FORA ESCA REMEDIATION PROGRAM

FINAL

Group 2

Remedial Investigation / Feasibility Study

Volume 1: Remedial Investigation

California State University Monterey Bay Off-Campus Munitions Response Area

Former Fort Ord
Monterey County, California

February 18, 2013

Prepared for:

FORT ORD REUSE AUTHORITY

920 2nd Avenue, Suite A
Marina, California 93933

Prepared Under:

Environmental Services Cooperative Agreement No. W9128F-07-2-01621
and
FORA Remediation Services Agreement (3/30/07)

Document Control Number: 09595-09-079-061

Prepared by:

ARCADIS

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

This effort was sponsored by the Army, Assistant Chief of Staff Installation Management. The content of the information does not necessarily reflect the position or policy of the Government and no official endorsement should be inferred.

Group 2 Remedial Investigation/Feasibility Study
Volume 1: Remedial Investigation
Former Fort Ord
Monterey County, California

Reviewed and Approved By:	Stan Cook FORA ESCA Program Manager Fort Ord Reuse Authority	18 Feb 2013 Date
Reviewed By:	Christopher G. Spill, P.G. ESCA Technical Project Manager ARCADIS U.S., Inc.	18 Feb 2013 Date
Prepared By:	Linda Temple ESCA Remediation Project Manager Weston Solutions, Inc.	18 Feb 2013 Date
Approved By:	Nelline Kowbel, P.E. ESCA Remediation Project Engineer Weston Solutions, Inc.	18 Feb 2013 Date
Approved By:	Kristie Reimer ESCA Remediation Program Manager ARCADIS U.S., Inc.	18 Feb 2013 Date

CONTENTS

FIGURES

PLATES

APPENDICES

[this page intentionally left blank]

ACRONYMS AND ABBREVIATIONS

ACES	Areas Covered by Environmental Services
AOC	Administrative Order on Consent
AP-T	armor-piercing tracer
ARAR	applicable or relevant and appropriate requirement
Army	United States Department of the Army
ASR	Archives Search Report
bgs	below ground surface
BM	bench mark
BO	biological opinion
BRA	Basewide Range Assessment
BRAC	Base Realignment and Closure
CBR	chemical, biological, and radiological
CEHND	United States Army Corps of Engineers, Huntsville Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	CMS Environmental, Inc.
COC	chemical of concern
CN	w-Chloroacetophenone
CS	O-Chlorobenzylidene Malonitrile
CSM	Conceptual Site Model
CSUMB	California State University Monterey Bay
CTS	California tiger salamander
DGM	digital geophysical mapping
DMM	discarded military munitions
DOD	United States Department of Defense
DTSC	Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ESA	Endangered Species Act
ESCA RP	Environmental Services Cooperative Agreement Remediation Program
FFA	Federal Facility Agreement
FORA	Fort Ord Reuse Authority
FOSET	Finding of Suitability for Early Transfer
FS	Feasibility Study
ft	feet
HA	historical area
HE	high explosive
HFA	Human Factors Applications, Inc.
HLA	Harding Lawson Associates

HMP	Habitat Management Plan
HTW	hazardous and toxic waste
IRP	Installation Restoration Program
ISD	Insufficient Data
km	kilometer
lbs	pounds
LE	low explosive
MDmunitions debris	
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program
MOUT	Military Operations in Urban Terrain
MR	Munitions Response
MRA	Munitions Response Area
MRS	Munitions Response Site
msl	mean sea level
NCP	National Contingency Plan
NPL	National Priorities List
NRMA	natural resources management area
ODDS	Ordnance Detection and Discrimination Study
OE	ordnance and explosives
OEW	ordnance and explosive waste
PA/SI	Preliminary Assessment/Site Inspection
QA	quality assurance
QA/QC	quality assurance/quality control
QC	quality control
RA	Risk Assessment
RAO	remedial action objective
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remediation Program
RQA	Residential Quality Assurance
RWQCB	Regional Water Quality Control Board
SEDR	Summary of Existing Data Report
SOP	standard operating procedure

TIP	Technical Information Paper
TPT	target practice trainer
USA	USA Environmental, Inc.
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service
UXB	UXB International, Inc.
UXO	unexploded ordnance
WP	white phosphorous
WWII	World War II

[this page intentionally left blank]

GLOSSARY

Anomaly
Any item that is seen as a subsurface irregularity after geophysical investigation. This irregularity should deviate from the expected subsurface ferrous and non-ferrous material at a site (i.e., pipes, power lines, etc.).

Anomaly Avoidance
Techniques employed by unexploded ordnance (UXO) personnel at sites with known or suspected munitions and explosives of concern (MEC) to avoid any potential surface MEC and any subsurface anomalies. This usually occurs at mixed hazard sites when hazardous, toxic, and radioactive waste investigations must occur prior to execution of an MEC removal action. Intrusive anomaly investigation is not authorized during ordnance avoidance operations.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980
CERCLA authorizes federal action to respond to the release or threatened release of hazardous substances into the environment or a release or threatened release of a pollutant or contaminant into the environment that may present an imminent or substantial danger to public health or welfare.

Construction Support
Assistance provided by United States Department of Defense (DOD) explosive ordnance disposal (EOD) or UXO-qualified personnel and/or by personnel trained and qualified for operations involving chemical agents (CA), regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards.

Covenant Deferral Request (CDR)
A letter along with a supporting information package known as a Covenant Deferral Request (CDR) is assembled by the Federal landholding to formally request deferral of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) covenant until all remediation has been accomplished prior to transfer. United States Environmental Protection Agency (EPA) requires that the information is: 1) of sufficient quality and quantity to support the request for deferral of the CERCLA covenant; and 2) that it provides a basis for EPA to make its determination. This information is submitted to EPA in the form of a CDR.

Deferral period
The period of time that the CERCLA covenant warranting that all remedial action is complete before transfer, is deferred through the Early Transfer Authority.

Discarded Military Munitions (DMM)
Generally, military munitions that have been abandoned without proper disposal or removed

from storage in a military magazine or other storage area for the purpose of disposal. The term does not include UXO, military munitions that are being held for future use or planned disposal, or military munitions that have been properly disposed of, consistent with applicable environmental laws and regulations. (10 U.S.C. 2710[e][2])

Early Transfers
The transfer by deed of federal property by United States DOD to a nonfederal entity before all remedial actions on the property have been taken. Section 120 (h)(3)(C) of the CERCLA allows Federal agencies to transfer property before all necessary cleanup actions have been taken. This provision, known as early transfer authority, authorizes the deferral of the CERCLA covenant when the findings required by the statute can be made and the response action assurances required by the statute are given. The Governor of the state where the property is located must concur with the deferral request for property not listed on the National Priorities List (NPL). For NPL property, the deferral must be provided by the EPA with the concurrence of the Governor. Upon approval to defer the covenant, DOD may proceed with the early transfer.

Environmental Services Cooperative Agreement Remediation Program (ESCA RP Team)
ARCADIS U.S., Inc. (formerly LFR Inc.), Weston Solutions, Inc., and Westcliffe Engineers, Inc.

Exclusion Zone
A safety zone established around a munitions and explosives of concern (MEC) work area. Only essential project personnel and authorized, escorted visitors are allowed within the exclusion zone. Examples of exclusion zones are safety zones around MEC intrusive activities and safety zones where MEC are intentionally detonated.

Explosive
A substance or a mixture of substances that is capable by chemical reaction of producing gas at such temperature, pressure, and speed as to cause damage to the surroundings. The term "explosive" includes all substances variously known as high explosives and propellants, together with igniters, primers, initiators, and pyrotechnics (e.g., illuminant, smoke, delay, decoy, flare, and incendiary compositions).

Feasibility Study (FS)
The primary objective of the FS is "to ensure appropriate remedial alternatives are being developed and evaluated and an appropriate remedy selected" [NCP 40 CFR 300.430(e)].

Geophysical Reacquisition
Geophysical Reacquisition involves utilizing both a positioning method (i.e., Global Positioning System [GPS], ultrasonic, or tape from corners) and geophysical instruments to reacquire and pinpoint anomaly locations selected by the geophysical processors. The geophysical instruments include the original instrument used for the digital survey of the grid and the analog instrument being utilized by the UXO teams for intrusive activities. The intended result of this method is to pinpoint the location where the intrusive teams will find the subsurface item causing the anomaly.

Intrusive Activity
An activity that involves or results in the penetration of the ground surface at an area known or suspected to contain MEC. Intrusive activities can be of an investigative or removal action nature.

Mag and dig
Utilizing hand held geophysical instruments to detect anomalies and immediately investigating the anomalies (without using collection of digital data and post processing to determine which anomalies to dig) by manual digging or with the assistance of heavy equipment.

Mag and flag
Utilizing handheld geophysical instruments to detect anomalies, marking anomalies with a flag and later investigating the anomalies by manual digging or with the assistance of heavy equipment.

Material Documented as Safe (MDAS)
Material Potentially Presenting an Explosive Hazard (MPPEH) that has been assessed and documented as not presenting an explosive hazard and for which the chain of custody has been established and maintained. This material is no longer considered to be MPPEH.

Material Documented as an Explosive Hazard (MDEH)
MPPEH that cannot be documented as MDAS, that has been assessed and documented as to the maximum explosive hazards the material is known or suspected to present, and for which the chain of custody has been established and maintained. This material is no longer considered to be MPPEH.

Material Potentially Presenting an Explosive Hazard (MPPEH)
Material that, prior to determination of its explosives safety status, potentially contains explosives or munitions (e.g., munitions containers and packaging material; munitions debris remaining after munitions use, demilitarization, or disposal; and range-related debris); or material potentially containing a high enough concentration of explosives such that the material presents an explosive hazard (e.g., equipment, drainage systems, holding tanks, piping, or ventilation ducts that were associated munitions production, demilitarization or disposal operations). Excluded from MPPEH are munitions within DOD's established munitions management system and other hazardous items that may present explosion hazards (e.g., gasoline cans, compressed gas cylinders) that are not munitions and are not intended for use as munitions.

Memorandum of Agreement (MOA)
"Memorandum of Agreement Among the Fort Ord Reuse Authority, Monterey County and Cities of Seaside, Monterey, Del Rey Oaks and Marina, California State University Monterey Bay, University of California Santa Cruz, Monterey Peninsula College, and the Department of Toxic Substances Control Concerning Monitoring and Reporting of Environmental Restrictions on the Former Fort Ord, Monterey County, California."

Military Munitions
All ammunition products and components produced for or used by the armed forces for national defense and security, including ammunition products or components under the control of the DOD, the Coast Guard, the Department of Energy, and the National Guard. The term includes confined gaseous, liquid, and solid propellants, explosives, pyrotechnics, chemical and riot control agents, smokes, and incendiaries, including bulk explosives, and chemical warfare agents, chemical munitions, rockets, guided and ballistic missiles, bombs, warheads, mortar rounds, artillery ammunition, small arms ammunition, grenades, mines, torpedoes, depth charges, cluster munitions and dispensers, demolition charges, and devices and components of the above. The term does not include wholly inert items, improvised explosive devices, and nuclear weapons, nuclear devices, and nuclear components, other than non-nuclear components of nuclear devices that are managed under the nuclear weapons program of the Department of Energy after all required sanitization operations under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) have been completed. (10 U.S.C. 101[e][4][A through C]).

Military Munitions Response Program (MMRP)
DOD-established program that manages the environmental, health and safety issues presented by munitions of explosives concern.

Minimum Separation Distance (MSD)
Minimum distance between a potential explosion site (PES) and personnel, assets, or structures, required to provide the appropriate level of protection from a detonation (either intentional or unintentional) at the PES.

Munitions and Explosives of Concern (MEC)
This term, which distinguishes specific categories of military munitions that may pose unique explosives safety risks, means: (A) UXO, as defined in 10 U.S.C. 101(e)(5)(A) through (C); (B) DMM, as defined in 10 U.S.C. 2710(e)(2); or (C) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. 2710(e)(3), present in high enough concentrations to pose an explosive hazard.

Munitions Constituents (MC)
Any materials originating from UXO, discarded military munitions, or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions (10 U.S.C. 2710).

Munitions Debris (MD)
Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarization, or disposal.

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples include former ranges and munitions burial areas. A munitions response area is comprised of one or more munitions response sites.

Munitions Response Site (MRS)
A discrete location within an MRA that is known to require a munitions response.

Ordnance and Explosives (OE)
See MEC.

Quality Assurance (QA)
An integrated system of management activities involving planning, implementation, assessment, reporting, and quality improvement to ensure that a process, item, or service is of the type and quality needed to meet project requirements.

Quality Control (QC)
The overall system of operational techniques and activities that measures the attributes and performance of a process, item, or service against defined standards that are used to fulfill requirements for quality.

Record of Decision (ROD)
A ROD is the document used to record the remedial action decision made at a National Priorities List property. The ROD will be maintained in the project Administrative Record and project file.

Remedial Investigation (RI)
The RI is intended to "adequately characterize the site for the purpose of developing and evaluating an effective remedial alternative" (NCP, 40 CFR 300.430[d]). In addition, the RI provides information to assess the risks to human health, safety, and the environment that were identified during risk screening in the site investigation.

Remedial Actions
Those actions consistent with a permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health, welfare, or the environment. The term includes but is not limited to such actions at the location of the release as storage; confinement; perimeter protection using dikes, trenches, or ditches; clay cover; neutralization; cleanup of released hazardous substances and associated contaminated materials; recycling or reuse; diversion; destruction; segregation of reactive wastes; dredging or excavations; repair or replacement of leaking containers; collection of leachate and runoff; on-site treatment or incineration; provision of alternative water supplies; and any monitoring reasonably required to assure that such actions protect the public health, welfare, and the environment. The term includes the costs of permanent relocation of residents and businesses and community facilities where the President of the United States determines that, alone or in combination with other measures, such relocation is more cost-effective and environmentally preferable to the transportation, storage, treatment, destruction, or secure disposition off site of hazardous substances, or may otherwise be necessary to protect the public health or welfare. The term includes off-site transport and off-site storage, treatment, destruction, or secure disposition of hazardous substances and associated contaminated materials.

Response Action
Action taken instead of or in addition to a removal action to prevent or minimize the release of MEC so that it does not cause substantial danger to present or future public health or welfare or the environment.

Technology-Aided Surface Removal
A removal of UXO, DMM, or chemical warfare material (CWM) on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., handheld magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM, or CWM, or other factors make visual detection difficult.

Unexploded Ordnance (UXO)
Military munitions that (A) have been primed, fuzed, armed, or otherwise prepared for action; (B) have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material; and (C) remain unexploded either by malfunction, design, or any other cause. (10 U.S.C. 101[e][5][A through C]).

UXO-Qualified Personnel
Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist, or Senior UXO Supervisor.

UXO Technicians
Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.

1.0 INTRODUCTION

The former Fort Ord is located on Monterey Bay in northwestern Monterey County, California (Figure 1). Since 1917, portions of the former Fort Ord were used by the United States Department of the Army (Army) for maneuvers, target ranges, and other purposes. Military munitions were fired into, fired upon, or used on the facility. As a result, a wide variety of conventional munitions and explosives of concern (MEC), consisting of unexploded ordnance (UXO) and discarded military munitions (DMM) items, have been encountered at the former Fort Ord.

This Group 2 Remedial Investigation/Feasibility Study (RI/FS) Report was prepared by the Environmental Services Cooperative Agreement (ESCA) Remediation Program (RP) Team on behalf of the Fort Ord Reuse Authority (FORA) in accordance with an Administrative Order on Consent (AOC), which addresses cleanup of portions of the former Fort Ord in Monterey County, California. The ESCA RP Team consists of ARCADIS U.S., Inc. (formerly LFR Inc.), Weston Solutions, Inc., and Westcliffe Engineers, Inc.

This report has been prepared in accordance with the AOC Task 4 and Task 5. ARCADIS U.S., Inc., has prepared this document on behalf of FORA in accordance with industry standards and consistent with the requirements of the Remediation Services Agreement dated March 30, 2007 by and between ARCADIS U.S., Inc., and FORA including any applicable governing documents and applicable laws and regulations.

The AOC was entered into voluntarily by the United States Environmental Protection Agency (EPA) Region 9, the California Department of Toxic Substances Control (DTSC), FORA, and the United States Department of Justice Environment and Natural Resources Division (EPA Region 9 CERCLA Docket No. R9-2007-03). The AOC was issued under the authority vested in the President of the United States by Sections 104, 106, and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, 42 United States Code (U.S.C.) §§ 9604, 9606, and 9622.

As described in the Summary of Existing Data Report (SEDR; ESCA RP Team 2008a), Group 2 included the California State University Monterey Bay (CSUMB) Off-Campus Munitions Response Area (MRA) and the County North MRA, which was formerly referred to as the Development North MRA (Figure 1). In August 2009, the Track 1 Plug-In Approval Memorandum ("the Approval Memorandum") was submitted for the County North MRA by the Army for public review and comment (Army 2009b). A notice announcing agency concurrence with the Approval Memorandum was published on March 16, 2010. The Track 1 Plug-In process was described in the Army's "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)," dated March 10, 2005 (Army 2005). Therefore, this Group 2 RI/FS Report only addresses the CSUMB Off-Campus MRA.

This Group 2 RI/FS Report: 1) describes the nature and extent of MEC; 2) assesses explosives safety risk that may be present; and 3) develops, screens, and evaluates alternatives to reduce the potential explosives safety risk to current and future property owners and the general public. The Group 2 RI/FS Report will be used by the Army in developing the Proposed Plan and making a decision on remedial actions. In accordance with the guidance provided in the Group 2 RI/FS Work Plan (ESCA RP Team 2009), the Group 2 RI/FS Report is based on the evaluation of previous work conducted for the CSUMB Off-Campus MRA. Previous removal actions included subsurface removal of MEC throughout the entire footprint of the MRA.

1.1 Purpose of the Remedial Investigation

The RI/FS process as outlined in the EPA guidance (EPA 1988) represents the methodology that the Superfund program has established for characterizing the nature and extent of risk posed by contaminated sites and for evaluating potential remedial options. The objectives of the Group 2 RI/FS are to:

- Validate existing data;
- Describe the nature and extent of MEC;
- Complete the former Fort Ord Ordnance And Explosives Risk Assessment (RA) if explosives safety risk is present; and
- Develop and evaluate an appropriate range of remedial action alternatives to support remedy selection if explosives safety risk is present.

The purposes of the Group 2 RI, as defined under Task 4 of the AOC Scope of Work, are to gather information necessary to describe the nature and extent of MEC, conduct a baseline risk assessment for MEC, and develop preliminary remedial action objectives (RAOs). The purposes of the Group 2 FS, as defined under Task 5 of the AOC Scope of Work, are to screen remedial technologies, develop remedial alternatives, identify applicable or relevant and appropriate requirements (ARARs), refine RAOs, and conduct a detailed evaluation of remedial alternatives. In accordance with AOC paragraph 25, the Group 2 RI/FS was conducted in accordance with CERCLA, the National Contingency Plan (NCP), and applicable guidance, in addition to the Group 2 RI/FS Work Plan (ESCA RP Team 2009).

The Group 2 RI/FS will be used by the Army in developing the Proposed Plan and making a decision on remedial actions for the CSUMB Off-Campus MRA that will be documented in a Record of Decision (ROD).

1.2 Former Fort Ord Military Munitions Response Program

This section summarizes the munitions response program related to MEC cleanup that was previously implemented at the former Fort Ord by the Army and the subsequent program that was implemented to continue MEC remediation in portions of the former Fort Ord by FORA.

1.2.1 Cleanup Program Under the Army

The former Fort Ord was placed on the National Priorities List (NPL) in 1990 primarily because of chemical contamination in soil and groundwater that resulted from past Army use. To oversee the cleanup of the base, the Army, EPA, DTSC, and Central Coast Regional Water Quality Control Board (RWQCB) entered into a Federal Facility Agreement (FFA). One of the purposes of the FFA was to ensure that the environmental impacts associated with past and present activities at the former Fort Ord were thoroughly investigated and appropriate remedial action taken as necessary to protect public health and the environment. In accordance with the FFA, the Army was designated as the lead agency under CERCLA for conducting environmental investigations, making cleanup decisions, and taking cleanup actions at the former Fort Ord. The EPA was designated as the lead regulatory agency for the cleanup, while the DTSC and RWQCB were designated as supporting agencies.

The Army has conducted a number of MEC survey and clearance activities, including geophysical surveys. The Army has conducted its activities pursuant to the President of the United States' authority under CERCLA Section 104, as delegated to the Army in accordance with Executive Order 12580 and in compliance with CERCLA Section 120.

In November 1998, the Army agreed to evaluate MEC at the former Fort Ord and perform a basewide munitions response (MR) RI/FS consistent with CERCLA. The basewide MR RI/FS program addressed MEC hazards at the former Fort Ord and evaluated past removal actions as well as recommended future remedial actions deemed necessary to protect human health and the environment under future uses. In April 2000, an agreement was signed between the Army, EPA, and DTSC to evaluate MEC at the former Fort Ord subject to the provisions of the FFA. The signatories agreed that the FFA provided the appropriate framework and process to address the Army's MEC activities. The FFA established schedules for performing RIs and FSs, and required that remedial actions be completed expeditiously.

The basewide MR RI/FS program is described in the Draft Final Ordnance and Explosives RI/FS Work Plan (United States Army Corps of Engineers [USACE] 2000). Elements of the MR RI/FS program include a literature review, preparation of a Sampling and Analysis Plan for additional MEC characterization activities, evaluation of MEC work by previous contractors and FORA, performance of an Ordnance Detection and Discrimination Study (ODDS), identification of ARARs, evaluation of risks, and development of long-term risk management measures, a community relations plan, and a health and safety plan. The MR RI/FS program only addresses the physical risk from MEC. The potential for soil contamination from munitions constituents at the former Fort Ord is being addressed under the Army's Basewide Range Assessment (BRA) Program (Shaw 2012).

The Army's approach to categorizing areas within the former Fort Ord includes track groupings consisting of Track 0 through Track 3. Specifically, track definitions are as follows:

- Track 0: Areas that contain no evidence of MEC and have never been suspected of having been used for military munitions-related activities. In June 2002, the Army signed

a Track 0 ROD (Army 2002). The Track 0 ROD addresses selected land parcels, and also provides a Plug-In process to address future land parcels that are considered eligible for inclusion in the Track 0 process.

- Track 1: Sites where military munitions were suspected to have been used but, based on results, the sites fall into one of three categories: 1) sites with no evidence to indicate that military munitions were used; 2) sites used for training but military munitions used do not pose an explosive hazard; or 3) sites used for training but military munitions potentially remaining do not pose an unacceptable risk. In April 2005, the Army signed a Track 1 ROD (Army 2005). The Track 1 ROD addresses selected land parcels, and also provides a Plug-In process to address future land parcels that are considered eligible for inclusion in the Track 1 process.
- Track 2: Sites where MEC were present and MEC removal has been conducted.
- Track 3: Sites where MEC are known or suspected but investigations have not been initiated or completed.

In addition, to remain consistent with the federal Endangered Species Act (ESA), the Army has completed consultations with the United States Fish and Wildlife Service (USFWS) on the Army's predisposal actions, including cleanup of MEC. These consultations have resulted in biological opinions (BOs) that include endangered species incidental take statements. These BOs allow impacts to and incidental take of listed species during MEC cleanup activities, but require mitigation measures to be implemented during the MEC cleanup activities to reduce and minimize impacts to the protected species and their habitats.

1.2.2 Early Transfer Property and Environmental Services Cooperative Agreement

The transfer of a portion of the former Fort Ord, pursuant to CERCLA Section 120(h)(3)(C), was requested by FORA in a letter dated May 18, 2005. Under CERCLA Section 120(h)(3), the United States is required to provide a covenant in deeds conveying the property warranting that all remedial action necessary to protect human health and the environment has been taken before the date of transfer. For a federal facility listed on the NPL, CERCLA Section 120(h)(3)(C) allows the EPA administrator, with concurrence of the governor of the state, to defer the CERCLA covenant requirement. These types of transfers under CERCLA Section 120(h)(3)(C) are typically called "early transfers," in which the United States provides the warranty after transfer of the property when all of the response actions necessary to protect human health and the environment have been taken. The period between the transfer of title and the making of this final warranty is known as the "deferral period." Early transfers allow productive reuse of the property through access while final remediation work is being conducted. In addition, United States Department of Defense (DOD) and Army policy require that the military department proposing to transfer property prepare a Finding of Suitability for Early Transfer (FOSET).

The Army has completed the "Final Finding of Suitability for Early Transfer, Former Fort Ord, California, Environmental Services Cooperative Agreement (ESCA) Parcels, and Non-ESCA Parcels (Operable Unit Carbon Tetrachloride Plume)" ("FOSET 5"; Army 2007). The Army has requested deferral of the CERCLA covenant and EPA has approved, with the

concurrence of the Governor of the State of California, the Covenant Deferral Request associated with the early transfer of the property.

On March 31, 2007, the Army and FORA entered into an ESCA to provide MEC remediation services during the deferral period, thereby allowing the Army to transfer approximately 3,340 acres of property and the responsibility of removing MEC to FORA as an Economic Development Conveyance. The former Fort Ord Property transferred under the ESCA is collectively referred to as the Areas Covered by Environmental Services (ACES). In accordance with the ESCA, FORA is responsible for addressing response actions for the property except for those responsibilities retained by the Army. The ESCA and the AOC identify the Army-retained conditions for which the Army assumes responsibility. If these conditions are encountered, FORA is required to notify the Army of their presence in accordance with the guidelines set forth in the ESCA. Included in the Army-retained conditions are:

- Radiological material
- Chemical or biological warfare agents
- Natural resource injuries or damages occurring as a result of contamination releases that have occurred due to Army ownership or activities except to the extent such injuries are a direct result of FORA's activities
- Unknown uninsured conditions, which include the management and cleanup of non-MEC-related hazardous and toxic wastes above insurance parameters
- Perchlorate contamination in soil or groundwater

To accomplish this effort, FORA entered into an agreement with the ESCA RP Team, to assist in the completion of the MEC cleanup activities in accordance with the ESCA and the AOC. During the ESCA RP, FORA is responsible for administrative and management program elements, while the ESCA RP Team conducts the MEC cleanup work under FORA oversight.

1.2.3 FORA ESCA Remediation Program

The purpose of the ESCA RP is to provide the necessary environmental services to FORA, which include characterization, assessment of risk of explosive hazards, FS, remediation alternatives analysis, and performance of remediation (excluding the Army-retained conditions described in Section 1.2.2) in accordance with the ESCA and the AOC. The primary objective of the ESCA RP is timely cleanup of the property in accordance with the ESCA and AOC. The potential for soil contamination from munitions constituents at the former Fort Ord is being addressed under the Army's BRA Program (Shaw 2012). As stated in FOSET 5, based on the BRA Program, no further action was recommended for historical areas (HAs) within the CSUMB Off-Campus MRA (Army 2007). In addition, Installation Restoration Program (IRP) Site 39B (Inter-Garrison Site) is located within the CSUMB Off-Campus MRA. As stated in the FOSET, the EPA and the DTSC have concurred that no further action is necessary at Site 39B (Army 2007); however, subsequent soil sampling performed within the MRA resulted in a recommendation for an Interim Action to remove

soil contamination from one area with an elevated concentration of lead in shallow soil (Army 2009a). In February 2010, Shaw Environmental, Inc. (on behalf of the Army) excavated approximately 20 cubic yards of soil from HA-161 and disposed of the soil in the Operable Unit 2 landfills. Confirmation samples collected from the excavation indicated that residual soil concentrations for lead were below the target cleanup concentrations. The results of the soil removal activities were presented in the Draft Final Interim Action Confirmation Report (Shaw 2011). As a follow-up to the 3rd Five-Year Review, an additional evaluation is being conducted by the Army to determine the protectiveness of the human health-based cleanup levels for the Interim Action sites with lead in soil, including Site 39B (Army 2012). This evaluation is expected to be completed by December 2013.

The SEDR was completed for the ACES as required under Task 2 of the AOC Scope of Work (ESCA RP Team 2008a). In the SEDR, the ACES were combined into nine MRAs to facilitate the implementation of the AOC. The SEDR provided a site overview, evaluation of existing data, identification of data gaps, a conceptual site model (CSM) including an initial assessment of explosives safety risks, and proposed future use for each MRA. The SEDR also presented conclusions and recommendations for further actions and formed the basis for the RI planning efforts.

The nine MRAs were consolidated into four groups, according to similar pathway-to-closure characteristics (Figure 2). Group 1 consists of the Parker Flats and Seaside MRAs. Group 2 consists of the CSUMB Off-Campus and County North MRAs. Group 3 consists of the Interim Action Ranges, Laguna Seca Parking, Military Operations in Urban Terrain (MOUT) Site, and Del Rey Oaks/Monterey MRAs. Group 4 consists of the Future East Garrison MRA (ESCA RP Team 2008a). The Interim Action Ranges MRA was subsequently removed from Group 3 for independent evaluation as agreed upon by FORA, the EPA, DTSC, and the Army.

1.2.4 Regulatory Pathway to Closure

A detailed regulatory pathway to closure for the Group 2 MRAs was developed and presented in the SEDR (ESCA RP Team 2008a). The findings and conclusions presented in the SEDR indicated that the existing data were sufficient to proceed to the RI/FS. The pathway to closure began with the preparation of the Group 2 RI/FS Work Plan, which was finalized in July 2009 (ESCA RP Team 2009). Based upon the evaluation of existing data conducted in accordance with the Group 2 RI/FS Work Plan, the County North MRA was categorized as a Track 1 site (Section 1.2.1); therefore, a Track 1 Plug-In Approval Memorandum for the County North MRA was submitted by the Army for public review and comment (Army 2009b). A notice announcing agency concurrence with the Approval Memorandum was published on March 16, 2010.The County North MRA has been incorporated as part of the Army's Track 1 ROD (Army 2005). Therefore, this Group 2 RI/FS Report focuses on the CSUMB Off-Campus MRA.

In 2009, the FORA conducted the initial phase of a Residential Quality Assurance (RQA) Pilot Study (Phase I) in a portion of the CSUMB Off-Campus MRA. The approach for the RQA Pilot Study was presented in the Final Group 1 Remedial Investigation/Feasibility

Study Work Plan ("the Group 1 RI/FS Work Plan"), dated December 17, 2008 (ESCA RP Team 2008b). The specifics of the RQA process implemented in the field as part of the RQA Pilot Study were described in the Residential Quality Assurance Pilot Study Modification White Paper, which was provided to the EPA, the DTSC, and the Army on December 10, 2008 for review.

The RQA process developed during the initial phase of the RQA Pilot Study was tested during the RQA Process Implementation Study (Phase II). The approach to the Implementation Study was provided in Field Variance Form (FVF) No. G1WP-004, which was an addendum to the Final Group 1 RI/FS Work Plan and associated Appendix F: RQA Pilot Study Work Plan (ESCA RP Team 2011a). FVF No. G1WP-004 presented the details of the RQA Process Implementation Phase. The RQA Pilot Study (Phase I) and the ESCA RQA Process Implementation Study (Phase II) are discussed in Section 3.5 of this report and are referred to as the RQA Process Pilot Study.

Upon completion of the RI/FS report, an Army Proposed Plan and ROD will be prepared to document remedial actions necessary to achieve regulatory closure under CERCLA. Following approval of the Army ROD, the remaining regulatory requirements will include the preparation of a Remedial Design/Remedial Action Work Plan and an Institutional Control Implementation Plan, execution of necessary remedial actions as appropriate, and preparation of a Remedial Action Completion Report to document that the requirements for closure have been met.

1.3 Report Organization

The Group 2 RI/FS Report is organized with the RI, RA, and FS in three volumes.

Volume 1 - Remedial Investigation

This volume provides the results of the Group 2 RI and includes the following components:

- **Section 1 – Introduction.** This section provides the purpose of the report and background information on the Army's Military Munitions Response Program (MMRP) and the FORA ESCA RP.
- **Section 2 – Background.** This section presents the Fort Ord military munitions-related history, physical setting, and background information on the basewide MR RI/FS.
- **Section 3 – Remedial Investigation.** This section provides the RI for the CSUMB Off-Campus MRA and includes presentation of the literature review and the data collected by the Army during previous munitions response activities and by FORA during the RQA Process Pilot Study activities.
- **Section 4 – Data Analysis.** This section presents the evaluation of literature review and the data collected during previous munitions response activities and the RQA Process Pilot Study activities.

- **Section 5 – Update of Conceptual Site Model.** This section provides an update to the CSM presented in the SEDR.
- **Section 6 – Conclusions and Recommendations.** This section presents a summary of the RI results and the conclusions and recommendations based on the evaluation of data.
- **Section 7 – References.** This section provides a list of references for documents cited in the report.

Volume 2 - Explosives Safety Risk Assessment

This volume provides the results of the Group 2 Explosives Safety RA, which describes the qualitative and quantitative factors potentially resulting in a receptor encountering MEC items. The RA is used to develop and evaluate remedial alternatives during the FS. The RA includes the following components:

- **Section 1 – Introduction.** This section describes the purpose and objectives of the RA and presents background information on the Group 2 RI/FS process.
- **Section 2 – Data and Data Usability.** This section provides an evaluation of the data and data usability to support the RA.
- **Section 3 – Reuse Areas and Future Land Use Receptors.** This section identifies the selected receptors for the reuse areas within the CSUMB Off-Campus MRA.
- **Section 4 – MEC Risk Assessment Results.** This section presents the assumptions and results of risk analysis for each of the reuse areas within the CSUMB Off-Campus MRA.
- **Section 5 – Uncertainty.** This section describes the uncertainties related to the data, input components, and future land use and associated receptors.
- **Section 6 – Conclusions.** This section presents a summary of the RA results and the conclusions.
- **Section 7 – References.** This section provides a list of references for documents cited in the report.

Volume 3 - Feasibility Study

This volume provides the results of the Group 2 FS that identifies and selects preferred remedial alternatives to address potential risks from residual MEC. It presents the RAOs, identification of alternatives, screening of alternatives, and selection of alternatives. The FS also describes the Proposed Plan and ROD process. The FS includes the following components:

- **Section 1 – Introduction.** This section describes the purpose and objectives of the FS and presents background information on the Group 2 RI/FS process.
- **Section 2 – Remedial Approach.** This section defines the reuse areas for which remedial alternatives will be developed, and describes the application of RA results, RAOs, ARARs, land use control guidelines that will be applied in the development of

remedial alternatives, and the ongoing and future MEC-related activities at the former Fort Ord that are components of the ESCA RP.

- **Section 3 – Identification of Potentially Applicable Response Actions.** This section identifies the range of applicable general response actions for MEC risk management at the CSUMB Off-Campus MRA and a screening of general response actions and process options.
- **Section 4 – Development of Remedial Alternatives.** This section presents long-term management measures specific to implementation and management of the remedial alternatives selected for the CSUMB Off-Campus MRA, and includes development of remedial alternatives, and identification of potential ARARs associated with implementation.
- **Section 5 – Evaluation and Comparison of Remedial Alternatives.** This section presents an evaluation and comparison of remedial alternatives for the CSUMB Off-Campus MRA.
- **Section 6 – Identification of the Preferred Remedial Alternative.** This section presents and summarizes the proposed preferred remedial alternative for the CSUMB Off-Campus MRA.
- **Section 7 – Approval Process.** This section describes the approval process for documenting the preferred alternative(s) for implementation at Group 2 in the RI/FS Proposed Plan and ROD.
- **Section 8 – References.** This section provides a list of references for pertinent documents cited in the report.

[this page intentionally left blank]

2.0 BACKGROUND

This section provides a summary of the former Fort Ord general history and a description of the physical setting, hazardous and toxic waste (HTW) history and conditions, biological resources, cultural resources, structures and utilities, and land use for the CSUMB Off-Campus MRA.

2.1 General History

Beginning with its founding in 1917, Fort Ord served primarily as a training and staging facility for cavalry and infantry troops and was known as the Camp Ord Military Reservation. In 1940, the 7th Infantry Division was activated at Fort Ord for training and eventually assigned to Korea in 1947. From 1947 to 1974, Fort Ord was a basic infantry training center, which included training for the 4th, 5th, and 6th Infantry Divisions. In 1974, the 7th Infantry Division was reactivated at Fort Ord and was eventually converted to a light infantry division in 1983, which operated and trained without heavy tanks, armor, or artillery (USACE 1993).

Fort Ord was selected in 1991 for Base Realignment and Closure (BRAC), but troop reallocation was not completed until 1993. The base was officially closed in September 1994. Although Army personnel still operate the base, no active Army divisions are stationed at the former Fort Ord.

2.2 Physical Setting

The following sections summarize the location, description, and general physical setting of the CSUMB Off-Campus MRA and the former Fort Ord.

2.2.1 CSUMB Off-Campus MRA Location and Description

The CSUMB Off-Campus MRA is located in the north-central portion of the former Fort Ord, bordered by Inter-Garrison Road to the north, the County North MRA to the east and southeast, the Parker Flats MRA to the south, and 8th Avenue and CSUMB campus property to the west and southwest (Figure 3). The MRA boundaries generally correspond to the boundaries of land transfer Parcel S1.3.2 (Figure 3). The CSUMB Off-Campus MRA is wholly contained within the jurisdictional boundaries of Monterey County.

