the soil, or use of the area as part of any residential development be completed on a section of the site on the north face of the ravine and under the power transmission lines.

7.3.3 Technical Assessment

7.3.3.1 Question A

Is the remedy functioning as intended by the decision document?

The Army has completed the remedial action at Site 31 in accordance with CERCLA and the RI Sites ROD, and met the objectives defined in the ROD. Therefore, the remedy is functioning as intended by the decision document.

7.3.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The exposure and toxicity criteria used to evaluate human health risks are still valid.

7.3.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

There is no new information that calls into question the effectiveness of the remedy.

7.3.4 Issues

A CRUP is being prepared in response to DTSC's request for long-term management in the form of a land use covenant prohibiting excavation, exposure of the soil, or use of the area as part of any residential development.

7.3.5 Recommendations and Follow-Up Actions

The remedy is functioning as intended, therefore, no follow-up actions are recommended. Beyond the remedy, the CRUP will be implemented if and when the property is transferred.

7.3.6 Protectiveness Statement

The remedial actions at Site 31 are protective of human health and the environment.

7.4 Site 39 (Includes Sites 5 and 9)

7.4.1 Background

Site 39 is in the southwestern portion of the former Fort Ord and includes the Inland Ranges (approximately 8,000 acres) and the 2.36-inch Rocket Range (approximately 50 acres). The Inland Ranges are bounded by Eucalyptus Road to the north, Barloy Canyon Road to the east, South Boundary Road to the south, and North-South Road to the west. The 2.36-inch Rocket Range is immediately north of Eucalyptus Road, near the north-central portion of the Inland Ranges.

The Inland Ranges were reportedly used since the early 1900s for ordnance training exercises, including onshore naval gunfire. Over the years, various types of ordnance have been used or found in the Inland Ranges, including hand grenades, mortars, rockets, mines, artillery rounds, and small arms rounds. Some training activities using petroleum hydrocarbons were also conducted. The 2.36-inch Rocket Range was reportedly used for anti-armor (bazooka) training during and shortly after World War II.

The proposed future use of most of the Inland Ranges will be as a natural resource management area (NRMA). This area will be managed by the U.S. Department of the Interior, BLM, and public access will be restricted. Several areas within, but along the periphery of, the Inland Ranges have a proposed future land use other than as a NRMA. The Military Operations on Urban Terrain Area, in the northeastern edge of the Inland Ranges, are proposed for use as a peace officer training area. The areas along the south boundary of the Inland Ranges are proposed for several uses, including city and county parks, a school expansion, and relocation of Highway 68.

7.4.2 Remedial Actions

7.4.2.1 Description of Remedial Units

Groundwater

No groundwater remedial unit was defined for Site 39 because (1) the vertical extent of contamination is limited to shallow soil, (2) the depth to groundwater beneath Site 39 is estimated to range from 60 to 180 feet bgs, (3) the presence of potential contaminants (i.e., antimony and nitrates) in groundwater has not been confirmed, and (4) groundwater data from MWs indicated there is little potential for contamination of groundwater as a result of site activities.

Soil Remedial Unit 1

Soil Remedial Unit 1 includes soil with detectable concentrations of cyclotrimethylenetrinitramine (RDX), beryllium, or TPH at or above the Target Cleanup Levels of 0.5 mg/kg, 2.8 mg/kg, and 500 mg/kg, respectively, from the following areas: Range 36A, Range 40A, Range 33, and the Explosive Ordnance Target Areas.

Based on the chemical data presented in the RI for Site 39, SRU 1 is defined by the distribution of chemicals present in the soil as discussed below.

- Range 40A – One area with concentrations of TPH above the Target Cleanup Level that consists of approximately 175 cy of soil.
- Range 33 – Two locations at isolated target areas where concentrations of RDX are above the Target Cleanup Level. The remedial unit area extends to 2 feet bgs and contains a total of approximately 60 cy of soil.
- Explosive Ordnance Target Areas – Three general areas where concentrations of RDX are above the Target Cleanup Level. The first area is in the vicinity of Ranges 35, 36, and 37 and the 2.36-Inch Rocket Range and contains approximately 30 cy of soil. The second area is in the vicinity of Ranges 43, 45, and 48, and contains approximately 120 cy of soil. The third area is in the vicinity of Ranges 30 and 30A and contains approximately 30 cy of soil. The remedial unit areas extend to about 2 feet bgs and contain a total of approximately 180 cy of soil.

Soil Remedial Unit 2

Soil Remedial Unit 2 primarily includes soil containing lead above the human health based level of concern of 1,860 mg/kg in the explosive ordnance target areas and small arms ranges. For the explosive ordnance target areas, the distribution of lead with concentrations at or above 1,860 mg/kg defines the remedial unit. For the small arms ranges, chemical data for lead in soil and the distribution of lead above 1,860 mg/kg is believed to correspond to the distribution of spent ammunition based on the Site 3 investigation. Because the conditions at the small arms ranges are similar to Site 3, the same model for site characterization was applied to these ranges. SRU 2 consists of the following:

7.4.2.2 Remedy Selection

The following four remedial alternatives were evaluated in the FS (HLA, 1995f).

- Alternative 1: No action
- Alternative 2: Institutional controls
- Alternative 3: Excavation and onsite disposal
- Alternative 4: Excavation and offsite disposal

Selected Remedy

Alternative 3 was the selected remedy and includes the following components:

- Excavation of approximately 4,520 cy of soil.
- Soil containing TPH and RDX above the cleanup goal and human health based level of concern of 500 and 0.5 mg/kg, respectively, would be placed at the OU 2 landfill.
- Soil containing lead and beryllium concentrations above the human health based levels of concern of 1,860 and 2.8 mg/kg, respectively, would be placed in the OU 2 landfill.
- Deed restrictions until remaining OE are removed.

7.4.2.3 Remedy Implementation

The remedy for Site 39 has not been fully implemented. Lead contaminated soils were excavated from portions of Ranges 24, 25 and 26 after the OE hazard was removed (IT, 2000c). Portions of Ranges 18 and 19 were also remediated to cleanup goals that would allow unrestricted use in parcels with a proposed residential reuse (Shaw, 2005a). The remedy will continue to be implemented.

7.4.2.4 System Operations and Maintenance

There is presently no O&M required based on the chemical contamination.

7.4.2.5 Progress Since the last Five-Year Review

Explanation of Significant Differences Excavation and Segregation of Spent Ammunition From Soil Site 39

This ESD was issued in December, 2003, and describes a change in the final remedy selected for lead-contaminated soil at the Small Arms Ranges at Site 39. The portion of the remedy for Site 39 that addressed the Small Arms Ranges included segregation and recycling of spent ammunition from soil containing lead prior to placement of soil at the OU 2 Landfill. The remedy to dispose of lead contaminated soils in the OU 2 Landfill was selected in the OU 2 ROD, dated August 1994, and three ESDs dated August 1995, August 1996, and January 1997. The same remedy was used to address lead contaminated soils excavated from the Small Arms Ranges at Site 3 (the Beach Trainfire Ranges) where conditions are similar to those at Site 39. The Site 3 remedy was selected in the Interim ROD, Site 3, Beach Trainfire Ranges (Army, 1997c).

Due to public concerns, site conditions, and engineering constraints; segregation and recycling of spent ammunition prior to placement at the OU 2 Landfill, when conducted for the Site 3 remedial activities, was found to be of significant public concern and technically and economically impractical. Therefore, the Army determined that these procedures should be eliminated from the remedy for Small Arms Ranges at Site 39.

Basewide Range Assessment

The Comprehensive BRA Report summarized the status of investigation for the presence of potential COCs at known or suspected small arms ranges, multi-use ranges, and military munitions training areas within the former Fort Ord, including those within Site 39 (MACTEC, 2006a).

The objective of the Basewide Range Assessment 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 Historical Areas (HA) can be eliminated

from consideration for potential remediation, and (3) identify sites that require additional investigation, or should be considered for remediation. The Basewide Range Assessment process involved five steps: 1) 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.

This investigation identified areas of additional soil contamination associated with ranges within Site 39 and resulted in a significant increase in the volume of soil to be excavated at the site.

Ecological Risk Assessment

The ERA for Small Arms Ranges, Habitat Areas, Impact Area, Former Fort Ord, California (MACTEC and Arcadis/BBL, 2007) described the methods, approach, and results of an assessment conducted to evaluate potential ecological risks for the ranges within habitat areas of the Impact Area. The ERA is being used to guide risk management decision-making. 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 evaluate risk reduction based on various potential remediation scenarios developed based on an assessment of habitat quality and distribution and concentrations of contaminants.

The ERA focused on chemical contamination in soil associated with 22 Range Areas at Site 39; lead, copper, antimony and explosive compounds were identified as chemicals of potential ecological concern. Ecological receptors at the Impact Area evaluated in the ERA included plants, reptiles, herbivorous/insectivorous mammals, omnivorous/carnivorous mammals, herbivorous birds, carnivorous/omnivorous birds, and insectivorous birds. Aquatic receptors were also evaluated for pond areas.

Because previous ecological risk evaluations for the Impact Area 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, and lead bioavailability tests were also conducted on soil and plant samples. Baseline (NoA) 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 within known and potential breeding habitat for the California Tiger Salamander (CTS) along with preservation of high-quality habitat to be used in remedial decision-making.

Feasibility Study Addendum

The FS Addendum (Shaw, 2007) for the Site 39 Ranges presents the revised SRUs originally identified in the Basewide RI Sites ROD for Site 39 based on additional investigations for contaminated soils and the ERA completed at Site 39 since the time the ROD was prepared. The purpose of this FS Addendum is to summarize the results of the comprehensive Basewide Range Assessment and ERA for contaminated soils present at Site 39, and identify the revised remedial units based on those results for which the original preferred remedial alternative of Onsite Placement at the OU2 Landfill Beneath a Cap will be implemented as identified in the Basewide RI Sites ROD. The results of the Basewide Range Assessment, ERA, and this FS Addendum will be used to guide risk management and remedial decision-making for these ranges during the preparation of a ROD amendment to address ecological risks and the additional volume of contaminated soil which will require remediation.

7.4.3 Technical Assessment

7.4.3.1 Question A

Is the remedy functioning as intended by the decision document?

The remedy has not been implemented.

7.4.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The remedy has not been implemented. The human health based cleanup levels remain valid. The ERA proposed cleanup goals below those established for human health in the Basewide RI Sites ROD. The RAOs and volumes of soil proposed for remediation have been modified based on the new data and are presented in the Draft Site 39 FS Addendum.

7.4.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

New information contained in the ERA resulted in new clean up goals based on ecological receptors. Uncertainties in toxicity data for the *CTS*, a threatened species, require special considerations near potential breeding ponds. The RAOs and volumes of soil proposed for remediation have been modified based on the new data and are presented in the Site 39 FS Addendum.

7.4.4 Issues

Based on the results of the Basewide Range Assessment and the ERA additional areas have been proposed for remediation. The proposed volume of soil to be excavated has increased substantially and will require an ROD Amendment for the Site 39 section of the Basewide RI Sites ROD. In addition, seven ranges within Site 39 can not be investigated until the MEC removal is complete.