The CSUMB Off-Campus MRA is approximately 333 acres in size and composed of several munitions response sites (MRSs) that were identified through a review of Fort Ord records completed for the Fort Ord Revised Archive Search Report (USACE 1997a). The majority of the MRA is composed of MRS-31, which was a troop training and maneuvers area that encompassed five smaller MRSs:

- MRS-04C, a chemical, biological, and radiological (CBR) training area;

- MRS-07, a mine and booby trap training area;
- MRS-08, a mine and booby trap training area;
- a portion of MRS-13B, a practice mortar range; and
- MRS-18, a minefield practice area, which reportedly included a 100-pound (-lb) practice bomb (unfuzed and concrete filled) that was found prior to base closure.

The remainder of the MRA consists of MRS-13C, which contained a practice mortar range located south of the MRA.

The locations and designations of the MRSs are presented on Figure 4. Where two MRSs coincide, the designation nomenclature is represented as both MRSs separated by a colon (e.g., MRS-04C:MRS-31).

Access to the CSUMB Off-Campus MRA is not restricted by fencing or road barricades. Inter-Garrison Road, located immediately north of the MRA, is an active roadway with daily vehicle traffic. This is a major roadway of the FORA transportation network. A number of unpaved roadways and dirt trails are located throughout the MRA.

2.2.2 Climate

The climate is characterized by warm, dry summers and cool, rainy winters. The Pacific Ocean is the principal influence on the climate at the former Fort Ord, and the source of fog and onshore winds that moderate temperature extremes. Daily ambient air temperatures typically range from 40 to 70 degrees Fahrenheit, but temperatures in the low 100 degrees Fahrenheit have occurred. Thick morning fog is common throughout the year. Winds are generally from the west. The average annual rainfall of 14 inches occurs almost entirely between November and April. Storm-water runoff is limited because the predominant soil is permeable sand.

2.2.3 Vegetation

Vegetation within the CSUMB Off-Campus MRA consists primarily of coastal coast live oak woodland with smaller areas of maritime chaparral and grassland (Figure 5; USACE/Jones & Stokes 1992). Vegetation varies from sparsely vegetated areas to dense brush. Past field activities have noted the presence of poison oak in the area.

2.2.4 Surface Water and Groundwater

There are no surface-water features or delineated wetlands present on the CSUMB Off-Campus MRA. The Salinas Groundwater Basin is the main hydrogeologic unit that underlies the MRA. The depth to groundwater is estimated to be greater than 100 feet (ft) below ground surface (bgs). There are no known wells within the boundaries of the CSUMB Off-Campus MRA; however several monitoring wells are located to the north, west, and southwest of the MRA (Figure 6).

2.2.5 Topography and General Geology

The terrain of the MRA is primarily rolling hills. The prominent features of the MRA include several hills and several low lying areas or depressions. The elevation of the MRA ranges from approximately 240 ft above mean sea level (msl) to approximately 375 ft above msl (Figure 6). The terrain of the MRA has approximately 2 to 15% slopes.

The surface soils are characterized as eolian (sand dune) and terrace (river deposits), which consist of unconsolidated materials of the Aromas and Old Dune Sand formations. The primary soil type present in the MRA is Oceano Loamy Sand (Figure 6). Soil conditions at the MRA consist predominantly of weathered dune sand, which provides a relatively good environment for conducting geophysical surveys, including electromagnetic and magnetic surveys.

2.3 CSUMB Off-Campus MRA HTW History and Conditions

The BRA Program, as described in Section 1.2.1, was conducted by the Army to evaluate the potential presence of chemicals of concern (COCs) related to HTW at known or suspected small arms ranges and military munitions training sites within the former Fort Ord (Shaw 2012). The areas are identified as HAs. The objectives of the BRA Program investigation activities were to identify which HAs could be eliminated from consideration for potential remediation related to COCs, and to identify areas that require additional investigation for potential chemical contamination or should be considered for remediation. As stated in FOSET 5, based on the BRA Program, no further action was recommended for HAs within the CSUMB Off-Campus MRA (Army 2007).

IRP Site 39B (Inter-Garrison Site) is located within the CSUMB Off-Campus MRA. The interim action at IRP Site 39B included the excavation and removal of approximately 164 cubic yards of soil mixed with debris from two locations. The soil contained semivolatile organic compounds and total petroleum hydrocarbons. Post-remediation evaluation indicated that no further threat to human health or the environment was expected and no further investigation or remediation was recommended. The EPA and the DTSC concurred that no further action was necessary at IRP Site 39B (Army 2007); however, subsequent soil sampling performed within the MRA resulted in a recommendation for an Interim Action to remove soil contamination from one area with an elevated concentration of lead in shallow soil (Army 2009a). In February 2010, Shaw Environmental, Inc. (on behalf of the Army) excavated approximately 20 cubic yards of soil from HA-161 and disposed of the soil in the Operable Unit 2 landfills. Confirmation samples collected from the excavation indicated that residual soil concentrations for lead were below the target cleanup concentrations. The results of the soil removal activities were presented in the Draft Final Interim Action Confirmation Report (Shaw 2011).

2.4 CSUMB Off-Campus MRA Special-Status Biological Resources

Special-status biological resources are those resources, including plant, wildlife, and native biological communities, that receive various levels of protection under local, state, or federal

laws, regulations, or policies. The closure of former Fort Ord is considered a major federal action that could affect several species proposed for listing or listed as threatened or endangered under the federal ESA.

The Habitat Management Plan (HMP) for former Fort Ord complies with the USFWS BOs and establishes the guidelines for the conservation and management of wildlife and plant species and habitats that largely depend on former Fort Ord land for survival (USACE 1997b). The HMP incorporated conservation measures pursuant to USFWS BOs dated prior to issuance of the HMP in April 1997. Since April 1997, three additional BOs have been issued that are relevant to munitions response activities (USFWS 1999, 2002, and 2005).

The HMP identifies the CSUMB Off-Campus MRA as a development parcel with borderland development areas along a natural resources management area (NRMA) interface (Figure 7). Borderland development areas are narrow strips of development parcels that abut the NRMA boundary. While these development parcels otherwise have no management restrictions, the strips constituting borderland development areas have special management requirements. The NRMA and habitat reserve areas support plant and animal species that require implementation of mitigation measures identified in the HMP to ensure compliance with the ESA and to minimize impacts to listed species.

As identified in the HMP, a number of special-status species could be found on the CSUMB Off-Campus MRA. The Monterey spineflower is a threatened plant species and has been identified as having possible occurrence in the CSUMB Off-Campus MRA. In 2004, the California tiger salamander (CTS) was identified as a threatened species. CTS may be found as far as 2 kilometers (km) from aquatic breeding habitats. As shown on Figure 7, it is possible the CTS may be found in the CSUMB Off-Campus MRA as it is within 2 km of aquatic features that may provide breeding habitat for the CTS. The California black legless lizard and the Monterey ornate shrew are also identified in the HMP as having possible occurrence in the CSUMB Off-Campus MRA.

2.5 Cultural Resources

According to archaeological records, the greater Monterey Peninsula was occupied by Native American groups, including the Ohlone (Costanoan) Indians (EA 1991). Monterey County has designated the southeastern margin of the former Fort Ord as an archaeologically sensitive zone based on two known archaeological sites (EA 1991). The remaining portions of the former Fort Ord have been designated as having low or no archaeological sensitivity.

2.6 Structures and Utilities

The CSUMB Off-Campus MRA formerly contained two buildings; a former fueling station and a field latrine (Figure 3; Army 2007). The fueling station building was approximately 165 square ft in size and was constructed in 1977. The field latrine building was approximately 175 square ft in size and the date of construction was unknown.

The fueling facility contained underground storage tanks, which were reportedly removed in January 1996 (RCI 1996). The MMRP database indicates that a single pyrotechnic MEC item was found at the approximate location of one of the storage tanks. The remaining asphalt pads and structures were removed by the ESCA RP Team in January 2009 with UXO construction support. No MEC or munitions debris (MD) items were encountered during the demolition operations.

The CSUMB Off-Campus MRA is not served by any utilities. However, a telephone line, electrical line, high-powered transmission line, storm-drain line, and natural gas line extend onto or cross a portion of the MRA in various locations (Figure 3; Army 2007). Three short storm-drain lines also extend onto the MRA from the CSUMB campus property located to the southwest.

No fencing or barriers are present on the MRA; therefore, the MRA is accessible to users. Signs (no trespassing and warning) are posted along Inter-Garrison Road.

2.7 Land Use

The current use of the MRA includes undeveloped open space. Historically, this area has been accessed by day recreational users, including equestrians, hikers, and mountain bikers. There is evidence of past trespasser activity and illegal dumping.

The Base Reuse Plan (FORA 1997) indicated this MRA is proposed school/university reuse with residential infill opportunities, and the plan to use the parcel for future residential and open space is based on the CSUMB Master Plan (CSUMB 2007). The western one-sixth (approximate) of the MRA is proposed for use as off-campus housing for CSUMB (ESCA RP Team 2008a). This area is approximately 49 acres and identified as a proposed future residential (CSUMB campus housing) area in Figure 8. Construction of buildings and roads, installation of utilities, as well as the activities of future residents are expected within the MRA. The eastern five-sixths (approximate) of the MRA is proposed for an oak woodland and maritime chaparral open space park with a 100-ft buffer along the NRMA interface (ESCA RP Team 2008a). The area is approximately 284 acres and identified as a proposed future non-residential (CSUMB open space park) area in Figure 8. Vegetated areas and hiking trails may require maintenance such as planting and weeding. Recreational hiking and bicycling/horseback riding on dirt paths are expected to occur.

Current land use restrictions specified in the deed for the property transfer parcel are prohibition of:

- any uses other than investigation and/or remediation of MEC and installation of utilities/ roadways until Certification of Completion of Remedial Action has occurred
- the use of the property for residence, hospital, school (for persons under the age of 21, except for post-secondary schools), and a day care center for children
- activities (including soil disturbance) in violation of the Excavation Ordinance, as modified

Additionally, the current land use restrictions stated in the State Covenant to Restrict the Use of Property (Army/DTSC 2009) require:

- the buyer, lessee, or sub-lessee be given written notice that there is the potential for the presence of MEC in the soil of the property
- DTSC, the United States working through the Army, and their contractors and/or agents to have reasonable right-of-entry and access to the property for inspection, monitoring, testing, sampling and other activities consistent with the CERCLA covenant as deemed necessary by the DTSC in order to protect the public health and safety or the environment and oversee any required activities

3.0 CSUMB OFF-CAMPUS MRA REMEDIAL INVESTIGATION

The major decision points to be addressed during the RI are as follows:

- Is the site characterization data of known and sufficient quality and quantity to adequately characterize the nature and extent of MEC?
- Is the site characterization data of known and sufficient quality and quantity to support completion of an explosives safety risk assessment?

As discussed in the Group 2 RI/FS Work Plan and the SEDR, data from these munitions response actions completed by the Army within the CSUMB Off-Campus MRA are available in the MMRP database and after-action reports, and appear to be of sufficient quality and quantity to update the CSMs and support the development of an RI/FS. In addition to the evaluations performed during the RI, the RQA Process Pilot Study was applied to the portion of the CSUMB Off-Campus MRA proposed for residential reuse to verify the quality of the data from the munitions response actions.

In order to answer these questions, the data that have previously been collected at the CSUMB Off-Campus MRA must first be validated. Validation of the data consists of the following:

- A review of the site historical records, military history, and archives search reports (ASRs) to determine the documented historical land use and known historical military practices;
- A review of previous munitions response program investigations and removal actions, which includes a review of the work plans and after-action reports to determine the investigation and removal action procedures utilized during the previous work;
- An evaluation of the equipment used during previous investigation and removal activities to determine if the equipment used was capable of detecting the types of munitions items that would be expected at the MRA based upon the documented historical use; and
- A review of the data contained in the after-action reports and a comparison of the data to information contained in the MMRP database to determine the completeness of the data set.

The results of the literature and investigation and removal action reviews are used to support the data analysis. Analysis of the data includes an evaluation of the literature review process and the grid sampling, assessment, and removal action processes based on information from standardized literature review and review checklists. The results of the data analysis are then used to update the CSMs and make recommendations as to whether the data can be used to complete an RA and an FS.

3.1 CSUMB Off-Campus MRA Historical Records and Military History

Available historical aerial photographs and facility training maps, the Army's ASRs, and historical military field manuals were reviewed to evaluate the types of training that were likely conducted on the CSUMB Off-Campus MRA and the historical practices related to these types of training. The following sections provide the results of the historical records review.

3.1.1 Review of Historical Aerial Photographs and Facility Training Maps

The following presents a summary of the CSUMB Off-Campus MRA history and development by decade of operation that is based on the review of available historical training maps obtained from the Army's archives and available historical aerial photographs and topographic maps.

3.1.1.1 Pre-1940s Era

A topographic map of the area from 1934 indicated that the majority of the CSUMB Off-Campus MRA was located to the northwest of the "Camp Ord Military Reservation" (Army 1938). The southeastern portion of the MRA was located within the military reservation boundary. This map included only a few identifiable features, such as roads, right-of-ways, and topographical lines. There were no identifiable features or text indicating military use within the CSUMB Off-Campus MRA.

Based upon information provided in the 1993 ASR, the majority of the CSUMB Off-Campus MRA was privately owned agricultural land until the Army purchased the land in the early 1940s from the private landowners (USACE 1993).

3.1.1.2 1940s Era

A review of aerial photographs from 1941 and 1949 indicated the following:

- To the southwest of MRS-04C and MRS-08, there was a vegetated area with two clearings consisting of straight edges and square corners indicating deliberate human activity as opposed to natural clearings.
- In the southeastern portion of the CSUMB Off-Campus MRA along the boundary with the County North MRA, three semicircular, manmade features and one lengthier sinuous manmade feature that possibly resembled fighting positions or walls were observed.
- The northwestern portion of the MRA did not appear to be disturbed.
- The majority of the CSUMB Off-Campus MRA consisted of numerous interconnecting trails, dirt roads, and clearings possibly indicating military activities related to troop training and maneuvers.

No other structures or features within the CSUMB Off-Campus MRA attributable to military activities were readily identifiable.

A training map from 1945 did not identify any specific types of training that occurred within the CSUMB Off-Campus MRA (Army 1945).

3.1.1.3 1950s Era

Review of training and facility maps and aerial photographs from the 1950s identified several training areas within the CSUMB Off-Campus MRA. The following summarizes the results of the review:

- A 1951 aerial photograph covered approximately one-eighth of the CSUMB Off-Campus MRA (the far western portion). No military activity other than the presence of trails and dirt roads was evident in the area.
- A 1953 training area map (Army 1954) showed the following training areas within the CSUMB Off-Campus MRA or a portion of the MRA:
  - "Mines & Booby Traps" in the north central portion of the MRA with a rectangular feature assigned the number "2" located immediately to the west of the "Mines & Booby Traps" label;
  - "Sinkhole Training Area" along the southwestern MRA border;
  - "BM Blanco Tactical Training Area" in the southeastern portion of the MRA (the term bench mark [BM] usually refers to a mark on a permanent object indicating elevation and serving as a reference in topographic surveys); and
  - "Bleachers" in the southeastern portion of the MRA.

  Additionally, the map indicated that the 11th Infantry Division was assigned to the area encompassing the CSUMB Off-Campus MRA (Army 1954).

- A 1956 aerial photograph covered a majority of the CSUMB Off-Campus MRA. The clearings in the vegetated area southwest of MRS-04C and MRS 08 as described in the 1941 aerial photograph were no longer visible. The 1956 aerial photograph did not cover the southern portion of the MRA; therefore, it was unknown if the three semicircle, manmade features and one lengthier sinuous feature were still in place.
- A 1956 training area map (Army 1956) indicated the same general training areas as the 1953 map described above with the addition of a black rectangle in the northwestern portion of the CSUMB Off-Campus MRA (just north of the location identified as MRS-18 in the 1997 ASRs), which was previously assigned the number "2" in the 1953 map, and a rectangular area labeled "FBTA" in the southeastern corner of the MRA. No definition of "FBTA" was provided on the map; however, this may indicate a Field Battalion Training Area or Firing Battery Training Area. The black rectangle shown on the map may have represented the training area for mines and booby traps.
- A 1957 training area map (Army 1957) indicated the same general training areas as the 1953 map with the following exceptions:

- "Mines & Booby Traps" designation previously located in the north central portion of the MRA was replaced with two black rectangles labeled "MBA #1" and "MBA #3". MBA was an abbreviation for "mine and booby trap area" (USACE 1997a). MBA #1 was located just north of the area later identified as MRS-18 and MBA #3 was located to the southwest of the area later identified as MRS-08;
- "MTR SQ #2", which was an abbreviation for a mortar square, in the southwestern corner of the MRA; and
- "FP-1", which was an abbreviation for a firing point, in the BM Blanco Training Area along the southeastern boundary of the MRA. An undated map with a hand-written note designated as the "Beardsley map" of Fort Ord showed a range fan extending from FP-1 to the southern boundary of the impact area. The FP-1 designation did not appear on later facility training maps.
- The 1957 map indicates that the 3rd Brigade was assigned to the area encompassing the CSUMB Off-Campus MRA. The mission of the 3rd Brigade was to conduct basic combat training (Army 1968). While the 3rd Brigade was assigned to the area, this does not mean that the area was exclusively used by the 3rd Brigade or only for basic combat training.

- A 1958 training area map (Army 1958) included a CBR training area in the north central portion of the MRA. The CBR training area did not appear on subsequent training areas and facility maps that were available for review.

3.1.1.4 1960s Era

Review of training maps and aerial photographs from the 1960s identified several training areas within the CSUMB Off-Campus MRA. The following summarizes the results of the review:

- The 1961 training area map (USACE 1961) was blank with the exception of "MBA – 1" (Mine and Booby Trap Area) in the northwestern portion of the MRA, "ST – 3 & 4" (abbreviation unknown) in the eastern portion of the MRA, and "RGT" (Rifle Grenade Training) on the southwestern boundary of the MRA. No brigade assignment was indicated on this map.
- A 1964 training area map (Army 1964) indicated a confidence course in the northwestern portion of the MRA and "LMW" (Land Mine Warfare) east of the confidence course (immediately north of the area later designated as MRS-18). "BM Blanco W" (Bench Mark Blanco West) was shown in the southwestern portion of the MRA and "BM Blanco" continued to be shown in the eastern portion of the MRA. A boundary line was drawn using a series of asterisks on the map that encompassed the CSUMB Off-Campus MRA designating the boundary of a training area according to the legend on the map. In addition, there was a large "g" in the middle of the designated training area indicating that the 1st Brigade was assigned to the area according to the legend on the map.
- A 1966 aerial photograph showed several changes from the 1956 aerial photograph. The clearings in the vegetated area southwest of MRS-04C and MRS-08 were completely overgrown; however, at least 12 parallel linear clearings perhaps indicating trails were

visible. Additionally, a natural clearing immediately north of MRS-18 as depicted in the 1956 aerial photograph showed indication of military activity with the clearing being divided into sections by new trails or dirt roads. Evidence of the semicircular and sinuous, manmade features in the southeastern portion of the MRA were still visible; however, they were not as clearly identifiable as in the 1941 aerial photograph. A clearing appeared in the west-southwestern portion of MRS-07, approximately where the training maps indicate the confidence course was located.

- A 1968 map (Army 1968) indicated the same information as the 1964 training map with two additions: an "Obstacle Course" designation in the northeastern portion of the MRA, "TFT 104/110" designation in the southeastern portion of the MRA near the "BM Blanco" designation, and "TFT 109" designation south of the "BM Blanco W" designation in the southwestern portion of the MRA. The definition of "TFT" was not provided on the map. The training area boundary was still shown on this map, only the asterisks boundary designation was replaced with a band of dots.

3.1.1.5 1970s Era

Review of training maps and aerial photographs from the 1970s indicated training areas within the CSUMB Off-Campus MRA. The following summarizes the results of the review:

- Training areas identified on the 1971 map (USACE 1971) in the CSUMB Off-Campus MRA were the same as the training areas in the 1968 map.
- The 1972 training area map (Army 1972) indicated, via the use of numbers with descriptions provided in the legend, the same training areas as the 1968 map; however, the location of a few of the areas were not exactly the same:
  - Confidence Course and Land Mine Warfare area (designated with the numbers 1 and 7, respectively) in the northwestern portion of the MRA remained in approximately the same locations as the previous maps.
  - Obstacle Course (designated with the number 2), was shown in a more western location than in previous maps.
  - "BM Blanco W" (designated with the number 5) was shown north of "BM Blanco" (designated with the number 3) in the eastern portion of the MRA. The training areas could have moved or the markings on the map could be approximations.
  - "TFT 104/110" and TFT 109" designations previously indicated on the 1968 map were not shown on the 1972 map.
  - An additional area identified as "Land NAV West" (designated with the number 6) was indicated in the southwestern portion of the MRA in the approximate area where "BM Blanco W" was previously located on the 1968 map.
- The 1978 aerial photograph still showed the parallel linear clearings in the vegetated area southwest of MRS-04C and MRS-08; however, the linear clearings were not as distinct as in the 1966 aerial photograph. Evidence of the three semicircular features and one lengthier sinuous feature that possibly resembled fighting positions or walls in the southeastern portion of the MRA was still apparent; however, these features were not as

distinct as in the 1941 aerial photograph. The clearing noted in the 1966 aerial photograph in the west-southwestern portion of MRS-07 and in the area where the training maps showed labels for a confidence course were larger, and three square structures were visible. South of MRS-07, the vegetation appeared to be lighter and a loop trail was visible. The paved area related to the fuel facility was present in the northwestern portion of the MRA.

3.1.1.6 1980s Era

Review of training maps and aerial photographs from the 1980s identified several training areas within the CSUMB Off-Campus MRA. The following summarizes the results of the review:

- The 1982 training area map (Army 1982a) indicated two field training areas and two training courses. The two field training areas were marked "F" (indicated in the map legend as "DAY/NIGHT DEFENSIVE AREA (INACTIVE)") covering the eastern portion of the MRA and "G" (not defined in the map legend) covering the western portion of the MRA. The two training courses were in field training area "G". They were a Confidence Course (in the northeastern portion of the MRA) and an Obstacle Course (in the north-central portion of the MRA) designated with "+1" and "+2", respectively, on the map.
- The 1984 training area map (USACE 1984) indicated only two training areas: a "Confidence Course" in the northwestern portion of the MRA and an "Obstacle Course" in the northeastern portion of the MRA. Dashed lines marked the approximate boundaries of these training areas. The map was also subdivided into larger training areas with the boundaries designated using dashed lines. The larger training areas encompassing the CSUMB Off-Campus MRA were designated with a "G" in the western portion of the MRA and an "F" in the eastern portion of the MRA. The overall types of training that occurred in these two areas were not indicated on the map legend.
- The 1986 aerial photograph still showed the clearings, structures, and loop trail in the confidence course area; however, other previously noted features appeared to be reclaimed by vegetation. The fuel facility was still present in the northwestern portion of the MRA.
- The 1987 training area map (Army 1987c) shows the same information as the 1982 map (Army 1982a).

3.1.1.7 1990s Era

Review of documentation from the 1990s included a 1991 map titled "Range and Field Training Area Sketch and a 1992 Back Country Roads Map (Army 1992b). The 1991 Range and Field Training Area Sketch was identical to the 1982 training area map discussed in section 3.1.1.6. The Back County Roads Map was a reproduction of a 1968 training area map with names added for the roads. The features on the map were the same as previously discussed in Section 3.1.1.4 for the 1968 training area map. No additional

training areas were identified on either map. The base was officially closed in September 1994.

3.1.2 Review of Archives Search Reports

Three ASRs were completed for the former Fort Ord (USACE 1993, 1994, and 1997a). The purpose of the ASRs prepared for the former Fort Ord was to gather and review historical information to determine the types of munitions used, identify possible disposal areas, identify unknown training areas, and recommend follow-up actions. Guidance for conducting archives searches did not exist prior to 1995 (USACE 1995). The initial ASR was conducted in 1993 based on the Scope of Work provided to the St. Louis Corps of Engineers by the Huntsville Corps of Engineers, and on archive search reports completed at other military installations. The 1995 guidance specified that the ASR include information on historical records, site visits, follow-up actions, prior documentation, and characterization and evaluation for potential MEC response sites. The Army issued two subsequent reports in 1994 and 1997 that contained additional information and descriptions of the follow-up actions recommended as part of the 1993 ASR.

The ASR Supplement 1 was performed in 1994 for the purpose of evaluating additional historical maps and information obtained from ongoing research (e.g., interviews, archive searches, and site visits) and remediation activities pursuant to the basic ASR for Fort Ord (USACE 1994). The 1997 Revised ASR combined information obtained through the previous archive searches with the results of a Preliminary Assessment/Site Inspection (PA/SI) conducted by the USACE (USACE 1997a). The PA/SI consisted of interviews with individuals familiar with the MRSs, visits to previously established sites, reconnaissance of newly identified training areas, and the review of data collected during grid sampling or removal actions. The 1997 Revised ASR was conducted in accordance with the USACE guidance (USACE 1995).

3.1.2.1 1993 Archives Search Report

The ASR (USACE 1993) initially divided the former Fort Ord into sites based upon previous uses identified on historical training maps and made recommendations on whether further action appeared warranted for the sites. The following information was reported in the 1993 ASR for the sites identified within the boundaries of the CSUMB Off-Campus MRA:

- Site 4, CBR Training Areas, was identified in the 1993 ASR as appearing on 1957 and 1958 maps. Site 4 had four distinct training areas, which were identified by location as FR 082557, FR 091552, FR 096568, and FR 082545. These four areas were later defined as Sites 4A, 4B, 4C, and 4D, respectively, in the 1997 ASR presented below. Only Site 4C (now MRS-04C) was located within the boundaries of the CSUMB Off-Campus MRA. At the time of the 1993 ASR, a gas chamber was identified on Site 4B where the soldiers tested their masks for leaks, which was located outside the boundaries of the CSUMB Off-Campus MRA.

- Site 7 and Site 8 (now MRS-08), Mine and Booby Trap Training Areas, were identified as appearing on maps dating from 1956-1957 (designated as MBA #1 and MBA #3, respectively). Sites 7 and 8 were estimated to be approximately 4 and 2 acres, respectively. It was recommended in the ASR that the areas be swept with a magnetometer for indications of buried mines.
- Site 13, Practice Mortar Ranges, consisted of two ranges identified as Sites 13A and 13B. Site 13A was located outside the boundaries of the CSUMB Off-Campus MRA. A portion of Site 13B is included within the boundaries of the CSUMB Off-Campus MRA (MRS-31). The 1993 ASR identified Sites 13A and 13B as ranges for mortar practice during the 1940s and 1950s where it was likely that only practice ammunition and sabot trainers were used. It was recommended in the ASR that spot sweeps of Site 13B should be considered.
- Site 18, 100-lb Bomb (now MRS-18), was identified in the vicinity of the confidence course within the CSUMB Off-Campus MRA. According to the 1993 ASR, the bomb was an unfuzed, concrete-filled training device. The area where the bomb was located was also identified in the 1970s as a minefield practice area for locating landmines (Mine and Booby Trap Area #1 [MBA #1] discussed above in Site 7). The site was estimated to be approximately 15 acres. It was recommended in the ASR that a sweep of MBA #1 be widened to include the confidence course area.
- Firing points were shown on the undated "Beardsley" map. Firing Point FP-1 was located along the southern boundary of the CSUMB Off-Campus MRA with the range safety fans aligned in a southerly direction, toward the main impact area. It was recommended in the ASR that a field visit be conducted before further action.
- Machine gun squares and mortar squares were shown on maps from the 1950s. Mortar square MTR SQ #2 was located in the southwestern portion of the CSUMB Off-Campus MRA on a 1957 training area map. According to the ASR, these areas were believed to be used to conduct crew drills and were not believed to be firing points.

3.1.2.2 1994 Archives Search Report Supplement 1

The ASR Supplement 1 (USACE 1994) was performed for the purpose of evaluating additional historical maps and information obtained from on-going research (e.g., interviews, archive searches, and site visits) and remediation activities pursuant to the 1993 ASR. The following information was reported for the sites located within the boundaries of the CSUMB Off-Campus MRA:

- Site 7 and Site 8 (now MRS-08), Mine and Booby Trap Training Areas, information was updated in the 1994 ASR Supplement 1. During a walk-through of the area, a grenade fuze was found in an area located to the east of the CSUMB Off-Campus MRA. It was recommended in the ASR Supplement 1 that the land between the western edge of the recreational vehicle campground westward to the "CSU footprint" be swept for ordnance and explosive waste. The "CSU footprint" boundaries are approximately the same as the CSUMB Off-Campus MRA. The area was estimated to be approximately 200 acres (USACE 1994).

3.1.2.3 1997 Revised Archives Search Report

The Revised ASR (USACE 1997a) combined information obtained through the previous archive searches with the results of a PA/SI conducted by the USACE. The PA/SI consisted of interviews with individuals familiar with the sites, visits to previously established sites, reconnaissance of newly identified training areas, and the review of data collected during grid sampling or removal actions. These previously established sites and newly identified training areas were designated as ordnance and explosives (OE) sites. The Revised ASR was conducted in accordance with USACE guidance (USACE 1995). The following information was reported for the sites located within the boundaries of the CSUMB Off-Campus MRA:

- Site OE 4, CBR Training Areas (formerly referred to as Site 4 in the 1993 and 1994 ASRs), consisted of four discreet areas (4A, 4B, 4C, and 4D), of which Site 4C was located in the CSUMB Off-Campus MRA and was later identified as MRS-04C. Information was updated in the 1997 Revised ASR based on MEC grid sampling conducted during 1993 and 1994 by the Army's contractor, Human Factors Applications, Inc. (HFA). HFA sampled 5 of 6 grids at Site 4C (now MRS-04C). A MEC removal action was later performed over the entire Site 4C by HFA as part of the CSU footprint removal action. The grid sampling and removal actions are discussed in greater detail in Section 3.2 of this RI report.
- Site OE 7, Mine and Booby Trap Training Areas (now MRS-07); information was updated in the 1997 Revised ASR based on MEC grid sampling conducted during 1993 and 1994 by HFA. Seven grids were sampled at Site OE 7. A MEC removal action was later performed over the entire site by HFA as part of the CSU footprint removal action. The grid sampling and removal actions are discussed in greater detail in Section 3.2 of this RI report.
- Site OE 8, Mine and Booby Trap Training Areas (now MRS-08); information was updated in the 1997 Revised ASR based on MEC grid sampling conducted during 1993 and 1994 by HFA. HFA sampled the entire site. A MEC removal action was later performed by HFA as part of the CSU footprint removal action. The grid sampling and removal actions are discussed in greater detail in Section 3.2 of this RI report.
- Site OE 13, Practice Mortar Ranges (now MRS-13B and MRS-13C); information was updated in the 1997 Revised ASR. Site OE-13C was described as the wedge between the CSU footprint and OE-13B reflecting the final accurate survey data for this location. The entire OE 13B was estimated to be approximately 225 to 251 acres in size. The northern one-third of OE-13B (the portion within the CSUMB Off-Campus MRA) underwent a removal action as part of the CSU Footprint. At the time of the 1997 Revised ASR, a removal action was in progress within the remainder of OE-13B (outside of the CSUMB Off-Campus MRA). The grid sampling and removal actions conducted within the CSUMB Off-Campus MRA boundaries are discussed in greater detail in later sections of this report.
- Site OE-18, 100-lb Bomb (now MRS-18:MRS-31); information was updated in the 1997 Revised ASR. In the 1970s this area was a minefield practice area used to teach trainees methods for locating landmines. A 1993 incident report shows that a 100-lb bomb identified as an unfuzed concrete-filled training device was found in this area. Three

practice mines and a parachute flare are also listed on the 1993 incident report. Fourteen grids were sampled by the Army's contractor HFA, in 1993-1994. A removal action was later accomplished by HFA as part of the larger CSU Footprint removal action (now MRS 31). The grid sampling and removal actions are discussed in greater detail in Section 3.2 of this report.

- Site OE-31, CSU Footprint (now MRS 31), was identified in the 1997 Revised ASR. The CSU Footprint included sites 4C, 7, 8, 18, CSU, and HFA/CSU. The Army's contractor, HFA, conducted a 4-ft removal action in approximately three-quarters of the Site's CSU Footprint, generally encompassing most of the western portion of the site. The Army's contractor, UXB International, Inc. (UXB), conducted a 4-ft removal action in two areas: the eastern portion of the site (the nearly 70-acre CSU site), and a small area in the north-central portion of the CSU Footprint (the nearly 6-acre HFA/CSU site). The grid sampling and removal actions are discussed in greater detail in later sections of this report.

3.1.3 Review of Historical Military Training Practices

The sections below describe the practices typically associated with the identified types of training based on a review of historical field manuals and the munitions that may be expected as a result of the use of the area for these types of training. The types of training identified in the CSUMB Off-Campus MRA included rifle grenade training, hand grenade training, mine and booby trap training, CBR training, practice mortar training, and basic physical training. Military munitions were not likely used during physical training, such as land navigation, obstacle course training, hand-to-hand combat; therefore, no further discussion of these activities has been presented in this RI report.

3.1.3.1 Pre-World War II Training

Documentation of pre-World War II (WWII) training activities at the former Fort Ord was limited. Footage from a 1938 film entitled "A Year on a Calvary Post, 1938 – 11th Calvary, Presidio, Monterey, CA, National Archives" from 1940 was reviewed; however, the film did not contain definitive information regarding training at the CSUMB Off-Campus MRA (NARA 1941). No training maps were available for review from this time period. Because the majority of the CSUMB Off-Campus MRA was privately owned agricultural land prior to 1940, it is unlikely that this area was used for military training until after this time. This conclusion was supported because only a few pre-WWII military munitions (four MK II fragmentation hand grenades [MEC]) were found within the CSUMB Off-Campus MRA during grid sampling, investigations, and removal actions, as discussed in detail in Section 3.2 of this RI report.

3.1.3.2 1940s Training

No specific types of training were identified on 1940s training maps. Although rifle grenade training in the vicinity of the CSUMB Off-Campus MRA was not identified on training maps until 1961, some of the rifle grenades found during the removal actions

conducted at the CSUMB Off-Campus MRA (discussed in greater detail in Section 3.2) were in use in the 1940s. Based on the types of MEC and MD identified during the removal actions, it appeared that portions of the CSUMB Off-Campus MRA may have been used for practice rifle grenade and practice hand grenade training during the 1940s.

Rifle Grenade Training

Rifle grenades were designed to fire from rifles by a launcher that was attached to the gun muzzle. A special blank cartridge, issued with the grenade, was required to complete the launching. General information on the use of pyrotechnic items, including smoke grenades, was obtained from Army field and technical manuals (Army 1977b and 1987b).

Range configuration information for practice rifle grenade training was obtained from the manual entitled "Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat" (Army 1983). Technical information for recent rifle grenade training was obtained from TM 43-0001-29 (Army 1987a). According to the 1983 policies and procedures manual, live rifle grenades were fired behind a protective barrier equivalent to a screen of sandbags 0.5-meter thick or reinforced concrete walls 0.16-meter thick. Sandbags could have been used in a practice training area. The maximum range for the M11 series rifle grenade was 150 meters. According to the information in the American Arsenal (Hogg 2001), the depth to which the launcher was inserted into the rifle stabilizer tube determined the range attained by the fired grenade. Therefore, targets would likely be placed at various distances to practice firing at different ranges.

The rifle grenade models found as MEC or MD within the CSUMB Off-Campus MRA were the M9 series high explosive (HE), M11 series practice, M19A1 white phosphorous (WP), and M22 series and M23 series smoke grenades. Based on the distribution of the MEC and MD found, it appeared that the rifle smoke grenades were used for training within the CSUMB Off-Campus MRA, predominantly in the eastern portion of the MRA.

Rifle Grenade, Practice and HE: The M9 HE grenade and M11 series antitank practice grenade were available for use in the 1940s and 1950s. The M11 series item was an inert loaded dummy grenade similar in shape and weight to the M9 series HE antitank grenade. No explosive charge was associated with this practice item. The later M11 series differed from the M9 series in that the fins could be replaced in case they were damaged or worn out. Practice rifle grenades were inert; therefore, no MEC other than possible blanks used to fire the rifle grenade would be expected. The M9 was loaded with HE and MEC could be expected in an area where training was conducted with the M9.

Rifle Grenade, Smoke: Pyrotechnics were generally used for signaling and ground smoke. The M23 series rifle smoke grenade was used only for signaling. The M22 series and M19A1 WP rifle smoke grenades were used for both signaling and smoke screens. The M22 series grenades were fired from a rifle equipped with a grenade launcher and functioned on impact. At impact, a firing pin would strike a primer producing a flame, which ignited a starter mixture charge, which in turn, ignited a smoke mixture charge. The M19A1 WP was equipped with an internal detonator that exploded rupturing the case of the munition to disperse the WP filler. The filler of the M23 was ignited by the fire from the grenade

cartridge that fired the item. It then dispersed colored smoke as a streamer that followed the trajectory of the grenade.

Practice Hand Grenade Training

Although no specific hand grenade training areas were identified on the training maps, review of the removal action data indicated that hand grenades available for use in the 1940s and 1950s, including the MK II practice grenade and the MK I illumination grenade, were found in the CSUMB Off-Campus MRA.

MK II Practice Grenade: The MK II practice hand grenade used the M205 series or the M10 series fuze on earlier models, and was designed to train personnel to arm and throw hand grenades (Army 1977a). It was identical to the MK II fragmentation hand grenade, except for a filling hole in the base and a cork stopper to close the hole after the black powder strips had been inserted. The black powder strips provided noise and smoke without fragments upon functioning. It was functioned when a soldier removed the safety pin from the safety lever and threw the grenade allowing the safety lever to fly free, releasing the spring-loaded striker to strike the primer (FM 3-23.30; Army 2000b) The primer ignited the delay element in the fuze, which burned for a period of 4.0 to 5.0 seconds before igniting the black powder strips forcing the cork out of the hole in the base and causing spotting charge (Navy 1947).

MK I Illumination Grenade: The MK I illumination grenade was used for ground signaling. Information obtained from FM 3-23.30 indicated that it could also be used as an incendiary agent (Army 2000b). The grenade contained 3.5 ounces of illuminating pyrotechnic composition and a special igniter fuze. The filler would burn for 25 seconds and could illuminate an area 200 meters in diameter.

3.1.3.3 1950s to 1980s Training

Use of the CSUMB Off-Campus MRA for confidence course, obstacle course, and general training/maneuvers continued through base closure.

Training and Maneuver Areas

A training and maneuver area may have included using a site for squad patrols. Infantry platoons and squads conducted three types of patrols: reconnaissance, combat, and tracking (Army 1992a). Each patrol included specific objectives using infantry troops, sometimes with engineer support, to gather information and conduct simulated combat operations. Combat patrols would include the use of blank small arms ammunition, and possibly pyrotechnics and smoke producing items (e.g., signals, flares, and smoke grenades). Numerous pyrotechnic items including simulators, illumination and smoke producing signals, and flares (MEC and MD) were found throughout the CSUMB Off-Campus MRA suggesting that this area was used for various training activities.

In the 1950s, the CSUMB Off-Campus MRA was used as an infantry training area and included basic combat and advanced individual training (Army 1957). Training activities identified within the CSUMB Off-Campus MRA included CBR training, tactical training, and physical training (confidence and obstacle courses). Military munitions were not likely used during physical training. Practice mortar training was identified along the southern boundary of the MRA.

Mine Training

Practice mine training within the CSUMB Off-Campus MRA was documented on training maps, and expended practice mines, antitank mine activators (practice), and mine fuzes were found during the removal actions conducted with the CSUMB Off-Campus MRA. Practice mine and booby trap training was documented on the 1950s through 1970s training maps and in Range Control Standard Operating Procedures (Army 1980).

Firing devices and simulators (MEC and MD) found during the CSUMB Off-Campus MRA removal action indicate booby trap training occurred within the CSUMB Off-Campus MRA boundaries. Firing devices (MEC and MD) found within the CSUMB Off-Campus MRA included the M1A1 pressure, M1 pull, M1 release, M5 release, M3 tension and release, and a base coupling firing device. During the initial grid sampling investigation conducted in the CSUMB Off-Campus MRA, large numbers of firing devices (MD) were removed.

Review of the training facility maps indicated that practice mines may have been used for training in several localized areas within the CSUMB Off-Campus MRA. There was no available information confirming landmine training in the CSUMB Off-Campus MRA or on how it was performed in the 1950s. According to current field manuals, practice and inert mines or explosive booby trap simulators were used in training personnel in the precautions and proper methods to be observed in the care and handling, arming, booby trapping, and disarming of mines (Army 1997). High explosive mines were not normally used in training, except for demonstration purposes. The 1997 training manuals indicated that live mines were used as part of current training practices, but that live mine training and simulator training were not conducted concurrently at the same location in order to preclude a live mine being mistaken for an inert mine (Army 1997).

Information concerning emplacement of minefields in Army training manuals served as a guide as to how the site vicinity may have been used for mine training (Army 1997 and 2000a). Based on practices described in field manuals, it was likely that during training, the trainees would learn to mark practice mine locations as well as perform practice mine removal operations. It was also likely that the trainees would practice clearing paths or lanes through the minefield by probing, marking, and possibly destroying the practice mines with explosives or grappling hooks.

Booby Trap Training

Based on the review of a 1959 Fort Ord Yearbook, booby trapping of mines appeared to have been taught at Fort Ord (Fort Ord 1959). Firing devices that may have been used as part of booby trap training at Fort Ord included the M5 pressure release firing device, M1A1

pressure release firing device, the M1 pull firing device, the M3 pull/release firing device, and the M1 pressure release (Army 1965). These firing devices contained no energetic material (e.g., pyrotechnic charges), unless the coupling base was attached. Information presented below was provided for descriptive purposes and was based on current training materials (Army 1997).

Booby traps were placed in a variety of locations, some of which include:

- In and around buildings, installations, and field defenses
- In and around road craters or any obstacle that must be cleared
- In natural, covered resting places along routes
- In likely assembly areas
- In the vicinity of stocks of fuels, supplies, or materials
- At focal points and bottlenecks in road or rail systems

When setting booby traps, the commander established a control point that served as a headquarters and material holding area. Each setting party worked in a clear defined area. Entry to these areas was strictly controlled. The locations of booby traps were recorded. The traps were inspected for safety and camouflage before they were armed.

Based on these general field practices, it would be expected that as well as setting the traps, personnel would also practice neutralizing and removing the traps.

If the training was in setting or disarming the traps, it is likely that actual booby trap firing devices were used with a standard coupling base (sometimes referred to as a base coupling), which provided an energetic report to indicate that the trap had been successful. Only rarely would any reason exist to connect these firing devices to explosives, blasting caps, or detonating cord, and this would have to be done in a demolition area properly sited for the explosives quantities used (Hall 2003).

CBR Training

Tear gas agents O-Chlorobenzylidene Malonitrile (CS) and w-Chloroacetophenone (CN) might have been part of the training performed in the CBR training areas. Based on an army training manual, training using CS typically involved using a small 4-inch tall, 2.75-inch wide tin can filled with gelatin capsules, and a candle flame would be used to heat the open tin can (Army 1982b). This was usually performed in a test chamber. There were no buildings (i.e., gas chambers) on facility maps located within MRS-04C, which was identified as a CBR training area. No evidence of CBR training using items of this type was found during the removal action activities within the CSUMB Off-Campus MRA.

The training could also be performed using hand grenades containing CS or CN. It would be expected that the CS and CN concentrations used by Army training personnel would be similar to that used to control mobs or riots. CS and CN temporarily incapacitated the

victim (typically less than 30 minutes) through intense irritation of the eyes; irritation of the mucous membranes of the nose, trachea, or lungs; and irritation of the skin.

Practice Mortar Training

Based on the review of training facilities maps, practice mortar training was identified as occurring along the southern boundary and to the south of the CSUMB Off-Campus MRA in the 1950s. Practice and training mortars available for use in the 1950s included 60 millimeter (mm) and 81 mm mortars.

Two 81 mm M68 training mortars (MD) were reported to be found in the CSUMB Off-Campus MRA. The M68 cartridge was used for training in the loading and firing of the 81 mm mortar. When the cartridge was loaded it would slide down the mortar tube until the percussion primer in the ignition cartridge would strike the firing pin in the base cap of the mortar. The primer ignited the ignition cartridge. Since this round was fired only at Charge 0, the gases from the ignition cartridge expelled the projectile from the mortar tube and propelled it to the target. The projectile was fin-stabilized in flight. Since the projectile was inert, there was no detonation upon impact, and the projectile could be recovered for reuse.

In addition, seventeen 81 mm M3 propellant charges (MD) were found in a single location near the south-central border of the MRA. It was likely that the propellant charges were related to the practice mortar range located to the southwest.

Hand Grenade Training

Although no specific practice hand grenade training areas were identified on the available training maps, review of the removal action data indicated practice M30 grenades (MEC and MD) were found in the CSUMB Off-Campus MRA. Over 100 live and expended grenade fuzes (MEC and MD) were also found. Grenade fuze models found included M205 series and M228 series.

The M30 practice hand grenade used the M205A1 or M205A2 fuze and was designed to train personnel to arm and throw hand grenades. It was used to simulate the M26 series of fragmentation hand grenades. The M30 emitted a small puff of white smoke and made a loud popping sound when functioned. Based on current information provided in FM 3-23.30 (Army 2000b), a qualification course would consist of several stations that could include fighting positions, bunkers, logs, silhouettes, and other obstacles. This type of training could have occurred within the eastern portion of the CSUMB Off-Campus MRA based on the locations of the practice hand grenades recovered during previous removal actions.

3.2 MEC Investigations and Removal Actions

The following describes the MR investigations and removal operations conducted by the Army within the boundaries of the CSUMB Off-Campus MRA (MRS-04C:MRS-31, MRS-07:MRS-31, MRS-08:MRS-31, MRS-13B:MRS-31, MRS-13C, MRS-18:MRS-31, and MRS-

31). Appendix A includes the military munitions, both MEC and MD, found during the MR investigations described below.

3.2.1 Investigation and Removal Action Approach

Numerous investigation and removal operations were performed by the Army within the boundaries of CSUMB Off-Campus MRA. Initially, grid sampling was conducted within the areas identified in the ASRs. Later, the removal actions were conducted based on the property transfer parcel boundaries (i.e., the entire MRA). The removal action at the CSUMB Off-Campus MRA was conducted in three parts by Army contractors HFA, UXB, and USA Environmental, Inc. (USA; formerly CMS Environmental, Inc. [CMS]). For the removal actions, brush cutting was conducted to facilitate the MEC surveys, although large trees were not removed. The areas were then divided into 100- by 100-ft grids and the grids were subdivided into 5-ft wide search lanes. The following sections describe the investigation and removal activities conducted.

3.2.1.1 HFA Grid Sampling

From January to February 1994, the Army's contractor, HFA, conducted initial investigations at several MRS sites at the former Fort Ord, which included MRS-04C, MRS-07, MRS-08, MRS-13B, and MRS-18 within the CSUMB Off-Campus MRA. HFA submitted a Phase I work plan to conduct the grid sampling activities (HFA 1993) and the results of the grid sampling were documented in HFA's Ordnance and Explosives Waste (OEW) Sampling and OEW Removal Action Final Report (HFA 1994b). In accordance with the work plan, sampling grids were approximately 100- by 100-ft and separated by at least 200 ft. Sample grids were established within and adjacent to the MRSs. A maximum search lane width of 5 ft was used during grid sampling. The grids received a surface and subsurface survey across the entire grid using either the Schonstedt Model GA-52C or Model GA-72Cv magnetometer. The work plan indicated that the surface and subsurface surveys would be conducted simultaneously whenever possible.

In accordance with the work plan, surface debris was segregated as UXO, UXO-related scrap, or non-UXO scrap. Subsurface contacts and anomalies were marked with yellow flags for excavation and identification. Items identified as UXO were further classified as safe to move or unsafe to move by a UXO specialist. UXO that was determined to be safe to move was transported to a safe holding area for later disposition. UXO that was determined to be unsafe to move was blown in place. UXO-related scrap was determined to be free of explosives prior to being turned over to the Fort Ord Defense Reutilization Materials Office. In accordance with the work plan, non-UXO scrap was not removed from the grid.

Quality control (QC) consisted of performing a check of 10% of each grid surveyed. If a UXO item was detected during the QC check, the entire grid was searched again. According to the work plan, if UXO was located during the MRS investigations, the grid sampling activities would be discontinued for that MRS unless otherwise directed by the United States Army Corps of Engineers, Huntsville Division (CEHND) safety representative. According to

HFA's final report, the CEHND declared the following sites in the CSUMB Off-Campus MRA contained UXO: MRS-4C, MRS-07, MRS-13B, and MRS-18.

In general, the grid sampling activities were conducted in accordance with the procedures stated in the work plan. Photographs in the HFA after-action report indicate that narrow lanes were cut in some of the denser areas of maritime chaparral to allow access while minimizing biological impacts (HFA 1994b). The depths of excavations, and the types of UXO-related scrap and non-UXO scrap located, were not included in the information provided in the final report; however, the HFA Phase I work plan did not indicate that the depths of UXO items removed would be recorded as part of the investigation activities (HFA 1993). The HFA after-action report included a description of the area where grid sampling was performed, but did not include the exact location or sampling grid for the UXO items removed during grid sampling, unless the item was blown in place (i.e., detonated where it was found).

3.2.1.2 HFA Removal Operations

Based upon the results of the grid sampling, HFA recommended conducting a removal action across the entire CSUMB Off-Campus MRA (referred to as the CSU Footprint, which corresponds to MRS-31). From February to June 1994, HFA conducted a subsurface removal action over approximately 238.5 acres located within the western portion of the CSUMB Off-Campus MRA. The removal action activities were conducted in accordance with the Phase III work plan (HFA 1994a) and the results of the removal action were documented in HFA's OEW Sampling and OEW Removal Action Final Report (HFA 1994b).

The site was divided into 100-ft by 100-ft square grids, which were land surveyed using the "TOPCON" Total Station. The grids received a surface and subsurface survey across the entire grid using Schonstedt Model GA-52Cv or GA-72Cv magnetometers. Magnetometers were inspected daily on a predetermined piece of ordnance to ensure that the instruments were in calibration and operating within specifications. Each magnetometer was tested every morning and field tested after lunch to determine that it was operating correctly. A solid steel, inert 81 mm mortar was buried at 4 ft bgs and used as a standard for determining correct operation of each magnetometer. Instruments that were in need of repair or were not operating within designed parameters were immediately removed from service.

Rope was used to form the grid boundaries and search lanes. The width of the search lanes did not exceed 5 ft. Contacts were plotted using an XY coordinate system measuring along the base lines of the grids. Contacts and anomalies were marked with yellow flags for excavation and identification. Contacts were excavated to a depth of 4 ft bgs. Subsurface anomalies identified as UXO were classified as safe to move or unsafe to move by the senior UXO supervisor and the CEHND Safety Specialist. UXO determined safe to move were transported to a safe holding area for later disposal by HFA personnel. The location of UXO that was determined to be unsafe to move was marked with a red flag for in-place destruction at the end of the work day. UXO-related scrap was determined free of explosives prior to being turned over to the Fort Ord Defense Reutilization Materials Office. In accordance with the work plan, non-UXO scrap was initially not removed from the grid. In March 1994, the

scope of work was modified to allow HFA to remove non-UXO-related scrap from the grids as well (HFA 1994b).

QC consisted of performing a check of 10% of each grid surveyed. If a UXO item was detected during the QC check, the entire grid was searched again. QC daily logs were included with HFA's final report. The HFA QC/Safety Officer conducted sweeps of 10% of the project grids and observed UXO personnel to determine that their techniques were proper and they were following the prescribed safety procedures. There were no HFA QC failures noted in the resurveyed grids. According to the work plan, failure was triggered by the discovery of a MEC item in the previously cleared grid.

As documented in HFA's OEW Sampling and OEW Removal Action Final Report (HFA 1994b), HFA completed the removal action of approximately 77% of the area identified as the CSU Footprint. In June 1994, UXB took over the removal action activities at the former Fort Ord and completed the removal action in the remaining grids within the CSUMB Off-Campus MRA. HFA's removal action activities were conducted in accordance with the procedures stated in HFA's removal work plan. The depths of detections, and the types of range-related and other debris located were not recorded, and therefore were not included in the information provided in the final report (HFA 1994b); the HFA Phase III work plan did not indicate that the depths of MEC removed would be recorded as part of the removal action activities (HFA 1994a). As a result, depths were not included in the MMRP database for the MEC items removed during HFA's removal action The HFA after-action report included the grid identification in which the MEC were found; however the exact location of the items (such as northing and easting coordinates) were not recorded.

3.2.1.3 UXB Removal Operations

In June 1994, UXB took over the removal action activities within the CSUMB Off-Campus MRA. The removal actions were performed by UXB over the remaining approximately 75 acres in the eastern portion of the CSUMB Off-Campus MRA.

The removal action approach was described in UXB's Phase II Removal Action Work Plan (UXB 1994). Site perimeter land surveys and brush removal were done prior to starting MEC removal work. After the perimeter was established, the entire area was divided into 100-ft by 100-ft square grids and a wood stake was placed at each of the grid corners. Once grid boundaries were established, the grid was divided into 5-ft-wide search lanes. Specialists investigated each lane by moving forward at a slow continuous pace visually inspecting the surface while simultaneously searching for subsurface anomalies with a magnetometer. Originally, the geophysical instruments used were the Schonstedt Model GA-52C and Model GA-72Cv magnetometers. In October 1994, UXB began using the Schonstedt Model GA-52Cx magnetometer. Magnetometers were tested daily to ensure reliability.

Each anomaly was marked with a pin flag and the process was repeated until the grid was completely checked. Each contact was then hand-excavated by a UXO specialist to determine if it was MEC, MD, or scrap. Ordnance items were identified, recorded, and

assessed to determine the condition and potential hazard. Initially, excavations were conducted to a depth of 3 ft. In December 1994, the excavation depth requirement changed to 4 ft. If the anomaly could not be uncovered within 4 ft of the surface, the on-site CEHND Safety Specialist was asked to determine if deeper excavation was required. The recovered UXO was removed from the site and disposed of through the Fort Ord Defense Reutilization and Marketing Office (UXB 1995a).

Following the change of the excavation depth requirement from 3 ft to 4 ft, the project began using a test area with a solid steel, inert 81 mm mortar buried to 4 ft to test the magnetometers. On December 20, 1994, a 2.36-inch inert rocket and a 105 mm projectile were added to the test area at a depth of 4 ft bgs. On July 10, 1995 another test area included two 5- by 40-ft lanes. Various inert munitions items were buried at varying depths within the test area lanes. This area was used by teams to check their magnetometer and by the QC officer to randomly QC teams on their search procedures.

UXB's removal actions were conducted over two areas in the CSUMB Off-Campus MRA. From July 1994 to July 1995, UXB conducted a subsurface removal action over approximately 69.8 acres (part of which extended into the adjacent County North MRA). The results of this removal action were presented in UXB's final report for CSU (UXB 1995b) and in a comprehensive final report prepared for all of the areas in which UXB conducted a removal action (UXB 1995a). The depths of detections, and the types of other debris located were not included in the information provided in UXB's final reports; however, the work plan did indicate that the depths of MEC items removed would be recorded in the daily field journals (UXB 1994). As part of the historical reviews conducted for the Munitions Response RI/FS program at the former Fort Ord, the Army has attempted to locate and obtain Fort Ord project documentations from UXB. Documents obtained from UXB included field journals for some sites. A spot check was conducted by the Army of the UXB documents. Copies of these daily field journals are not available on the administrative record for review. Attempts to locate the original copies of these journals by the ESCA RP Team in the Army's records were unsuccessful. The Army's spot check indicated that depths of recovered MEC were not recorded by UXB in daily field journals during its MEC removal work within the CSUMB Off-Campus MRA. Because depths were not recorded in UXB's final reports, depths were not included in the MMRP database for MEC items removed during this removal action and the MMRP database has assigned the depth of zero (on the surface) for MEC recovered by UXB from within the CSUMB Off-Campus MRA

From April to June 1995, UXB conducted a subsurface removal action to a depth of 4 ft over approximately 5.7 acres located approximately in the center of the CSUMB Off-Campus MRA using the Schonstedt Model GA-52Cx magnetometer. According to the UXB after-action report (UXB 1995c), this 5.7-acre area had previously been left uncleared by HFA due to a "hazardous material" incident that halted intrusive work. The immediate area of the incident became IRP Site 39B Inter-Garrison Site under the Army's Interim Action program. Approximately 164 cubic yards of soil mixed with debris was excavated from the site (HLA 1997). Confirmation samples were collected and Harding Lawson Associates (HLA) concluded that residual concentrations of COCs above the remediation goals did not remain in the soil thus allowing UXB to complete the subsurface removal action (HLA 1997).

The results of the MEC removal action were presented in UXB's final report for CSU/HFA (UXB 1995c) and in a comprehensive final report prepared for all of the areas in which UXB conducted a removal action (UXB 1995a). The depths of detections, and the types of other debris located were not included in the information provided in UXB's final reports. As a result, depths were not included in the MMRP database for MEC items removed during this removal action and the MMRP database has assigned the depth of zero (on the surface) for MEC recovered by UXB from within the CSUMB Off-Campus MRA. UXB's final report included the grid identification in which the MEC were found; however the exact location of the items (such as northing and easting coordinates) were not recorded.

The UXB final reports indicated that there were no QC failures in the resurveyed grids; however, the complete QC field logs were not available for review. Failure was apparently triggered by the discovery of a MEC item in the previously cleared grid. According to the final reports, the CEHND performed a QA inspection and no failures were documented (UXB 1995a, 1995b, and 1995c).

3.2.1.4 USA (formerly CMS) Removal Operations

From June to September 1997, removal actions were performed by USA over 24.5 acres of the CSUMB Off-Campus MRA in the area identified as MRS-13C (along the southern boundary line of the CSUMB Off-Campus MRA). The removal in MRS-13C was conducted by completely dividing the area into 100- by 100-ft grids or portions of grids. Each grid was divided into search lanes of 5-ft widths delineated by lengths of rope laid on the ground. Prior to conducting the intrusive investigation, a surface sweep of each search lane was performed. Each grid (or portion of grid) was investigated with the Schonstedt Model GA-52Cx magnetometer with the operator swinging the Schonstedt from side to side while walking the length of the search lane. The surface sweep was used to locate surface MEC and MD. The surface items were flagged and the location was recorded. After the MD was consolidated, an intrusive geophysical investigation was conducted. The search lanes were again investigated with the Schonstedt magnetometer using the same technique as used in the surface sweep. Subsurface anomalies encountered were investigated to a depth of 4 ft. Near-surface anomalies were excavated with hand tools while some deeper anomalies were excavated by backhoe. While digging, the Schonstedt was used to check and verify the location of the anomaly (CMS 1995). Anomaly locations were excavated until a metal object was encountered or the instrument no longer showed a response. The MEC and MD items and the depth at which MEC and MD were encountered were recorded for the removal action in MRS-13C and were available in USA's after-action report (USA 2000). In addition, USA's after-action reports included the exact location of MEC items (i.e., northing and easting coordinates). Functional checks of the Schonstedt instruments were performed daily. Additionally, QC and QA surveys were performed. QC procedures entailed a resurvey of at least 10% of each grid by a USA QC Officer. QA procedures generally entailed a second 10% resurvey by USACE personnel.

Throughout operations, USA performed daily operational checks and QC inspections. Copies of the daily QC logs were included in USA's after-action report for the MRS-13C (USA 2000). The USA QC Specialist was responsible for ensuring that personnel performed

operational checks and made appropriate log entries. The QC Specialist performed random unscheduled checks of the various sites to ensure the personnel performed the work as specified in the work plan. In accordance with the USA work plan (CMS 1995), instruments requiring maintenance and/or calibration were checked prior to the start of each workday. Batteries were replaced as needed and the instruments were checked against a known source.

The after-action reports prepared by USA indicate that three grids out of approximately 163 grids initially failed QC inspection due to an excess number of anomalies found and were, therefore, re-investigated prior to passing QC inspection. Following USA's QC inspection, each grid received a QA inspection by a USACE OE Safety Specialist. Every grid in MRS-13C passed the initial QA inspection and was accepted by USACE. Copies of the QA acceptance records were included in the USA's after-action report (USA 2000).

3.3 Equipment Evaluation

This section describes the results of a review of the geophysical instruments used during the removal actions performed within the CSUMB Off-Campus MRA.

3.3.1 Schonstedt GA-Series Magnetometer

The investigation for MEC and MD within the CSUMB Off-Campus MRA was performed using either the Schonstedt Model GA-52C, GA-G2Cx, or GA-72Cv magnetometers. The Schonstedt GA-52C, GA-52Cx, and GA-72Cv magnetometers are handheld devices that, when properly adjusted, will emit a distinctive tone when placed near a ferrous metal object; the volume and pitch of this tone can provide an experienced operator with qualitative information about the nature of the detected object (e.g., size, location, burial depth). These instruments are passive dual flux-gate magnetometers – a highly sensitive magnetic locator that detects ferrous (iron) metal objects; however, they cannot detect non-ferrous metal objects (e.g., lead, brass, copper, aluminum). In general, magnetometers make passive measurements of the earth's natural magnetic field; ferrous metal objects (and rocks) are detected because they produce localized distortions (anomalies) in the magnetic field. The Schonstedt magnetometer actually detects slight differences in the magnetic field (the "gradient") by means of two sensors mounted a fixed distance apart within the instrument's staff. Because the magnetic response changes greatly even over a short distance, a gradient magnetometer like the Schonstedt is especially sensitive to smaller, near-surface ferro-metal objects (Breiner 1973).

Schonstedt magnetometers will also respond to soil and rock containing ferrous minerals (often referred to as "hot rocks"), as well as asphalt pavement containing enough ferrous mineralization to produce a Schonstedt response. The presence of "hot rocks" and asphalt pavement can mask the response from potential MEC items located near or below these items. Accordingly, it is recognized that the interpretation of the Schonstedt instrument response can be subjective. For deeper targets especially, the operator often must analyze a subtle change in the audio output and decide whether the instrument is responding to a potential MEC item or to pavement or soil minera1ization. Additionally, it can be difficult to

determine the exact location of a more deeply buried object because the Schonstedt audio response may be dispersed over an area that is several ft wide.

The Schonstedt magnetometer is an analog device that does not record any data. Typically, the location of a detected object is marked in the field by a pin flag or promptly excavated to uncover the detected object. For that reason, Schonstedt surveys are sometimes called "mag and flag" or "mag and dig" surveys.

3.3.2 Evaluation of Schonstedt GA-Series Magnetometer Detection Efficiency

Parsons Infrastructure & Technology Group, Inc. ("Parsons") previously conducted an ODDS at the former Fort Ord to evaluate the performance of various geophysical equipment, including the detection efficiency of the Schonstedt GA-52C, GA-52Cv, and GA-52Cx (Parsons 2002). As part of the ODDS, seeded tests were performed to evaluate the ability of the Schonstedts to detect MEC items buried at various depths. The seeded test was conducted with multiple lane widths, including the 5-ft width, which was the width used during the CSUMB Off-Campus MRA removal actions described in this report. The ODDS seeded test evaluated instrument performance based on two different search radii, 1.6 ft and 3.3 ft. If the distance between the location identified by the instrument and the actual location of an item was equal to or less than the search radius, the item was considered detected by the instrument.

The results of the ODDS were presented in Parsons' Final ODDS Report (Parsons 2002). As presented in the ODDS, the statistical tests performed on the results suggested that there was no significant difference between the detection capabilities of the three different Schonstedt models tested (GA-52C, GA-52Cv, and GA-52Cx).

Based upon the results of the ODDS, limitations of the Schonstedt Models GA-52C, GA-72Cv, and GA-52Cx magnetometer survey included:

- Schonstedt magnetometers are unable to detect non-ferrous metal MEC and have limited effectiveness at detecting predominantly non-ferrous items, such as the grenade fuzes found in abundance at the CSUMB Off-Campus MRA. Some of these fuzes may have been "detected" visually (i.e., present on the ground surface) or, if buried, were encountered by chance while excavating detected ferro-metal items.
- Schonstedt magnetometers are subject to interference from asphalt pavement. The CSUMB Off-Campus MRA included an approximately 0.75-acre paved area at the former fueling facility. Although this area was included in HFA's removal activities, the presence of the asphalt in this area may have interfered with the effectiveness of the removal action within this area.
- The effectiveness of a Schonstedt survey depends on the skill of the instrument operator, particularly the thoroughness of their coverage when swinging the instrument within the survey lane. Unlike surveys with digital instruments, where positioning data are also obtained, there is no digitally documented verification that the Schonstedt operator achieved complete coverage during the survey. Therefore, the quality control/quality

assurance (QC/QA) processes must be relied upon to verify that the Schonstedt operator achieved complete survey coverage within the survey lane. In addition, instrument gain (sensitivity) and volume settings will also affect the ability of the operator to recognize a response from a buried metal object. Some documentation of instrument setting is provided; therefore, based on notations regarding instrument setting in some daily reports it is assumed that the contractors were aware of the instrument settings and the instrument settings used were appropriate for the site conditions.

- The detection capability of the Schonstedt magnetometers is greater for larger, shallowly buried items and decreases as items are more deeply buried and smaller in size.

Despite these limitations, use of the Schonstedt at the CSUMB Off-Campus MRA was considered effective for the following reasons:

- After removing the source of each of the anomalies, the UXO technicians rechecked the location and were often able to extend the Schonstedt below ground surface following excavation of an item. This procedure increased the likelihood that deeper items could be detected in these locations.
- The majority of the MEC items expected, based on a thorough review of the historical documentation, and removed during previous investigations from the CSUMB Off-Campus MRA were non-penetrating and would be expected to be found on the surface and near surface.
- Unexpended non-ferrous MEC such as the grenade fuze, in additional to being non-penetrating types expected to be shallow, contain ferrous components that increase the likelihood of detection with the Schonstedt magnetometers. Expended items may contain fewer ferrous components but are not hazardous.
- Documented QC/QA procedures involved equipment functional checks and independent resurveying of portions of each grid, providing assurance that the CSUMB Off-Campus MRA MEC surveys were performed in a thorough and appropriate manner.

3.4 Collection and Management of Field Data

The data collected during the removal actions conducted by HFA, UXB, and USA were recorded in daily field journals and on grid sheets. Daily field journals from UXB were not available for review. The grid sheets included descriptions of the MEC items encountered in each grid and were provided in the final reports prepared by each of the contractors (HFA 1994b, UXB 1995a, UXB 1995b, UXB 1995c, and USA 2000). Although exact location and depth data was not collected for MEC and MD removed during grid sampling and removal actions, and the exact location of items found cannot be plotted on maps, the grid in which each item of MEC and MD was encountered was recorded. The data recorded on the grid sheets were also included in the Army's MMRP database. The Army has previously evaluated the collection and management of field data for past munitions response actions.

The evaluation conducted by the Army was used to support the validation of data collected by the Army and its contractors, which included the following activities:

- Data QA (If there was no evidence that data QA was conducted, a 10% QA effort was performed).
- Parsons, under contract with the Army, performed a QC review of the data in the MMRP database previously generated from work conducted by prior munitions response contractors. The review followed an approved standard operating procedure (SOP; Parsons 2002). This evaluation included a review of the field grid records and the MMRP database. It also included a review of HFA data provided in the after-action report (HFA 1994b). The USACE implemented a QA review of 10% of the data reviewed by Parsons. The QA review included a comparison of the data set with the data set reported in the contractor after-action reports. The requirements of the USACE QA review are described in the SOP. The purpose of the QC data review was to complete a check of all available grid records to identify discrepancies between the after-action reports and the grid records, if any. Discrepancies were then researched and appropriate corrections were made in the MMRP database. No completion report was located documenting the results of the QC review of the MMRP database; however, notations were made in the database to indicate changes.

In addition to the Army's review, the ESCA RP Team compared the Fort Ord MMRP database to the relevant CSUMB Off-Campus MRA final and after-action reports to identify discrepancies, if any, between the information provided in the reports and the current database. The ESCA RP Team's review indicates there were some differences between the reports and the final database, as follows:

- Some changes were made to model descriptions and condition of items found and that some items were changed from MEC to MD. Because documentation was generally provided for the changes, the data were considered useable for performance of the MEC risk assessment and feasibility study.
- Hazard codes were assigned by the Army and not by the contractors in the final or after-action reports. A hazard category could not be assigned for some items as the model was unknown. In those cases, the worst case was assumed for an item of that type.
- The locations of MEC items found in Site 13B during HFA's grid sampling operations were not available in the after-action report or the MMRP database.
    - Grid sheets were submitted for MEC items found during the grid sampling activities if a blow-in-place-type detonation was required. Therefore, only one grid sheet was included in HFA's final report for the grid sampling that occurred in Site 13B.
    - Approximately two-thirds of Site 13B was located within the boundaries of the Parker Flats MRA, which is south of the CSUMB Off-Campus MRA. A map included with HFA's after-action report showed the locations of the grids sampled, but did not indicate grid numbers. Therefore, the list of items found in the portion

of Site 13B that was within the CSUMB Off-Campus MRA could not be confirmed.

- The map indicated that only one Site 13B sample grid was located within the proposed residential area in the CSUMB Off-Campus MRA. Therefore, the items listed on Table 1-2 of the HFA after-action report (HFA 1994b) could have been found in that grid but not in other portion of the proposed residential area. Also, the MMRP database indicated that the majority of the items found in Site 13B were munitions debris consistent with the historical use of the area as a tactical training area.

- The MMRP database and HFA daily operations journal and after-action report, Table 1-2, indicated that two fragmentation bombs (a 220-lb fragmentation and a 250-lb fragmentation) were found in MRS-13B.
  - The HFA daily operations journal indicated that a "250lb AN/M88 Frag Bomb W/O Fuze" was found on January 28, 1994 during the grid sampling investigation by Team 1 in Site 18/13 (the journal on that date explained "half of - site 18 lies within site 13" thus the reference to Site 18/13). In addition, the journal entry on January 31, 1994 indicated that the "frag bomb" was de-milled and found to be inert filled.
  - Table 1-2 in the HFA after-action report (HFA 1994b) listed the information regarding items relevant to grid sampling operations. Table 1-2 listed one "BOMB, FRAG, 220lb, Inert" found in Site 13B during grid sampling. The bomb listed in the journal and the bomb listed in Table 1-2 may be the same item. The journal specified the model name of the fragmentation bomb as AN-M88, which according to ORDATA (a U.S. Government database of landmines and other unexploded ordnance, developed to assist humanitarian de-mining work) weighed 220 lbs, not 250 lbs. The weight listed in the journal may have been incorrectly stated and the error corrected in Table 1-2.
  - Although the Army's MMRP database listed the 220-lb and 250-lb fragmentation bombs separately, both items were identified as inert, which indicated that even if two items were encountered they were both inert training devices and not evidence of an impact area.

- Appendix E of the HFA final report (HFA 1994b) contained a photograph of a 20-lb fuzed fragmentation bomb that was not included in the MMRP database. The caption below the fragmentation bomb indicated that it was found in Grid 27-F of the CSU Footprint. Grid 27-F was in the vicinity of MRS-18 and MRS-13B. The photo could be mislabeled and may actually be the 220-lb inert fragmentation bomb found during grid sampling of Site 18/13 as discussed above.

  A fuzed 20-lb fragmentation bomb, with the yellow banding as shown in the photograph, would have been considered unsafe to move and this item would likely have been blown in place. Since Table 2-7 of the HFA final report does not indicate that a fragmentation bomb was blown in place, it is likely that this 20-lb fragmentation bomb was inert filled.

- Another photograph showed four 81 mm mortars. The caption below the photograph indicated that the items were live and were found in Grid 28-G of the CSU Footprint. The grid sheet 28-G was not included in Volume III of the final report (HFA 1994b), which contained copies of HFA's grid sheets, or in the Volume III errata sheets that were submitted by HFA after the final report was submitted (HFA 1994c). A notation in Volume III indicated that grid sheets were not included for "clear grids" implying that if grid sheets were not included in the report, then the grid did not contain MEC items. In addition, grids sheets were only included for reporting if a MEC item found required a blow-in-place-type detonation. Assuming that the caption on the photograph was correct, the mortars would have been found in the CSU area either during grid sampling or the removal action. Table 2-5 of the HFA final report listed four 81 mm practice mortars found in April 1994, which was when HFA was conducting the removal action in the CSUMB Off-Campus MRA. It is possible that HFA did not include the grid sheet in the report because they were practice items and the caption for the photograph was incorrect. Also, if these mortars were found during grid sampling, then the grid sheet would not be included in the final report as these items would not typically require a "blow in place" type detonation.
- A review of the data collected by HFA and UXB indicated that the depths at which items were encountered were not recorded in the final reports (HFA 1994b, UXB 1995a, UXB 1995b, and UXB 1995c). In addition, the depths were not recorded in the MMRP database for the data collected by HFA and UXB in the CSUMB Off-Campus MRA. For HFA's grid sampling and removal activities, the HFA work plans did not indicate that the depth of items would be recorded as part of the removal action (HFA 1993). According to UXB's work plan, UXB would record the depth of items in their daily field journals; however, copies of the individual team daily field journals were not available for review. Although depth information was not available for HFA and UXB data, the majority of the items were placed items that were not expected to penetrate during use.
- The data collected by HFA during a response action conducted in "Site 7" was entered in the Army's MMRP database as being recovered from MRS-07. MRS-07, which was identified as a mine and booby trap training area, was located within the boundaries of the future residential reuse area (ESCA RP Team 2011b). Based on a review of response action reports (HFA 1994a and 1994b; and USACE 1994), "Site 7" was also identified as a mine/booby trap training area, which was located outside the boundaries of the future residential reuse area (ESCA RP Team 2011b). Historical training maps from 1953 through 1971 also identified a mine/booby trap area in the same vicinity as "Site 7" (Army 1953, 1956, 1957, 1964, 1968; and USACE 1961 and 1971). A response action conducted in "Site 7" by HFA confirmed the presence of military munitions in "Site 7"; however, the military munitions data for "Site 7" (ESCA RP Team 2011b) were entered in the Army's MMRP database as being found in MRS-07. The data collected at "Site 7" has been included in the Group 2 RA. The locations of MRS-07 and "Site 7" are shown in Figure 8.