7.4.5 Recommendations and Follow-Up Actions

Complete the ROD Amendment for the Site 39 section of the Basewide RI Sites ROD, prepare and implement the remedial action work plan. Any additional areas identified following completion of the MEC response actions should be remediated using the ecological screening values identified in the Site 39 ROD Amendment which is currently under development.

7.4.6 Protectiveness Statement

The remedy will be protective of human health upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled by an existing fence. The ecological protectiveness determination of the remedy cannot be made at this time until the ROD Amendment is finalized. It is expected that these actions will be completed in 2008, at which time a protectiveness determination can be made.

7.5 Surface Water Outfalls

The Basewide Surface Water OF Investigation (SWOI) evaluated contamination within, and adjacent to, thirty-five OFs and manholes. The OFs at Fort Ord are part of a surface water drainage system made up of aboveground natural and engineered drainages that discharge to, or receive discharge from, the subsurface storm drain system. Water in the drainage system may have come in contact with areas of known historical chemical usage. The surface water OFs OF-1 through OF-14, OF-16 through OF-30, OF-32, and OF-33 were included in RI Sites ROD because they were investigated as part of the Basewide RI/FS.

Results of the SWOI indicated that soil and sediment near or in the surface water OFs contained the following contaminants: TPH, organic chemicals, pesticides, lead, cadmium, and polychlorinated biphenyls (PCBs). A Human Health Screening Risk Evaluation indicated that soil and sediment from OF-15, OF-34, and OF-35 should be removed for the protection of human health. No further action was required for the other OFs that were investigated.

7.5.1 Site Summary

Contaminated soil and sediment was excavated and removed from OF-15, OF-34, and OF-35 under the IA Sites program at Fort Ord (Section 10.0). The cleanups related to these three sites are complete.

The selected remedy for the remaining OFs was no further action and allows for unrestricted reuse.

As part of the redevelopment of the former Fort Ord, the original storm drainage system has been modified significantly since 2002. Four of the five storm water OF pipes that extended into Monterey Bas were removed and several percolation basins were constructed. A Storm Water Master Plan was prepared for FORA to provide guidelines for implementing storm water.

7.6 Site 25

Site 25 is an 11-acre, unpaved field in the Main Garrison used from 1950 to 1972 to store decommissioned equipment, including transformers containing PCBs. The selected remedy was no further action and allows for unrestricted reuse.

7.7 Site 33

7.7.1 Background

Site 33 includes the golf course maintenance area, which consists of a pesticide mixing area, an unpaved surface drainage area, and a former pesticide storage area. The golf course was established in the early 1950s, and pesticides and herbicides were used regularly since operations began. Pesticides, herbicides, and metals were detected in soil at concentrations below PRGs set for reuse of this site.

The Human Health Risk Assessment for soil at Site 33 evaluated exposure of a golf course maintenance worker to Contaminants of Potential Concern (COPCs). Based on the assessment, adverse human health effects are not expected for the proposed reuse. A quantitative ERA was also performed (HLA, 1996f). Ecological impacts were evaluated by collecting plants and animals and measuring chemical concentrations of COPCs in their tissues. Results of the ecological evaluation indicated that tissue concentrations in prey were not likely to produce adverse effects in animal populations, nor would tissue concentrations in plants within the surrounding habitat be adversely affected.

7.7.2 Remedial Actions

7.7.2.1 Remedy Selection

The remedy for Site 33 will be a deed restriction on the property that prohibits residential use.

7.7.2.2 Remedy Implementation

The remedial action was to maintain restrictions on the deed to the property for other than residential uses.

7.7.2.3 System Operations and Maintenance

Periodic review of deed restrictions may be required, and continuing five-year reviews will be required at this site.

7.7.2.4 Progress Since the last Five-Year Review

The property was transferred to the City of Seaside in September 2004 under FOST 6 (Parcel No. F2.7.2). A deed restriction was implemented at the time of the land transfer to restrict the land use to non-residential. There was no change in the status of the site noted during the site visit on January 24, 2007. The site remains a golf course maintenance area. DTSC reported that the land use control for Site 33 is still in place.

7.7.3 Technical Assessment

7.7.3.1 Question A

Is the remedy functioning as intended by the decision document?

The remedy is functioning as intended by maintaining deed restrictions to protect human health and the environment.

7.7.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The exposure and toxicity criteria that were used for the risk evaluation are still valid.

7.7.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No additional information has been identified that could call the protectiveness of the remedy into question.

7.7.4 Issues

There are no unresolved issues.

7.7.5 Recommendations and Follow-Up Actions

Maintain the deed restriction.

7.7.6 Protectiveness Statement

The remedial actions at Site 33 are protective of human health and the environment.

8.0 SITE 3 ROD

This section presents background information on the Site 3 Interim ROD; a summary of remedial actions and a technical assessment of the actions taken at this site; identifies any issues related to the protectiveness of the remedy based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedy.

8.1 Background

Site 3, the Beach Trainfire Ranges, extends approximately 3.2 miles along the coastline of Monterey Bay at the western boundary of Fort Ord, and was used for small arms training since the 1940s. In general, trainees fired small arms weapons from firing lines in the eastern portion of the site toward targets spaced at varying intervals to the west. Spent ammunition accumulated on the east-facing (leeward) sides of the sand dunes that formed the "backstops" for the targets. Site 3 is proposed for reuse as a state park consisting of hiking trails, campgrounds, and ancillary facilities. The excavation of contaminated soil on this site is complete. A post remediation risk assessment for both ecological and human health was completed (HLA, 1998c, IT, 2000b). The Army has completed a proposed plan, public comment period, and ROD addressing ecological risks at this site as described in Section 8.2.5.

Site 3 is also known as MRS 22 (see Section 13, which addresses MEC-related issues).

8.2 Remedial Actions

8.2.1 Soil Remedial Unit

A human health based level of concern of 1,860 mg/kg for lead in soil was developed. Concentrations of lead above 1,860 mg/kg occur mainly in areas where greater than 10 percent of the surface is covered by spent ammunition. Although some areas with moderate bullet distribution contain lead above the human health based level of concern, the ERA recommended remediation only in areas of heavy bullet distribution to minimize impacts to the sensitive ecological habitat in other areas. Therefore, the SRU is defined by those areas of heavy bullet distribution (greater than 10 percent).

8.2.2 Remedy Selection

- Alternative 1: No Further Action
- Alternative 2: Excavation, screening and soil treatment
- Alternative 3: Excavation, screening and onsite disposal

Selected Remedy

Alternative 3 was the selected remedy and consists of mechanical and hand excavation of areas with greater than 10 percent coverage of spent ammunition and soil followed by mechanical separation using screens and gravity-feed separation techniques. Excavated soil would be placed in the OU 2 landfill as foundation layer, or would be disposed of at an appropriate landfill facility. This alternative provides flexibility in planning and management of the large volume of soil to be excavated from Site 3 through consideration of two options. Disposal Option 1, placement of the soil in the OU 2 landfill, would meet the intent and purpose of the CAMU regulations in that it would offer an onsite location for management of the soil in an innovative, cost-effective, and protective manner. Disposal Option 2, transportation,

pretreatment, and disposal at a Class I landfill, could be used in conjunction with Option 1 for excess soil not needed for the OU 2 foundation layer.

8.2.3 Remedy Implementation

The Army has completed the remedial action at Site 3 in accordance with CERCLA and the Site 3 Interim ROD (Army, 1997c). The remedial action included excavation of soil contaminated with lead and associated spent ammunition. Approximately 162,800 cy of impacted soil were removed from Site 3, of which approximately 129,200 cy of soil were transported to the screening plant for separation of spent ammunition from soil. The remaining 33,600 cy, composed of approximately 26,700 cy of vegetation and 6,900 cy of soil from over excavated areas (containing little spent ammunition) were not screened and were used as general fill at the OU 2 Landfill, Cell E. Of the screened material, approximately 42,000 cy were used for the foundation layer at Cell E; 49,200 cy for the foundation layer at Cell F; and 38,000 cy were used as general fill at Cell E. Approximately 719,000 pounds of spent ammunition recovered from the screening plant were recycled and reclaimed at an offsite facility.

All final confirmation samples contained less than 1,860 mg/kg and, therefore, met the human health based cleanup level of 1,860 mg/kg lead as defined in the ROD. The post remediation human health risk assessment stated that unacceptable human health risks and hazards are considered unlikely to be associated with future recreational, commercial, or residential development of Site 3 under the exposure conditions evaluated (IT, 2000b). The post remediation ERA concluded that significant risks to herbivorous birds and carnivorous/omnivorous mammals from exposure to residual chemicals remaining in the soil at Site 3 are not expected (HLA, 1998c). Potentially significant risks were identified for two "hot spot" areas where soil concentrations were elevated. However, significant risks to populations of small mammals and plants from exposure to residual chemicals in soil are not expected. The soil remediation resulted in the site being available for unrestricted reuse.

8.2.4 System Operations and Maintenance

There are presently no O&M requirements identified for Site 3.

8.2.5 Progress Since the last Five-Year Review

The Site 3 Interim ROD was finalized as part of the *Record of Decision, No Further Action Related to Munitions and Explosives of Concern-Track 1 Sites; No Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22)* (Army, 2005b). This ROD specifies that Site 3 is protective of ecological receptors and no further action is necessary. Ecological monitoring will be conducted at Site 3 to confirm the results of the ERAs and evaluations conducted to date (HLA, 1995f, 1998c: IT, 2000b). This data will be evaluated in conjunction with the previous ERA data during five year reviews to assess the need for continued monitoring. In November, 2006, the Army issued the Post-Remediation Ecological Habitat Sampling and Analysis Plan (Shaw, 2006d). Data collected under this plan will be used to evaluate the need for future monitoring and will be reported during the next five year review.

The Army has agreed that, provided the California State Parks and Recreation staff collect spent bullets and notify the Army, the Army will collect the spent bullets and either recycle the material or properly dispose of it through the Army's hazardous waste disposal process.

8.3 Technical Assessment

8.3.1 Question A

Is the remedy functioning as intended by the decision document?

The remedy is functioning as intended.

8.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The exposure and toxicity criteria used to evaluate human health risks are still valid. Therefore, the selected remedy is valid.

8.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

8.4 Issues

In November, 2006, the Army issued the *Post-Remediation Ecological Habitat Sampling and Analysis Plan* (Shaw, 2006d). Data collected under this plan should be used to evaluate the need for continued future monitoring and should be reported during the next five year review.

8.5 Recommendations and Follow-Up Actions

The need for future ecological monitoring should be evaluated after reviewing the data collected under Post-Remediation Ecological Habitat Sampling and Analysis Plan (Shaw, 2006d).

8.6 Protectiveness Statement

The remedial actions at Site 3 are protective of human health and the environment. Additional monitoring is being conducted to confirm that the remedy is protective of ecological receptors, and will be evaluated in the next five-year review.

9.0 NO ACTION SITES ROD

This section presents background information on the NoA Sites ROD and, a summary of remedial actions, and a list of sites that have completed the process.