3.4.1 Accuracy of Site Boundaries

Site boundaries were first presented as part of the 1993 ASR (USACE 1993). These boundaries served as a foundation for the initial investigation under the MMRP. Since that time, site boundaries have been modified based on results of MEC investigations and to support property transfer. The evaluation of previous work included an evaluation of existing information to determine whether the establishment of site boundaries was accurate, based on historical information and removal data, and whether the surveying method used to delineate the site boundaries was accurate.

Site boundaries were based on property transfer boundaries for the CSUMB Off-Campus MRA as provided by the Army. Along the eastern boundary of the CSUMB Off-Campus MRA, the UXB removal action exceeded the transfer parcel boundary and extended into the adjacent County North MRA. An overlay of the MEC investigation and property transfer boundaries indicated that the entire CSUMB Off-Campus MRA was covered during the removal actions conducted by HFA, UXB, and USA. The establishment of the CSUMB Off-Campus MRA boundary was not based on a single defined area of use. Although aerial photos show features that could be related to troops training, they did not provide sufficient evidence to establish boundaries. The CSUMB Off-Campus MRA encompassed several MRSs, the boundaries of which were established as part of the archives search process. Training facilities maps provided evidence that the eastern portions of the CSUMB Off-Campus MRA had the same use as the western portion of the County North MRA. Since the CSUMB Off-Campus MRA boundary was based on property transfer parcels there was no need to revise the current boundaries.

3.5 Residential Quality Assurance Process Pilot Study

FORA conducted a RQA Pilot Study within portions of the ESCA parcels. The Group 1 RI/FS Work Plan included an RQA Pilot Study Work Plan which was presented in Volume 2 of the Group 1 RI/FS Work Plan (ESCA RP Team 2008b) and described the initial phase (Phase I) of the pilot study activities. Details of the field activities associated with the RQA Pilot Study were described in the Residential Quality Assurance Pilot Study Modification White Paper, which was provided to the EPA, the DTSC, and the Army on December 10, 2008 for review. The RQA Pilot Study (Phase I) was conducted in a portion of the proposed future residential reuse area of the CSUMB Off-Campus MRA in 2009.

As described in the CSUMB Off-Campus MRA RQA Process Pilot Study Technical Information Paper (RQA TIP; ESCA RP Team 2012), an implementation phase of the RQA Pilot Study, referred to as the RQA Process Implementation Study (Phase II), was recommended to test the process developed during Phase I. In February 2011, FVF No. G1WP-004 was prepared to describe the approach to the Implementation Study and was submitted as an addendum to the Final Group 1 RI/FS Work Plan and associated Appendix F: RQA Pilot Study Work Plan (ESCA RP Team 2011a). The CSUMB Off-Campus MRA RQA TIP documented the activities associated with the RQA Pilot Study (Phase I) and the ESCA RQA Process Implementation Study (Phase II), data collected, and evaluation of the

effectiveness of the RQA Process as applied at the CSUMB Off-Campus MRA proposed future residential reuse area (ESCA RP Team 2012).

As described in the CSUMB Off-Campus MRA RQA TIP, the initial phase of the RQA Pilot Study (Phase I) was conducted in an approximately 17 acre portion of the proposed future residential area in the CSUMB Off-Campus MRA (Figure 9). The activities conducted as part of the initial phase of the RQA Pilot Study included site preparation activities to clear the area of debris, buildings, and vegetation; conducting a baseline digital geophysical mapping (DGM) survey and investigation over the approximately 17 acre area; and scraping soil in an approximately 5 acre portion of the area and conducting a post-scrape DGM survey and investigation of the 5 acre portion. The relevance and usefulness of this RQA process was then tested during the RQA Pilot Study Implementation Study (Phase II) across the entire 49-acre area proposed for future residential reuse. The implementation phase of the RQA Pilot Study included a detailed assessment of the technical challenges, quality, documentation, and data collected during previous MEC investigations and removal actions in the future residential reuse portion of the CSUMB Off-Campus MRA, and a verification site walk performed in the future residential reuse not included in the Pilot Study test area. The RQA Pilot Study and RQA Process Implementation Study were conducted as additional verification and quality assurance of prior MEC investigation and removal activities. The RQA data was collected in a manner consistent with the data quality objectives of the Group 1 RI/FS Work Plan and is included in the risk assessment presented as Volume 2 of this Group 2 RI/FS.

Based on the RQA Process evaluation, including results of the RQA Pilot Study and RQA Implementation Study, the approximately 49 acres proposed for future residential reuse within the CSUMB Off-Campus MRA was recommended as acceptable for future residential reuse with appropriate institutional controls, such as the county excavation ordinance, construction support, and disclosures. Further assessment under the RQA process was not warranted based on the following information:

- The portion of the proposed future residential reuse area that underwent previous removal actions followed by the RQA Pilot Study was recommended as acceptable for residential reuse based on few or no munitions recovered, no remaining evidence of high hazard munitions, no remaining technical challenges, no remaining detection depth concerns, and no remaining documentation or QA/QC concerns.
- The remainder of the proposed future residential reuse area that underwent previous removal actions and was evaluated further using the field verification site walk was recommended as acceptable for residential reuse based on no evidence of high hazard munitions and no remaining documentation or QA/QC concerns.

4.0 DATA ANALYSIS

The results of the reviews of the historical records and investigation and removal actions, including the RQA Process Pilot Study, were used to complete the data analysis. The data analysis process consisted of answering a series of questions and the process was documented through the completion of a series of checklists. Copies of checklists prepared for the CSUMB Off-Campus MRA are provided as Appendix B. An evaluation checklist for the grid sampling performed at the CSUMB Off-Campus MRA was not provided because a removal action was completed across the entire MRA.

4.1 Literature Review Evaluation Summary

As determined during the historical review, the majority of the CSUMB Off-Campus MRA was not purchased by the Army until the 1940s. This finding was validated by the items found during removal actions, which indicated few pre-WWII munitions items. A review of historical aerial photographs and training facility maps indicated that the CSUMB Off-Campus MRA was used primarily for troop training. No evidence that the CSUMB Off-Campus MRA was used as an artillery range was found during the review of historical aerial photographs and training facility maps. A review of historical training practices indicated that the troop training practices conducted in the area would have primarily involved the use of pyrotechnics and smoke-producing items (e.g., simulators, flares, and smoke grenades). Although the literature review indicated that the area was not used as an artillery range, the types of activities that were identified indicated that military munitions would have been used at the CSUMB Off-Campus MRA. As such, the Army's contractors conducted MEC grid sampling and removal activities at the CSUMB Off-Campus MRA.

4.2 Investigation and Removal Action Review Evaluation

This section describes the analysis of results of the military munitions investigations and removal actions and the data.

4.2.1 Investigation and Removal Action Design

Initial grid sampling investigation was conducted within the CSUMB Off-Campus MRA in 1994 to determine if further action (removal) was necessary. Based on grid sampling results, 3- to 4-ft deep removal actions were conducted within the majority of the MRA from 1994 to 1995 and in 1997. The main objective of the removal actions was to remove detected MEC from the MRA to a depth of 3 to 4 ft (or deeper). If an anomaly was detected below a depth of 3 to 4 ft, permission from the USACE MEC Safety Specialist was obtained prior to continuing the investigation. The HFA, UXB, and USA final and after-action reports indicated that detected anomalies within the CSUMB Off-Campus MRA were investigated and military munitions removed. The MEC surveys conducted during the grid sampling and removal actions were completed using the Schonstedt Model GA-52C, GA-72Cv, and/or GA-52Cx magnetometers. The equipment evaluation discussed in Section 3.3 indicated that

these instruments were effective at detecting the types of munitions expected at the CSUMB Off-Campus MRA.

The RQA Process Pilot Study was conducted within the CSUMB Off-Campus MRA proposed future residential reuse area in 2008, 2009 and 2011 as an additional verification and quality assurance of prior MEC investigation and removal action activities. The RQA data was collected in a manner consistent with the data quality objectives of the Group 1 RI/FS Work Plan. The RQA Process Pilot Study was completed using a modified EM61-MK2 towed-array using a sled with lowered sensors (referred to as "the FORA ESCA Sled," as described in the RQA TIP) during the baseline and post-scrape DGM surveys and Schonstedt Model GA-52Cx magnetometers, which were effective at detecting the types of munitions expected at the CSUMB Off-Campus MRA, during the verification site walk (ESCA RP Team 2012). The RQA Pilot Study baseline DGM survey confirmed the results of the previous MEC investigations and removal action and provided extensive documentation within the RQA-CSUMB test area. During the verification site walk, uncertainties with previous removal actions or concern with quality in the proposed residential reuse area outside the boundaries of the Pilot Study test area was identified, evaluated and resolved. Based on the results, the RQA Pilot Study Process activities removed detected MEC and MD from the proposed future residential reuse area to the depth of detection. The RQA TIP indicated that detected anomalies within the CSUMB Off-Campus MRA were investigated and military munitions removed.

In general, the grid sampling and removal actions previously conducted within the CSUMB Off-Campus MRA were conducted in accordance with procedures described in the applicable work plans and in accordance with the accepted procedures at the time. The following summarizes the usability of the data collected at the CSUMB Off-Campus MRA:

- Removals by HFA were conducted according to the work plan and field QA/QC resulted in no failures. Review of available documentation indicated that anomalies detected were investigated and military munitions identified, both MEC and MD (and other debris after March 1994), were removed as required by the contractor work plan. From February to March 1994, other debris was not removed from the MRA.
- Removals by UXB were conducted according to the work plan and field QA/QC resulted in no failures. Review of available documentation indicated that anomalies detected were investigated and military munitions identified, both MEC and MD, and other debris, were removed as required by the contractor work plan.
- Removals by CMS/USA were conducted according to the work plan and field QA/QC resulted in only three QC grid failures, which were resolved, and no QA failures. Review of available documentation indicated that anomalies detected were investigated and military munitions identified, both MEC and MD, were removed as required by the contractor work plan.
- RQA Process Pilot Study was conducted according to the work plan and field QA/QC resulted in no failures (ESCA RP Team 2012).

4.2.2 Types of Munitions Removed

Appendix A presents the MEC and MD recovered in the CSUMB Off-Campus MRA as listed in the Army's MMRP database and data collected during the RQA Pilot Study completed by FORA. The MEC items found during MEC investigation and removal actions conducted at the CSUMB Off-Campus MRA did not show a pattern of use as an artillery range. The majority of the items found were practice, pyrotechnics, and smoke-producing items (e.g., simulators, flares, and smoke grenades), which was consistent with the historical use of the MRA. Some high explosive (HE) and low explosive (LE) items were found during the removal actions and their number and locations indicated a pattern of use in the CSUMB Off-Campus MRA. These items included fuzes, practice grenades, firing devices, igniters, bulk HE, and blasting caps. The remainder of the HE and LE items recovered and the randomness of the locations in which the items were found did not indicate a pattern of use in the CSUMB Off-Campus MRA.

A review of available historical aerial photographs and training maps and the ASRs indicated that the CSUMB Off-Campus MRA was most likely used for private agricultural purposes prior to the 1940s. This was further validated by the types of munitions items found during previous removal actions, which indicated few pre-WWII munitions items. The Army purchased the CSUMB Off-Campus MRA land sometime in the early 1940s. Although rifle grenade training in the vicinity of the CSUMB Off-Campus MRA was not identified on training facilities maps until 1961, some of the rifle grenades found during the removal actions at the CSUMB Off-Campus MRA were in use in the 1940s.

Evidence of more extensive use of the MRA for troop training was apparent beginning in the early 1950s and continued through the 1990s. The historical evaluation identified numerous types of training conducted throughout the Army's ownership of the MRA. The types of training that were suspected of having occurred in the CSUMB Off-Campus MRA included:

- Tactical training in the southeastern portion of the MRA;
- Mine and booby trap training and landmine warfare training in the northwestern portion of the MRA (just north of the area designated as MRS-18);
- Mine and booby trap training in the central portion of the MRA (to the southwest of the area designated as MRS-08);
- Confidence course training in the northwestern portion of the MRA (in the vicinity of the former fuel facility) in the 1970s until base closure;
- Obstacle course training in the north central to northeastern portion of the MRA from the late 1960s until base closure;
- CBR training in the north central portion of the MRA in the late 1950s (designated as MRS-04C:MRS-31); and
- Practice mortar training along the southern boundary and to the south of the CSUMB Off-Campus MRA (designated as MRS-13C and MRS-13B to the south).

The types of munitions found during the removal actions at the CSUMB Off-Campus MRA are discussed in the following sections.

4.2.2.1 Tactical Training

A review of historical information indicated that the CSUMB Off-Campus MRA was used to conduct basic combat and tactical training in the southeastern portion, which included realistic combat training, tactics, and maneuvers (Army 1992a). Training operations would have included the use of blank small arms ammunition, pyrotechnics (simulators and illumination), and smoke producing items (e.g., signals, flares, and smoke grenades).

The highest density and diversity of MEC and MD were found in the southeastern portion of the MRA where historical information indicated tactical training occurred. The MEC and MD items recovered during the removal actions included items classified as smoke, simulators, grenades and grenade fuzes, flares, and miscellaneous munitions.

- **Smoke Hand Grenades:** M18 series and hexachlorethane AN M8 smoke grenades (MEC and MD) were found in the CSUMB Off-Campus MRA, with the highest concentration of these items found in the southeastern portion (Plate 1). According to the Army's MMRP database, most of the items, where a depth was recorded, were found within the top 2 inches of soil. Only one item (found in MRS-13C) was recorded as being found at a depth of 24 inches bgs. Smoke hand grenades were non-penetrating and would be expected to be found in the top few inches of soil. It was suspected that the items found at depths greater than a few inches were buried, either in pits or through disturbance of soil.
- **Smoke Pots:** Fifteen smoke pots (model unknown; MEC and MD) and one 2.5-lb smoke pot (MEC) were found in the southeastern portion of the CSUMB Off-Campus MRA (Plate 1). Smoke pots were non-penetrating items and would be expected to be found at or near the surface. It was suspected that items found at depths greater than a few inches were buried, either in pits or through disturbance of soil.
- **Simulators:** A variety of simulators were found within the northern portion of the CSUMB Off-Campus MRA: M80 explosive detonation simulator (MEC), M22 antitank guided missile and rocket simulator (MEC), M74 series airburst projectile simulator (MEC and MD), M117 explosive booby trap simulator (flash; MEC and MD), M47 Flash Bang (MEC and MD), M110 (MEC), M116A1 (MEC), M97 series (MD), and Dragon Simulator (MEC). The most common simulator found was the M74 series airburst projectile simulator (Plate 2). The highest concentration of simulators was found in the southeastern portion of the CSUMB Off-Campus MRA. Simulators used in the CSUMB Off-Campus MRA were probably used for demonstration purposes or in conjunction with other training activities (e.g., booby trap training). Simulators were non-penetrating items and would be expected to be found at or near the surface. It was suspected that items found at depths greater than a few inches were buried, either in pits or through disturbance of soil.
- **Flares:** Flares were found in the CSUMB Off-Campus MRA, with the highest concentration of these items found in the southeastern portion (Plate 3). The flares found

at the CSUMB Off-Campus MRA included the M48 parachute trip flare (MEC and MD) and the M49 series surface trip flare (MEC and MD). One item was recorded at a depth of 18 inches bgs, two items were recorded at a depth of 24 inches bgs, and one item was recorded at a depth of 48 inches bgs. Because M48 series flares deploy parachutes, it was a non-penetrating item and would be expected to be found on or near the surface. The M49 series trip flare functioned by burning in the location where it was emplaced with no movement of the flare when ignited and was also a non-penetrating item and would be expected to be found in the top few inches of soil. It was suspected that items found at depths greater than a few inches were buried, either in pits or through disturbance of soil.

- **Signals:** Signals were found in the CSUMB Off-Campus MRA (Plate 3), and included several 40 mm flares (MEC and MD), and M17 series (MD), M18A1 (MEC and MD), M19 series (MD and MEC), M125 series (MEC and MD), M126 series (MEC and MD) ground illumination signals. The signals identified within the CSUMB Off-Campus MRA were non-penetrating items and would be expected to be found in the top few inches of soil. It was suspected that items found at depths greater than a few inches were buried, either in pits or through disturbance of soil.
- **60 mm Illumination Mortars:** 60 mm illumination mortars were used in conjunction with night training maneuvers. 60 mm illumination mortars (MD and MEC) were identified predominately in the southeastern portion of the CSUMB Off-Campus MRA. Because these items were used for illumination, they were incorporated into maneuvers and training activities. It was possible that they were also used in other areas and landed within the southeastern portion of the CSUMB Off-Campus MRA. Ten 60 mm illumination mortars (MEC model unknown), 14 MD items related to the 60 mm illumination mortar, and one 60 mm mortar (MD model unknown) were found in the southeastern portion of the MRA (Plate 4).

4.2.2.2 Mine Training

Review of the CSUMB Off-Campus MRA data indicated that practice mines were used for training in localized areas. Practice mines and mine fuzes (MEC and MD) were recovered primarily in the north central portion of the CSUMB Off-Campus MRA, mostly in the low-lying areas (Plate 5). The highest density of MEC and MD classified as mines, mine fuzes, and firing devices were observed just north of MRS-18 where historical training maps identified mine and booby trap training and landmine warfare training, and throughout the central portion of the MRA where a mine and booby trap training area was identified on 1950s training facility maps.

Approximately 76 antipersonnel and antitank practice mines were removed during the grid sampling and removal actions conducted in the CSUMB Off-Campus MRA. The information on many of the models and depths at which the mines and mine fuzes were found was not available in the Army's MMRP database.

Antitank/antipersonnel mines: Mines found during the removal action included practice M1 series, M2 series, M8 series, M10 series, M12 series, M16, M20, and M68 series (MEC and MD). Other associated mine training items found consisted of M1A1and 604 practice

antitank mine fuzes (MEC and MD), M1 antitank mine activators, M1 and M3 firing devices, and firing device base coupling units. Land mines were non-penetrating and would be expected to be found in the top few inches of soil. It was suspected that the items found at depth greater than a few inches were buried, either in pits or through disturbance of soil.

4.2.2.3 Booby Trap Training

Review of available training maps for the CSUMB Off-Campus MRA indicated booby trap training areas in the central portion of the MRA, in the vicinity of MRS-08 and MRS-18 (Plate 6). Booby trap simulators and firing devices (MEC and MD) were recovered primarily in the central portion of the CSUMB Off-Campus MRA, mostly in the low-lying areas in the vicinity of the areas identified on historical training maps as booby trap training areas. The items recovered primarily from this area consisted of M5 pressure release firing devices, M1 pull and pressure release firing devices, pull/release tension multi-option firing devices. Squibs, blasting caps, and bulk explosives were recovered from the eastern and southeastern portions of the MRA.

4.2.2.4 Rifle Grenade Training

The rifle grenade models found as MD, MEC, or fragments within the CSUMB Off-Campus MRA were the M9 series HE, M11 series practice, M19A1 WP, M22 series, and M23 series smoke grenades (Plate 1). Based on the distribution of the MEC and MD found, the rifle smoke grenades were used for training within the CSUMB Off-Campus MRA, predominantly in the eastern portion of the MRA.

- **M22 Series and M23 Series Smoke Rifle Grenades:** The CSUMB Off-Campus MRA was likely used for practicing of signaling or smoke screens in support of basic combat training. Numerous M22 series and M23 series rifle grenades (MEC and MD) were found in the eastern portion of the CSUMB Off-Campus MRA (Plate 1).
- M9 Series Rifle Grenade, HE: The M9 series HE grenade was available for use in the 1940s and 1950s. Because only two M9 series HE grenades (MEC) were found at a single location, training with these items did not likely occur in the CSUMB Off-Campus MRA (Plate 1).
- **M11 Practice Rifle Grenade:** The M11 series antitank practice grenade was available for use in the 1940s and 1950s. Because only six M11 practice rifle grenades (MEC) were found, training with these items did not likely occur extensively in the CSUMB Off-Campus MRA (Plate 1).
- **M19 WP Rifle Grenade:** The M19 WP rifle grenade was used for both signaling and smoke screens. Only three MD and four MEC M19A1 WP rifle grenades were found during the removal actions, indicating that the use of these items was extremely limited within the CSUMB Off-Campus MRA and the potential for other M19A1 rifle grenades to be present was unlikely (Plate 1).

4.2.2.5 Hand Grenade Training

A review of the removal action data indicated that hand grenades were found in the CSUMB Off-Campus MRA that were available for use from the 1940s to the 1990s, including MK II fragmentation, MK II practice, and MK I illumination, M21, MK III, M26, M30, M69, AN-M14, TH3 Incendiary, and CS grenades (Plate 7).

A review of the removal action data indicated only one M26 MD item, three M30 MD, four M30 MEC, and several practice grenades of unknown models were found in the eastern half of the CSUMB Off-Campus MRA (Plate 7). Numerous live and expended grenade fuzes (MEC and MD) were also found. Grenade fuze models found included M10 series, and M205 series (the only fuzes authorized for use with the M30 practice grenade [Army 1969]), plus M228 fuzes and fuzes of unknown model.

- **MK II Fragmentation Grenade:** No MK II items were found in the southeastern portion of the MRA where the manmade, semicircular features were visible in the 1941 aerial photograph. Four MK II MEC and four MK II model unknown hand grenades (2 MEC and 2 MD) were found in separate locations across the MRA. MK II fragmentation grenades were non-penetrating items and would be expected to be found at or near the surface. Because the MK II items were found scattered throughout the MRA, there did not appear to be a pattern of use for HE hand grenade training (Plate 7).
- **MK II Practice Hand Grenades and Unknown Model Practice Hand Grenades:** M10 series fuzes used in the early models of the MK II practice hand grenades and M205 series and unknown fuzes were found in the CSUMB Off-Campus MRA. Thirty items were identified as MK II practice grenades and were primarily found in the eastern half of the CSUMB Off-Campus MRA (Plate 7). The MK II practice hand grenade was a non-penetrating item and would be expected to be found at or near the surface. It was suspected that MK II practice grenades found at depths greater than 6 inches were either buried through disturbance of soil or in burial pits.
- **MK I Illumination Hand Grenade:** Several MK I illumination grenades and MD were found in the eastern half of the CSUMB Off-Campus MRA (Plate 7). Because these items were used for ground signaling, it was expected that they would be used in areas where basic combat training was conducted. The MK I illumination grenade was a non-penetrating item, and would be expected to be found at the surface or the near surface. It was suspected that MK I illumination grenades found at depths greater than 6 inches were either buried through disturbance of soil or in burial pits.
- **M30 Practice Hand Grenade:** M30 practice hand grenades were found in the eastern half of the MRA (Plate 7). M205 series hand grenade fuzes were also found in these areas. This area was likely used for practice hand grenade training. The M30 practice hand grenade was a non-penetrating item and would be expected to be found at or near the surface. It was suspected that M30 practice grenades found at depths greater than 6 inches were either buried through disturbance of soil or in burial pits.
- **M15 WP Hand Grenades:** Only two M15 WP hand grenades (MEC) were found within the CSUMB Off-Campus MRA (Plate 7). The M206 grenade fuze was used with the M15 WP hand grenade, although no fuzes specifically identified as M206 were found

in the CSUMB Off-Campus MRA. The M15 WP hand grenades were non-penetrating items and would be expected to be found at or near the surface. It was suspected that M15 WP grenades found at depths greater than 6 inches were either buried through disturbance of soil or in burial pits.

4.2.2.6 CBR Training

There were no buildings identified on facility maps or historical aerial photographs that were located within or near MRS-04C that may have been used for CBR training (i.e., gas chambers).

The training could also be performed using hand grenades containing CS or CN. No CN grenades were found in the CSUMB Off-Campus MRA. Several CS grenades (MEC and MD) were found in the eastern two-thirds of the MRA, but the locations did not coincide with the MRS-04C or CBR training area marked on the 1956 facilities and training map (Plate 7). The lack of typical CBR facilities and few CS items encountered indicated incidental use of CS grenades, but no evidence of a gas chamber.

4.2.2.7 Miscellaneous Items

Projectiles

Miscellaneous projectiles found in the CSUMB Off-Campus MRA included (Plate 4):

- One 1.1-inch MK II fuzed projectile (MEC) found in the southwestern corner of the MRA.
- One 20 mm target practice tracer (TPT; MEC model unknown) found in the northwestern corner of the MRA, and one 20 mm (MD model unknown) found in the southeastern corner of the MRA.
- Two 22 mm M744 practice projectiles (MEC) found in the southeastern corner of the MRA.
- One 37 mm projectile (insufficient data [ISD]; model unknown) was found at the obstacle course in the northwestern portion of the MRA. There was no hazard code assigned to this item in the MMRP database. Two 37 mm armor-piercing tracer (AP-T) M80 (MD), which contained no explosive filler, were found in the southeastern portion of the MRA.
- Two 40 mm M382 practice projectiles (MEC), one 40 mm base fuze (MEC model unknown), which may have been misclassified, and two 40 mm practice projectiles (MD model unknown) were found in the southeastern corner of the MRA.
- Two 81 mm M68 training mortars (MD) were found in the southeastern corner of the MRA. The M68 was used for training in the loading and firing of the 81 mm mortar. The complete round consisted of an inert projectile, a fin assembly, and an ignition cartridge. The pear-shaped, cast iron projectile had no provision for a fuze.

- One 105 mm fuzed projectile (MEC model unknown) found in MRS-18.
- One 106 mm training projectile (MEC model unknown) found in MRS-18.
- Potentially, one 20-lb fuzed fragmentation bomb (caption indicated location in Grid 27-F of the CSU Footprint).
- Four live, unfired, 81 mm mortar rounds (caption indicated location in Grid 28-G of the CSU Footprint) appeared in a photograph in the after-action report. These items were not entered into the MMRP database at the time the after-action report was finalized. Based on the photograph, these items were added to the database in 2008.
- Potentially, one inert 220-lb and one unfuzed inert 250-lb fragmentation bomb found in Site 13B during grid sampling. It is possible that the 220-lb bomb was the same as the item noted in a daily journal as a 250-lb fragmentation bomb.
- One M30A1 concrete-filled bomb (MD model unknown) found in MRS-18:MRS-31.
- Two M9 HE rifle grenades (MEC) were found in MRS-8 during grid sampling.

Rockets

Miscellaneous rockets found in the CSUMB Off-Campus MRA are shown on Plate 8 and included:

- **2.36-inch Rockets:** Five M7 2.36-inch practice rockets (MEC) and three 2.36-inch rocket tail booms (MD) were found in the CSUMB Off-Campus MRA. No evidence of training with rockets, either HE or practice, was identified within the CSUMB Off-Campus MRA on historical training maps. The small number of items and the lack of designated ranges or targets indicated no pattern of use for 2.36-inch rockets in the CSUMB Off-Campus MRA (Plate 8).
- **3.5-inch Rockets:** Twenty-one 3.5-inch practice rockets (5 MEC and 16 MD), nine 3.5-inch rockets (1 MEC and 8 MD), and eleven 3.5-inch rocket related MD were found predominately in the western portion of the CSUMB Off-Campus MRA. Review of available training maps did not indicate a range for 3.5-inch rocket training within the CSUMB Off-Campus MRA, but use of 3.5-inch rockets in ranges within the Impact Area south of the Parker Flats MRA was known to have occurred. Based on the limited number of 3.5-inch practice rockets found within the CSUMB Off-Campus MRA and the absence of a defined range on training maps, a rocket range was likely not present in this area (Plate 8).
- **Antitank Rockets (35 mm sub caliber):** Six 35 mm M73 sub caliber practice rocket MEC items were found together in the eastern portion of the CSUMB Off-Campus MRA and may have been discarded items related to training within the impact area (Plate 8). No other evidence of 35 mm practice training was identified in the CSUMB Off-Campus MRA. Because very few 35 mm sub caliber rockets were found during the removal actions conducted within the CSUMB Off-Campus MRA, training specifically associated with these items did not likely occur in this area.

Other miscellaneous items found in the MRA are shown on Plate 9 and included:

- Primers and cartridges
- Energetic materials
- Fragmentation bomb fuze

Because very few of the above-listed miscellaneous items were found during the removal actions conducted within the CSUMB Off-Campus MRA, there was no pattern of use that indicated training with these items in this area. These items were possibly discarded within the CSUMB Off-Campus MRA. It is not expected that additional items would remain in the CSUMB Off-Campus MRA.

4.2.3 Removal Action Boundaries

The establishment of the CSUMB Off-Campus MRA boundary was based upon the property transfer boundary and removal actions were conducted across the entire MRA. The ASR identified several MRSs within the CSUMB Off-Campus MRA, but the MRS boundaries were approximate. The approximate MRS boundaries initially defined the locations of the MEC grid sampling, but the results of the MEC grid sampling indicated that the CSUMB Off-Campus MRA should be defined as an MRS (identified as MRS-31, which included the other MRSs previously identified plus MRS-13C, the wedge between the CSU footprint and OE-13B) and that a removal action across the entire MRA was warranted. As such, the removal actions were conducted to depths of 3 and 4 ft bgs across the majority of the CSUMB Off-Campus MRA. There was no need to revise the CSUMB Off-Campus MRA site boundaries.

4.2.4 Data Management and Completeness of Existing Records and Data Gaps

The records were reviewed to evaluate if there were enough defensible data to 1) assess whether or not the work was completed according to contractual requirements, 2) make recommendations on the adequacy of the removal actions, and 3) identify data gaps, if any, that may need to be addressed to evaluate the adequacy of the response action.

In general, the majority of existing records and data were complete and the removal actions were conducted in accordance with the work plan requirements. The review of the CSUMB Off-Campus MRA boundaries and the removal action areas identified in the reports indicated that a removal action was conducted to 3 or 4 ft bgs across the majority of the MRA. Some issues regarding data quality have been identified, as follows:

- A few differences between the reports and the final database as described in Section 3.4 of this report. HFA was not required to remove non-munitions related debris during the first eight days (approximately 170 grids) of the removal action in the "CSU Footprint" (now MRS-31). Since HFA worked from west to east, it was anticipated that the grids on the western end of the HFA removal action area contained other debris. Since this portion of the MRA contained the confidence course and was adjacent to the former fuel facility, other debris would have included footers, tie downs, and fasteners for confidence course structures and automotive parts from automobile maintenance

operations at the fueling facility. This was considered a data issue because the amount of debris in this area would have made it difficult to perform QC/QA in grids containing debris.

- A comparison of the database used for this report indicated some changes had occurred between the release of the final after-action reports and the current database; however, because only a few discrepancies were noted, the data were considered useable for a MEC risk assessment and a feasibility study.
- Although exact location and depth data were not collected for MEC and MD removed during grid sampling and removal actions, and the precise location of items found could not be plotted on maps, the locations of MEC and MD items were recorded within the 100- by 100-ft grid where the items were encountered so their approximate locations could be mapped.
- The available information, including the MMRP database and UXB and HFA final reports, did not provide depths at which MEC items were found during removal actions at the CSUMB Off-Campus MRA. This limited the usability of the data because it was not possible to verify the depth distribution of MEC removed from the MRA. Considering, however, the type of training that was known or suspected to have occurred based upon the historical literature review, and the types of munitions encountered during the previous removal actions at the CSUMB Off-Campus MRA, the majority of the MEC items would be expected to be encountered at or near the ground surface. Therefore, the lack of depth data did not make the data unusable.
- Hazard types were assigned to the removed items by the Army and not by the contractors. Hazard types could not be assigned to some items as the model was unknown. In those cases, the worst hazard type was assigned to the item by the ESCA RP Team for the purposes of conducting the risk assessment.
- Approximately 0.75 acre of the CSUMB Off-Campus MRA (the former fuel facility) historically contained site features that may have interfered with the effectiveness of the instruments used during the historical removal actions. The fuel facility was built between 1968 and 1978. Review of the history of the area indicated that the portion of CSUMB Off-Campus MRA where the former fuel facility was located was primarily used as a confidence course. The remaining asphalt pads and structures related to the fuel facility were removed by the ESCA RP Team in January 2009 with UXO construction support. No MEC or MD items were encountered during the demolition operations.
- FORA relied on the Army's QC review of the data in the MMRP database previously generated from work conducted by prior munitions response contractors.
- The nomenclature used for MEC and MD items changed over time. Parsons was unable to positively determine if the majority of the items found in CSUMB Off-Campus MRA were MEC (UXO/DMM) or MD. Therefore, the items were classified as ISD. This RI took a conservative approach by assuming that the ISD items identified in the MMRP database were MEC.

[this page intentionally left blank]

5.0 CONCEPTUAL SITE MODEL

The results of the data evaluation were used to update the CSM that was developed during the preliminary site characterization phase of work as documented in the SEDR (ESCA RP Team 2008a). In general, the original conclusion that the CSUMB Off-Campus MRA was primarily used as a troop training area was consistent with the results of the RI data evaluation. A review of the historical aerial photographs and training maps available and the ASRs indicated that the CSUMB Off-Campus MRA was most likely used for private agricultural purposes prior to the 1940s. This was further supported by the types of munitions items found, which indicated few pre-WWII munitions items. The Army purchased the land encompassing the CSUMB Off-Campus MRA sometime in the early 1940s. Although rifle grenade training in the vicinity of the CSUMB Off-Campus MRA was not identified on training facilities maps until 1961, some of the rifle grenades found at the CSUMB Off-Campus MRA were in use in the 1940s.

Evidence of more extensive use of the MRA for troop training was apparent beginning in the early 1950s and continued through the 1990s. The historical evaluation identified numerous types of training conducted throughout the Army's ownership of the MRA. Based upon the types of munitions that were recovered, the types of training that were suspected of having occurred in the vicinity of the CSUMB Off-Campus MRA included:

- Tactical training in the southeastern portion of the MRA from the 1950s until base closure;
- Practice rifle grenade training in the eastern portion of the MRA as early as the 1940s through the 1960s;
- Practice grenade training in the eastern portion of the MRA, although the time frame was unknown;
- Mine and booby trap training and landmine warfare training in the northwestern portion (just north of the area designated as MRS-18) in the 1950s and 1960s;
- Mine and booby trap training in the central portion of the MRA (to the southwest of the area designated as MRS-08) in the 1950s and 1960s;
- Confidence course training in the northwestern portion of the MRA (in the vicinity of the former fuel facility) in the 1970s until base closure; and
- Obstacle course training in the north central to northeastern portion of the MRA from the late 1960s until base closure.

High explosive items, including M9 series rifle grenades and MKII fragmentation hand grenades, were found at various locations throughout the MRA. Given that few of these items were recovered and that the locations of the items were scattered across the MRA, no pattern of use was observed for these HE items. A pattern of use was identified for bulk HE. The MEC and MD recovered indicate that HE items may have been used during training operations in portions of the MRA.

Although MEC and MD items were found throughout the MRA, the highest concentrations of MEC and MD found were located in the southeastern portion, the central area (southwest of MRS-08), the northwestern portion (north of the MRS-18), and towards the eastern border of the MRA. In general, the areas where the highest density of MEC and MD were observed and the types of MEC and MD found coincided with consistently used training areas shown on historical training maps.

The highest density and diversity of MEC and MD were found in the southeastern portion of the MRA where tactical training was identified as occurring. The MEC and MD items recovered included items classified as smoke, simulators, grenades and grenade fuzes, flares, and miscellaneous munitions.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following section presents the conclusions and recommendations for the CSUMB Off-Campus MRA based on the review and analysis of the data associated with historical documentation and grid sampling, investigation, and removal actions, including the RQA Process Pilot Study.

6.1 Conclusions

The following conclusions have been made regarding the historical use of the CSUMB Off-Campus MRA and the data collected:

- Based upon the results of the literature review, grid sampling results, and removal actions, the site was used for the following types of training:
  - Tactical training in the southeastern portion of the MRA from the 1950s until base closure;
  - Practice rifle grenade training in the eastern portion of the MRA as early as the 1940s through the 1960s;
  - Practice grenade training in the eastern portion of the MRA, although the time frame was unknown;
  - Mine and booby trap training and landmine warfare training in the northwestern portion (just north of the area designated as MRS-18) in the 1950s and 1960s;
  - Mine and booby trap training in the central portion of the MRA (to the southwest of the area designated as MRS-08) in the 1950s and 1960s;
  - Confidence course training in the northwestern portion of the MRA (in the vicinity of the former fuel facility) in the 1970s until base closure; and
  - Obstacle course training in the north central to northeastern portion of the MRA from the late 1960s until base closure.
- The MEC and MD encountered within the MRA were consistent with the documented historical uses. The majority of these items were associated with practice and pyrotechnic munitions.
- Other MEC and MD not related to the training listed above were also found within the CSUMB Off-Campus MRA, but there was no evidence of a pattern of use indicating that training with these items occurred in the CSUMB Off-Campus MRA.