9.1 No Action Sites Summary

A NoA ROD was signed in April 1995 (Army, 1995a) and is based on the Army's NoA Proposed Plan (Army, 1994c). The NoA ROD defines the criteria that a site must meet to qualify as a NoA site and describes the approval process. NoA sites at Fort Ord are either:

- Category 1 Sites: already in a protective state and pose no current or potential threat to human health or the environment.
- Category 2 Sites: where CERCLA does not provide authority to take any remedial action. These sites may be regulated by State or local agencies and follow their requirements.

The criteria and approach for these sites are conservative and consistent with those presented for the OU and RI sites.

For each proposed NoA site, the evaluation process began with a site characterization investigation and report. The regulatory agencies reviewed the report and approved it after their comments were addressed. If the site met the criteria, a NoA approval memorandum was submitted for public comment and regulatory agency approval. If the approval memorandum was accepted, the site was included in the NoA ROD process. If approval was not granted, the site was transferred to the IA category (Section 10.0).

The selected remedy for the NoA sites consisted of no further action.

The following sites were included in the NoA process and have completed the approval process:

- Site 11 – AAFES Fueling Station
- Site 13 – Railroad Right-of-Way
- Site 18 – 1600 Block Facility
- Site 19 – 2200 Block Facility
- Site 23 – 3700 Block Motor Pool Complex
- Site 26 – Sewage Pump Stations, Buildings 5871 and 6143
- Site 27 – Army Reserve Motor Pool
- Site 28 – Barracks and Main Garrison Area
- Site 29 – Defense Reutilization Marketing Office
- Site 35 –FAAF Aircraft Cannibalization Yard
- Site 37 – Trailer Park Maintenance Shop
- Site 38 – AAFES Dry Cleaners

10.0 INTERIM ACTION SITES ROD

This section presents background information on the IA Sites ROD; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

10.1 Background

An IA ROD (IAROD) was signed in March 1994 (Army, 1994a). The IAROD was based on the IA FS and proposed plan (HLA, 1993a; HLA, 1993b). The IAROD defined criteria that a site must meet to qualify as an IA site, and described the approval process for implementing IAs. The primary criteria include: (1) the maximum depth of affected soil that could be addressed as an IA was 25 feet bgs, and (2) the volume of affected soil that could be addressed as an IA was limited typically to between 500 and 5,500 cy. The cleanup goals and approach for these sites were consistent with those presented for the OUs and RI sites at Fort Ord.

For each proposed IA (IA) site, the process began with a site characterization investigation and report. The regulatory agencies reviewed the report and approved it after their comments were addressed. If the site met the criteria, an IA approval memorandum was submitted for regulatory agency approval. The public was notified that an approval memorandum was submitted, and if the approval memorandum was approved, public notice of the proposed action was provided two weeks before work began. The IA was then implemented and a Confirmation Report was prepared. If the report was approved, the site was included in the IAROD process. If the confirmation report was not approved, it was resubmitted after additional action was taken to address agency concerns. If it was determined that the contamination was too extensive to be remediated under the IAROD, then the site was transferred to the RI sites category. An RI/FS report would then be prepared for the site and it would be included in the Basewide RI Sites ROD.

10.2 Remedial Actions

10.2.1 Remedy Selection

- Alternative 1: NoA
- Alternative 2: Excavation, soil treatment, recycling and/or disposal.

Selected Remedy

Alternative 2 was the selected remedy and includes excavating, treating, recycling and/or disposal of contaminated soil from IA areas and backfilling with clean soil.

10.2.2 Remedy Implementation

The following sites received agency concurrence for the confirmation reports prior to August 2002 as described in the first five-year review and are not described in this section:

- Site 14 – 707th Maintenance Facility
- Site 15 – Directorate of Engineering and Housing (DEH) Yard

- Site 20 – South Parade Ground and 3800 and 519th Motor Pools
- Site 22 – 4400/4500 Block Motor Pool West
- Site 24 – Old DEH Yard
- Site 36 – FAAF Sewage Treatment Plant
- Site 40 – FAAF Helicopter Defueling Area
- OFs OF-34 and OF-35

Site 1 – Ord Village Sewage Treatment Plant

Site 1 is the former Ord Village Sewage Treatment Plant in the southwest corner of Fort Ord within the coastal dunes. Sewage treatment operations ceased in 1964; currently, the facility is used as a sewage pump station. Potential chemicals of interest include petroleum hydrocarbons, VOCs, SVOCs, mercury and other metals, fecal coliform, and nitrates. The cleanup of the site included excavation of the sludge drying beds and additional soil excavations in areas noted in the original site investigation. All cleanup activities are completed. The *Interim Action Confirmation Report, Site 1 - Ord Village Sewage Treatment Plant, Fort Ord, California* (HLA, 1997i) was submitted in 1997 and received concurrence from the regulatory agencies in 2005.

Site 6 – Range 39, Abandoned Car Dump

Site 6 is an approximate 400-foot by 1,000-foot undeveloped parcel 1.5 miles southeast of the intersection of Eucalyptus and Parker Flats roads, within the multi-range area, where vehicles, scrap metal, and other items were disposed. All contaminated soil in this area has been removed, and the *Interim Action Confirmation Report, Site 6 – Range 39 (Abandoned Car Dump), Fort Ord, California* (*HLA, 1997a*) was submitted in 1997. The confirmation report received concurrence from EPA and is pending concurrence from DTSC.

Site 8 – Range 49, Molotov Cocktail Range

Site 8, an undeveloped parcel at Inland Range 49, was a former training area where troops practiced using Molotov cocktails. Contamination associated with Site 8 includes flammable liquids (possibly leaded gasoline, transmission oil, and motor oil) in soils adjacent to the two armored vehicles that were used as practice targets for the Molotov cocktails. All contaminated soils were removed under the IA process. The *Interim Action Confirmation Report, Site 8 – Range 49 (Molotov Cocktail Range), Fort Ord, California* (HLA, 1996i) was submitted in 1996 and received concurrence from the regulatory agencies in 2006.

Site 10 – Burn Pit

Site 10 is a former burn pit approximately 160 feet south of the Fort Ord Fire Station in the Main Garrison. The site was an unlined, rectangular pit (approximately 45 feet long, 25 feet wide, and 2 feet deep) into which flammable liquids were placed, ignited, and subsequently extinguished for firefighting training. A 2-inch diameter pipe apparently was used to regulate fluid levels in the pit, and a narrow drainage ditch exits the pit to the south. The southern portion of the 2-inch-diameter pipe is buried within surface soils. The pit is no longer in use and is partially overgrown with grass. All contaminated soils have been removed and the *Interim Action Confirmation Report, Site 10 - Burn Pit, Fort Ord, California* (HLA, 1996j) was submitted in 1996 and received concurrence from the regulatory agencies in 2007.

Site 21 – 4400/4500 Block Motor Pool East

Site 21, the 4400/4500 Block Motor Pool East, was used for motor vehicle service, maintenance, and storage, and is in the eastern portion of the Main Garrison. Potential areas of concern included a 400-gallon gasoline fuel spill near Building 4495 that occurred in 1979, six oil/water separators, a concrete-lined canal and its unpaved discharge area, nine wash racks and nine grease racks, and twenty

current and former underground storage tanks (UST). The cleanup of this site is complete. The *Interim Action Confirmation Report, Site 21 - 4400/4500 Motor Pool, East Block, Fort Ord, California* (HLA, 1996e) was submitted in 1996 and received concurrence from the regulatory agencies in 2006.

Site 30 – Driver Training Area

Site 30, the Driver Training Area, is a partially developed parcel in the East Garrison. Former facilities at the site representing potential areas of concern included a former grease rack with stained surface soils, a former gasoline station with two USTs, and an abandoned wash rack. The site cleanup is complete. The *Confirmation Report, Site 30 - Driver Training Area, Fort Ord, California* (HLA, 1996b) was submitted in 1996 and received concurrence from the regulatory agencies in 2002.

Site 32 – East Garrison Sewage Treatment Plant

Site 32, the EG Sewage Treatment Plant in the northern portion of the East Garrison consists of sludge beds, a percolation pond, and Dotton-sedimentation tanks. Potential contaminants include TPH as gasoline, TPHd, VOCs, metals, fecal coliform bacteria, and nitrogen. The contaminated soils at this site were excavated and the cleanup is complete. The *Interim Action Confirmation Report, Site 32 - East Garrison Sewage Treatment Plant, Fort Ord, California* (HLA, 1998a) was submitted in 1998 and received concurrence from the regulatory agencies in 2002.

Site 34 – Fritzsche Army Airfield (FAAF) Fueling Facility

Site 34 includes the former FAAF Fueling Facility and developed areas. Potential areas of concern included: four helicopter wash aprons, one vehicle wash rack, and associated oil/water separators at various locations. Helicopters were cleaned at the wash aprons using solvent solutions, and vehicles were cleaned at the wash rack using soap and water. Each wash apron or wash rack is a relatively large, 12-inch-thick concrete pad where helicopters or vehicles were washed. Each pad either sloped inward toward a central drain or sloped uniformly in the direction of a perimeter drain adjacent to an associated oil/water separator. The contaminated soil was excavated in accordance with the remedy outlined in the IAROD, and additional soil contamination resulting from former USTs was removed. The USTs and contaminated soil has been removed and the cleanup is complete. The *Interim Action Confirmation Report, Site 34, Fritzsche Army Airfield Fueling Facility, Fort Ord, California* (Uribe, 1998) was submitted in 1998 and received concurrence from the regulatory agencies in 2002.

Site 39A – East Garrison Ranges

The EG Ranges are on the west side of the East Garrison. The ranges included three small-bore shooting ranges (EG-1, EG-2, and EG-3), a skeet range, and a target area that appears to have been part of a decommissioned moving target range. Weapons use was limited to pistols (.45 caliber or less) at Ranges EG-1 and EG-2, and to small-bore (.22 caliber) rifles at Range EG-3. Bullets were fired at targets 25 or 50 meters away and became embedded in the hillsides at the back of the range. The skeet range was primarily a recreational shooting range for trap and skeet. Potential contaminants were arsenic, antimony, copper, and lead associated with spent ammunition, and polyaromatic hydrocarbons from clay pigeons that contain 32 percent petroleum pitch (asphalt). Soil was excavated and the cleanup of this area is complete. The *Interim Action Confirmation Report, Site 39A - East Garrison Ranges, Former Fort Ord, California* (HLA, 1998d) was submitted in 1998 and received concurrence from the regulatory agencies in 2005.

Site 39B – Inter-Garrison Training Area

Site 39B is located east of the Main Garrison, south of Inter-Garrison Road between Eighth Avenue and Abrams Drive. In 1994, when an unexploded ordnance (UXO) clearance crew found a small container while excavating a site, two crewmembers became dizzy and nauseated. The crew also noted metal debris and odors at a second location within 50 feet of the containers. An emergency response action was

initiated to treat the UXO crew and secure the site. Other items found in the vicinity of the incident included oil filters, scrap metal, paint cans, engines, and ammunition canisters. A Time-Critical Removal Action was completed in 1994, and soil was determined to be contaminated with lead, oil and grease, and diesel fuel. The soil contamination in this area was excavated and the cleanup is complete. The *Interim Action Confirmation Report, Site 39B - Inter-Garrison Site, Fort Ord, California* (HLA, 1997f) was submitted in 1997 and received concurrence from the regulatory agencies in 2006.