The following conclusions have been made regarding the MEC removal adequacy and data quality:

- The Army's contractors completed a removal action to depths of 3 and 4 ft over the majority of the CSUMB Off-Campus MRA. The detected anomalies were excavated and the MEC and MD were removed. The procedures used to complete the removal

actions were of sufficient quality to validate the quality of the data collected. HFA was not required to remove other debris during the first eight days (approximately 170 grids) of the removal action. Since HFA worked from west to east, the grids on the western end of the HFA removal action area probably contain other debris. Since this portion of the MRA contained the confidence course and the former fuel facility, other debris would have included footers, tie downs, and fasteners for confidence course structures and automotive parts from automobile maintenance operations at the fueling facility. This was considered a data issue because the amount of debris in this area would have made it difficult to perform QC/QA in grids containing debris. However, since procedures used to complete the removal action were of sufficient quality and there were no reported QC or QA issues, the quality of the data was considered to be valid for the purposes of this investigation through the RQA Process Pilot Study, as discussed in the RQA TIP (ESCA RP Team 2012).

- Approximately 0.75 acre of the CSUMB Off-Campus MRA (the former fuel facility) historically contained site features that may have interfered with the effectiveness of the instruments used. Review of the history of the area indicated that the portion of CSUMB Off-Campus MRA where the former fuel facility was located was primarily used as a confidence course. Given the historical use of the area as a confidence course, MEC items were not expected to remain in this area.
- The Schonstedt was used for the geophysical surveys. The instrument was evaluated as part of the ODDS study. The results of the evaluation indicated that the Schonstedt was effective in detecting shallow ferrous items in the areas surveyed.
- Differences were observed between the reports and the final database; however, these occurrences may be explained as described in Section 4.2.4 of this report and were not an indication of a problem with data quality.
- The property transfer parcel boundaries represented the limits of the removal action, and may not reflect the limits of MEC in the area.
- As described in the SEDR and Group 2 RI/FS Work Plan, the existing data that was included in the MMRP database for the CSUMB Off-Campus MRA was of sufficient quality and quantity to complete the risk assessment and feasibility study for the CSUMB Off-Campus MRA.
- The data collected for the RQA Process Pilot Study further supported the historical military use of the western portion of the MRA and was of sufficient quality and quantity to enhance the risk assessment and feasibility study for the CSUMB Off-Campus MRA.
- As described in the CSUMB RQA TIP (ESCA RP Team 2012), based on the RQA Process evaluation, including results of the RQA Pilot Study and ESCA RQA Process Implementation Study, the data collected supported the recommendation of approximately 49 acres proposed for future residential reuse within the CSUMB Off-Campus MRA as acceptable for future residential reuse with appropriate institutional controls, such as the county excavation ordinance, construction support, and disclosures.

6.2 Recommendations

Review of the available literature, grid sampling and removal action results, and equipment performance results indicated that the investigations conducted in the CSUMB Off-Campus MRA successfully detected, excavated, and recovered MEC items and that the imminent safety hazard was removed. It is possible, however, for residual MEC to remain undetected in the CSUMB Off-Campus MRA. Therefore, it is recommended that a risk assessment and feasibility study be performed.

[this page intentionally left blank]

7.0 REFERENCES

Breiner, Sheldon. 1973. Applications Manual for Portable Magnetometers.

CMS Environmental, Inc. (CMS). 1995. CEHND Approved OEW Sampling and Removal Action Work Plan, Fort Ord, California. August 22. (Fort Ord Administrative Record No. OE-0130)

California State University Monterey Bay (CSUMB). 2007. CSUMB Master Plan, Volume I, Design Plan, prepared by Moore Iacofano Goltsman, Inc. and others. December.

EA Engineering, Science, and Technology (EA). 1991. Draft Final Fort Ord, California, Base-Wide Remedial Investigation/Feasibility Study, Volume I: Literature Review and Base Inventory Report. March. (Fort Ord Administrative Record No. BW-0136)

Environmental Services Cooperative Agreement Remediation Program Team (ESCA RP Team). 2008a. Final Summary of Existing Data Report, Former Fort Ord, Monterey County, California. November 26. (Fort Ord Administrative Record No. ESCA-0130)

———. 2008b. Final Group 1 Remedial Investigation/Feasibility Study Work Plan, Seaside Munitions Response Area and Parker Flats Munitions Response Area Phase II, Former Fort Ord, Monterey County, California. December 17. (Fort Ord Administrative Record No. ESCA-0124)

———. 2009. Final Group 2 RI/FS Work Plan, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey, California. July 8. (Fort Ord Administrative Record No. ESCA-0161)

———. 2011a. Field Variance Form No. G1WP-004 modifying the Final Group 1 RI/FS Work Plan, Seaside MRA and Parker Flats MRA, Phase II, Volumes 1 and 2, FORA ESCA Remediation Program. February 4. (Fort Ord Administrative Record No. ESCA-0133B)

———. 2011b. Field Variance Form No. G1WP-006 modifying the Final Group 1 RI/FS Work Plan, Seaside MRA and Parker Flats MRA, Phase II, Volumes 1 and 2, FORA ESCA Remediation Program. November 21. (Fort Ord Administrative Record No. ESCA-0133E)

———. 2012. Final Residential Quality Assurance Process Pilot Study Technical Information Paper CSUMB Off-Campus Munitions Response Area, Former Fort Ord, Monterey County, California. October 8. (Fort Ord Administrative Record No. ESCA-0257B)

Fort Ord. 1959. 1959 Fort Ord Year Book.

Fort Ord Reuse Authority (FORA). 1997. Fort Ord Base Reuse Plan, prepared by EMC Planning Group Inc. and EDAW, Inc. June 13.

Hall, Thomas. 2003. Comments on Draft Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study, Former Fort Ord, California. February.

Harding Lawson Associates (HLA). 1997. Interim Action Confirmation Report, Site 39B – Inter-Garrison Site, Fort Ord, California. October. (Fort Ord Administrative Record No. IAFS-170).

Hogg, Ian V. 2001. The American Arsenal, The World War II Official Standard Ordnance Catalog of Small Arms, Tanks, Armored Cars, Artillery, Antiaircraft Guns, Ammunition, Grenades, Mine, etcetera. Greenhill Books.

Human Factors Applications, Inc. (HFA). 1993. Ordnance and Explosive Waste (OEW) Site Operations, Fort Ord – Phase I Work Plan and Accident Prevention Plan. December. (Fort Ord Administrative Record No. OE-0019)

———. 1994a. Ordnance and Explosive Waste (OEW) Site Operations, Fort Ord – Phase III Work Plan and Site Specific Safety and Health Plan. February 22. (Fort Ord Administrative Record No. OE-0007)

———. 1994b. OEW Sampling and OEW Removal Action. Ft. Ord Final Report. Prepared for the U.S. Army Corps of Engineers, Huntsville Division. December 1. (Fort Ord Administrative Record Nos. OE-0011, OE-0012, and OE-0013)

———. 1994c. Volume III Errata Sheets. December 2. (Fort Ord Administrative Record No. OE-0018)

National Archives (NARA). 1941. National Archives Footage, NARA #993850, 111 M 541 R1, 2, 3, 5, and 7.

Parsons Infrastructure & Technology Group, Inc. (Parsons). 2002. Final Ordnance Detection and Discrimination Study (ODDS), Former Fort Ord, Monterey, California. August.

———. 2006. Draft Final Non-Time Critical Removal Action MRS-MOCO.2 NOI Removal Area (Phases 1 and 2) After-Action Report. June 6. (Fort Ord Administrative Record No. OE-0580D)

Remedial Constructors, Inc. (RCI). 1996. Indefinite Delivery Contract For the Removal & Disposal of Underground Storage Tanks & PCB Transformers in Northern & Central California, Closure Report (Final) Vols. 1 through 5. Contract No. DACW05-94-D-0020 Delivery Order No. 13, Underground Storage Tank (UST)

Removal Program, Phase 2, Fort Ord, CA. September 6. (Fort Ord Administrative Record Nos. BW-2203, BW-2203A, BW-2203B, BW-2203C, and BW-2203D)

Shaw Environmental, Inc. (Shaw). 2011. Draft Final Interim Action Confirmation Report; Area 39B, Historical Area 161 Excavation; Inter Garrison Training Area; Former Fort Ord, California. March 24. (Fort Ord Administrative Record No. IAFS-236A)

———. 2012. Final Comprehensive Basewide Range Assessment Report. Former Fort Ord, California, Revision 2. January 17. (Fort Ord Administrative Record No. BW-2300L)

United States Army Corps of Engineers (USACE). 1961. Basic Information, Training Facilities Map, Master Plan, Fort Ord California. December 17, 1956. Revised June 30.

———. 1971. Master Plan, Future Development Plans, Training Facilities Plan. November.

———. 1984. Master Plan, Basic Information Maps, Training Facilities Map. June.

———. 1993. Archives Search Report, Fort Ord, California, Monterey County, California. December. (Fort Ord Administrative Record No. OE-0005A)

———. 1994. Archives Search Report (Supplement No. 1), Fort Ord, California, Monterey County, California. November. (Fort Ord Administrative Record No. OE-0010)

———. 1995. Procedures for Conducting Preliminary Assessments for Potential Ordnance Response Sites. ETL 1110-1-165. Engineering and Support Center, Huntsville. April.

———. 1997a. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. January 1. (Fort Ord Administrative Record No. OE-0022)

———. 1997b. Installation-Wide Multispecies Habitat Management Plan for Former Fort Ord, California (HMP). With Technical Assistance from Jones and Stokes, Sacramento, California. April 1. (Fort Ord Administrative Record No. BW-1787)

———. 1998. Final Engineering Evaluation/Cost Analysis (EE/CA) Phase II, Ordnance and Explosives Matrix, Former Fort Ord, California. April 2. (Fort Ord Administrative Record No. OE-0144)

———. 2000. Draft Final Ordnance and Explosives Remedial Investigation/Feasibility Study (OE RI/FS) Work Plan. January 4. (Fort Ord Administrative Record No. OE-0233M)

United States Army Corps of Engineers/Jones & Stokes Associates, Inc. (USACE/Jones & Stokes). 1992. Flora and Fauna Baseline Study of Fort Ord, California. December. (Fort Ord Administrative Record No. BW-1938)

United States Department of the Army (Army). 1938. Topographic Map, 1933-1934, Camp Ord and Vicinity.

———. 1945. Map of Training Facilities, Fort Ord and Vicinity, California. Revised August.

———. 1954. Map of Training Areas That Cannot Be Used At Same Time: (As Presented In Use).

———. 1956. Map of Fort Ord Training Areas & Facilities. Enclosure I to Annex 'O'. Revised: December 20.

———. 1957. Map of Fort Ord Training Areas & Facilities. Enclosure I to Annex 'H'. Revised: July 15.

———. 1958. Map of Fort Ord Training Areas and Facilities. Enclosure 1 To Appendix 1 To Annex 'H'. Revised: January 10.

———. 1964. Field Training Areas & Range Map, Fort Ord. Appendix 2, Annex O. April 27.

———. 1965. Field Manual FM 5-31 Booby Traps. September 31.

———. 1968. U.S. Army Training Center Infantry, Company D, 4th Battalion, 1st Brigade, Fort Ord, California. Infantry Training Yearbook. June.

———. 1969. Field Manual FM 23-30 Grenades and Pyrotechnic Signals. December.

———. 1972. Field Training Area and Range Map. Appendix 3, To Annex W, FT Ord Reg. 350-1. Revised: July 1.

———. 1977a. Technical Manual, Army Ammunition Data Sheets for Land Mines (FSC 1345) Department of Army Headquarters, TM 43-0001-36. February 14.

———. 1977b. Technical Manual, Army Ammunition Data Sheets: Artillery Ammunition Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers, And Artillery Fuzes (Federal Supply Class 1310, 1315, 1320, 1390), TM-43-0001-28. April.

———. 1980. Range Regulations, Fort Ord Regulation 350-5, HQ 7th Infantry Division & Fort Ord, CA 94931. September 9.

———. 1982a. Map of Ranges and Training Area Overlay, Fort Ord and Vicinity. April 1.

———. 1982b. Technical Manual, Army Equipment Data Sheets, Chemical Weapons And Munitions Headquarters Department of the Army. TM 43-0001-26-2. April 29.

———. 1983. Policies and Procedures For Firing Ammunition For Training, Target Practice, and Combat, AR 385-63. October 15.

———. 1987a. Army Ammunition Data Sheets for Grenades, Technical Manual 43-0001-29. September.

———. 1987b. Visual Signals, Field Manual 21-60. September 30.

———. 1987c. Map of Ranges and Training Area Overlay, Fort Ord and Vicinity. November 5.

———. 1992a. Field Manual FM 7-8, Infantry Rifle Platoon and Squad. April 22. Change 1. March 2001.

———. 1992b. Map of Back Country Roads, Fort Ord, California. September 25.

———. 1997. Standards in Weapons Training, Army Pamphlet 350-38. Headquarters Department of the Army, Washington, D. C. DA PAM 350-38. July.

———. 2000a. Mine/Countermine Operations, FM 20-32. Chapter 13. May 29.

———. 2000b. FM 3-23.30 Grenades and Pyrotechnic Signals. September.

———. 2002. Final Record of Decision, No Action Regarding Ordnance-Related Investigation, Former Fort Ord, California. June 19. (Fort Ord Administrative Record No. OE-0406)

———. 2005. 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), Former Fort Ord, California. March 10. (Fort Ord Administrative Record No. OE-0526)

———. 2007. Final Finding of Suitability for Early Transfer (FOSET), Former Fort Ord, Environmental Services Cooperative Agreement (ESCA) Parcels and Non-ESCA Parcels (Operable Unit Carbon Tetrachloride Plume) (FOSET 5). June 26. (Fort Ord Administrative Record No. FOSET-004J)

———. 2009a. Approval Memorandum, Proposed Interim Action Excavation, IA Areas 39B HA-161, Site 39B - Inter Garrison Training Area, Former Fort Ord, California. March 18. (Fort Ord Administrative Record No. IAFS-233)

———. 2009b. Track 1 Plug-In Approval Memorandum, County North Munitions Response Area, Former Fort Ord, California. August 26. (Fort Ord Administrative Record No. ESCA-0169)

———. 2012. 3rd Five-Year Review, Fort Ord Superfund Site (including FORA ESCA RP Sites), Monterey, California. September 17. (Fort Ord Administrative Record No. BW-2632)

United States Department of the Army/California Department of Toxic Substances Control (Army/DTSC). 2009. Covenant to Restrict Use of Property, Environmental Restriction, California State University Monterey Bay – Munitions and Explosives of Concern, Fort Ord Reuse Authority (FORA) Early Transfer Parcel. May 8.

United States Department of the Navy (Navy). 1947. NAVSEA OP 1164, U.S. Explosive Ordinance, Published by Direction of Commander, Naval Sea Systems Command. May 28, changes January 15, 1969.

United States Environmental Protection Agency (EPA). 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/001. October.

United States Fish and Wildlife Service (USFWS). 1999. Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California (1-8-99-F/C-39R). March 30. (Fort Ord Administrative Record No. BW-2232A)

———. 2002. Biological Opinion on the Closure and Reuse of Fort Ord, Monterey County, California, as it affects Monterey Spineflower Critical Habitat (1-8-01-F-70R). October 22. (Fort Ord Administrative Record No. BW-2233)

———. 2005. Cleanup and Reuse of Former Fort Ord, Monterey County, California, as it affects California Tiger Salamander and Critical Habitat for Contra Costa Goldfields (1-8-04-F-25R). March 14. (Fort Ord Administrative Record No. BW-2334)

USA Environmental, Inc. (USA). 2000. Final OE Removal Action After Action Report, Inland Range Contract, Former Fort Ord, California, Site OE-13C. December 26. (Fort Ord Administrative Record No. OE-0227A)

———. 2001. Final After Action Report Geophysical Sampling Investigation and Removal, Inland Range Contract Site Del Rey Oaks Group. April 24. (Fort Ord Administrative Record No. OE-0293A)

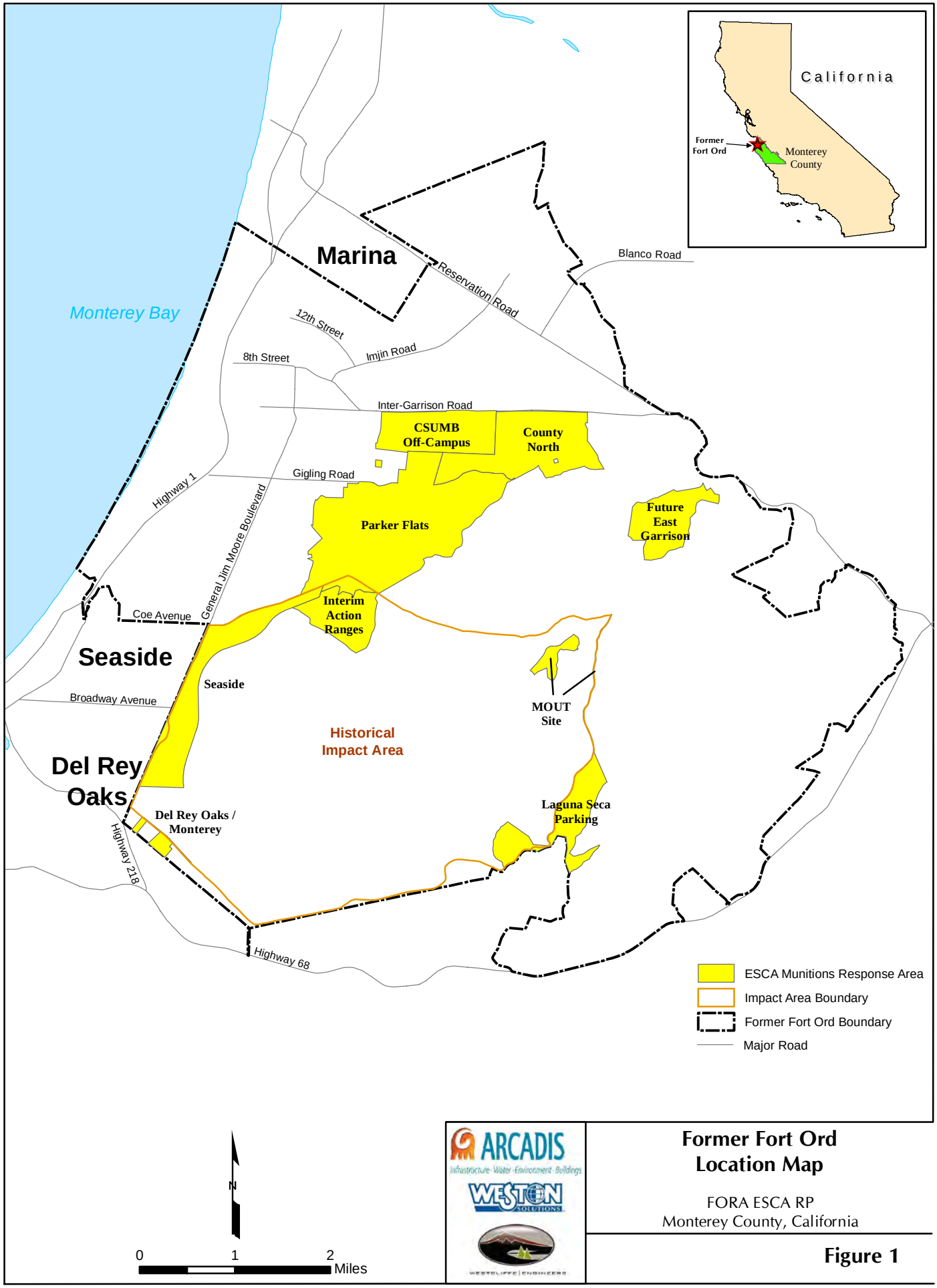
UXB International, Inc. (UXB). 1994. Final Work Plan for Ordnance and Explosive Waste (OEW) Phase II Removal Action, Fort Ord, California, Contract DACA87-93-D-0002. June. Amended July 1995. (Fort Ord Administrative Record No. BW-0581)

———. 1995a. Final Report for Ordnance and Explosive Removal Action, Fort Ord, California, Primary Report. November 1. (Fort Ord Administrative Record No. OE-0113)

———. 1995b. Final Report for Ordnance and Explosive Removal Action, Fort Ord, California, Site CSU. November 1. (Fort Ord Administrative Record No. OE-0121)

———. 1995c. Final Report for Ordnance and Explosive Removal Action, Fort Ord, California, Site HFA/CSU. November 1. (Fort Ord Administrative Record No. OE-0122)

[this page intentionally left blank]



T:\Projects\Group 2 RIFS\Vol1\2012_01_16_Fort_Ord_Location_Map.mxd 2/6/2012 @ 3:31:14 PM

ARCADIS Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

Former Fort Ord Location Map

FORA ESCA RP
Monterey County, California

Figure 1

CSUMB Off-Campus MRA

County North MRA

Parker Flats MRA

Future East Garrison MRA

Interim Action Ranges MRA

Seaside MRA

MOUT Site MRA

Laguna Seca Parking MRA

Del Rey Oaks/ Monterey MRA

Legend

Former Fort Ord Boundary

Group 1 MRAs

Seaside MRA
Parker Flats MRA

Group 2 MRAs

CSUMB Off-Campus MRA
County North MRA

Group 3 MRAs

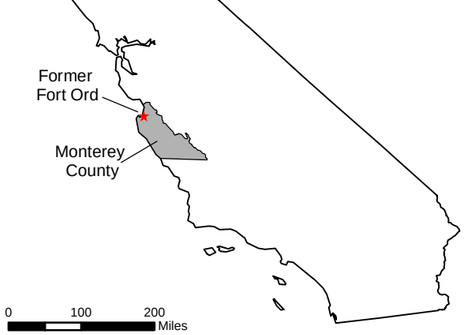
MOUT Site MRA
Del Rey Oaks/Monterey MRA
Laguna Seca Parking MRA

Interim Action Ranges MRA

Group 4 MRA

Future East Garrison MRA

Former Fort Ord Location Map



N

0 3,000 6,000 Feet

ARCADIS Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

ESCA Munitions Response Area Groups

FORA ESCA RP
Monterey County, California

Figure 2

T:\Projects\Group 2 RIFS\Vol1\2012_05_18_ESCA_MRA_Groups.mxd 5/18/2012 @ 3:47:43 PM

INTER-GARRISON RD

ABRAMS DR

8TH AVE

4545

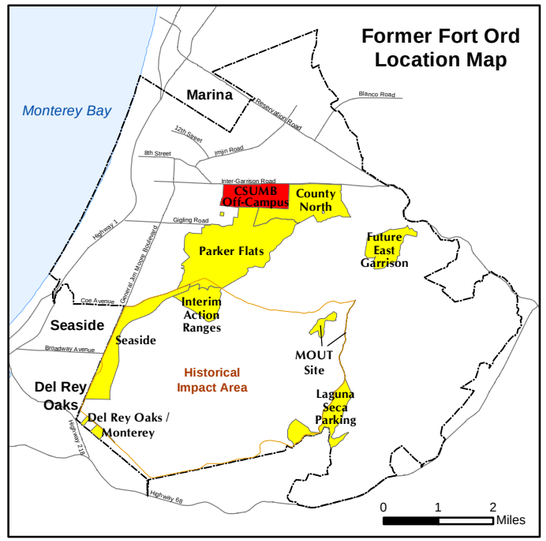
4B13

S1.3.2

T:\Projects\Group 2 RIFS\Vol1\2012_05_18_CSUMB_USACE_Land_Transfer_Parcel_Structures_and_Utilities.mxd 5/18/2012 @ 3:42:47 PM

Legend

- Gate
- Hydrant
- High-Power Transmission Line Tower
- Munitions Response Area
- Major Road
- Electrical Line
- Fence
- Gas Line
- Storm Line
- Telephone Line
- Water Line
- Sewer Line
- High-Power Transmission Line and Right of Way
- R9211 — Structure
- E23.1 — USACE Parcel



N

0 600 1,200 Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

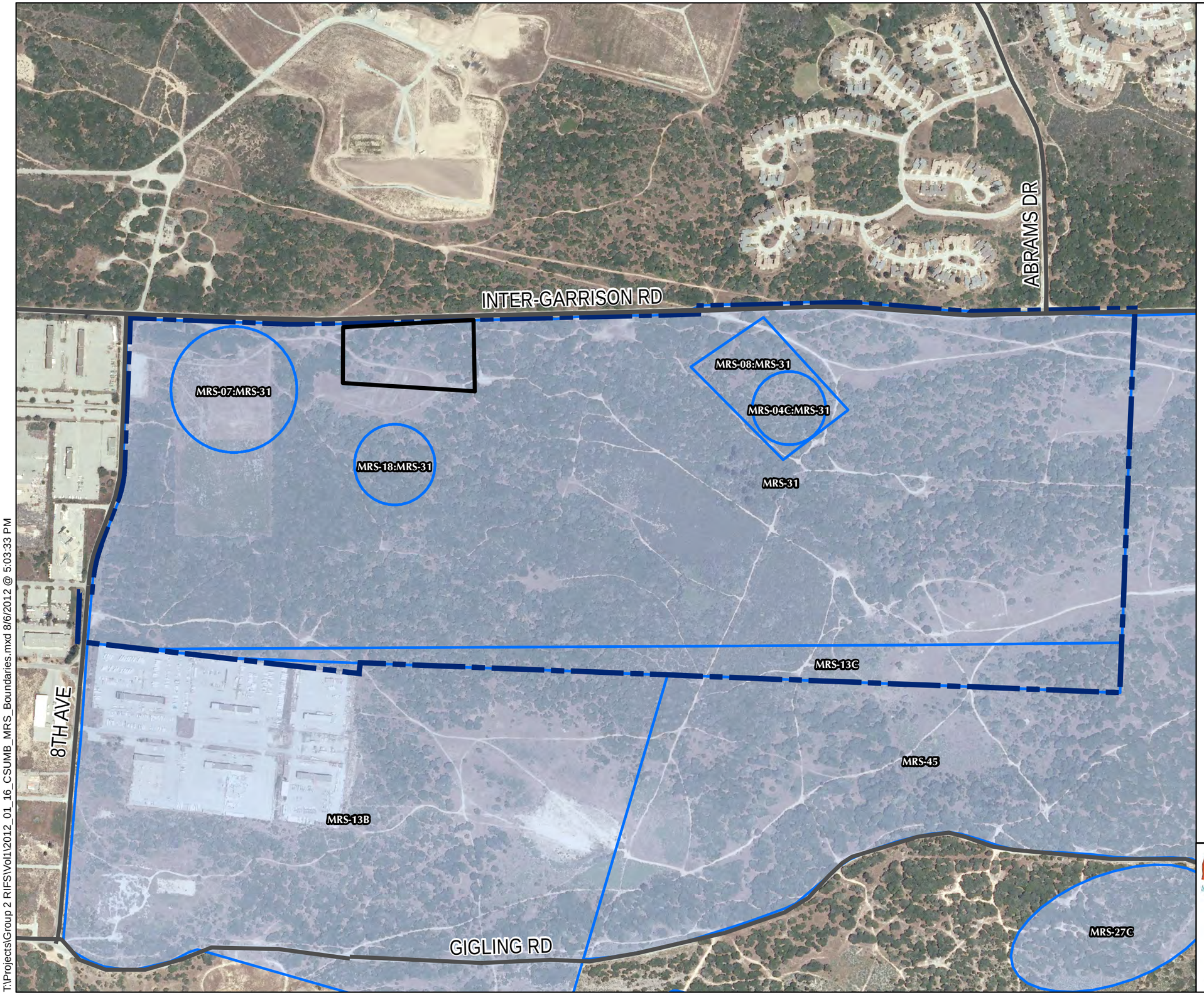
WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA
USACE Land Transfer Parcels, Structures, and Utilities

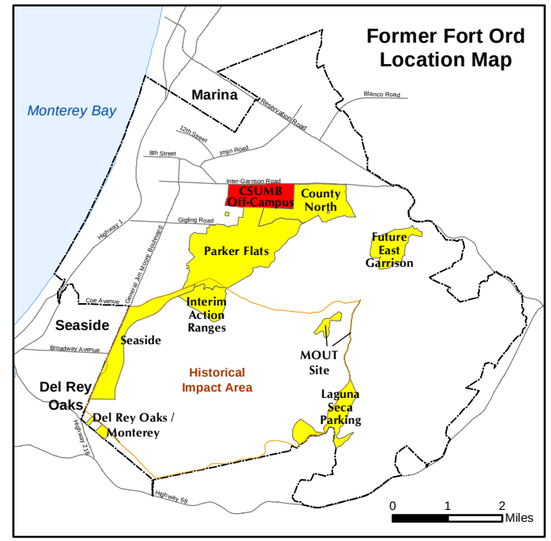
FORA ESCA RP
Monterey County, California

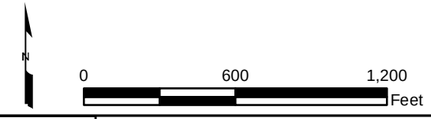
Figure 3



Legend

- Munitions Response Area
- Major Road
- MRS-31 — Munitions Response Site
- HFA "Site 7"





ARCADIS
Infrastructure Water Environment Buildings
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA Munitions Response Site Boundaries and RQA Pilot Study Area

FORA ESCA RP
Monterey County, California

Figure 4

T:\Projects\Group 2 RIFS\Vol1\2012_01_16_CSUMB_MRS_Boundaries.mxd 8/6/2012 @ 5:03:33 PM

T:\Projects\Group 2 RIFS\Vol1\2012_05_18_CSUMB_Generalized_Vegetation_Communities.mxd 8/6/2012 @ 4:27:25 PM

INTER-GARRISON RD

ABRAMS DR

S1.3.2

8TH AVE

GIGLING RD

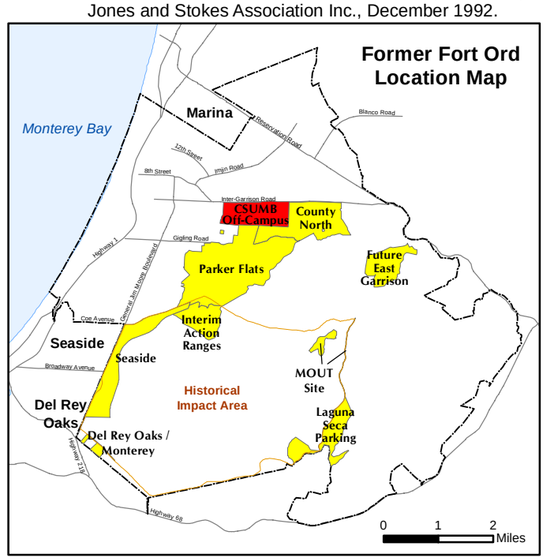
Legend

- Munitions Response Area
- Major Road
- S1.3.2 — USACE Parcel

Vegetation Type

- Grassland
- Maritime Chaparral
- Inland Coast Live Oak Woodland
- Coastal Coast Live Oak Woodland
- Developed / Disturbed

Source: Flora and Fauna Baseline Study of Fort Ord, California, Jones and Stokes Association Inc., December 1992.



N

0 600 1,200 Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA Generalized Vegetation Communities

FORA ESCA RP
Monterey County, California

Figure 5

INTER-GARRISON RD

ABRAMS DR

8TH AVE

GIGLING RD

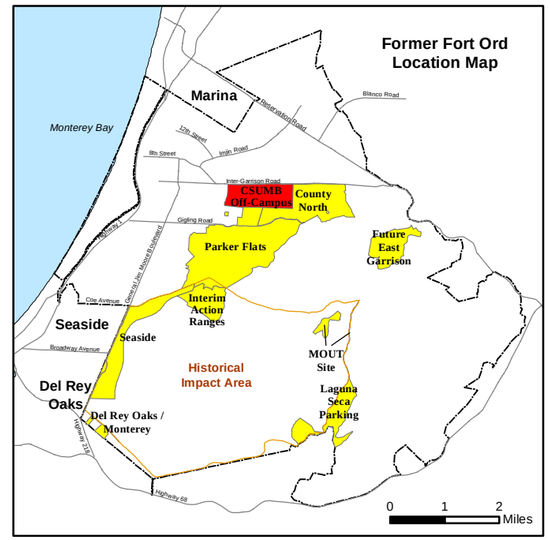
S1.3.2

Legend

- Environmental Well
- Munitions Response Area
- Major Road
- 540 Topography 5ft

Soil Type

- Baywood Sand, 2 to 15 Percent Slopes
- Oceano Loamy Sand, 2 to 15 Percent Slopes



N

0 600 1,200 Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

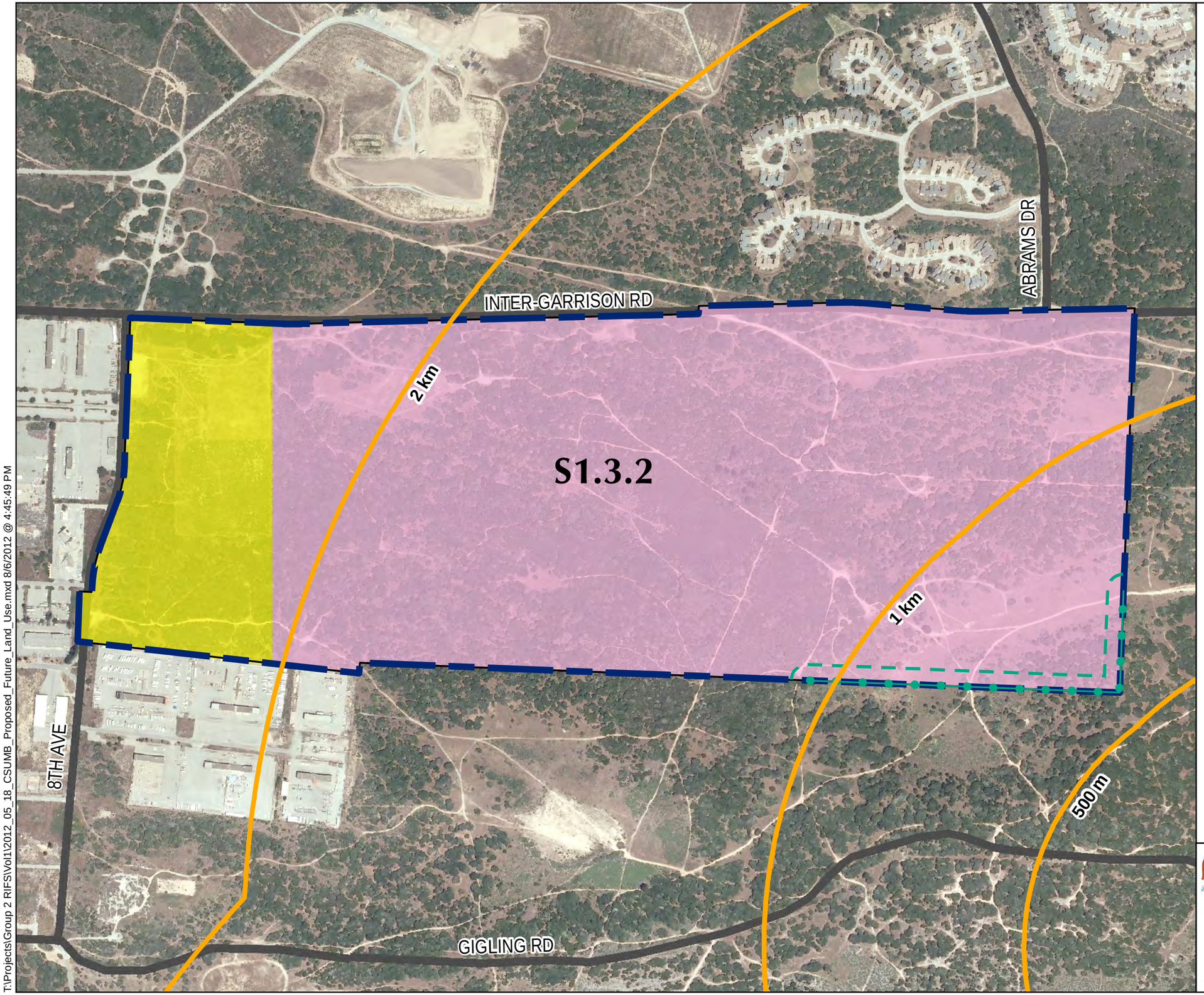
WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA
Topography and Soil Type

FORA ESCA RP
Monterey County, California

Figure 6

T:\Projects\Group 2 RIFS\Vol1\2012_05_18_CSUMB_Topography_and_Soil_Type.mxd 8/6/2012 @ 4:27:48 PM

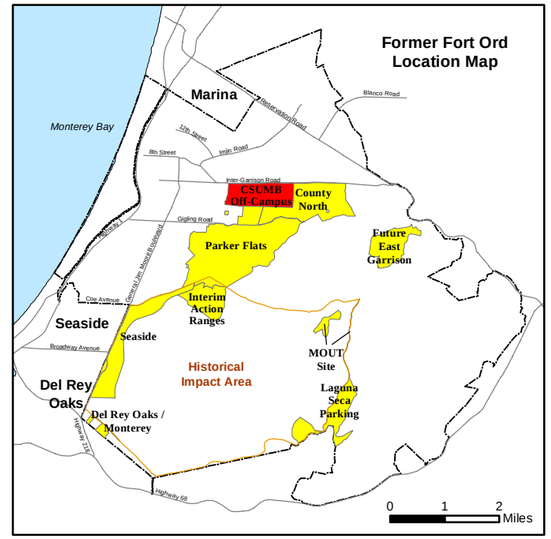


Legend

- Munitions Response Area
- Major Road
- California Tiger Salamander Buffer
- S1.3.2 — USACE Parcel
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

Proposed Future Land Use

- Residential (CSUMB Campus Housing)
- Non-Residential (CSUMB Open Space Park)



N

0 600 1,200 Feet

ARCADIS
Infrastructure · Water · Environment · Buildings
WESTON SOLUTIONS
WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA
Proposed Future Land Use

FORA ESCA RP
Monterey County, California

Figure 7

T:\Projects\Group 2 RIFS\Vol1\2012_05_18_CSUMB_Proposed_Future_Land_Use.mxd 8/6/2012 @ 4:45:49 PM

MRS-07

"Site 7"

MRS-07:MRS-31

MRS-18:MRS-31

MRS-08:MRS-31

MRS-04C:MRS-31

MRS-31

MRS-13C

MRS-13B

MRS-45

MRS-27C

MRS-27A

MRS-27B

Legend

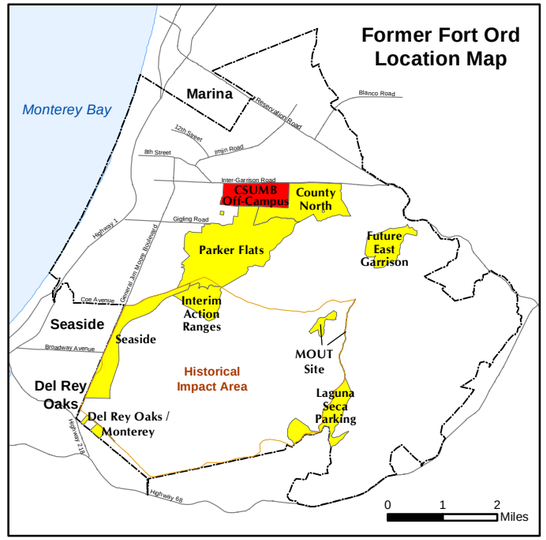
Munitions Response Area

MRS-31 Munitions Response Site

Proposed Future Land Use

Residential (CSUMB Campus Housing)

Reference: Human Factors Applications, Inc. (HFA), OEW Sampling and OEW Removal Action, Ft. Ord Final Report, December 1, 1994 (Fort Ord Administrative Record No.OE-0012).