Site 41 – Crescent Bluff Fire Drill Area

Site 41 consists of four small fire-fighting training pits identified during personnel interviews located on a bluff approximately 0.75 mile southeast of the East Garrison. The training pits were overgrown and contained ponded water during wet seasons. Potential contaminants associated with training pits were flammable liquids (e.g., fuels and solvents). The contaminated soil in this area was excavated and removed in accordance with the IAROD and all the cleanup related to the site is complete. The *Interim Action Confirmation Report, Site 41 - Crescent Bluff Fire Drill Area, Fort Ord, California* (HLA, 1997d) was submitted in 1997 and received concurrence from the regulatory agencies in 2006.

Outfall OF-15

Outfall OF-15 included a storm drain and channel immediately west of Trainfire Range No. 11 on the Beach Trainfire Ranges (Site 3). The contaminated soil in this area was excavated and removed in accordance with the IAROD and the cleanup related to this site is complete. The *Interim Action Confirmation Report, Outfall 15, Former Fort Ord, California* (HLA, 1998b) was submitted in 1998 and received concurrence from the regulatory agencies in 2005.

Site 34B – Former Burn Pit, Fritzsche Army Airfield Defueling Area

Fritzsche Army Airfield is located on the northern side of the former Fort Ord at the northern end of Imjin Road, and is bounded by Reservation Road to the south and Imjin Road to the east. Three sites of potential concern and an additional magnetic anomaly location were identified and investigated at FAAF, but only the Former Burn Pit (Site 34B) was identified as a potential IA area.

Site characterization activities at Site 34B identified soil contaminated with TPH as motor oil, dioxins and furans, and lead resulting from previous burn pit activities. All contaminated soil has been removed and the *Interim Action Confirmation Report Interim Action Area 34B, Former Burn Pit, Site 34—Fritzsche Army Airfield Defueling Area, Former Fort Ord, California* (Shaw, 2003) was submitted in 2003. The confirmation report received concurrence from DTSC in 2007 and is pending concurrence from EPA.

Site 39A – East Garrison Ranges Areas HA-80 and HA-85

HA-80 and HA-85 are located within Site 39A, which is on the eastern side of the former Fort Ord East Garrison, at the eastern end of Watkins Gate Road. HA-80 and HA-85 were identified as a landscape target range and a 50-yard rifle range, respectively, on the 1940 Camp Ord map showing the Ultimate Layout of Concurrent Training Areas.

HA-80 and HA-85 were identified for site characterization based on the results of a site reconnaissance and site investigation sampling. These areas contained soil with lead and antimony associated with former small arms firing ranges. The contaminated soil was excavated and removed in accordance with the IAROD and the cleanup related to this site is complete. The *Interim Action Confirmation Report IA Areas 39A HA-80 and 39A HA-85Site 39A, Ranges Former Fort Ord, California* (MACTEC, 2006a) was submitted in 2006 and received concurrence from the regulatory agencies in 2006.

10.2.3 System Operations and Maintenance

There are no O&M requirements under the IAROD.

10.2.4 Progress Since the last Five-Year Review

Two additional sites (Site 34B and Site 39A Areas HA-80 and HA-85) were remediated under the IAROD. The Site 34B confirmation report received DTSC concurrence and EPA concurrence is pending. The Site 39A Areas HA-80 and HA-85 confirmation report received agency concurrence.

10.3 Technical Assessment

10.3.1 Question A

Is the remedy functioning as intended by the decision document?

The completed IAs continue to allow unrestricted use of the IA Sites.

10.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes in the physical conditions of the IA sites that would affect the protectiveness of the remedy.

10.3.2.1 Changes in Standards to be Considered

Fort Ord specific PRGs listed in the IAROD were used as the basis for NoA decisions. The Fort Ord specific PRGs were compared to the most recent EPA Region IX PRGs (EPA, 1999). Four chemicals, arsenic, 1,3-dichlorobenzene, ethylbenezene, and naphthalene, now have a published Region IX EPA PRG which are lower than the Fort Ord-specific PRGs. For arsenic in soil, although the Fort Ord-specific PRG exceeds the EPA PRG, the exceedances are equivalent to Fort Ord background soil concentrations and therefore would not require reassessment of the need for remediation. For the other three chemicals, there were no detections at the IA Sites that exceed either of the new EPA Region IX PRGs.

10.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

There is no new information that calls into question the effectiveness of the remedy.

10.4 Issues

There are no unresolved issues that have been identified in regard to the protectiveness of human health and the environment.

10.5 Recommendations and Follow-Up Actions

There are no recommendations for follow-up actions.

10.6 Protectiveness Statement

The remedial actions at the IA Sites are protective of human health and the environment.

11.0 OPERABLE UNIT CARBON TETRACHLORIDE PLUME ROD

This section presents background information on the OUCTP ROD (in progress); summarizes remedial actions and provides a technical assessment of the actions taken at this site; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

11.1 Background

Carbon tetrachloride was originally identified in groundwater in 1992. The results from the initial investigation of CT were presented in the *Draft Final Carbon Tetrachloride Investigation Report* (HLA, 1999). Subsequent investigation activities and studies of OUCTP were conducted as part of the OUCTP RI (MACTEC, 2006b).

The apparent former source of the OUCTP is located on what is now Lexington Court, a residential area in the northern portion of the former Fort Ord. A groundwater contaminant plume emanating from this area extends across a large area bounded by Del Monte Boulevard, Abrams Drive, Neeson Road, and Blanco Road.

A soil vapor extraction system (SVE) and treatment system pilot study was performed to evaluate remediation of vadose zone soils in the OUCTP source area. During SVE system operation, 0.78 pounds of CT were removed from the vadose zone. CT soil gas data collected 6 months after the SVE and treatment system were shut down showed only low levels (an average of 0.06 parts per billion by volume [ppbv]) of CT concentrations. This indicated that the CT source has been removed and; therefore, no additional cleanup activity was recommended for soil gas in the vicinity of Lexington Court (Shaw, 2006c).

11.1.1 Soil Gas

In the downgradient portion of the plume, the J&E Model was used to estimate indoor air concentrations using soil vapor data from MW MW-BW-49A, sampled at a depth of 35 feet bgs. CT and chloroform in groundwater were at concentrations of 4 µg/L and of 0.27 µg/L, respectively. The J&E model indicated a potential risk of 2×10^{-5}, for off-gassing of VOCs into indoor air. This risk number falls within the EPA and Cal/EPA-DTSC risk management range (MACTEC, 2006b).

To further evaluate VOC off-gassing from groundwater, in the center portion of the groundwater plume, one soil vapor sample (CTP-SGP-66) was collected and analyzed for VOCs in September 2004 at 85 feet bgs (approximately 10 feet above the water table) over the highest concentration of CT. Well MW-BW-53A had CT, TCE, and chloroform at concentrations of 13 µg/L, 4.9 µg/L, and 1.6 µg/L, respectively. The results of the soil gas sample were all non-detect for all VOCs. This soil gas result suggests that J&E model overestimates risk from off-gassing, and actual measured concentrations of VOCs in soil gas are not significant in the center of the groundwater plume (MACTEC, 2006b).

Collection of indoor air and soil gas data in the suspected source area, as reported in the *Draft Final Report, March 2004 Indoor Air Sampling, Lexington Court, Former Fort Ord, California* (Shaw, 2004b), also indicates that subsurface vapors from the OUCTP are not contributing significantly to VOCs in indoor air in residences in the vicinity of the soil source area of the OUCTP (Shaw, 2004a, b). The measured indoor air CT concentrations in the source area were 0.092 ppbv and 0.099 ppbv and were comparable to concentrations measured in outdoor air samples collected at Lexington Court (0.09 ppbv

and 0.098 ppbv). Both the indoor and outdoor samples collected at Lexington Court were within the range of background concentrations 0.067 ppbv and 0.13 ppbv measured in outdoor air during the Fort Ord outdoor air monitoring. These results then support the conclusion that groundwater contamination appears to be an insignificant contributing source of VOCs to indoor air in the source area (MACTEC, 2006b).

11.1.2 Groundwater

The upper three aquifers at the former Fort Ord, none of which are currently used as a drinking water source within the OUCTP, have been found to contain concentrations above MCLs for CT and other VOCs within the OUCTP. The aquifer cleanup levels are listed in Table 7. The presence of CT in these three aquifers is described below.

A-Aquifer Groundwater

The length of the CT plume in the A-Aquifer is approximately 1.6 miles, and ranges from 500 to 750 feet in width along the length of the plume (see Plate 3). The State MCL for CT in groundwater is 0.5 µg/L, and the maximum historic detected concentration in the A-Aquifer since groundwater monitoring was initiated in 1992 was 19 µg/L. The most recent maximum concentration of CT detected in the A-Aquifer was 15 µg/L. Low levels of PCE and TCE have also been identified in the A-Aquifer within the OUCTP.

Hydraulic communication between this A-Aquifer and underlying aquifers is limited to those areas west of the OUCTP where the Fort Ord-Salinas Valley Aquiclude clay unit pinches out, or where it has been penetrated by wells without adequate sanitary seals. Two such vertical conduits have been identified and have resulted in the migration of CT from the A-Aquifer to the underlying Upper and Lower 180-Foot Aquifers. All identified vertical conduits have been destroyed (grouted and sealed) eliminating hydraulic communication between the A-Aquifer and the underlying aquifers.

Upper 180-Foot Aquifer

There are two narrow, parallel plumes in this aquifer as shown on Plate 3. The western CT plume in the Upper 180-Foot Aquifer is approximately 0.7 miles in length and 400 feet in width. The eastern CT plume in the Upper 180-Foot Aquifer is approximately 0.9 miles in length and ranges from 200 to 600 feet in width. The maximum historic detected concentration in the Upper 180-Foot Aquifer since groundwater monitoring was initiated was 9.8 µg/L. The most recent maximum concentration of CT detected in the Upper 180-Foot Aquifer was 3.5 µg/L.

Lower 180-Foot Aquifer

There are two separate plumes in this aquifer. The northern CT plume in the Lower 180-Foot Aquifer is approximately 0.75 miles in length and 1,000 feet in width. The maximum historic detected concentration in the Lower 180-Foot Aquifer since groundwater monitoring was initiated was 6.95 µg/L. The most recent maximum concentration of CT detected in the Lower 180-Foot Aquifer was 3.6 µg/L. Low levels of 1,2-DCA have also been detected in the Lower 180-Foot Aquifer.

11.2 Remedial Actions

11.2.1 Remedy Selection

The following four alternatives were evaluated in the FS (MACTEC, 2006b).