N

0 600 1,200 Feet

ARCADIS Infrastructure · Water · Environment · Buildings

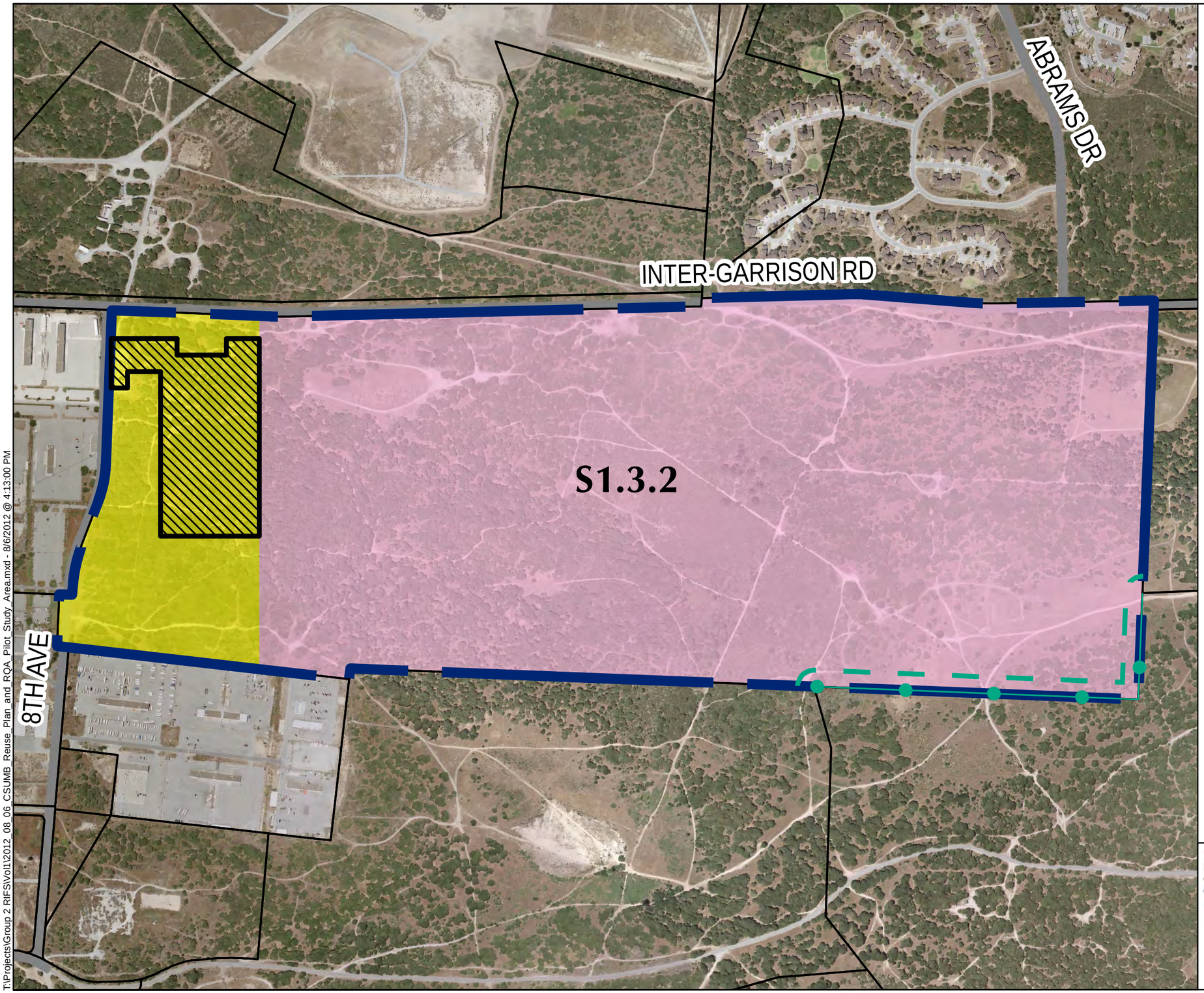
WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA
Locations of MRS-07 and "Site 7"

FORA ESCA RP
Monterey County, California

Figure 8

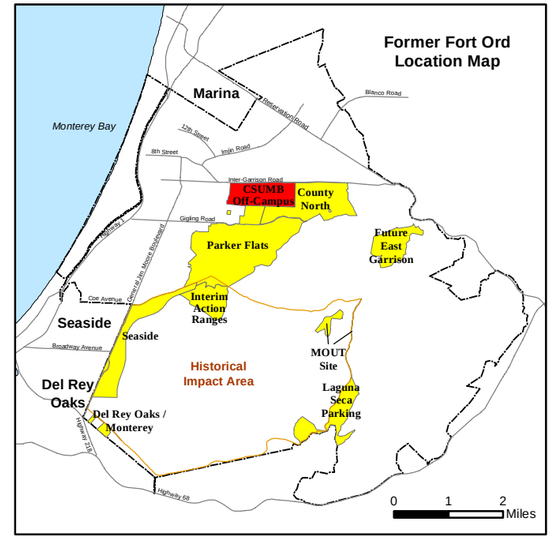


Legend

- Munitions Response Area
- Major Road
- S1.3.2 — USACE Parcel
- RQA Pilot Study Area
- Borderland Interface
- 100-Foot Buffer from Borderland Interface

Proposed Future Land Use

- Residential (CSUMB Campus Housing)
- Non-Residential (CSUMB Open Space Park)



N

0 600 1,200 Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

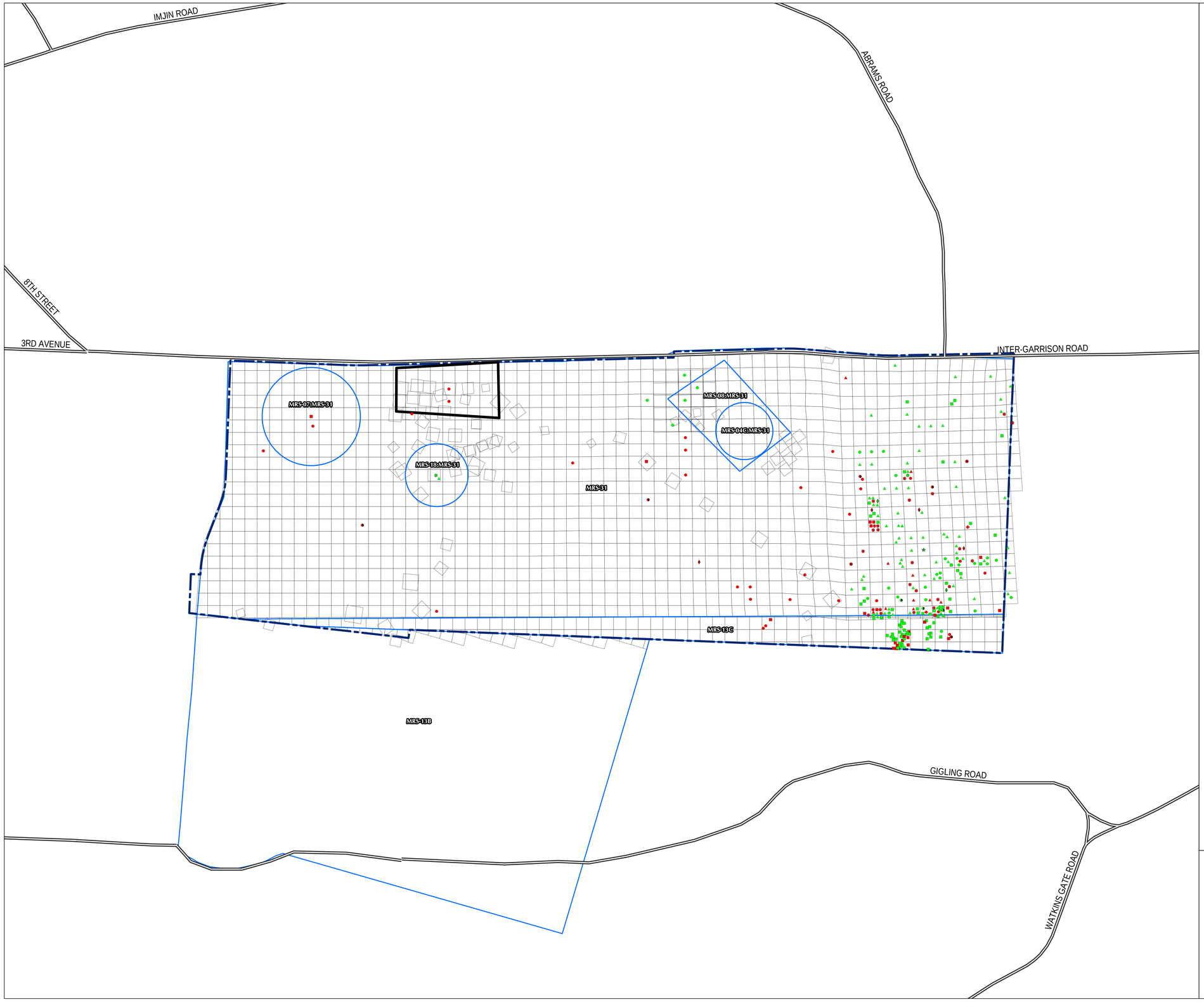
WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA Reuse Plan and RQA Pilot Study Area

FORA ESCA RP
Monterey County, California

Figure 9

T:\Projects\Group 2 RIFS\Vol1\2012_08_06_CSUMB_Reuse_Plan_and_RQA_Pilot_Study_Area.mxd - 8/6/2012 @ 4:13:00 PM



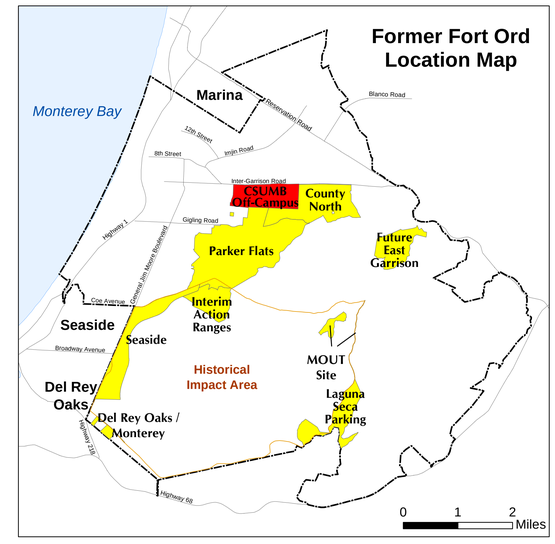
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Hand Grenade, Smoke
- Rifle Grenade, Smoke
- Grenade Smoke, Unknown
- Grenade, White Phosphorus
- Signal Smoke, M62
- Smoke Pots, HC
- Ash Pyrotechnic
- Smoke, 40mm
- Smoke Flare, Model Unknown

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

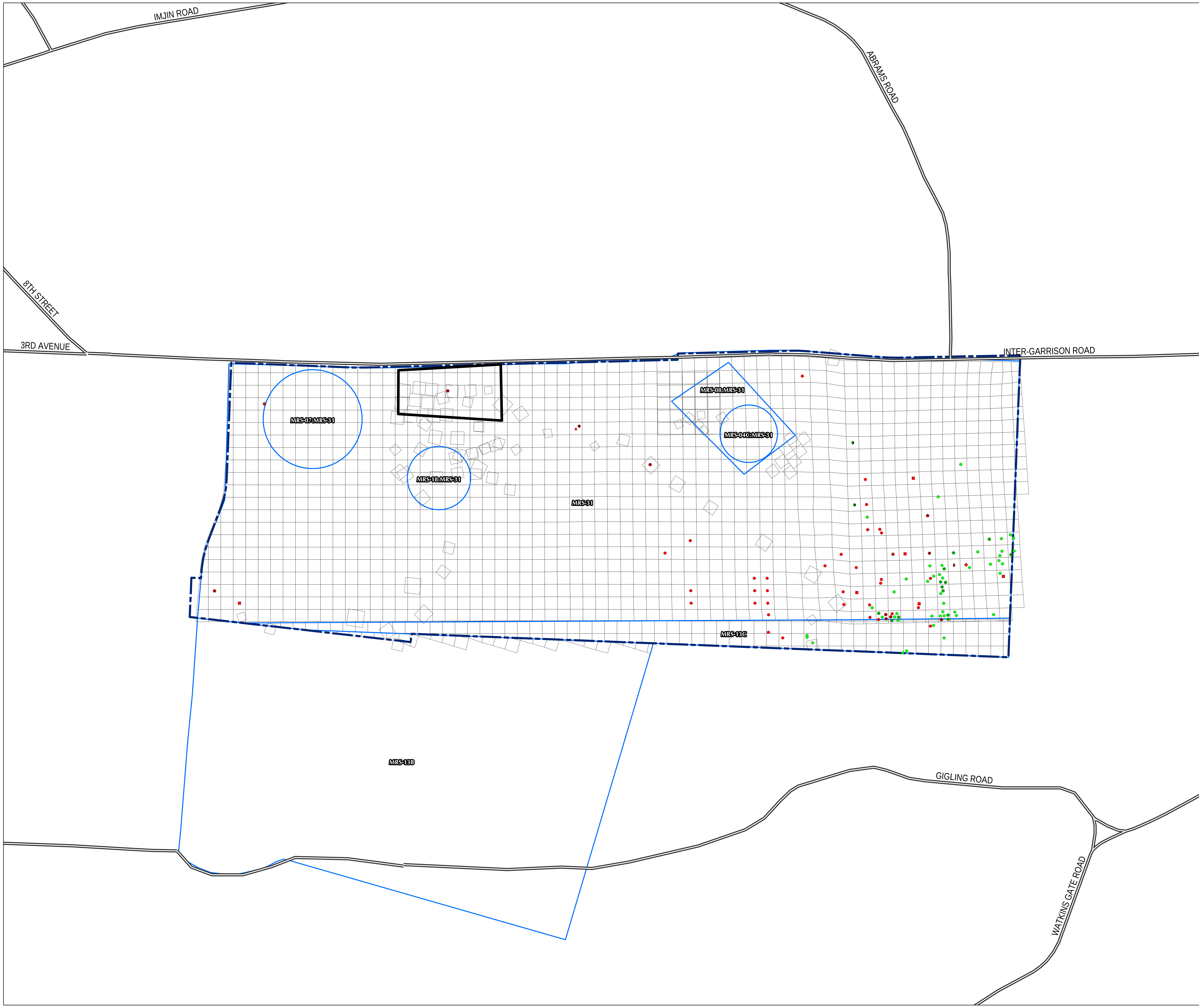
WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA Smokes

FORA ESCA RP
Monterey County, California

Plate 1

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Smokes.mxd - 8/8/2012 @ 12:27:42 PM



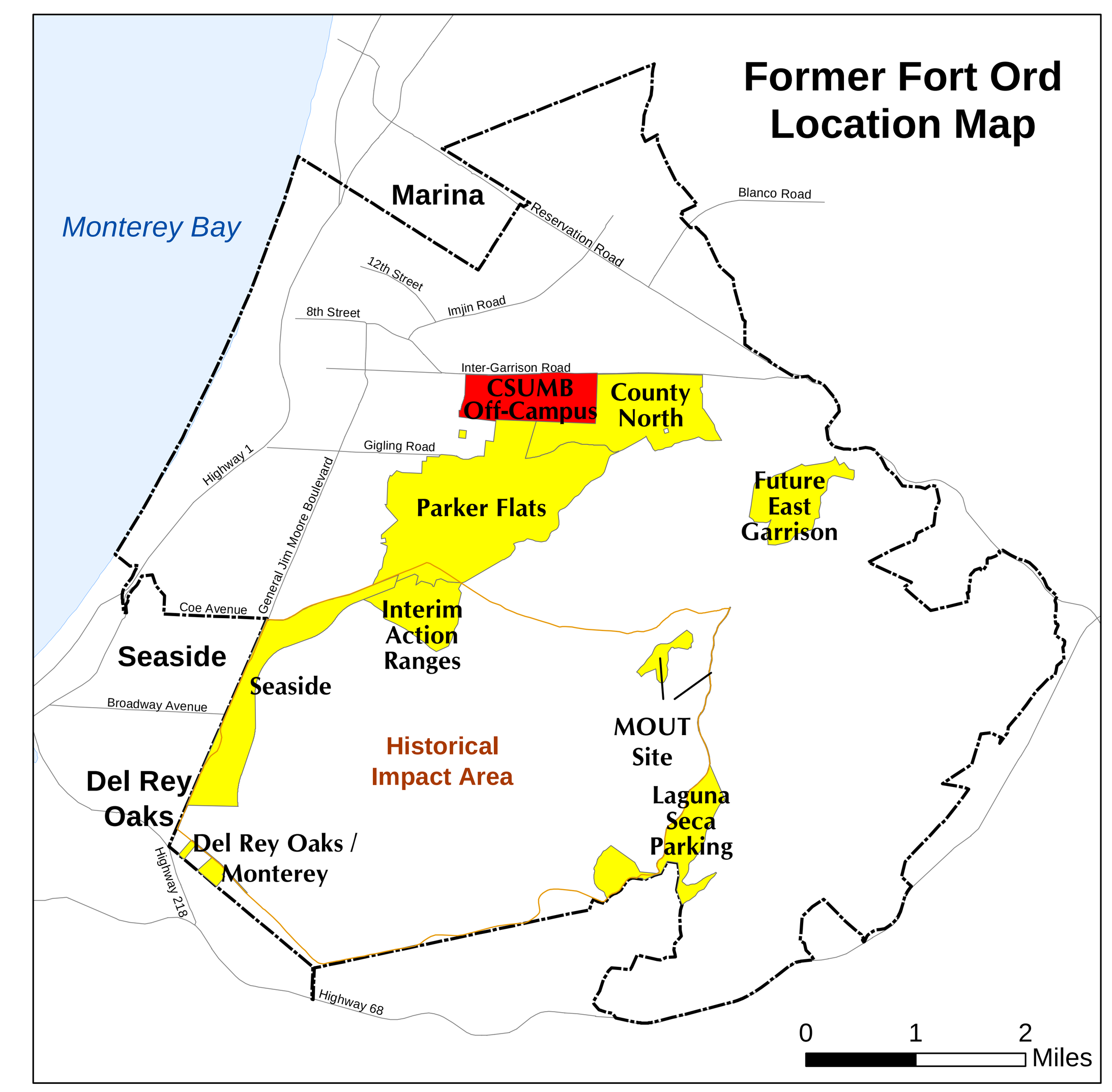
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Simulator, M74
- Simulator, M22
- Simulator, Dragon
- Simulators and Signals, Flash/Sound
- Electrical Booby Trap, Simulator; Booby Trap
- Simulator, M80
- Simulator, M116A1
- Simulator, Model Unknown

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings
WESTON SOLUTIONS
WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA Simulators

FORA ESCA RP
Monterey County, California

Plate 2

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Simulators.mxd - 8/8/2012 @ 12:27:31 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07:MRS-31

MRS-18:MRS-31

MRS-31

MRS-16:MRS-31

MRS-01G:MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

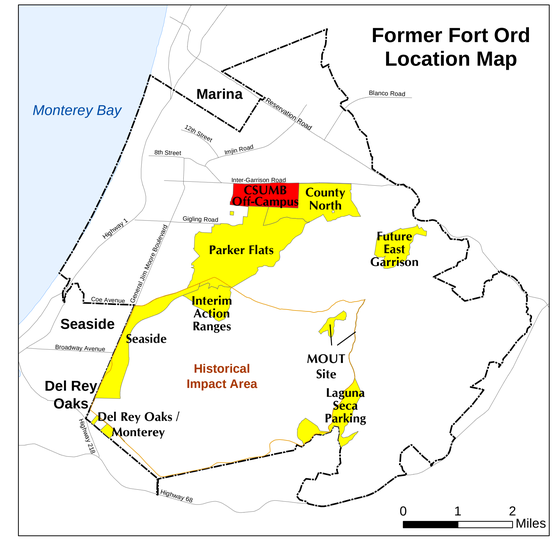
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Signal Flare, Air
- Signal Flare, Ground
- Flare, Casing
- Flare, Component, Unknown Model

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA Flares

FORA ESCA RP
Monterey County, California

Plate 3

T:\Projects\Group 2 RIFS\Vol1\plates\2012_03_30_CSUMB_Historical_MMRP_MEC_and_MD_Flares.mxd - 8/8/2012 @ 12:48:51 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07:MRS-31

MRS-18:MRS-31

MRS-31

MRS-04:MRS-31

MRS-04C:MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

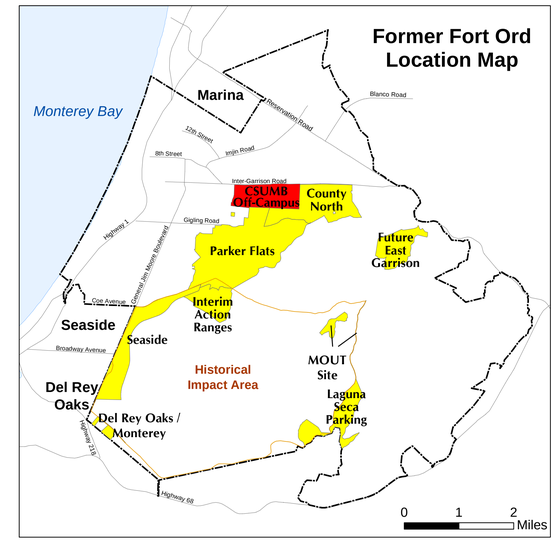
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Projectile, 20mm, TPT
- Projectile, 22mm, M744
- Projectile, 1.1 inch, MK2
- Projectile, 37mm, APT, M80; 37mm, Model Unknown
- Projectile, 40mm, Base Fuze; 40mm, Practice
- Projectile, 60mm, Illumination Mortar; 60mm, Parts
- Projectile, 81mm, Mortar Training, M43 and M68
- Projectile, 105mm
- Projectile, 106mm, Training Round

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA Projectiles

FORA ESCA RP
Monterey County, California

Plate 4

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Projectiles.mxd - 8/8/2012 @ 12:50:00 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07:MRS-31

MRS-08:MRS-31

MRS-04C:MRS-31

MRS-18:MRS-31

MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

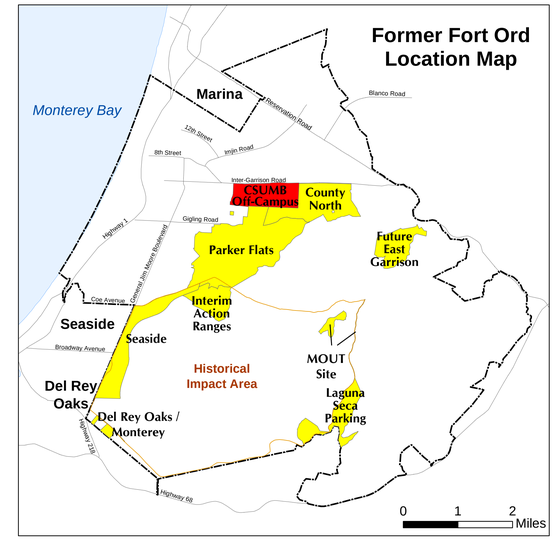
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Mine, Anti-personnel
- Mine, Anti-tank
- Mine, Fuze
- Mine, Training Mine, Model Unknown

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA
Mines and Mine Fuzes

FORA ESCA RP
Monterey County, California

Plate 5

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Mines_and_Mine_Fuzes.mxd - 8/8/2012 @ 12:56:51 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07:MRS-31

MRS-18:MRS-31

MRS-31

MRS-04:MRS-31

MRS-04C:MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

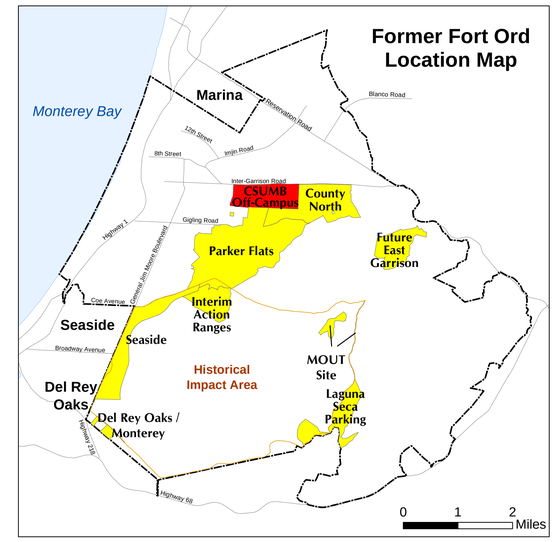
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Firing Device
- Squib
- Blasting Cap
- Bulk Explosive

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA
Firing Devices, Squibs, Blasting Caps, and Bulk Explosives

FORA ESCA RP
Monterey County, California

Plate 6

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Firing_Devices_Squibs_Blasting_Caps_and_Bulk_Explosives.mxd - 8/8/2012 @ 12:57:46 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07-MRS-31

MRS-18-MRS-31

MRS-04-MRS-31

MRS-04C-MRS-31

MRS-31

MRS-18C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

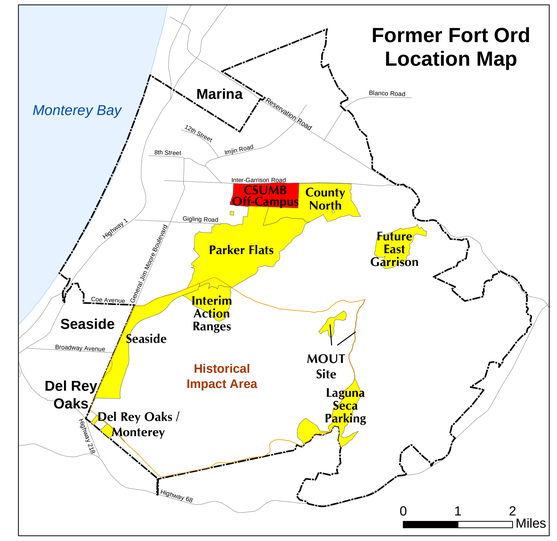
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Grenade, High Explosive
- Grenade, CS
- Grenade, Offensive, MK III
- Grenade, Incendiary
- Grenade, Illumination
- Grenade, Practice
- Grenade, Hand, Model Unknown
- Grenade, Rifle, Model Unknown
- Grenade, Fuze

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA
Grenades and Grenade Fuzes

FORA ESCA RP
Monterey County, California

Plate 7

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Grenades_and_Grenade_Fuzes.mxd - 8/8/2012 @ 1:05:52 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07:MRS-31

MRS-18:MRS-31

MRS-08:MRS-31

MRS-04C:MRS-31

MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

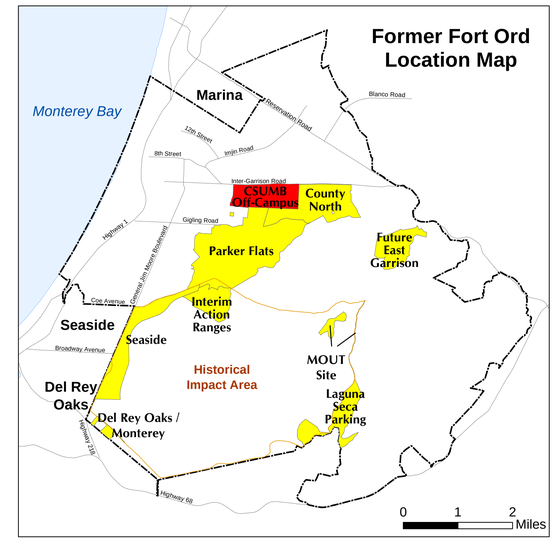
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Rocket, 2.36 inch, HEAT, M6
- Rocket, 2.36 inch, Practice; 2.36 inch Rocket Parts)
- Rocket, 3.5 inch, Practice; 3.5 inch Rocket Parts
- Rocket, 35mm, Practice, M73

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE | ENGINEERS

CSUMB Off-Campus MRA Rockets

FORA ESCA RP
Monterey County, California

Plate 8

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Rockets.mxd - 8/8/2012 @ 1:07:21 PM

IMJIN ROAD

ABRAMS ROAD

8TH STREET

3RD AVENUE

INTER-GARRISON ROAD

MRS-07;MRS-31

MRS-18;MRS-31

MRS-08;MRS-31

MRS-04C;MRS-31

MRS-31

MRS-13C

MRS-13B

GIGLING ROAD

WATKINS GATE ROAD

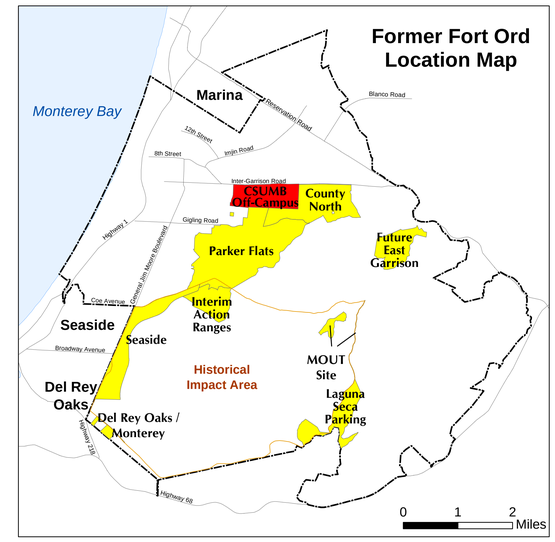
Legend

- CSUMB Off-Campus MRA Boundary
- Munitions Response Site
- HFA "Site 7"
- Major Road

MEC or MD

- Energetic Materials
- Compound Slag and OEW
- M16 Clip
- Bomb, Practice
- Spotting Charge
- Base Compound
- Fuze, Model Unknown
- Miscellaneous Primers, Catridges, and Igniters
- Frag Bomb Fuze
- M24, Model Unknown

NOTE - MEC and MD item locations are approximate and an item may have been found anywhere within the grid cell in which the item is displayed



N

0 300 600 900 1,200
Feet

ARCADIS
Infrastructure · Water · Environment · Buildings

WESTON SOLUTIONS

WESTCLIFFE ENGINEERS

CSUMB Off-Campus MRA
Miscellaneous MEC and MD

FORA ESCA RP
Monterey County, California

Plate 9

T:\Projects\Group 2 RIFS\Vol1\plates\2012_04_06_CSUMB_Historical_MMRP_MEC_and_MD_Miscellaneous.mxd - 8/8/2012 @ 1:14:11 PM

APPENDIX A

MEC and MD Found During Investigations

Table A-1:
Summary of CSUMB Off-Campus MRA MEC and MD by OE Model Number

OE Model	Model Description	MD		MEC		
		# Records	# Items	Risk Code	# Records	# Items
0	NO MODEL ASSIGNED - See Summary by Functional Group	325	1238	NA	162	903
2	Ordnance Components	2	3	999	2	5
3	Base, coupling, firing device	13	25	1	3	4
19	Cap, blasting, electric, M6			1	16	46
20	Cap, blasting, non-electric, M7			1	1	1
1218	Cartridge case, 40mm (projectile removed/case intact)	1	1	1		
46	Charge, 0.25lbs, demolition, TNT			2	1	1
47	Charge, 0.5lbs, demolition, TNT			2	10	104
51	Firing device, multi-option, M142	2	2	1	1	1
53	Firing device, pressure, M1A1	3	11	1		
55	Firing device, pull, M1	23	48	1	25	62
56	Firing device, pull friction, M2			1	3	6
57	Firing device, release, M1	2	29	1	3	6
58	Firing device, release, M5	12	115	1	27	86
59	Firing device, tension and release, M3	3	4	1	14	38
62	Flare, parachute, trip, M48	11	20	2	12	13
64	Flare, surface, trip, M49 series	17	21	1	32	35
74	Fuze, grenade, hand, M10 series	7	7	1	10	12
78	Fuze, grenade, hand, practice, M205 series	7	7	1	32	108
89	Fuze, grenade, hand, practice, M228	1	1	1	4	4
91	Fuze, mine, antitank, practice, M1A1	1	3	1		
93	Fuze, mine, antitank, practice, M604	1	1	1	12	15
95	Fuze, mine, combination, M10 series			1	4	4
131	Grenade, hand, practice, M30	3	3	1	2	4
132	Grenade, hand, practice, M69	4	4	1		
133	Grenade, hand, practice, MK II	11	13	1	10	17
134	Grenade, hand, practice, M21			1	1	1
136	Grenade, hand, riot, CS, M7A3			1	11	14
137	Grenade, hand, riot, CS-1, ABC-M25A2			1	2	2
140	Grenade, hand, smoke, HC, AN-M8	2	3	1	3	4
141	Grenade, hand, smoke, white phosphorous, M15			3	1	2
142	Grenade, hand, smoke, M18 series	32	59	1	27	40
148	Grenade, hand, fragmentation, MK II			3	4	4
149	Grenade, hand, Illumination, MK I	29	41	1	23	25
151	Grenade, hand, incendiary, TH3, AN-M14	1	1	1	2	9
152	Grenade, hand, offensive, MK III	2	3	3		
153	Grenade, hand, training, MK1A1	2	3	0		
156	Grenade, rifle, antitank, practice, M11 series			0	2	6
164	Grenade, rifle, smoke, white phosphorous, M19A1	1	3	3	3	4
165	Grenade, rifle, smoke, M22 series	33	47	1	14	18
167	Grenade, rifle, smoke, M23 series	2	3	1	2	4
169	Grenade, rifle, M9, HE			3	1	2
172	Igniter, time fuse, blasting, M60	2	2	1	1	1
180	Mine, antipersonnel, practice, M8 series	1	1	1	5	8
183	Mine, antipersonnel, practice, M16	2	2	0		
188	Mine, antipersonnel, practice, M68 (claymore)	1	1	0	4	6
191	Mine, antitank, practice, M1	1	1	1	2	2
192	Mine, antitank, practice, M1A1			1	2	2

Table A-1:
Summary of CSUMB Off-Campus MRA MEC and MD by OE Model Number

OE Model	Model Description	MD		MEC		
		# Records	# Items	Risk Code	# Records	# Items
193	Mine, antitank, practice, M10	2	2	1	1	1
194	Mine, antitank, practice, M12 series			1	7	9
195	Mine, antitank, practice, M20			1	8	11
205	Pot, 2.5lb, smoke, HC, screening, M1			1	1	1
229	Projectile, 20mm, target practice, M55A2	1	1	0		
240	Projectile, 37mm, armor piercing tracer, M80			0	2	2
236	Projectile, 37mm, armor piercing tracer, M51 series	1	1	NS		
266	Projectile, 40mm, practice, M382			1	2	2
278	Projectile, 40mm, cluster, white star, M585	1	1	1		
280	Projectile, 40mm, parachute, illumination, M583 series	1	1	1	1	2
281	Projectile, 40mm, parachute, star, M662			1	2	2
334	Projectile, 81mm, mortar, training, M68	2	2	0		
352	Rocket, 2.36inch, high explosive antitank, M6	1	1	3	2	2
353	Rocket, 2.36inch, practice, M7			0	5	5
357	Rocket motor, 3.5inch	3	7	1		
358	Rocket, 3.5inch, practice, M29 series	4	16	0	5	5
363	Rocket, 35mm, subcaliber, practice, M73			1	1	6
368	Signal, illumination, comet 1260			1	3	6
369	Signal, ground, rifle, parachute, M17 series	7	18	1		
375	Signal, illumination, AN-M43 series	1	1			
387	Signal, illumination, aircraft, AN-M37 series	1	1	1	2	2
389	Signal, illumination, ground, M125 series	96	273	2	23	37
391	Signal, illumination, ground, M126 series	32	66	2	4	4
399	Signal, illumination, ground, parachute, rifle, M19 series	8	29	1	3	3
410	Signal, smoke, ground, M62 series			1	1	1
414	Simulator, detonation, explosive, M80			1	2	2
415	Simulator, explosive boobytrap, flash, M117	2	2	1	1	1
418	Simulator, flash artillery, M110			1	1	1
420	Simulator, grenade, hand, M116A1			2	2	12
421	Simulator, launching, antitank guided missile and rocket, M22			1	6	7
424	Simulator, projectile, airburst, M74 series	39	198	1	32	51
426	Squib, electric			1	3	32
428	Projectile, 22mm, subcaliber, practice, M744			1	1	2
433	Projectile, 81mm, mortar, practice, M43 series			2	1	4
434	Activator, mine, antitank, practice, M1			1	6	7
1233	Projectile, 40mm, Practice, (model unknown)	1	2	2		
1239	Explosive, bulk, HE			999	1	0
1270	Fuze, grenade (model unknown)	115	276	1	13	39
1271	Fuze, mine (model unknown)	1	7	1	1	1
1304	Mine, antitank, practice (model unknown)	3	24	1	9	9
1315	Mine, antipersonnel, practice, M2A1B1	1	1	1	9	11
1318	Grenade, rifle, smoke (model unknown)	22	44	3	4	7
1331	Ash, Pyrotechnic			999	21	14
Total		**905**	**2700**		**682**	**1930**

Table A-1:
Summary of CSUMB Off-Campus MRA MEC and MD by OE Model Number

OE Model	Model Description	MD		MEC		
		# Records	# Items	Risk Code	# Records	# Items

Notes:
MEC = munitions and explosives of concern
MD = munitions debris
mm = millimeter

MEC Risk Code:
0 = Inert, will cause no injury
1 = Will cause an injury or, in extreme cases, could cause major injury or death to an individual if functioned by an individual's activities.
2 = Will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activities.
3 = Will kill an individual if detonated by an individual's activities.
NS = Not Specified
NA = Not Applicable
Risk code 999 was assigned to items in the MMRP when the exact item could not be identified.