- Alternative 1: NoA with Monitoring.
- Alternative 2: In Situ Enhanced Biodegradation (A-Aquifer); Groundwater Extraction and Treatment within OU2 Groundwater Treatment and Extraction System (Upper 180-Foot Aquifer); Monitored Natural Attenuation with Wellhead Treatment Contingency (Lower 180-Foot Aquifer).
- Alternative 3: In Situ Permeable Reactive Barrier (A-Aquifer); Groundwater Extraction and Treatment within OU2 Groundwater Treatment and Extraction System (Upper 180-Foot Aquifer); Monitored Natural Attenuation with Wellhead Treatment Contingency (Lower 180-Foot Aquifer).
- Alternative 4: Groundwater Extraction and Treatment (A-Aquifer); Groundwater Extraction and Treatment within OU2 Groundwater Treatment and Extraction System (Upper 180-Foot Aquifer); Monitored Natural Attenuation with Wellhead Treatment Contingency (Lower 180-Foot Aquifer).

Preferred Remedy

Alternative 2 is the preferred remedy and includes the following components:

- In Situ Enhanced Biodegradation (A-Aquifer)
- Groundwater Extraction and Treatment within OU2 Groundwater Treatment and Extraction System (Upper 180-Foot Aquifer)
- Monitored Natural Attenuation with Wellhead Treatment Contingency (Lower 180-Foot Aquifer).
- Monitoring of up to 30 additional wells for 30 years.
- Monitored natural attenuation of the Lower 180-Foot Aquifer with a contingency plan for well-head treatment of groundwater being extracted from potable water supply wells if COCs associated with OUCTP are detected above aquifer cleanup levels in these wells.
- Land use controls to ensure groundwater within the OUCTP is not accessed or used for any purpose by future property owners.

11.2.2 Remedy Implementation

The preferred alternative has not yet been implemented. Implementation of the remedy will begin following finalization of the OUCTP ROD.

11.2.3 System Operations and Maintenance

Because the selected remedy has not been implemented, there is no system operation or maintenance. Prior to implementing the remedy, O&M Manuals will be developed as appropriate.

11.3 Technical Assessment

11.3.1 Question A

Is the remedy functioning as intended by the decision document?

The selected remedy has not yet been implemented. However, Monterey County Ordinance 4011 has been put into effect that regulates water well installation within either the "Groundwater Prohibition Zone" or "Groundwater Consultation Zone," which includes the known groundwater plumes at the former Fort Ord. In addition, the Army has included groundwater use restrictions in the federal deed and has executed a CRUP (recorded with the deed) for all transferring parcels that are located over the groundwater plume. The deed restrictions and the CRUP will prohibit construction of wells for injection or extraction of any groundwater until the aquifer cleanup levels are attained.

11.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes in the assumptions, toxicity data, cleanup levels or RAOs used at the time of the remedy selection for the OUCTP.

11.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

11.4 Issues

Full-scale design specifications will be developed based on the results of the current pilot study.

11.5 Recommendations and Follow-Up Actions

The OUCTP ROD should be finalized.

11.6 Protectiveness Statement

The remedy for OUCTP will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled because of the presence of Monterey County Ordinance 4011 and the CRUP.

12.0 TRACK 0 ROD

This section presents background information on the Track 0 (NoA) ROD regarding MR; summarizes remedial actions and provides a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

12.1 Background

In 2002, the Army published *Final Record of Decision, No Action Regarding Ordnance-Related Investigation* (Track 0 ROD) (Army, 2002a). The Track 0 ROD addresses areas at the former Fort Ord that contain no evidence of MEC and have never been suspected as having been used for military munitions-related activities of any kind based on then-current knowledge outlined in the Literature Review (HLA, 2000) and investigated under the basewide MR RI/FS Program at former Fort Ord. The 129 Track 0 areas listed in the Track 0 ROD consist largely of land that has been developed for military support or residential use throughout Fort Ord's history and areas that have no physical or documented evidence of military munitions-related training.

The 2005 ESD (Army, 2005a) clarified that the definition for MEC does not include small arms ammunition (.50 caliber and below). Therefore, the presence of small arms ammunition does not preclude a NoA determination regarding military MR; nor does a NoA determination indicate that small arms ammunition is not present.

12.2 Remedial Actions

No remedial action for MEC is necessary in these areas.

12.2.1 Remedy Selection

No remedial action is necessary in Track 0 areas. In the future, should any ordnance-related item be found within any of the areas addressed in the Track 0 ROD, the Army will take appropriate action and within 90 days of the discovery, submit a plan for appropriate follow-on action to EPA and DTSC for consultation.

In addition, a "Plug-In" process can be used for documenting NoA determinations for other areas that meet the Track 0 criteria based on the ongoing MR RI/FS. An ESD (Army, 2005a) was prepared to clarify the scope of the Track 0 Plug-In process to include SCA may be eligible for Track 0 consideration where military munitions are found in a disposal area and munitions items were fully excavated. Presence of incidental military munitions items that are not indicative of past military munitions-related training do not preclude an area from being designated as Track 0. In addition, non-firing areas where military training might have occurred, but additional research under the MR RI/FS program clearly indicates that no live fire was conducted, will be eligible for evaluation under the Track 0 Plug-In process.

12.2.2 Remedy Implementation

The selected remedy was NoA and allows for unrestricted reuse.

Additional areas identified as Track 0 were documented as such through the Track 0 Plug-In process. Four separate Approval Memorandums, which are listed below, were prepared to include 45 new areas as Track 0 areas.

- *Track 0 Approval Memorandum, East Garrison Area 1, Former Fort Ord, Monterey, California* (Malcolm Pirnie, 2003).
- *Track 0 Plug-In Approval Memorandum, Selected Parcels – Group B, Former Fort Ord*. (Army, 2005d).
- *Track 0 Plug-In Approval Memorandum, Selected Parcels – Group C, Former Fort Ord*. (Army, 2005e).
- *Track 0 Plug-In Approval Memorandum, Selected Parcels – Group D, Former Fort Ord*. (Army, 2006b).

12.2.3 System Operations and Maintenance

No operations or maintenance are necessary for the selected remedy.

12.2.4 Property Transfer

A total of 3,067.5 acres over within 188 parcels have been approved for transfer by the Track 0 ROD and subsequent approval memorandums. As of January 1, 2007, 2,728 acres have been transferred within 163 parcels.

12.3 Technical Assessment

12.3.1 Question A

Is the remedy functioning as intended by the decision document?

The selected remedy for the Track 0 sites was NoA.

12.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Track 0 areas pose no known current or potential risk to human health or the environment from previous military munitions-related activities. Therefore, the selected "NoA" remedy is still valid.

12.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

12.4 Issues

There are no unresolved issues that have been identified in regard to the protectiveness of human health and the environment.

12.5 Recommendations and Follow-Up Actions

In the future, should any ordnance-related items be found within any of the areas addressed in the Track 0 ROD, the Army will take appropriate immediate action (i.e., removing the found item, recording the incident), and within 90 days of the discovery, submit a plan for appropriate follow-on action to EPA and DTSC for consultation.

12.6 Protectiveness Statement

Because the Track 0 areas contained no evidence of MEC and never have been suspected as having been used for military munitions-related activities, NoA was required at the areas. The site remedy is protective because there is no known current or potential risk to human health or the environment from previous military munitions-related activities.

13.0 TRACK 1 ROD

This section presents background information on the Track 1 ROD regarding MR; summarizes remedial actions and provides a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

13.1 Background

Record of Decision, No Further Action Related to Munitions and Explosives of Concern – Track 1 Sites, No Further Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22), Former Fort Ord, California (Track 1 ROD) was signed in April 2005 (Army, 2005b). The Track 1 ROD is based on the Track 1 OE RI/FS (MACTEC, 2004). The Track 1 sites addressed in the ROD included 21 MR sites for which no further action related to MEC is required because MEC associated with training conducted at these sites was not found during field investigations and/or is not expected to be found in the future. The ROD defines the criteria that additional sites must meet to qualify as a No Further Action site and describes the approval process. Track 1 No Further Action sites at Fort Ord are categorized into one of the following three categories:

Category 1 Sites: There is no evidence to indicate military munitions were used at the site, i.e., suspected training did not occur; or

Category 2 Sites: The site was used for training, but the military munitions items used do not pose an explosive hazard, i.e., training did not involve explosive items; or

Category 3 Sites: The site was used for training with military munitions, but military munitions items that potentially remain as a result of that training do not pose an unacceptable risk based on site-specific evaluations conducted in the Track 1 OE RI/FS. Field investigations identified evidence of past training involving military munitions, but training at these sites involved only the use of practice and/or pyrotechnic items that are not designed to cause injury. In the unlikely event that a live item of the type previously observed at the site is found, it is not expected that the item would function by casual contact (i.e., inadvertent and unintentional contact).

For the purposes of the ROD, MEC does not include small arms ammunition (.50 caliber and below).

The Track 1 ROD also presented a "No Further Action with Monitoring for Ecological Risks from Chemical Contamination" for Site 3 (MRS-22), the former Beach Trainfire Ranges. An Interim ROD for Site 3 (Army, 1997c) identified excavation of metals-contaminated soil and spent ammunition present at the site as the selected remedy for Site 3. Details of this section of the ROD are described in Section 8.0.

13.2 Remedial Actions

The selected remedy for the Track 1 sites consisted of no further action.

Even though no actionable risk was identified through the RI process, in the interest of safety, reasonable and prudent precautions should be taken when conducting intrusive operations at the Track 1 sites. For specific Track 1 sites (MRS-1, MRS-5, MRS-6, MRS-13A, MRS-22, MRS-24B, MRS-24D, MRS-24E, MRS-27Y, MRS-39, MRS-49, MRS-59A, MRS-62 and MRS-66) and Track 1 Plug-In sites/areas (MRS-6EXP, East Garrison Area 2 [parcels L23.3.2.2 and L23.3.3.2], MRS-2,

MRS-27F, MRS-45A, MRS-59B, parcel L23.5.2, MRS-46, and parcel E20c.1.1.10), the Army recommends construction personnel involved in intrusive operations at these sites attend the Army's MEC recognition and safety training. MR sites are shown on Plate 4.

The selected remedy for Site 3 (MRS-22) is no further action with monitoring for ecological risks and is described in Section 8.0.

13.2.1 Remedy Selection

The Track 1 ROD addresses identified potential munitions sites that contain no actionable risks. No remedial action is necessary in the Track 1 areas. MEC safety education program was recommended and is implemented through the community outreach program. The MEC safety education program is being provided to anyone by request. In the future, should any ordnance-related item be reported as found within any of the areas addressed in the Track 1 ROD, the Army will take appropriate action and submit a plan for appropriate follow-on action to EPA and DTSC within 90 days of the discovery.

In addition, a "Plug-In" process can be used for documenting No Further Action determinations for other areas that meet the Track 1 criteria based on the ongoing MR RI/FS program.

13.2.2 Remedy Implementation

The selected remedy for the Track 1 sites was no further action and allows for unrestricted reuse.

Additional areas have been identified as a Track 1 sites and were documented as such through the Track 1 Plug-In process. Three separate Approval Memorandums, which are listed below, were prepared to include the new areas as Track 1 sites.

- *Track 1 Plug-In Approval Memorandum, MRS-6 Expansion Area, Former Fort Ord, California* (Army, 2005c).
- *Track 1 Plug-In Approval Memorandum, East Garrison Areas 2 and 4 NE, Former Fort Ord, California*. (Army, 2006a).
- *Track 1 Plug-In Approval Memorandum, Multiple Sites, Groups 1 – 5, Former Fort Ord*. (Army, 2006c).