Reference: Fort Ord MMRP Database and CSUMB Off-Campus MRA RQA Process Pilot Study Technical Information Paper (ESCA RP Team 2012).

Table A-2:
Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned)

Original OE Nomenclature	MD		MEC	
	# Record	# Item	# Record	# Item
Firing Devices				
FIRING DEVICE, M10 (Model Unknown)			5	5
FIRING DEVICE, M57 (Model Unknown)			1	1
Grenades				
FUZE GRENADE M49 (Model Unknown)	1	2		
GRENADE FUZES (Model Unknown)	15	250		
GRENADE PRACTICE FUZE (Model Unknown)	1	1		
MK2 GRENADE FUZE (Model Unknown)	1	1		
GRENADE HALF (Model Unknown)	7	20		
PRACTICE GRENADE RED FILLER (Model Unknown)			1	1
W.P. GRENADE TOPS (Model Unknown)	1	5		
CS GRENADE (Model Unknown)	4	4		
GRENADE HAND PRACTICE (Model Unknown)			1	1
GRENADE, HAND, PRACTICE, UNFUZED (Model Unknown)	4	6		
GRENADE, HAND, WP (Model Unknown)	1	1		
MK2 HAND GRENADE (Model Unknown)			1	1
HAND, GRENADE (Model Unknown)	1	1		
GRENADE, M33, PRACTICE, W/P (Model Unknown)			1	1
M1 INCENDIARY GRENADES (Model Unknown)	1	4		
M26 GRENADE PRACTICE (Model Unknown)	1	1		
MK2 GRENADE (Model Unknown)	2	2	1	1
PRACTICE GRENADE (Model Unknown)	8	29	2	3
RIFLE GRENADE (Model Unknown)	11	48	4	16
RIFLE GRENADE DET (Model Unknown)			1	6
Mines				
A/T MINE (Model Unknown)	1	1		
ACTIVATOR, MINE (Model Unknown)			1	46
AP MINE PRACTICE M2 (Model Unknown)			1	1
AV TRAIN MINE (Model Unknown)	1	1		
EXPENDED POP UP MINES (OE Scrap)	1	2		
FUZE, MINE, FUNCTIONED (OE SCRAP)	1	8		
HEAVY PRACTICE MINE (Model Unknown)	1	1		
M2 PRACTICE MINE (Model Unknown)			1	2
MINE, AP, TRAINING (OE SCRAP)	1	56		
MINE, M8	3	5		
POP UP MINE (Model Unknown)	1	6		
Miscellaneous				
BAG SMOKE COMPOUND	1	1		
BASE COMPOUND (Model Unknown)			1	1
BOMB, M30A1, (CONCRETE FILLED) (Model Unknown)	1	1		
COMPOUND SLAG AND OEW (Model Unknown)			1	
FRAG BOMB FUZE (Model Unknown)			1	
FUZE, M12 (Model Unknown)			1	3
FUZES (Model Unknown)			1	14
HE (Model Unknown)			1	
M16 3 ORD CLIP (Model Unknown)	1	1		
M24 (Model Unknown)	2	2		
M24 PRACTICE (Model Unknown)	1	1		
M8 ELECTRIC CAP (Model Unknown)			1	1
PRIMER (Model Unknown)			1	

Table A-2:
Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned)

Original OE Nomenclature	MD		MEC	
	# Record	# Item	# Record	# Item
PRIMER, PERCUSSION (Model Unknown)			1	7
SPOTTING CHARGE (Model Unknown)	1	1		
TOW SPOTTING CHARGE (Model Unknown)			1	1
Mortars				
60MM MORTAR (Model Unknown)	1	1		
60MM MORTAR CANISTER (Model Unknown)	1	1		
81MM, M3, PROP CHARGE (Model Unknown)	1	17	1	1
ASSEMBLY, TAIL, MORTAR, 60MM (OE Scrap)	1	1		
Projectiles				
20MM (Model Unknown)	1	1		
PROJECTILE, 20MM, TPT (Model Unknown)			1	1
PROJECTILE, 37mm (Model Unknown)			1	1
40MM BASE FUZE (Model Unknown)			1	1
PROJECTILE, 105MM, WITH FUZE (Model Unknown)			1	1
106MM RECOILLESS TRAINING ROUND (PROJECTILE, FUZE, AND CANISTER) (Model Unknown)			1	1
PROJECTILE, WITH FUZE MK2/MOD12 1.1 INCH (Model Unknown)			1	1
CART CASE M74 (OE Scrap)	1	1		
CART M3 (Model Unknown)			1	60
CART M6 (Model Unknown)			1	18
CART M7 (Model Unknown)			1	50
CARTRIDGE, PRACTICE (Model Unknown)	1	1		
Flares, Signals, and Illumination				
37MM FLARE CARTS (Model Unknown)	2	4		
37MM ILLUM CANISTER (Model Unknown)	1	1		
40mm AIRBURST FLARE (Model Unknown)			2	2
40MM FLARE (Model Unknown)			1	3
40MM FLARE CANISTER (Model Unknown)	1	1		
40MM FLARE CART (Model Unknown)	1	1		
40mm FLARE PISTOL (Model Unknown)	1	3	3	4
PISTOL FLARE (Model Unknown)			1	1
40mm ILLUM (Model Unknown)	6	12	1	5
40MM ILLUM CANISTER (Model Unknown)	2	7		
40MM ILLUM M58 (Model Unknown)			1	1
40MM SIGNAL (Model Unknown)	2	4		
40MM SIGNAL CARTRIDGE (Model Unknown)	1	1		
40MM SIGNAL FLARE (Model Unknown)	2	3		
40MM SIGNAL GROUND FLARE (Model Unknown)			1	1
40MM SLAP FLARES (Model Unknown)	1	2		
40MM STAR CLUSTER (Model Unknown)	2	2		
40mm, ILLUM (STAR ONLY) (Model Unknown)			1	1
60MM ILLUM (Model Unknown)	3	9	1	10
60MM ILLUM CASE (Model Unknown)	1	1		
60MM ILLUM PROJO (Model Unknown)	1	1		
60MM ILLUMINATION ROUND (Model Unknown)			2	2
AIR ILLUM (SLAP FLARE) (Model Unknown)			1	1
AIRCRAFT SIGNAL (Model Unknown)			1	1
ILLUMINATING FLARE (Model Unknown)	1	3		
FLARE SIGNAL (Model Unknown)			1	1
FIN ASSEMBLY FLARE (OE Scrap)	1	1		

Table A-2:
Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned)

Original OE Nomenclature	MD		MEC	
	# Record	# Item	# Record	# Item
FLARE (Model Unknown)	5	5		
FLARE BODY (Model Unknown)	3	3		
FLARE CANISTER (OE Scrap)	1	1		
FLARE CART (Model Unknown)	1	1		
FLARE CASING (Model Unknown)	2	2		
FLARE MOTOR (Model Unknown)	1	16	2	49
FLARE, PARACHUTE (OE SCRAP)	3	32		
FLARE PART (Model Unknown)			1	1
FLARE, SIGNAL, M18A1 (Model Unknown)			25	44
GRENADE ILLUM (Model Unknown)	5	6		
FLARE RIFLE (Model Unknown)	2	5		
GRENADE, RIFLE, FLARE (Model Unknown)			9	10
GROUND SIGNAL FLARE (Model Unknown)	1	1		
ILLUM GRENADE (Model Unknown)	12	17	7	7
ILLUM GRENADE RIFLE (Model Unknown)	1	1		
ILLUM GRENADE TOP (Model Unknown)	2	11		
M49 FLARE MOUNT (OE Scrap)	2	2		
PARA FLARE (Model Unknown)	9	20		
PARACHUTE FLARE MOTOR (Model Unknown)			9	105
POP UP FLARE (Model Unknown)	3	6		
PULL FLARE DEVICE (Model Unknown)	1	1	1	2
PYROTECHNICS, LOOSE (Model Unknown)	1	0		
RIFLE FLARE (Model Unknown)	6	39	2	2
RIFLE GRENADE ILLUMINATION (Model Unknown)	6	42	1	1
RIFLE ILLUMINATING (Model Unknown)	3	18		
RIFLE GRENADE SIGNALS (Model Unknown)	1	3		
SIGNAL AIR (Model Unknown)	1	3		
SIGNAL BANG (Model Unknown)	1	29		
SIGNAL CART (Model Unknown)	2	50		
SIGNAL CASE (Model Unknown)	1	1		
SIGNAL FLARE, GROUND (Model Unknown)	2	27		
SIGNAL FLASH (Model Unknown)	2	28		
SIGNAL FLASH SOUND (Model Unknown)	5	19	4	11
FLASH, BANG, M47 (Model Unknown)			1	2
MATERIAL FLASH SOUND (Model Unknown)			1	13
ILLUM MATERIAL FLASH GROUND (Model Unknown)			1	7
STAR CLUSTER (Model Unknown)	1	1		
SIGNAL STAR CLUSTER (Model Unknown)	2	2		
WHITE STAR RIFLE (Model Unknown)	1	1		
SIGNAL, ILLUMINATOIN, GROUND, PARACHUTE, WHITE STAR, M18A1 (Model Unknown)	1	1		
ILLUMINATION, WHITE, STARS, RIFLE, GRENADE (Model Unknown)	1	3		
SIGNAL, ILLUMINATION (Model Unknown)			2	5
SLAP FLARE CASES (Model Unknown)	1	1		
SLAP FLARE MOTORS (Model Unknown)			2	29
SLAP FLARE TAIL ASSY (Model Unknown)			1	35
SLAP FLARE TUBE (Model Unknown)	1	1		
TRIP FLARE (Model Unknown)	13	30	8	10
TRIP FLARE BASE (Model Unknown)	1	1		
TRIP FLARE FUZE (Model Unknown)	5	8		

Table A-2:
Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned)

Original OE Nomenclature	MD		MEC	
	# Record	# Item	# Record	# Item
TRIP FLARE HOLDERS (Model Unknown)	1	2		
TRIP FLARE TOP (Model Unknown)	2	2		
Smoke Items				
40MM SMOKE (Model Unknown)			2	2
GRENADE, HAND, SMOKE (Model Unknown)	1	2		
GRENADE SMOKE (Model Unknown)	2	11		
GRENADE SMOKE FUZE (Model Unknown)	1	1		
M1 RIFLE SMOKE GRENADE (Model Unknown)	1	5		
M1 RIFLE SMOKE PARTIAl (Model Unknown)			1	1
M18 SMOKE EMPTY (OE Scrap)	1	1		
RIFLE GRENADE RED SMOKE (Model Unknown)			2	2
SMOKE RIFLE (Model Unknown)	4	51	1	1
RIFLE SMOKE GRENADES (Model Unknown)	3	15	1	4
SMOKE FLARE (Model Unknown)	1	1		
SMOKE GRENADE (Model Unknown)	63	120	9	10
SMOKE GRENADE FUZE (Model Unknown)	2	5	1	1
SMOKE GRENADE FRAGMENTS (OE Scrap)	1	1		
SMOKE GRENADE HEAD (Model Unknown)	1	1		
SMOKE, GRENADE, INCEN. (Model Unknown)			1	1
SMOKE POT (Model Unknown)	2	11	3	4
Rockets				
2.36 TAIL BOOM (OE Scrap)	1	3		
3.5 INCH NOSE CONE (OE Scrap)	1	2		
3.5 INCH OJIVE (OE Scrap)	1	1		
3.5 INCH ROCKET (Model Unknown)	4	8	1	1
3.5 INCH WARHEAD (Model Unknown)	1	1		
Simulators				
37MM AIRBURST SIM (Model Unknown)	2	2		
DEVICE PYROTECHNIC SIMULATOR (Model Unknown)			1	250
DRAGON SIMULATORS (Model Unknown)			1	2
ELECTRICAL, BOOBY TRAP, SIMULATORS (Model Unknown)			1	1
GRENADE SIMULATOR (Model Unknown)			1	1
40MM SIMULATOR CARTRIDGE (Model Unknown)	1	3		
M97 SIMULATOR AIRBURST (Model Unknown)	1	6		
M97A1 SIMULATOR, AIRBURST (Model Unknown)	1	1		
M97A1 SIMULATOR, PROJO (Model Unknown)	1	1		
SIMULATOR, GUNFLASH (Model Unknown)			1	9
SOUND/FLASH SIMULATOR (Model Unknown)	1	2		
Total	**325**	**1238**	**162**	**903**

Notes:
MEC = munitions and explosives of concern
MD = munitions debris
MM = millimeter

MEC Risk Code:
0 = Inert, will cause no injury
1 = Will cause an injury or, in extreme cases, could cause major injury or death to an individual if functioned by an individual's activities.

Table A-2:
Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned)

Original OE Nomenclature	MD		MEC	
	# Record	# Item	# Record	# Item

2 = Will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activities.
3 = Will kill an individual if detonated by an individual's activities.

Reference: Fort Ord MMRP Database and CSUMB Off-Campus MRA RQA Process Pilot Study Technical Information Paper (ESCA RP Team 2012).

APPENDIX B

Evaluation of Previous Work Checklists

Appendix B
Munitions Response Activity Evaluation Checklists
Part 1: Literature Review

	Yes	No	Inconclusive

TYPE OF TRAINING AND MILITARY MUNITIONS EXPECTED

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades, or other launched ordnance)?		X	

Sources reviewed and comments:

The individual MRSs within the CSUMB Off-Campus MRA (MRS-04C: MRS-31, MRS-07:MRS-31, MRS08: MRS-31, MRS-18:MRS-31, and MRS-31) were identified in the either the 1993 or 1997 Archives Search Report (USACE 1993, 1997a). There is no indication that these sites were used as an impact area. There is no evidence on the historical aerial photographs of an impact area. There are no labels on any of the historical training and facilities maps indicating an impact area within the CSUMB Off-Campus MRA.

2. Is there historical evidence that training involved use of High Explosive (HE) or Low Explosive (LE) items?	X		

Sources reviewed and comments:

The 1997 Revised ASR (USACE 1997a) indicates that the area of MRS18-MRS-31 was a minefield practice area used to teach trainees methods for locating landmines. Historical training and facilities maps indicate mine and booby trap training took place in the north central portion of the MRA.

3. Is there historical evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g., simulators, flares, smoke grenades) but not explosives?	X		

Sources reviewed and comments:

The area was shown on historical training and facility maps as a troop training and maneuvers area. Troop training and maneuvers include the use of simulators, flares, and smoke grenades.

DEVELOPMENT AND USE OF SURROUNDING AREA

4. Does subsequent development or use of the area indicate that military munitions would have been used at the site?		X	

Sources reviewed and comments:

This area remains undeveloped.

5. Does use of area surrounding the site indicate that military munitions would have been used at the site?	X		

Appendix B
Munitions Response Activity Evaluation Checklists
Part 1: Literature Review

	Yes	No	Inconclusive

Sources reviewed and comments:

The 1997 ASR indicates that MRS-13 to the south was a practice mortar range (USACE 1997a)

ESTABLISHMENT OF SITE BOUNDARIES

6. Is there evidence of training areas on aerial photographs that could be used to establish site boundaries?		X	

Sources reviewed and comments:

Aerial photographs do not show evidence of training areas that could be used to establish site boundaries.

7. Is there evidence of training on historical training maps that could be used to establish boundaries?		X	

Sources reviewed and comments:

Historical training maps show that training that took place in the CSUMB Off-Campus MRA and the County North MRA were the same; therefore, if the boundaries were not set by property transfer, these two MRAs could be combined.

8. Should current boundaries be revised?		X	

Sources reviewed and comments:

No, boundaries have been determined with respect to property transfer.

RESULTS OF LITERATURE EVALUATION

9. Does the literature review provide sufficient evidence to warrant further investigation?	X		

Sources reviewed and comments:

Literature review (1997 ASR) indicates that further investigations were conducted (USACE 1997a).

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive

HISTORICAL INFORMATION

1. Is there evidence that the site was used as an impact area (i.e., fired military munitions such as mortars, projectiles, rifle grenades, or other launched ordnance)?		X	

Sources reviewed and comments:

Although miscellaneous projectiles were found during removal actions, there was no pattern of use for these items.

References:

Military Munitions Response Program (MMRP) database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), Residential Quality Assurance Process Pilot Study Technical Information Paper CSUMB Off-Campus Munitions Response Area (RQA TIP; ESCA RP Team 2012).

2. Is there evidence that training involved use of explosive items?	X		

Sources reviewed and comments:

MMRP database indicates a pattern of use of fuzes, practice grenades, bulk HE, blasting caps. All other explosive items found do not show a pattern of use.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

3. Is there evidence that training involved use of pyrotechnic and/or smoke-producing items (e.g., simulators, flares, smoke grenades) but not explosives?	X		

Sources reviewed and comments:

MMRP database and data included in the RQA TIP indicate simulators, flares, and illumination signals were found.

References:

MMRP database for CSUMB Off-Campus MRA, RQA TIP (ESCA RP Team 2012).

REMOVAL RESULTS

4. Was removal performed within the appropriate area?	X		

Sources reviewed and comments:

A subsurface removal action occurred over 100% of the MRA as indicated in after-action reports.

References:

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).			
5. Were the type(s) of items found consistent with the type of training identified for the site?	X		

Sources reviewed and comments:

MMRP database for CSUMB Off-Campus MRA and data included in the RQA TIP indicated practice items consistent with a troop training area.

References:

MMRP database, RQA TIP (ESCA RP Team 2012).

6. Were the type(s) of items found consistent with the era(s) in which training was identified?	X		

Sources reviewed and comments:

Review of the MEC and MD in the MMRP database, RQA TIP, and after-action reports indicate this area was used for troop training (land mine, booby trap, tactical) from the 1950s to the early 1990s. The items found were consistent with this timeframe.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

7. Was High Explosive (HE) fragmentation found?	X		

Sources reviewed and comments:

MMRP database indicates a hand grenade (model unknown), M16 bounding mine, grenade fuzes, antitank mine (model unknown), and antivehicle training mine were recovered from the MRA.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000).

8. Were HEs found?	X		

Sources reviewed and comments:

MMRP database indicate a pattern of use for practice hand grenades/fuzes, firing devices, igniters, bulk HE, electric squib and blasting caps. Data included in the RQA TIP further support a pattern of use for practice hand grenades/fuzes, firing devices, and blasting caps. In addition, other HE items were found that do not indicate a pattern of use: fragmentation hand grenades, M9 rifle grenades, 2.36 inch M6 antitank rockets and associated debris, and photographs in HFA report showed a fragmentation bomb and 81 mm mortar found in the eastern portion of CSUMB Off-Campus MRA.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
9. Were Low Explosives (LEs) found?	X		

Sources reviewed and comments:

MMRP database indicate that practice anti-tank and anti-personnel mines, M49 trip flares, and practice grenades were found. Data included in the RQA TIP indicate that a M49 trip flare was found.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

10. Were pyrotechnics found?	X		

Sources reviewed and comments:

MMRP database indicate a variety of simulators, flares, illumination signals, M12 antitank practice mines, M604 antitank practice mine fuzes, MK1 illumination grenades, pyro mix and smoke pots were found. RQA TIP data indicate a M49 flare, illumination signals, flares and signal components, and a M604 antitank practice mine fuze were found.

References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

11. Were smoke-producing items found?	X		

Sources reviewed and comments:

MMRP database for CSUMB MRA indicate smoke grenades, 2.5lb smoke pots, and smoke signals were found.

References:

MMRP database for CSUMB Off-Campus MRA.

12. Were explosive items found (e.g., rocket motors with explosive components, fuzes with explosive components)?	X		

Sources reviewed and comments:

MMRP database for CSUMB Off-Campus MRA indicate that combination M10 series mine fuzes, 60mm illumination rounds, grenade fuzes and practice grenades were found. All other items found with explosive components, 81mm Mortar, fragmentation bomb, and MK II fragmentation grenades, do not show a pattern of use. Data included in the RQA TIP indicate that grenade fuzes and a practice grenade were found.

References:

MMRP database for CSUMB Off-Campus MRA, after-action report (HFA 1994b), RQA TIP (ESCA RP Team 2(

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
13. Do items found in the area indicate training would have included use of training items with energetic components?	X		

Sources reviewed and comments:

There is an indication that training included the use of blasting caps.
References:

MMRP database for CSUMB Off-Campus MRA, RQA TIP (ESCA RP Team 2012).

14. Were items found in a localized area (possibly the inconclusive remnants of a cleanup action)?		X	

Sources reviewed and comments:
After-action reports, the MMRP database, and data included in the RQA TIP do not indicate finding stockpiles of debris during removal actions; however, there is evidence the training materials were buried within the MRA.
References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

SITE INVESTIGATION DESIGN

15. Was the site divided into subareas to focus on areas of common usage, similar topography and vegetation, and/or other unique site features?	X		

Sources reviewed and comments:

HFA investigated individual MRSs within the MRA during sampling; however, the entire MRA was covered during removal action.
References:

After-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000).

16. Should the site be divided into subareas based on the above features?	X		

Sources reviewed and comments:

Area could be subdivided based upon the review of MEC and MD locations compared to military use history.
References:

Training facilities maps 1941-1997, MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000).

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
17. Should current site boundaries be revised based on sampling results?		X	

Sources reviewed and comments:

Boundary is based on property transfer and cannot be revised.
References:

EQUIPMENT REVIEW

18. Was equipment used capable of detecting items suspected at the site at the maximum expected depth?	X		

Sources reviewed and comments:

Schonstedt magenetometers have poor detection capabilities for smaller MEC items deeper than 2 ft bgs, however there is no indication that CSUMB Off-Campus MRA was used as an impact area for any MEC item.
References:
Phase 2 Engineering Evaluation/Cost Analysis (EE/CA; USACE 1998), ODDS (Parsons 2002), MMRP database, and after-action reports: HFA 1994b, Parsons 2006, UXB 1995a, UXB 1995b, UXB1995c, USA 2000, USA 2001.

19. Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?		X	

Sources reviewed and comments:
Schonstedt surveys at CSUMB Off-Campus MRA are limited by the Schonstedt's ability to detect primarily non-ferrous metal MEC items such as aluminum fuzes that contain only a small amount of ferrous material. All of the non-ferrous items found in CSUMB Off-Campus MRA are non-penetrating.
References:

MMRP database for CSUMB Off-Campus MRA, after-action reports (HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000), RQA TIP (ESCA RP Team 2012).

20. Do the results of the Ordnance Detection and Discrimination Study (ODDS) indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?	X		

Sources reviewed and comments:

Overall, the Schonstedt surveys at the CSUMB Off-Campus MRA are believed to have been effective in detecting the predominantly ferro-metal items found in the CSUMB Off-Campus MRA.
References:

ODDS (Parsons 2002).

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
21. Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?	X		

Sources reviewed and comments:

Overall, the Schonstedt surveys at the CSUMB Off-Campus MRA are believed to have been effective in detecting the ferro-metal items in the top foot of soil. This is based on comparison with the ODDS, where most MEC items were found in the top 2 feet of soil. This is further supported by the majority of MEC found in the MRA being non-penetrating. The seeding recovery results indicate that the Schonstedt GA-52Cx instrument is capable of detecting small items such as 37mm projectiles and hand grenades, using 3-ft lane spacing deeper than the ODDS and DRO data show. 100% of the fourteen 37mm projectiles seeded between 7-12 inches bgs and 100% of the two 37mm projectiles seeded between 13-24 inches bgs were recovered during the Schonstedt GA-52Cx operations. 86% of the 7 hand grenades seeded between 7-12 inches were recovered during the Schonstedt GA-52Cx operations. No hand grenades were seeded deeper than 12 inches bgs and no 37mm projectiles were seeded deeper than 18 inches bgs. The majority of the MEC items removed from the CSUMB Off-Campus MRA were non-penetrating and would be expected on the surface and near surface.

References:

Phase 2 EE/CA (USACE 1998), ODDS (Parsons 2002), Del Rey Oaks removal After-Action Report (USA 2001), MRS-MOCO.2 After-Action Report (Parsons 2006).

22. Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturers' specifications?	X		

Sources reviewed and comments:

HFA magnetometers inspected daily, tested each morning and field tested after lunch. UXB magnetometer tested daily and QC checked randomly. USA instruments checked daily and random QC checks made.

References:

HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000.

DATA PROCESSING AND DATA MANAGEMENT

23. Was the appropriate data processing scheme used for the site, and how were the data processed?			Not Applicable

Sources reviewed and comments:

Instruments used for the site do not collect digital geophysical data.

References:

HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000.

Appendix B
Munitions Response Activity Evaluation Checklists
Part 2: Removal Evaluation

	Yes	No	Inconclusive
24. Have the field data been collected and managed in accordance with quality control standards established for the project?	X		

Sources reviewed and comments:

• Removals conducted by HFA were conducted according to the work plan and field QA/QC resulted in no failures. Review of available documentation indicates that all anomalies detected were investigated and all military munitions identified, both MEC and MD and cultural debris, were removed as required by the contractor work plan.
• Removals conducted by UXB were conducted according to the work plan and field QA/QC resulted in no failures. Review of available documentation indicates that all anomalies detected were investigated and all military munitions identified, both MEC and MD and cultural debris, were removed as required by the contractor work plan.
• Removals conducted by CMS/USA were conducted according to the work plan and field QA/QC resulted in only 3 QC grid failures which were resolved and no QA failures out of approximately 163 grids. Review of available documentation indicates that all anomalies detected were investigated and all military munitions identified, both MEC and MD, were removed as required by the contractor work plan.

References:

HFA 1994b, UXB 1995a, UXB 1995b, UXB1995c, USA 2000, and Army's RI/FS Work Plan (USACE 2000).

RESULTS OF REMOVAL EVALUATION

A. Can the data be used to perform a risk assessment?	X		

Comments:

ESCA RP Team, HFA, CMS/USA, and UXB removals conducted according to WP including appropriate QA/QC. Because 100% of the data did not have accompanying depth information, depth will have to be extrapolated from the Fort Ord-wide database.
References:

HFA 1994, UXB 1995a, UXB 1995b, UXB1995c, USA 2000, ESCA RP Team 2012.

B. Can the data be used to perform a feasibility study?	X		

Comments:

All inputs to the FS are known. Data was of sufficient quality/quantity to conduct a R/A.
References:

Summary of Existing Data Report (ESCA RP Team 2008).

APPENDIX C

Response to Comments on the Draft Group 2 RI/FS

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
1	General Comment	**Comment:** The *Fort Ord Reuse Authority (FORA) Environmental Services Cooperative Agreement (ESCA) Draft Group 2 Remedial Investigation/Feasibility Study, California State University Monterey Bay Off-Campus Munitions Response Area, Former Fort Ord, California* dated September 17, 2009 (hereinafter referred to as the Draft GP 2 RI/FS CSUMB OC MRA), contains a number of definitions that are repeated in the Glossary sections of the three volumes of the document. In some instances, the definitions are not consistent in each volume where they are presented. In addition, some of the definitions provided do not match those presented in the most recent version of the Department of Defense Ammunition and Explosives Safety Standards (DoD 6055.09-STD). Please review the definitions that are presented in more than one volume of the document and ensure that they are both correct and consistent. Also, please ensure that the definitions of munitions related terms match those presented in the current version of DoD 6055.09-STD. **Response:** The glossary definitions have been revised to be consistent in each volume and to match the most recent version of the Department of Defense Ammunition and Explosives Safety Standards (DoDM 6055.09-M).
2	General Comment	**Comment:** There are a number of instances where the Draft GP 2 RI/FS CSUMB OC MRA notes the discovery of a munitions item without stating whether or not it was expended. This missing information is valuable in some instances for determining what occurred that resulted in the presence of the item at the location. For example, Section 3.1.2.2 1994 Archives Search Report Supplement 1, of Volume 1 notes that, "During a walk-through of the area, a grenade fuze was found in an area located to the east of the CSUMB Off-Campus MRA." As an example of the usefulness of this information, if the item were expended, it likely came from the use of the associated munition and was separated from that munition by the functioning thereof on the site. However, if the item were not expended, it would be a discarded military munition item that may not indicate use of the associated munition on the site, but the random discarding of the item for unknown reasons. As the condition of items is of interest in analyzing the reason for their presence on a site and the subsequent potential activities conducted thereon, please provide information as to whether a discovered item was expended or not (if known) when listing them in the narrative portions of the document. **Response:** When the condition of the item is known, the text has been revised to reflect whether it was expended or not. However, because of past record keeping practices, this type of information was not always recorded.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
3	General Comment	**Comment:** A number of the munitions items listed in Appendix B, MEC Items Found by Sector, of Volume 2, Risk Assessment, do not have a risk code assigned, even though the nomenclature and model (M) numbers of these items are known. Please assign a risk code to these items or provide an explanation as to why the data is insufficient to do so. Also please explain why items with a model (M) number are listed as "Model Unknown." **Response:** The model descriptions in Appendix B are presented exactly as they are stated in the MMRP database, including item descriptions with model numbers that are further described as "model unknown." For the purpose of the Group 2 risk assessment, risk codes have been assigned to the majority of the items for which risk codes are not specified in the MMRP database. The risk codes were assigned based on professional judgment. In cases where more than one risk code could apply to an item type, the highest possible risk code was chosen to assume the worst case scenario. Appendix B tables have been revised to include the assigned risk codes. In some cases, a risk code could not be assigned because the information provided in the item description was not consistent. For example, a risk code could not be assigned to the item described as "Grenade, M33, Practice, W/P (model unknown)" because the model number "M33" represents a high explosive munition; however, the item is also described as a "Practice" item, which is not a high explosive munition. In other cases, item descriptions did not provide enough information to determine a risk code, such as the item described as "Fuzes (model unknown)."
4	General Comment	**Comment:** **Applicable or Relevant and Appropriate Requirements:** Although the Army does not consider California laws and regulations concerning Land Use Covenants (LUCs) to be potential ARARs, DTSC and EPA disagrees with this assessment. Please insert the following agree to disagree language as appropriate: "Although the Army determined that there were no potential Federal or State applicable or relevant and appropriate requirements (ARARS) that relate to LUCs at the CSUMB Off-Campus MRA, LUCs will be implemented in a manner consistent with applicable Federal and State guidance. While the Army does not consider California laws and regulations concerning Land Use Covenants to be potential ARARs, the Army entered into a State Covenant to Restrict the Use of Property at the time the property was transferred,

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
		and after the CSUMB Off-Campus MRA ROD is signed, the existing covenant will be modified, if appropriate, to document the land use restrictions included in the selected remedy. Although DTSC and EPA Region IX disagree with the Army's determination that California laws and regulations concerning Land Use Covenants are not potential ARARs, they will agree-to-disagree on this issue since the Army executed the State Covenant to Restrict the Use of Property and agrees that it will be modified, if appropriate, to be consistent with the selected remedy, in a manner acceptable to DTSC." **Response:** The requested text has been added to the beginning of Section 2.4.2 of Volume 3.
5	General Comment	**Comment:** **Alternative 4 – Land Use Controls Including Contingency to Address Proposed Change in Site Reuse:** The Report stated that the Contingency in Alternative 4 consists of the Residential Quality Assurance (RQA) process, which could include subsurface investigation. The Report further stated that the effectiveness, implementability, and cost for the RQA are still be evaluated. This part of the Report seems to imply that there is insufficient information, presently, to evaluate Alternative 4 using the Nine Criteria. However, later in the report, Alternative 4 was "evaluated" using the Nine Criteria and determined to be the preferred alternative. Please provide a more comprehensive discussion on the RQA Pilot Study and how the results of the study support Alternative 4's nine criteria evaluation. **Response:** In consultation with the Army, the RQA Pilot Study (Phase I) and RQA Process Implementation Study (Phase II) were completed in a portion of the CSUMB Off-Campus MRA under a field variance to the Final Group 2 RI/FS Work Plan since the issuance of the Draft Group 2 RI/FS. As a result, RQA has been eliminated from the FS as a remedial technology component. Alternative 4, Land Use Controls Including Contingency to Address Proposed Change in Site Reuse, has been removed as a remedial alternative and Alternative 2, Land Use Controls, has been revised to include the removal of the residential use restriction from the future residential reuse area. The field activities, results, and conclusions of the RQA Pilot Study and RQA Process Implementation Study conducted in 2009 and 2011, respectively, are presented in the CSUMB Off-Campus MRA RQA Process Pilot Study Technical Information Paper (RQA TIP; ESCA RP Team 2012). The data collected during the RQA Process has been incorporated into the Group 2 RI/FS.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
1	Specific Comment, Volume I – Remedial Investigation, Glossary, Page ix	**Comment:** The definition of Construction Support found here does not match that found in DoD 6055.09-STD. The correct definition is as follows: **Construction Support.** Assistance provided by DoD explosive ordnance disposal (EOD) or UXO-qualified personnel and/or by personnel trained and qualified for operations involving CA, regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards. In addition, the definition provided in the Glossary section of Volume 1 indicates that "qualified UXO personnel" may provide this support, which is not always the case. Care must be taken in the use of the terms "UXO Personnel," "UXO Technicians," "qualified UXO personnel," and "UXO-Qualified Personnel," as they are not necessarily interchangeable. In some instances, they appear to be used in a manner that may conflict with Department of Defense Explosives Safety Board (DDESB) Technical Paper 18 (Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel). The following are the related definitions presented in that document: • UXO-Qualified Personnel: Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist or Senior UXO Supervisor. • UXO Technician: Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III. The term "UXO Sweep Personnel" is not formally defined, although the training and functions thereof are outlined in the DDESB Technical Paper 18. However, it is listed under the heading of "UXO Related Position Titles and Tasks" in that Technical Paper, as are the UXO Technician I, UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist and Senior UXO Supervisor. These positions are UXO personnel per the title of Technical Paper 18. The term "qualified UXO personnel" can mean any of these individuals that are qualified to perform