The MRS Security Program for the former Fort Ord has been updated to include the Army's recommendation for MEC recognition training program noted above. Notices regarding the Army's recommendation for MEC recognition training were included in FOST 9 and FOST10. For properties that had been transferred at the time the Track 1 ROD was signed, owners of those properties were notified in August 2005. Information about MEC recognition training sessions that have been provided is reported in annual MRS Security Program reports.

13.2.3 System Operations and Maintenance

No operations or maintenance are necessary for the selected remedy.

13.2.4 Property Transfer

A total of 2,403 acres over within 39 parcels have been approved for transfer by the Track 1 ROD and subsequent approval memorandum. As of January 1, 2007, 1,369 acres have been transferred within 8 parcels.

13.3 Technical Assessment

13.3.1 Question A

Is the remedy functioning as intended by the decision document?

The selected remedy for the Track 1 sites was no further action.

13.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Track 1 areas pose no known current or potential risk to human health or the environment from previous MEC-related activities. Therefore, the selected "No Further Action" remedy is still valid.

13.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

13.4 Issues

There are no unresolved issues that have been identified in regard to the protectiveness of human health and the environment.

13.5 Recommendations and Follow-Up Actions

As described in the Track 1 ROD, at the time of the next five-year review (2012), the Army should assess whether the MEC safety education program should continue. If information indicates that no MEC items have been found in the course of development or redevelopment of the site, it is expected that the education program may, in consultation with the concurrence of the regulatory agencies, be discontinued, subject to reinstatement if a MEC item is encountered in the future.

13.6 Protectiveness Statement

Because MEC associated with training conducted at Track 1 sites was not found during field investigations and/or is not expected to be found in the future, NoA was required at the areas. The site remedy is protective because there is no known current risk to human health or the environment from previous MEC-related activities.

14.0 PARKER FLATS MUNITIONS RESPONSE AREA, TRACK 2 ROD

This section presents background information on the Parker Flats MR Area, Track 2 MR ROD (Parker Flats ROD, in progress); a summary of preferred remedial alternative; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

14.1 Background

The ROD for the Parker Flats MR Area, Track 2 MR is in progress and is based on the Final *Track 2, Munitions Response RI/FS Parker Flats Munitions Response Area, Former Fort Ord, California* (MATEC, 2006c).

Track 2 sites are those sites where MEC was found and a MEC removal was conducted. The Track 2 site known as the Parker Flats MRA contains portions or all of several MRSs that were suspected to have been used for military training with military munitions. MEC removal actions were conducted in these MRSs and all MEC detected bgs was removed. These MEC removal actions were designed to address MEC to depths of four feet bgs but all anomalies were investigated and resolved. All detected MEC was removed and destroyed. Therefore, MEC is not expected at these MR Sites. However, it is possible that some MEC was not detected and remains on site. Therefore, the potential for a future land user (e.g., construction worker, resident) to encounter MEC at the Parker Flats MRA cannot be ruled out. Accordingly, the Army has evaluated remedial alternatives to address the risk to future land users from any MEC that potentially remains at the Parker Flats MRA. Currently, the active MRS Security Program ensures that measures are implemented to advise/inform the public about the possible hazards of MEC and security measures taken to prohibit/prevent public access to those MRS that pose an explosive threat to the community (Restricted MRS).

14.2 Remedial Actions

14.2.1 Remedy Selection

The Army evaluated the following three remedial alternatives that could potentially mitigate and manage risks from any MEC that could still be present in the Parker Flats MRA:

- Alternative 1: No Further Action
- Alternative 2: Land Use Controls
- Alternative 3: Additional MEC Remediation

Preferred Alternative

Alternative 2, Land Use Controls, is the preferred alternative for the Parker Flats MRA. This alternative includes a range of potential components that may be applicable at the Parker Flats MRA. When put in place, these components would be evaluated as part of the Army's annual monitoring and five-year review reporting activities to determine whether the specific measures are still necessary and are still protective of human health. These Land Use Controls and plan for implementation would be described in further detail in the Land Use Control Implementation Remedial Design/Remedial Action Work Plan. Land Use Controls will be executed and recorded at a county recorder's office so that they will be found during a title search of county records, will "run with the land" and must be enforceable.

The following components were considered as part of the Land Use Control alternative:

- MEC Recognition and Safety Training
- Construction Monitoring.

The Land Use Controls identified above will be maintained by the developer/property owner to protect subsequent landowners and reusers conducting intrusive activities on the property.

Based on the RI/FS, it is the Army's position that the additional layer of protection in the form of a residential use restriction is not necessary for the Parker Flats MRA; however, CERCLA dictates that the views of the regulatory agencies must be included in any decision-making. Therefore, in response to EPA and DTSC, the Army's proposed remedy as described in the Proposed Plan also includes restrictions against residential use. For the purpose of the Parker Flats ROD, residential use includes, but is not limited to, residences, schools, daycare facilities, hospitals, and hospices. Any proposal for residential development in the Parker Flats MRA will be subject to regulatory review.

14.2.2 Remedy Implementation

The remedy has not yet been selected. Implementation of the remedy will begin following finalization of the ROD.

14.2.3 System Operations and Maintenance

Annual monitoring and reporting will also be performed by the Army for the Parker Flats MRA regarding MEC finds and changes in site conditions that could increase the possibility of finding MEC at the site. The results of the monitoring activities will be reported to the regulatory agencies annually. The Army will also conduct a review of all basewide MR RI/FS sites every 5 years to determine whether the remedy at each site continues to be protective of human health and the environment. It will include a review of any land use controls.

14.3 Technical Assessment

14.3.1 Question A

Is the remedy functioning as intended by the decision document?

The selected remedy has not yet been implemented.

14.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There have been no changes in the assumptions, toxicity data, cleanup levels or RAOs used at the time of the remedy selection for the Parker Flats.

14.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

14.4 Issues

There are no unresolved issues that have been identified in regard to the protectiveness of human health and the environment.

14.5 Recommendations and Follow-Up Actions

The Parker Flats MR Area, Track 2 ROD should be finalized.

14.6 Protectiveness Statement

The remedy will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled by provisions within the MRS Security Program.

15.0 INTERIM ACTION SITE MUNITIONS RESPONSE ROD

This section presents background information on the IA sites MR ROD; summarizes remedial actions and provides a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

15.1 Background

The IA ROD (Army, 2002b) addresses sites that contain live, sensitively fuzed surface MEC-items in close proximity to residential neighborhoods and schools with a history of trespassing incidents. Three IAs sites, Ranges 43-48, Range 30A, and MRS-16 (previously referred to as Site OE-16), were identified as areas requiring IAs to protect human health from the imminent threat posed by MEC while an ongoing comprehensive study of MEC cleanup needs is conducted under the basewide MR RI/FS program. These three IAs sites are shown on Plate 4.

15.2 Remedial Actions

15.2.1 Remedy Selection

In order to perform comprehensive MEC-related actions at these sites, a three-tiered approach was used which evaluated the following alternatives:

Vegetation Clearance Alternatives

- NoA (as required by CERCLA as a baseline for comparison)
- Prescribed Burning
- Mechanical Cutting Methods
- Manual Cutting Methods

MEC Remedial Action Alternatives

- NoA with Existing Site Security Measures (as required by CERCLA as a baseline for comparison)
- Enhanced Site Security Measures
- Surface and Subsurface MEC Removal

MEC Detonation Alternatives

- NoA (as required by CERCLA as a baseline for comparison)
- Detonation with Engineering Controls
- Detonation Chamber and Detonation with Engineering Controls

Selected Remedies

For each of the IA sites, the remedy was selected as described below.

Vegetation Clearance via Prescribed Burning

Prescribed burning will include:

- Preparation of a burn plan outlining the objectives of the burn; the burn area; the range of environmental conditions under which the burn will be conducted; the manpower and equipment resources required to ignite, manage, and contain the fire; a smoke management plan; and establishment of communication procedures for the fire crew and to the public and other affected agencies.
- Site preparation, including removal of debris; establishment and maintenance of primary, secondary, and tertiary containment lines, staging areas, and escape routes; and protection of existing structures by removing nearby vegetation and applying fire suppressant foam or demolishing and removing the structures.
- Conducting the burn within the window of environmental conditions established in the burn plan.
- Conducting the burn in a manner to ensure the fire is fully contained and does not escape the perimeter of the burn area.
- Offering voluntary temporary relocation for any Monterey County resident who wishes to relocate during a prescribed burn.
- Conducting air monitoring during the prescribed burns; data will be used to further evaluate the effectiveness of prescribed burning as a vegetation clearance alternative.

MEC Remedial Action via Surface and Subsurface MEC Removal

Surface and Subsurface MEC Removal will consist of identification of MEC (conduct a visual search and operate MEC detection equipment), and remediation of any MEC found/detected on the ground surface of the site and in the subsurface to depths determined in the site-specific work plan. Subsurface MEC removal depths will be determined based on: (1) the type of MEC, (2) the typical depth at which the MEC type is found, (3) planned reuse of specific areas within the IA site, and (4) the capabilities of the geophysical detection equipment selected as best suited for site conditions by the MEC site geophysicist.

MEC Detonation via Detonation with Engineering Controls

MEC Detonation with Engineering Controls will consist of applying additional detonating charges to single or consolidated MEC items, and applying engineering controls (covering the MEC with tamped dirt, sandbags, contained water, or other materials) prior to detonation to reduce the blast and any associated fragmentation, emissions, or noise.

15.2.2 Remedy Implementation

Ranges 43-48

Prescribed burning was conducted in October 2003. Surface and subsurface MEC removal were conducted on the 499.5-acre MRS-Ranges 43–48 site from November 2003 to December 2005. The surface removal for MRS-Ranges 43-48 has completed over the entire site, and the subsurface removal has been conducted to the maximum capability of the technologies and instruments used in all portions of the site that could be completed within the environmental, funding and time constraints of the contract. Based on the results of this IA, the imminent threat posed to the public by the presence of MEC on this site has been significantly mitigated.

Approximately 227.2 acres of the removal area have been designated SCA or non-completed areas. The immediate threat posed to the public by these SCAs has been significantly mitigated because a surface removal of MEC was completed in these areas (Parsons, 2007).

The remaining explosive risks at Ranges 43-48 and the IA work completed will be evaluated under the MR RI/FS program.

Range 30A

The IA to address MEC for Range 30A has not been conducted. The final remedy for Range 30A will be evaluated as part of the Track 3 MR RI/FS.

MRS-16

The prescribed burn as part of an IA to address MEC was completed on approximately 58 acres of MRS-16 on October 19, 2006. An ongoing surface and subsurface removal of MEC began in December 2006.

15.2.3 System Operations and Maintenance

Because this remedy may result in MEC remaining on-site, a review will be conducted to ensure that the remedy continues to provide adequate protection of human health and the environment within five years after commencement of the remedial action. These sites will be evaluated as part of the next comprehensive five-year review for the former Fort Ord. Because this is an IA ROD, the IA sites will be further evaluated in the final ROD. Due to the presence of SCAs and non-completed areas, site security measures (fences, signs, perimeter controls, etc.) remain in place at Ranges 43-48 to provide continuing protection until such time that the final ROD modifies site security requirements.

Follow-up inspections of surface removal areas have been conducted in MRS-Ranges 43-48. Information from these activities will be evaluated in the next five-year review and the final ROD for the site.

15.3 Technical Assessment

15.3.1 Question A

Is the remedy functioning as intended by the decision document?

Implementation of the remedy is currently in progress and will meet the intended goals of the ROD.

15.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

There are no changes in the exposure assumptions or conditions at the site that would affect the protectiveness of the remedy.

15.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the remedy into question.

15.4 Issues

MEC remediation has not been implemented and/or completed at this time.

15.5 Recommendations and Follow-Up Actions

The remaining explosive risks at SCAs at MRS-Ranges 43-48 should be evaluated under the MR RI/FS program. MEC remediation at Range 30A should be evaluated as a component of the Track 3 MR RI/FS.

15.6 Protectiveness Statement

The interim remedy will be protective of human health and the environment in the short-term because exposure pathways that could result in unacceptable risks are being controlled by an existing fence. A long-term protectiveness determination is deferred and cannot be made until further information is obtained. Further information will be obtained by completing the interim remedy and comparing them with the requirements stated in the Interim ROD.

16.0 IMPACT AREA MUNITIONS RESPONSE AREA, TRACK 3 ROD

This section presents background information on the Impact Area MR Area, Track 3 MR Remedial Investigation / Feasibility Study; a summary of remedial actions and a technical assessment of the actions taken at these sites; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies.

16.1 Background

The Impact Area MR Area, Track 3 MR ROD is scheduled to be signed in the fall of 2007 and will be based on the *Draft Final Track 3 Impact Area Munitions Response Area Remedial Investigation/Feasibility Study, Former Fort Ord, California* (MACTEC, 2007a).

The Impact Area MRA consists of the 6,560-acre portion of the 8,000-acre historical Impact Area that is entirely within the natural resources management area described in the *Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California* (USACE, 1997). The Impact Area MRA is to be managed as a "habitat reserve" by BLM in the future. Within the 6,560-acre Impact Area MRA previous investigations included MEC removals on roads, trails, and permanent fuel breaks; surface removal actions in the Watkins Gate Burn Area and Eucalyptus Fire Area; sampling in limited areas; and surface and subsurface removals in portions of MRS-Ranges 43-48.

The Impact Area MRA is fenced, warning signs are posted, and access is controlled by the Army. The perimeter of the historical Impact Area is patrolled to detect and prevent trespassing.

Habitat management in the Impact Area MRA is essential to the protection and management of protected species within this habitat reserve, 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 Impact Area MRA is currently undeveloped. While the environmental investigation and cleanup is ongoing, habitat management activities such as invasive weed and erosion control are implemented on a routine basis. Other activities include ecological monitoring such as plant and animal studies. These activities are conducted under the supervision of the Army and require specific training and generally require UXO escort. No accidents involving MEC have occurred during these ongoing activities.

16.2 Remedial Actions

16.2.1 Remedy Selection

The Army evaluated four remedial alternatives described below that could potentially mitigate and manage risks from any MEC that could still be present in the Impact Area MRA. The final remedy will be selected after the public comment period.

Description of Remedial Action Alternatives

The following summarizes the components of each of the four remedial action alternatives developed in the FS (Volume II; MACTEC, 2007a).

- Alternative 1: No Further Action
- Alternative 2: Technology-aided Surface MEC Remediation and Land Use Controls
- Alternative 3: Subsurface MEC Remediation and Land Use Controls
- Alternative 4: Technology-Aided Surface MEC Remediation, with Subsurface MEC Remediation in Selected Areas and Land Use Controls.

Preferred Alternative

Based on the RI/FS, the Army has developed a Proposed Plan. The plan proposes Alternative 4, Combination of Technology-aided Surface MEC Remediation, with Subsurface MEC Remediation and Land Use Controls, as the preferred alternative for implementation at the Impact Area MRA.

This alternative assumes Technology-aided Surface MEC Remediation would be conducted throughout the entire Impact Area MRA, and Subsurface MEC Remediation would be conducted on fuel breaks and access roads, a safety buffer on the habitat-side of the habitat- development interface, and other limited areas in order to address specific concerns and needs. This alternative would include the following components:

- Planned prescribed burning in a series of small burns to clear vegetation and provide access to conduct MEC removals, up to 800 acres per year;
- Technology-aided surface MEC removal throughout the entire Impact Area MRA;
- Subsurface MEC removal (intrusive investigation of all anomalies) on fuel breaks and roads essential to habitat management activities, a safety buffer on the habitat-side of the habitat-development interface, and in other limited areas that may require MEC clearance to depth for specific purposes to support the reuse (assumed to be approximately 10 percent of the Impact Area MRA); Approximately 85 acres of highly density anomaly associated with sensitive type munitions would be excavated and sifted;
- Digital mapping to provide a record of remaining anomalies and to assist future property users in identifying areas with specific MEC safety support requirements for surface or subsurface activities;
- Implementation of Land Use Controls (MEC recognition and safety training; construction monitoring for intrusive activities; access management measures including regular security patrols and maintaining a perimeter fence and signs; fire suppression helicopter support for select future habitat management prescribed burns; and use restrictions including the prohibition of unrestricted land use);
- Post-remediation habitat monitoring, and habitat restoration as needed.

At the completion of the remedial action, including the initial implementation of land use controls, the following Long Term Management Measures will be implemented: a land transfer document that outlines any land use restrictions, such as prohibition of unrestricted land use; annual monitoring and reporting; and five-year review reporting required under CERCLA.

16.2.2 Remedy Implementation

Implementation of the remedy will begin following finalization of the ROD.

16.2.3 System Operations and Maintenance

Annual monitoring and reporting will be performed by the Army for the Impact Area MRA regarding MEC finds and changes in site conditions that could increase the possibility of finding MEC exposed due to erosion over time. The results of the monitoring activities will be reported to the regulatory agencies annually. The Army will also conduct a review of the Impact Area MRA every 5 years to determine

whether the remedy at each site continues to be protective of human health and the environment. It will include a review of any land use controls.

16.3 Technical Assessment

16.3.1 Question A

Is the remedy functioning as intended by the decision document?

The remedy has not yet been selected or implemented.

16.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The remedy has not yet been selected or implemented.

16.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

The remedy has not yet been selected or implemented.

16.4 Issues

Finalize the Impact Area MR Area, MR Track 3 ROD and implement the remedy.

16.5 Recommendations and Follow-Up Actions

The Impact Area MR Area, MR Track 3 ROD should be finalized.

16.6 Protectiveness Statement

The remedy for Track 3 Impact Area MRA will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled by an existing fence.

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17.0 DEL REY OAKS MUNITIONS RESPONSE AREA, TRACK 2 ROD

This section presents background information on the DRO MR Area, Track 2 ROD (ROD, in progress); a summary of preferred remedial alternative; identifies any issues related to the protectiveness of the remedies based on the review; presents recommendations and follow-up actions, if needed, to address issues identified during the review; and provides a statement regarding the protectiveness of the site remedies. This section presents background information on the DRO MR Area, Track 2 MR Remedial Investigation / Feasibility Study.

17.1 Background

The ROD for the DRO MR Area, Track 2 is in progress. The following sections are based on the Draft *Track 2, Munitions Response RI/FS Del Rey Oaks Munitions Response Area, Former Fort Ord, California* (MATEC, 2007b), which is currently under agency review.

The DRO MRA is approximately 324 acres and is located along the southwestern boundary of the former Fort Ord. The DRO MRA is composed of portions of or all of three MR Sites (MRS-15 DRO 01, MRS-15 DRO 02, and a portion of MRS-43). The entire area that comprises the DRO MRA was investigated through sampling, and several removal actions were conducted. Following specific removal actions, a geophysical investigation of the entire MRA was conducted and all detected MEC was removed. The result of the investigation and removal actions is that portions of the site were investigated multiple times. The work was conducted using Schonstedt GA-52Cx hand held magnetometers, Geonics EM-61 metal detectors, Geometrics G858 magnetometers, or a combination of these instruments. Quality control procedures employed after each removal action indicated the removal work met project requirements, with the exception of the "11 grid area," where the possibility of subsurface MEC cannot be entirely ruled out because machine gun links remaining in this area may create interference that could affect the ability to detect any potentially remaining MEC below 4 feet bgs.

The DRO MRA land was transferred from the Army to FORA in 2005, and then to the City of Del Rey Oaks. Identified reuse includes a visitor serving area, a business park, light industrial, and office park. The specific reuse of the visitor serving area was not identified; however, intended reuses reportedly include a golf course, lodging, and retail. Since the time the property was transferred, residential use is also being considered based on a proposed zoning change by the City of Del Rey Oaks that would allow residential development in the DRO MRA. The site is currently undeveloped.

17.2 Remedial Actions

17.2.1 Remedy Selection

The Army evaluated three remedial alternatives described below to address risks from any MEC that potentially remains in the DRO MRA during development and in the future following development and reuse of the area.

- Alternative 1: No Further Action
- Alternative 2: Land Use Controls Including Use Prohibitions
- Alternative 3: Land Use Controls Without Use Prohibitions

Preferred Alternative

Based on the evaluation and comparison of the three remedial alternatives, the Army proposes Alternative 2, Land Use Controls Including Use Prohibitions, as the preferred alternative for implementation at the DRO MRA. This alternative was developed assuming unrestricted (e.g., residential) use is prohibited.

- Deed Restriction.
- MEC Recognition and Safety Training.
- Construction Support.
- Residential Use Prohibition.

It should be noted that (1) grading activities are part of redevelopment activities and are not considered part of the Land Use Control remedial alternatives; and (2) compliance with environmental requirements associated with redevelopment would be the reuser's responsibility.

These Land Use Controls will be implemented in accordance with Land Use Control Guidelines. After the signature of the ROD, the current deed and Covenant to Restrict the Use of Property will be modified, if necessary, to be consistent with the final remedy.

At the time of five-year reviews, the Army will evaluate the effectiveness of each of the remedial land use controls. If experience indicates that no MEC items have been found in the course of development, redevelopment, or reuse of an area, it is anticipated that the requirements may, with the approval of the regulatory agencies, be modified or discontinued.

It should be noted that the City of Del Rey Oaks has already agreed to additional requirements in a separate agreement with DTSC, including:

- Excavation Ordinance— The City has designated all real property within the City's land use jurisdiction which was formerly part of Fort Ord and identified as a possible location of UXO as an "Ordnance Remediation District" ("District"). The City of Del Rey Oaks has adopted an ordinance to control and restrict excavation and movement of soil in the Ordnance Remediation District that includes the DRO MRA.
- Site-Wide Construction Support—The City of Del Rey Oaks requires that any soil disturbance projects involving 10 cy of soil be conducted with construction support.

In the event a suspected MEC item is discovered at the site, the reuser is to immediately report to the local law enforcement agency. In accordance with established procedures, the local law enforcement agency will in turn request a response by authorized UXO-qualified personnel (e.g. an Explosive Ordnance Disposal [EOD] unit) who will promptly be dispatched to destroy or otherwise take control of the reported military munitions item.

17.2.2 Remedy Implementation

Implementation of the remedy will begin following finalization of the ROD.

17.2.3 System Operations and Maintenance

Long-term management measures comprised of a deed notice, annual monitoring and reporting, and five-year review reporting would be included (the existing deed notice would be maintained) for the DRO MRA to (1) warn property owners of potential MEC risks associated with intrusive activities,

(2) monitor and report any MEC-related data during development or reuse, and (3) assess and manage information regarding the continued protectiveness of these alternatives over time.

17.3 Technical Assessment

17.3.1 Question A

Is the remedy functioning as intended by the decision document?

The remedy has not yet been selected or implemented.

17.3.2 Question B

Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

The remedy has not yet been selected or implemented.

17.3.3 Question C

Has any information come to light that could call into question the protectiveness of the remedy?

No new information has been identified that could call the protectiveness of the proposed remedy into question.

17.4 Issues

There are no unresolved issues that have been identified in regard to the protectiveness of human health and the environment.

17.5 Recommendations and Follow-Up Actions

The DRO MR Area, Track 2 ROD should be finalized.

17.6 Protectiveness Statement

The remedy for the DRO MR Area, Track 2 will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled by institutional control, CRUP.

18.0 STATUS OF OTHER INVESTIGATIONS

This section provides background information and status reports on other investigations at Fort Ord not addressed under one of the RODs previously described.

18.1 Resource Conservation and Recovery (RCRA) Closures

18.1.1 Building T-111

Background

The Building T-111 site was used for temporary container storage of wastes contaminated with PCBs from 1985 through January 1995. The building contained three epoxy-lined storage bays separated by four-foot high cement block berms, and an adjoining concrete-surfaced yard. Hazardous waste storage permit application data indicates that the facility anticipated handling an estimated 3,000 kilograms of PCB and associated material annually. A variety of other hazardous wastes also were stored at the site for a 10-month period in 1989. Specific waste types that were stored onsite and other site details are presented in the *Final Closure Plan, DRMO PCB Storage Building T-111, Former Fort Ord, California* (Harding ESE, 2003a).

Status Report

The final closure plan was submitted in February 2003 and approved by DTSC. Following the closure plan, wipe and concrete chip samples were collected and analyzed to demonstrate that the Defense Reutilization and Marketing Office (DRMO) PCB Storage Building T-111 met the clean closure performance standards as documented in the *Final RCRA Closure Certification Report DRMO PCB Storage Building T-111 (Solid Waste Management Unit FTO-009), Former Fort Ord, California* (Harding ESE, 2003b). DTSC concurred that the DRMO PCB Storage Building T-111 has met the performance criteria for clean closure and that DTSC considers Building T-111 officially closed. No further actions are necessary.

18.1.2 Range 36A

Background

Range 36A was an EOD range and was used for disposal of various types of commercial explosives and military ordnance and ammunition. Disposal of MEC occurred by open burning and open detonation. The range was used until October 1992, when Fort Ord's EOD unit was deactivated as part of the closure of Fort Ord. In January 1994, Range 36A was reactivated for disposal of MEC identified from Fort Ord's Time-Critical Removal Action Program for MEC found outside the Inland Ranges. Potential contaminants present at the range as a result of past activities include explosive compounds and metals.

Investigations were conducted at Range 36A by James M. Montgomery Consulting Engineering (JMM) and by HLA. In 1990, JMM performed a Preliminary Assessment/Site Investigation at Range 36A to evaluate the presence of explosive compounds and metals as a result of past activities at the site. The JMM investigation consisted of drilling two soil borings and installing three wells. Twenty-four soil samples, plus one split sample and one duplicate sample, were collected from the two borings and three MW boreholes, and the samples were analyzed for explosive compounds and metals.

In 1992, HLA performed an RI at Range 36A. This investigation included:

- Drilling 23 borings to depths of 15 to 20 feet bgs on an approximate 50-foot grid
- Collecting 69 surface and subsurface soil samples for lithologic characterization and chemical and physical analysis
- Analysis of soil samples for explosive compounds and priority pollutant metals.

The findings of the field investigations at Range 36A indicated the following:

- The explosive compounds cyclotetramethylenetetranitramine (HMX) and RDX were present at low levels (maximum concentrations of 1.84 and 16.5 mg/kg, respectively), were generally limited to shallow soil, and were below PRGs. The PRG for HMX is 803 mg/kg and the PRG for RDX is 4.4 mg/kg.

With the exception of beryllium detected at a maximum concentration 0.89 mg/kg in shallow soil, metals in soil at the site were below background or PRG concentrations. The Fort Ord PRG for beryllium is 0.39 mg/kg. The most recent EPA Region 9 PRG for beryllium is 150 mg/kg.

Additional sampling was conducted in 2004 to investigate the areas used after the previous investigations and to verify the presence of RDX above the PRG. At the request of DTSC, dioxins and perchlorate were also analyzed. The following items summarize the 2004 investigation:

- Ten soil samples were collected.
- RDX was detected in one sample but at a concentration less than the PRG of 4.4 mg/kg.
- Perchlorate was not detected in any of the soil samples.

Dioxins were detected at low levels (less than the 2,3,7,8-Tetrachlorodibenzo-p-dioxin [TCDD] PRG of 3.9E-06 mg/kg) in each of the surface samples. One dioxin congener was detected at soil sample collected at a depth of 5 feet but at a concentration was less than the 2,3,7,8-TCDD PRG. Additionally, all calculated TCDD-TE concentrations for dioxins detected in the soil samples were less than the 2,3,7,8-TCDD PRG.

Status Report

The *Final RCRA Closure Plan, Range 36A, Former Fort Ord, California (Solid Waste Management Unit FTO-016)* (MACTEC, 2005) was submitted in 2005. This plan was amended after geophysical investigation revealed widespread metal debris across the whole site. In the amended plan, the Army proposed to excavate and investigate additional areas to demonstrate with a reasonable probability that MEC are unlikely to be found at Range 36A. These amended closure procedures will provide sufficient information to determine whether Range 36A meets the closure performance standards or additional MR is warranted.

The amended closure activities were completed in February 2007. No MEC was found. The final closure certification report was submitted in June 2007.

18.1.3 Solid Waste Management Units (SWMUs)

Background

In support of Fort Ord's RCRA Part B permit application, the Army Environmental Hygiene Agency identified 58 Solid Waste Management Unit (SWMUs) in 1988. All but two of these 58 SWMUs were in areas investigated during the RI/FS or were previously identified as Operable Units. In 1996, the Army identified 14 additional SWMUs. The *Draft Field Investigation and Data Review, Solid Waste*

Management Units, Fort Ord, California (HLA, 1996g) recommended no additional sampling under the SWMU program.

A limited site visit to the SWMUs in 2001 as well as review of previous visits and data review concluded that no investigative sampling is recommended under the SWMU. The recommendation is documented in the *Draft Final Field Investigation and Data Review, Solid Waste Management Units, Fort Ord, California* (Harding ESE, 2002).

Status Report

The following SWMUs listed in the first five-year review are presently active:

- FTO-010 – Army and Air Force Exchange Service (AAFES) Service Station
- FTO-027 – Building 4495 Temporary Container Storage
- FTO-055 – Army Reserve Center Motor Pool Temporary Container Storage

The following additional SWMUs were active during the 2007 site inspection:

- FTO-030– Building 4518W Temporary Container Storage.
- FTO-031 – Building 4522 Temporary Container Storage.

The following SWMUs listed in the first five-year review have been transferred and are no longer controlled by the Army:

- FTO-068 – Auto Craft Shop Temporary Container Storage. This SWMU has been transferred to California State University, Monterey Bay.

- FTO-071 – Golf Course Maintenance Area Temporary Container Storage. This SWMU has been transferred to the City of Seaside.

18.2 Basewide Range Assessment

18.2.1 Background

A comprehensive Basewide Range Assessment was conducted to evaluate the potential presence of metals and/or explosive compounds in the soil at known or suspected small arms ranges, multi-use ranges, and military munitions training areas within the former Fort Ord. The Basewide Range Assessment (MACTEC, 2006d) summarizes the status of the investigation for 221 known or suspected small-arms and multi-use training ranges. The areas are recognized as HAs, which were identified for investigation as part of the *Basewide Range Assessment Work Plan* (Harding ESE/IT, 2001b) and previous investigations performed as part of the Basewide RI/FS (HLA, 1995f).

The objectives of the Basewide Range Assessment investigation activities is to identify which HAs can be eliminated from consideration for potential remediation related to metals and/or explosive compounds, and to identify sites that require additional investigation for potential chemical contamination, or should be considered for remediation related to metals and/or explosive compounds.

The Basewide Range Assessment process involves 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. The first three steps

are considered part of the preliminary assessment phase and the final two steps are considered part of the remediation phase.

18.2.2 Status Report

Of the 221 sites included in the Basewide Range Assessment (MACTEC, 2006d), 33 sites have been remediated, 19 sites have been identified for remediation at Site 39, 8 sites have been identified for additional investigation following military munitions removal actions, 11 sites have been identified for additional investigation, and 150 sites have been identified for no further action for chemical contamination based on completed evaluations (Table 3).

Activities at some of the HAs identified for inclusion in the Basewide Range Assessment have not been completed due to accumulations of munitions and MEC or because MEC removal activities are ongoing limiting access to the site. In the future, when additional work is completed at the HAs included in this report, or if additional HAs are identified, the Basewide Range Assessment report will be updated to include the new data. The following table summaries the status of all HA sites identified to date:

Status of Sites	Number of Sites
Remediation complete, no further action recommended	33
No further action based on investigation	150
Further investigation required following Military Munitions clearance	8
Further investigation required	11
Remediation proposed	19

The remediation which was completed under the Site 3 Interim ROD included the remediation of HAs 1 through 17 (IT, 2000b). HAs 18D, 19D, 21D, 24D, 25D, and 46D were remediated for future development under the Basewide RI Sites ROD for Site 39 (IT, 2000c). HAs 80 through 89 were remediated under the IA Sites ROD as IAs at Site 39A (HLA, 1998d and MACTEC, 2006a). The following HAs are proposed for remediation under the Basewide RI Sites ROD for Site 39 and will be included in the Site 39 FS Addendum: 18, 19, 22, 23, 26,27, 27A, 28, 29, 33, 34, 36,37, 39, 40, 43, 44, 45, and 48. Some of the HAs cannot be investigated until the MEC removal action is completed. These HAs include: 30, 31A, 32, 41, 42, 70, 73, and 118. The remaining HAs were recommended for no further action or will be further evaluated to determine if remediation may be necessary (Table 8).

19.0 NEXT FIVE-YEAR REVIEW

The next five-year review will be submitted in May 2012. The next review will include only those sites with ongoing remediation, sites that have not received final agency approval for closure prior to this report, and sites where institutional controls are in place to preclude unrestricted/residential use.

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