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
		their UXO related functions (including UXO Technician I and UXO Sweep Personnel). However, the term "UXO-Qualified" does not include UXO Sweep Personnel or UXO Technician I by definition. Care must be exercised in the use of these terms to avoid the presentation of incorrect information by their misuse. This could result in individuals performing functions that they are not fully qualified to perform. Please replace the noted definition found in the Glossary Section with that found in the current version of DoD 6055.09-STD. Also, please review the use of the noted UXO Personnel terms in the three volumes of the Draft GP 2 RI/FS CSUMB OC MRA and correct them as necessary to comply with the definitions found in DDESB Technical Paper 18. **Response:** The definition of construction support has been revised to match the definition provided in DoD 6055.09-STD. In addition, use of the term "qualified MEC personnel" has been replaced with "UXO-qualified personnel" in the document.
2	Specific Comment, Volume I – Remedial Investigation, Section 2.2.1, CSUMB Off-Campus MRA Location and Description, Page 2-2	**Comment:** The first sentence of the next to last paragraph of this section states that, "The locations and designations of the MRSs are presented in Figure 3." However, a review of Figure 3, CSUMB MRA Facility Profile Physical Features, indicates that this information is not presented on the cited figure. Please review Figure 3 and revise it as necessary to present the missing information. **Response:** Three figures have been added to the RI and figures numbers have been adjusted. The cited statement has been revised to refer the reader to Figure 4, CSUMB Off-Campus MRA RQA Munitions Response Site Boundaries and RQA Pilot Study Area, which includes MRS boundaries.
3	Specific Comment, Volume I – Remedial Investigation, Section 3.1.1.3, 1950s Era, Page 3-3	**Comment:** The fourth primary bullet in the section contains the acronym "FBTA," with no definition thereof provided, nor is there a statement that the meaning of this acronym is unknown. Please revise the cited bullet to provide a definition of "FBTA" or a statement that the meaning is unknown. **Response:** The text has been revised as follows: · A 1956 training area map (Army 1956) indicated the same general training areas as the 1953 map described above with the addition of a black rectangle in the northwestern portion of the CSUMB Off-Campus MRA (just north of the location identified

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
		as MRS-18 in the 1997 ASRs), which was previously assigned the number "2" in the 1953 map, and a rectangular area labeled "FBTA" in the southeastern corner of the MRA. ***No definition of "FBTA" was provided on the map; however, this may indicate a Field Battalion Training Area or Firing Battery Training Area.*** The black rectangle shown on the map may have represented the training area for mines and booby traps.
4	Specific Comment, Volume I – Remedial Investigation, Section 3.1.1.3, 1950s Era, Page 3-4	**Comment:** The second bullet on page 3-4 states that, "An undated "Beardsley" map of Fort Ord showed a range fan extending from FP-1 to the southern boundary of the impact area." No explanation of what constitutes a "Beardsley" map is provided. Please revise the cited bullet to define a "Beardsley" map, or provide a definition thereof elsewhere in the document. **Response:** The second bullet has been revised as follows: · "FP-1", which was an abbreviation for a firing point, in the BM Blanco Training Area along the southeastern boundary of the MRA. An undated ***map with a hand-written note designated as the*** "Beardsley" map**"** of Fort Ord showed a range fan extending from FP-1 to the southern boundary of the impact area. The FP-1 designation did not appear on later facility training maps.
5	Specific Comment, Volume I – Remedial Investigation, Section 3.1.3.2, 1940s Training, Page 3-11	**Comment:** The subsection entitled "Practice Rifle Grenade Training" contains information on training using munitions items that are not practice rifle grenades. Please review the contents of the subsection and revise the title to better reflect the types of munitions discussed therein. Also in the "Rifle Grenade, Smoke" subparagraph of the above noted subsection, the following is found: "Pyrotechnics were generally used for signaling and ground smoke. The M23A1 was used only for signaling. The M22, M22A2, and M19 WP were used for both signaling and smoke screens. The grenades were fired from a rifle equipped with a grenade launcher and functioned on impact. At impact, a firing pin would strike a primer producing a flame, which ignited a starter mixture charge, which in turn, ignited a smoke mixture charge." This functioning description is correct for all of the listed munitions except the M19 series white phosphorous (WP) rifle grenade and the M23A1, which is a colored smoke streamer rifle grenade. The M19 had an internal detonator that exploded and ruptured the case of the munition to disperse the WP filler. The fire from the grenade cartridge that fires the item ignited the M23A1 filler. It then disperses colored smoke as a streamer that follows the trajectory of the grenade, and it does not function on impact as stated in the cited subparagraph. Please correct this in the cited narrative.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
		Response: The cited subsection title has been revised to "Rifle Grenade Training" to be inclusive of all items discussed in the subsection. The subparagraph titled "Rifle Grenade, Smoke" has been revised to correctly state the functionality of the munitions discussed and to reflect model numbers consistent with the updated data presented in Appendix A. These changes are as follows: **"Rifle Grenade, Smoke**: Pyrotechnics were generally used for signaling and ground smoke. The M23~~A1~~ ***series rifle smoke grenade*** was used only for signaling. The M22~~A2~~ ***series*** and M19***A1*** WP ***rifle smoke grenades*** were used for both signaling and smoke screens. The ***M22 series*** grenades were fired from a rifle equipped with a grenade launcher and functioned on impact. At impact, a firing pin would strike a primer producing a flame, which ignited a starter mixture charge, which in turn, ignited a smoke mixture charge. ***The M19A1 WP was equipped with an internal detonator that exploded rupturing the case of the munition to disperse the WP filler. The filler of the M23 was ignited by the fire from the grenade cartridge that fired the item. It then dispersed colored smoke as a streamer that followed the trajectory of the grenade.***"
6	Specific Comment, Volume I – Remedial Investigation, Section 3.1.3.3, 1950s to 1980s Training, Page 3-15	**Comment:** The last sentence of the first paragraph of the subsection entitled "Practice Mortar Training" that is found on page 3-15 states that, "The projectile was fin-stabilized in flight. Since the projectile was inert, there was no detonation upon impact, and the cartridge could be recovered for reuse." As the common definition of the term cartridge is all of the items necessary to fire the weapon once, the expended practice item found downrange is a projectile and not a cartridge, as the propelling elements of what was the mortar cartridge have been expended and the remnants are no longer a cartridge (i.e., not a complete round). Please replace the word "cartridge" with the word "projectile" in the cited sentence. **Response:** The term cartridge has been replaced with the word projectile in the cited text.
7	Specific Comment, Volume 2 – Risk Assessment, Section 2.4,	**Comment:** The first sentence in the last paragraph on page 2-3 notes that, "Additionally, the MEC items evaluated in the risk assessment were nonpenetrating and, therefore, would not be expected at depth unless they were deposited in burial pits." The intent of this sentence is unclear and it may be somewhat misleading as written. Of concern is the statement that the items "…would

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
	MEC Density, Page 2-3	not be expected at depth…" The term "depth" is nebulous and could be misconstrued to mean at any depth below the surface, which is incorrect. Please revise the cited paragraph to reflect the fact that the items may be found at shallow subsurface depths ands well as on the surface. **Response:** The text has been revised as follows: "Additionally, the MEC items evaluated in the risk assessment were non-penetrating and, therefore, ***would be expected on the surface or at shallow depths below ground surface and*** would not be expected at depth***s*** greater than 1 ft bgs unless they were deposited in burial pits."
8	Specific Comment, Volume 3 – Feasibility Study, Glossary, Page vii	**Comment:** The definition of the term "Construction Support" does not match that found in DoD 6055.09-STD. Please note the related information found in Specific Comment 1 above and correct the definitions and terminology as requested therein. **Response:** The definition of construction support has been revised in all volumes to match the definition found in DoD 6055.09-STD.
9	Specific Comment, Volume 3 – Feasibility Study, Glossary, Page ix	**Comment:** The definition of the term "Material Potentially Presenting an Explosive Hazard (MPPEH)" does not match that found in DoD 6055.09-STD. It is also inconsistent with the definition of the same term found in the Glossary in Volume 1, which does match that found in DoD 6055.09-STD. Please revise the Volume 3 definition of MPPEH to match that found in the Glossary section of Volume 1. **Response:** The definition of MPPEH has been revised in all volumes to match the definition found in DoD 6055.09-STD.
10	Specific Comment, Volume 3 – Feasibility Study, Section 3.1.2.5, Construction Monitoring, Page 3-3	**Comment:** The title and contents of this section are confusing. Is this intended to describe the same process evaluated by Section 3.2.2.6, Construction Support? If so, why the disparate titles? Also, why does 3.1.2.5 use the term "qualified MEC personnel (Military munitions specialist[s])" and Section 3.2.2.6 use the differing term "qualified UXO-trained personnel," neither of which is technically correct? Please review the contents of the two cited sections and determine if they are discussions of the same process. If so, please make them consistent and also correct the terminology used to describe the personnel that will be involved. If the two sections describe different processes (i.e., Construction Monitoring and Construction Support

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

No.	Comment Type / Report Section	Comment/Response
		are two different processes), please explain this in the appropriate location in Volume 3. **Response:** The title of the section has been revised to "Construction Support." In addition, the terms "qualified MEC personnel (Military munitions specialist[s])" and "qualified UXO-trained personnel" have been replaced with "UXO-qualified personnel" throughout Volume 3.
11	Specific Comment, Volume 3 – Feasibility Study, Section 3.1.4.2, Instrument-Aided Surface MEC Remediation, Page 3-5	**Comment:** This section appears to describe what DoD 6055.09-STD defines as a "Technology-Aided Surface Removal," which is defined as follows: **Technology-Aided Surface Removal.** A removal of UXO, DMM, or CWM on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., handheld magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM, or CWM, or other factors make visual detection difficult. If this is what is intended, please change the section title to read, "Technology-Aided Surface Removal" and use this term throughout the Draft GP 2 RI/FS CSUMB OC MRA when discussing this process. If this is not what is intended, please provide an explanation of the intent. **Response:** The term "Technology-Aided Surface Removal" has been used to describe the process in Section 3.1.4.2 and throughout Volume 3 where appropriate. Additionally, the glossary has been modified to include the DoD 6055.09-STD definition.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Judy Huang of the EPA, dated November 19, 2009

[this page intentionally left blank]

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
1	Volume 1 – Remedial Investigation, Page 1-1, Section 1.0 Introduction	**Comment:** Fourth paragraph describes *Track 1 Plug-In Approval Memorandum, County North Munitions Response Area (MRA), Former Fort Ord, California* as having been released for "approval by the regulatory agencies and the general public" in August 2009. This is not correct. The referenced document was made available for a 30-day public review period on August 28, 2009. Public comments were accepted through September 28, 2009. The Army will request agency concurrence only after considering the public comments that were received during the review period, and revising the approval memorandum if necessary. Please correct the text in this section to reflect the correct Track 1 plug-in process. The same comment applies to other portions of the RI/FS where this information is presented. **Response:** Occurrences of the cited text reading, "In August 2009, the Track 1 Plug-In Approval Memorandum ("the Approval Memorandum") was submitted for the County North MRA by the Army for approval by the regulatory agencies and the general public (Army 2009)" have been revised as follows: "In August 2009, the Track 1 Plug-In Approval Memorandum ("the Approval Memorandum") was submitted for the County North MRA by the Army for ~~approval by the regulatory agencies and the general public~~ ***public review and comment*** (Army 2009b). ***A notice announcing agency concurrence with the Approval Memorandum was published on March 16, 2010."***
2	Volume 1 – Remedial Investigation, Page 1-5, Section 1.2.3 FORA ESCA Remediation Program	**Comment**: The first paragraph discusses the status of the Army's Basewide Range Assessment (BRA) program under which investigation of potential munitions constituents (MC) is conducted at the former Fort Ord. As correctly described in this section, at the time the Finding of Suitability for Early Transfer (FOSET) was issued for the ESCA properties in November 2007, no further action was recommended for the historical areas (HAs) located within the CSUMB Off-Campus MRA based on an evaluation dated December 2006. Subsequently additional soil sampling was conducted within HA-161 which resulted in a recommendation for an Interim Action to remove soil contamination from one area with an elevated concentration of lead in shallow soil. Additional information is available in *Approval Memorandum, Proposed Interim Action Excavation, IA Areas 29B HA-161, Site 39B - Inter Garrison Training Area, Former Fort Ord, California*, dated March 18, 2009 (Administrative Record Number IAFS-233). The regulatory agencies have approved the proposed Interim Action excavation at HA-161. The Army will provide advance notice to Fort Ord Reuse Authority (FORA) of the planned fieldwork related to this action. In addition, please note that the most current

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		status of HAs are compiled in *Final Comprehensive Basewide Range Assessment Report, Former Fort Ord, California, Revision I* , June 2009 (Administrative Record Number BW-2300J). **Response**: The first paragraph of this section has been revised to include explanation of the approved additional soil sampling at HA-161. Changes to the text in this section are as follows: "The purpose of the ESCA RP is to provide the necessary environmental services to FORA, which include characterization, assessment of explosive risk, FS, remediation alternatives analysis, and performance of remediation of hazardous substances, including but not limited to MEC (excluding the Army-retained conditions described in Section 1.2.2). The primary objective of the ESCA RP is timely cleanup of the property in accordance with the ESCA and AOC. The potential for soil contamination from munitions constituents at the former Fort Ord is being addressed under the Army's BRA Program (Shaw/MACTEC 2009). As stated in FOSET 5, based on the BRA Program, no further action ~~has been~~***was*** recommended for historical areas (HAs) within the CSUMB Off-Campus MRA (Army 2007). In addition, Installation Restoration Program (IRP) Site 39B (Inter-Garrison Site) is located within the CSUMB Off-Campus MRA. As stated in the FOSET, the EPA and the DTSC have concurred that no further action is necessary at Site 39B (Army 2007)***; however, subsequent soil sampling performed within the MRA resulted in a recommendation for an Interim Action to remove soil contamination from one area with an elevated concentration of lead in shallow soil (Army 2009a). In February 2010, Shaw Environmental, Inc. (on behalf of the Army) excavated approximately 20 cubic yards of soil from HA-161 and disposed of the soil in the Operable Unit 2 landfills. Confirmation samples collected from the excavation indicated that residual soil concentrations for lead were below the target cleanup concentrations. The results of the soil removal activities were presented in the Draft Final Interim Action Confirmation Report (Shaw 2011).***"
3	Volume 1 – Remedial Investigation,	**Comment**: The information provided in this section is not incorrect. However, it should be noted that Parcel S1.3.2 is designated in the 1997 Fort Ord Base Reuse

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
	Page 2-5, Section 2.7 Land Use	Plan as "school/university" with residential infill opportunities, and that the plan to use the parcel for residential and open space uses is based on the CSUMB Master Plan. Current land use restrictions should also be noted. (Same comment applies to Volume 2 Risk Assessment, Section 3.1 and Volume 3 Feasibility Study, Section 2.3.3.) **Response**: The text of Section 2.7 of Volume 1, Section 3.1 of Volume 2, and Section 2.3.3 of Volume 3 have been revised to include the land use designation and land use restrictions of Parcel S1.3.2.
4	Volume 1 – Remedial Investigation, Section 3.0 CSUMB Off-Campus MRA Remedial Investigation	**Comment**: We would like to suggest that stronger discussions about the validation of existing data would better support the conclusions of the RI, the risk assessment and the feasibility study (FS). · p.3-1, Section 3.0 CSUMB Off-Campus MRA Remedial Investigation. The two major decision points for the RI concern the quality of the available data, but they do not address the availability of sufficient quantity of data. We understand that this finding has already been made prior to the RI/FS (in the RI/FS Work Plan and Summary of Existing Data Report), but it should be re-stated here so a reader does not need to look up additional documents for that information. · p.3-22, Section 3.4 Collection and Management of Field Data. A review of referenced after-action reports indicates that locations of recovered items (such as MEC and MD) were not always recorded by the munitions response contractor. However, this section does not discuss this topic at all. Please consider providing an evaluation with regard to the availability and quality of item location information. If such an evaluation was determined not to be relevant, please provide the rationale. **Response**: In response to the first bulleted item above, the following changes have been made to include discussion regarding the quantity of existing data available for the CSUMB Off-Campus MRA: The first bullet point has been revised as follows: "Is the site characterization data of known and sufficient quality ***and***

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		quantity to adequately characterize the nature and extent of MEC?" The following text has been added to Section 3.0: ***"As discussed in the Group 2 RI/FS Work Plan and the SEDR, data from these munitions response actions completed by the Army within the CSUMB Off-Campus MRA are available in the MMRP database and after-action reports, and appear to be of sufficient quality and quantity to update the CSMs and support the development of an RI/FS."*** In addition, the last bullet of Section 6.1 has been revised and two additional bullets have been added as follows: · *"**As described in the SEDR and Group 2 RI/FS Work Plan,*** ~~T~~*t*he existing data that was included in the MMRP database for the CSUMB Off-Campus MRA was of sufficient quality and quantity to complete the risk assessment and feasibility study for the CSUMB Off-Campus MRA. · ***The data collected for the RQA Process Pilot Study further supported the historical military use of the western portion of the MRA and was of sufficient quality and quantity to enhance the risk assessment and feasibility study for the CSUMB Off-Campus MRA.*** · ***As described in the CSUMB RQA TIP (ESCA RP Team 2012), based on the RQA Process evaluation, including results of the RQA Pilot Study and ESCA RQA Process Implementation Study, the data collected supported the recommendation of approximately 49 acres proposed for future residential reuse within the CSUMB Off-Campus MRA as acceptable for future residential reuse with appropriate institutional controls, such as the county ordnance ordinance, construction support, and disclosures.***" In response to the second bullet point, the first paragraph of Section 3.4 has been revised as follows: "The data collected during the removal actions conducted by HFA,

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		UXB, and USA were recorded in daily field journals and on grid sheets. Daily field journals from UXB were not available for review. The grid sheets included descriptions of the MEC items encountered in each grid and were provided in the final reports prepared by each of the contractors (HFA 1994b, UXB 1995a, UXB 1995b, UXB 1995c, and USA 2000). ***Although exact location and depth data was not collected for MEC and MD removed during grid sampling and removal actions, and the exact location of items found cannot be plotted on maps, the grid in which each item of MEC and MD was encountered was recorded.*** The data recorded on the grid sheets were also included in the Army's MMRP database. The Army has previously evaluated the collection and management of field data for past munitions response actions. The evaluation conducted by the Army was used to support the validation of data collected by the Army and its contractors, which included the following activities:"
5	Volume 1 – Remedial Investigation, Page 3-21, Section 3.3.2 Evaluation of Schonstedt Model GA-52CX Magnetometer Detection Efficiency	**Comment**: This section provides a qualitative discussion of the limitations of Schonstedt magnetometers and rationales for considering that they were effective [at detecting anomalies] during the previous MEC removal actions at the CSUMB Off-Campus MRA. The second to the last bullet discusses that the majority of MEC items expected at the site were shallow and/or nonpenetrating types which generally are readily detectable by the Schonstedt. However, on the previous page, "limitations" included the inability of the Schonstedt to detect non-ferrous items" such as the grenade fuzes found in abundance at the CSUMB Off-Campus MRA." Please provide additional text addressing the listed limitations to better support the stated conclusion. **Response**: The following bullet has been added to Section 3.2.2 to clarify that the limitations of the Schonstedt did not reduce the ability to detect non-ferrous MEC in the CSUMB Off-Campus MRA: · ***Unexpended non-ferrous MEC such as the grenade fuze, in additional to being non-penetrating types expected to be shallow, contain ferrous components that increase the likelihood of detection with the Schonstedt magnetometers. Expended items may contain fewer ferrous components but are not hazardous.***
6	Volume 1 – Remedial Investigation,	**Comment**: First paragraph, third sentence states that the objectives of the MEC removal actions conducted at the CSUMB Off-Campus MRA was "to remove detected

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
	Page 4-1, Section 4.2.1 Investigation and Removal Action Design	MEC, munitions debris, and cultural debris." This is not a correct description of MEC removal actions previously conducted by the Army in the subject property. Although munitions debris and other debris may be removed during a course of a removal action, removal of these non-explosive items is not a part of the main removal action objective. Please modify the sentence to avoid potential misunderstanding. **Response**: The cited text has been revised as follows: "The ***main*** objective of the removal actions was to remove detected MEC~~, munitions debris, and cultural debris~~ from the MRA to a depth of 3 to 4 ft (or deeper)."
7	Volume 1 – Remedial Investigation, Page 5-1, Section 5.0 Conceptual Site Model	**Comment**: The information listed here about the site, including the historical training uses and MEC items recovered during the removal actions, indicates that the site was used for military training with military munitions of practice and pyrotechnic types. Based on the information provided in this section it could appear that the site could meet the Track 1, Category 3 criteria requiring no further munitions response action. In order to communicate the appropriateness of evaluating the site further, it should be clarified here that there are indications that suggest possible past uses of high explosive items within portions of the CSUMB Off-Campus MRA. In addition, please clarify the following points regarding these items. · p.3-10, Section 3.1.3.1 Pre-World War II Training. This section cites four MKII fragmentation hand grenades as having been recovered from the CSUMB Off-Campus MRA. This is consistent with Appendix A "Summary of CSUMB Off-Campus MRA MEC and MD Data by OE Model Number" (OE Model 148). However, Appendix A "Summary of CSUMB Off-Campus MRA MEC and MD Data by Functional Group (No OE Model Number Assigned)" indicates that perhaps only two of the items could have been MKII fragmentation hand grenades. In addition, p.4-6, Section 4.2.2.5 Hand Grenade Training, first bullet, states "six MKII were found in separate locations across the MRA." Please review these sections and correct the apparent inconsistency. · p.4-9, Section 4.2.2.7 Miscellaneous Items (under Types of Munitions Removed). At the end of this section, miscellaneous types of items found in the CSUMB Off-Campus MRA are listed, with a note that: "Because a very few of the above-listed miscellaneous items were found during the removal actions…, there was no pattern

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		of use that indicated training with these items in this area." The listed miscellaneous items include "squibs and blasting caps" and "bulk explosives." However, these types of items were described in Section 4.2.2 as having an indication of a pattern of use in the CSUMB Off-Campus MRA (page 4-2). These sections appear to be in conflict with each other. Please review the information again and update these sections as appropriate. **Response**: To clarify the appropriateness of evaluating the MRA further, the following paragraph has been added to Section 5.0: ***"High explosive items, including M9 series rifle grenades and MKII fragmentation hand grenades, were found at various locations throughout the MRA. Given that few of these items were recovered and that the locations of the items were scattered across the MRA, no pattern of use was observed for HE items. A pattern of use was identified for bulk HE. The MEC and MD recovered indicate that HE items may have been used during training operations in portions of the MRA."*** In response to the comment for Page 3-10, Section 3.1.3.1: Table A-1, Summary of CSUMB Off-Campus MRA MEC and MD by OE Model Number, includes MEC and MD items found at the CSUMB Off-Campus MRA listed by model number, when known. Items without known model numbers are summarized as "NO MODEL ASSIGNED – See Summary of Functional Group" at the top of Table A-1. Items with no known model numbers are further described in Table A-2, Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned). The four MKII fragmentation hand grenades (OE Model 148) recovered at the CSUMB Off-Campus MRA are listed in Table A-1. In addition, two MKII grenades with unknown model numbers were recovered from the MRA and are detailed in Table A-2. Because the model numbers of these two items are unknown, the time frame for when they were used (i.e., Pre-World War II) cannot be determined with certainty. Therefore, of the six total MKII hand grenades found at the CSUMB Off-Campus MRA, only four are included in the discussion of Pre-World War II Training in Section 3.1.3.1. All six are, however, included in the MK II Fragmentation Grenade Training discussion in Section 4.2.2.5. In response to the comment for Page 4-9, Section 4.2.2.7: The last paragraph of this section has been revised to remove the bullet items for squibs, blasting caps, and bulk explosives. Discussion of squibs, blasting caps, and bulk

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		explosives has been incorporated into Section 4.2.2.3, Booby Trap Training.
8	Volume 1 – Remedial Investigation	**Comment**: The RI should describe that the Residential Quality Assurance (RQA) pilot test fieldwork has been completed in a portion of the site. If the data from the RQA pilot test is available, it should be included as part of the RI/FS evaluation. **Response**: Section 1.2.4, Regulatory Pathway to Closure, of the RI has been revised to include a brief description of the RQA Pilot Study and RQA Process Implementation Study completed in a portion of the proposed future residential reuse area of the CSUMB Off-Campus MRA. Section 3.5, Residential Quality Assurance Process Pilot Study, has been added to the RI and describes the pilot study process in greater detail and presents the resulting recommendations. Data collected during the pilot study and implementation study have been incorporated into the RI/FS. The pilot study and implementation study were not conducted as an investigation or removal action, therefore, are not included in the evaluation of previous investigations and removal actions.
9	Volume 2 – Risk Assessment	**Comment**: Appendix B, Tables listing MEC items found in the CSUMB Off-Campus MRA. These tables list the MEC items, their munitions model description, risk code, quantity, northing and easting, and depth. The information is presumed to have been obtained from the Fort Ord MMRP Database. Itshould be noted, however, that precise MEC locations and depths were not recorded during the field work by HFA and the depths of recovered MEC items were not reported by UXB in after-action reports; therefore, the data was not available for entry into the MMRP database. In the absence of these details the MMRP Database has assigned the depth of zero (on the surface) and the northing and easting of the center of the grid so that these items can be displayed on a map. Such data quality issue was not described in the Risk Assessment and these tables. Therefore, a reader might incorrectly interpret that the location and depth information provided here represents the actual and precise locations and depths from which these items were recovered. Please provide a brief text at the end of these tables and/or in the body of the report to clarify the data quality so that a reader is made aware of the issue and be prompted to review a comprehensive data evaluation in the RI or the referenced source documents. **Response**: The following footnote has been added to Tables B-1 and B-2 of Appendix B: ***"The depths of items recovered by HFA and UXB were not recorded***

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
		at the time of removal activities; therefore, the MMRP database has assigned the depth of zero (on the surface) for the recovered items. The exact locations (northing and easting coordinates) of items recovered by HFA and UXB were not recorded at the time of removal activities. To facilitate mapping of these items, the MMRP database has assigned the northing and easting of the recovered items to the center of the grids in which the items were found."
10	Volume 3 – Feasibility Study, Alternative 4 LUCs including Contingency to Address Proposed Change in Site Reuse	**Comment**: The remedial alternative includes a component that would provide additional information, which would remove the existing residential restriction. In the evaluation of alternatives, depending on which of the nine criteria is being evaluated, this component was assumed to be (a) additional subsurface MEC removal or (b) RQA. But in Section 3.2.2.10, effectiveness and technical feasibility of the RQA were described as unknown. Therefore the long-term effectiveness and implementability of Alternative 4 cannot be fully evaluated based on the information presented in the draft RI/FS. Please consider updating the information regarding RQA by providing additional information from the RQA pilot test that is currently in progress within the CSUMB Off-Campus MRA. **Response**: The RQA Pilot Study (Phase I) and RQA Process Implementation Study (Phase II) were completed in a portion of the CSUMB Off-Campus MRA under a field variance to the Final Group 1 RI/FS Work Plan since the issuance of the Draft Group 2 RI/FS. As a result, RQA has been eliminated from the FS as a remedial technology component. Alternative 4, Land Use Controls Including Contingency to Address Proposed Change in Site Reuse, has been removed as a remedial alternative. Alternative 2, Land Use Controls, has been revised to include the removal of the residential use restriction from the future residential reuse area. The field activities, results, and conclusions of the RQA Pilot Study and Implementation Study conducted in 2009 and 2011, respectively, are presented in the RQA Process Pilot Study Technical Information Paper (RQA TIP; ESCA RP Team 2012). The data collected during the RQA Process has been incorporated into this Group 2 RI/FS.
11	Volume 3 – Feasibility Study, Page 2-6, Section 2.2.2 Annual Monitoring and Five Year	**Comment**: Here a general description of the five-year review requirements is provided. Please note that CERCLA five-year reviews are conducted as a basewide effort at the former Fort Ord and the status of all of the remedies at the former Fort Ord will be reviewed together. The next five-year review will occur in 2012.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
General Comments

No.	Comment Type / Report Section	Comment/Response
	Review Reporting (under "Long-Term Management Measures Specific to the CSUMB Off-Campus MRA")	**Response**: The text in Section 2.2.2 has been revised to include additional information regarding the CERCLA five year review process as follows: ***"CERCLA five-year reviews are conducted as a basewide effort at the former Fort Ord. All remedies at the former Fort Ord are reviewed together, including*** ~~A review of~~ the remedy selected for the CSUMB Off-Campus MRA reuse areas ~~will be conducted within five years after implementation~~. The purpose of the five-year review is to determine whether the remedy at a reuse area continues to be protective of human health and the environment (1) within a period of five years from the time the remedy was implemented, or (2) five years from the time of a previous five-year review. The results of annual monitoring and the methods, findings, and conclusions of the five-year review will be documented in a five-year review report, which will identify any recommendations to address them, as appropriate. ***The next five-year review will occur in 2017."***
12	Volume 3 – Feasibility Study	**Comment**: FS cost estimates for the remedial alternatives are understood to be FORA costs. Cost estimates for the Long-Term Management Measures need to be clarified if some or all of the costs are intended to be Army costs. **Response**: The following footnotes have been added to Table 5-2 which describes the long-term management costs: [1] Costs for initial deed notice and modification of deed notice assumed by FORA. [2] Costs of annual monitoring assumed by FORA until land is transferred to recipient. [3] Costs of first two five-year review reports (for 2012 and 2017) assumed by FORA, then covered by the Army.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
1	Volume 1 – Remedial Investigation, Page 1-1, Section 1.0 Introduction	**Comment**: It would be helpful to add to this section text that indicates the status of munitions response at the site, i.e. subsurface removal of munitions and explosives of concern (MEC) has already been conducted in the entire footprint of the subject MRA. Otherwise this information is not provided until the middle of Section 3. **Response**: The text in Section 1.0 of Volume 1 has been revised as follows: "***In accordance with the guidance provided in the Group 2 RI/FS Work Plan (ESCA RP Team 2009), t***~~T~~he ***Group 2 RI/FS R***~~r~~eport is based on the evaluation of previous work conducted for the CSUMB Off-Campus MRA~~ according to the guidance provided in the Group 2 RI/FS Work Plan (ESCA RP Team 2009)~~. ***Previous removal actions included subsurface removal of MEC throughout the entire footprint of the MRA.***"
2	Volume 1 – Remedial Investigation, Page 1-6, Section 1.2.4 Regulatory Pathway to Closure	**Comment**: Second paragraph, last sentence reads "The Army ROD includes the preparation of a Remedial Design/Remedial Action Work Plan and an Institutional Control Implementation Plan, execution of necessary remedial actions, and preparation of a Remedial Action Completion Report to document that the requirements for closure have been met." The Record of Decision would describe the selected remedy, but would not include documents such as a Remedial Design/Remedial Action Work Plan and a Remedial Action Completion Report. Therefore the current sentence is confusing with regard to the scope of the Record of Decision that would be developed for the CSUMB Off-Campus MRA. Please revise the sentence. **Response**: The end of the second paragraph has been revised as follows: "~~The Army ROD includes the preparation of a Remedial Design/Remedial Action Work Plan and an Institutional Control Implementation Plan, execution of necessary remedial actions, and preparation of a Remedial Action Completion Report to document that the requirements for closure have been met.~~ ***Following approval of the Army ROD, the remaining regulatory requirements will include the preparation of a Remedial Design/Remedial Action Work Plan and an Institutional Control Implementation Plan, execution of necessary remedial actions as appropriate, and preparation of a Remedial Action Completion Report to document***

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
		that all requirements for closure have been met."
3	Volume 1 – Remedial Investigation, Page 2-2, Section 2.2.1 CSUMB Off-Campus MRA Location and Description	**Comment**: Second to the last paragraph indicates that the locations and designations of munitions response sites (MRSs) within the CSUMB Off-Campus are presented in Figure 3. However, neither Figure 3 or any other figure included in the RI show the boundaries of MRSs. Please include the boundaries of affected MRSs in one of the figures. **Response**: Three figures have been added to the RI and figures numbers have been adjusted. The statement in the second to last paragraph of Section 2.2.1 has been revised to refer the reader to Figure 4, CSUMB Off-Campus MRA RQA Munitions Response Site Boundaries and RQA Pilot Study Area, which includes MRS boundaries.
4	Volume 1 – Remedial Investigation, Page 3-15, Section 3.2 Previous MEC Investigations and Removal Actions	**Comment**: The subsections describe the previously conducted removal actions as "100% removal operations" and "100% removal actions." The use of percentages to categorize MEC investigation activities has been noted as confusing to some people. Please use alternative wording if possible. **Response**: The term "100%" has been removed from the text in cases where it refers to removal operations and removal actions.
5	Volume 1 – Remedial Investigation, Page 3-17, Section 3.2.1.2 HFA 100% Removal Operations	**Comment**: Third paragraph, fourth sentence describes the 1994 MEC removal action by HFA as a 4-ft removal. However, in Section 3.1.2.3 (p.3-9) it was described as a 3-ft removal action. Please review the information and correct the discrepancy. **Response**: The text in Section 3.1.2.3 has been corrected as follows: "The Army's contractor, HFA, conducted a ~~3~~***4***-ft removal action in approximately three-quarters of the Site's CSU Footprint, generally encompassing most of the western portion of the site."
6	Volume 1 – Remedial Investigation, Page 3-17, Section 3.2.1.2 HFA 100% Removal	**Comment:** Fifth paragraph describes the HFA removal action data recorded/not recorded and available/not available, as follows: "The depths of detections, and the types of range-related and cultural debris located were not included in the information provided in the final report (HFA 1994b). In addition, depths were not recorded in the MMRP database for the MEC items removed from [*sic*] during the HFA's removal actions; however, the HFA Phase III work

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	Operations	plan did not indicate that the depths of MEC items removed would be recorded as part of the removal action activities (HFA 1994a)." The current text is potentially confusing in that (a) it suggests that locations of range-related and cultural debris were recorded, b) it suggests that depths of recovered MEC item were recorded by HFA and available, but were not entered into the MMRP database, and (c) because it does not discuss locations of recovered items as being recorded, the information may be assumed to be available in the after action reports and for inclusion in the MMRP database. In addition, it does not discuss the availability of data concerning munitions debris that might have been removed during the subject work. Please reevaluate the text and modify it to reduce the potential for misinterpretation as described above. **Response**: The cited text in Section 3.2.1.2 has been revised as follows: "The depths of detections, and the types of range-related and ~~cultural~~ other debris located ***were not recorded, and therefore*** were not included in the information provided in the final report (HFA 1994b); ***the HFA Phase III work plan did not indicate that the depths of MEC removed would be recorded as part of the removal action activities (HFA 1994a).*** ~~In addition~~***As a result***, depths were not ~~recorded~~ ***included*** in the MMRP database for the MEC items removed during the HFA's removal action~~; however, the HFA Phase III work plan did not indicate that the depths of MEC items removed would be recorded as part of the removal action activities (HFA 1994a)~~. ***The HFA after-action report included the gird identification in which the MEC were found; however the exact location of the items (such as northing and easting coordinates) were not recorded.***"
7	Volume 1 – Remedial Investigation, Page 3-18, Section 3.2.1.3 UXB 100% Removal Operations	**Comment**: Third paragraph, last sentence states that the recovered MEC items were turned into the DRMO. Please check the accuracy of this statement. In addition, the referenced report (UXB, 1994a) is not listed in Section 7.0 References. **Response**: The reference has been corrected in Section 3.2.1.3 to reflect the cited report as UXB 1995a. Section 10.2 of UXB 1995a confirms that all MEC were disposed of onsite through the Fort Ord Defense Reutilization and Marketing Office (DRMO).
8	Volume 1 – Remedial	**Comment**: Fourth paragraph, fourth sentence reads: "Various inert MEC items were

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	Investigation, Page 3-18, Section 3.2.1.3 UXB 100% Removal Operations	buried…within the test area lanes." The buried test items were most likely inert munitions items, not MEC. Please check this information and modify the statement as appropriate. **Response**: The cited text in Section 3.2.1.3 has been revised as follows: "Various inert ~~MEC~~ ***munitions*** items were buried…within the test area lanes."
9	Volume 1 – Remedial Investigation, Page 3-19, Section 3.2.1.3 UXB 100% Removal Operations	**Comment**: Fifth paragraph (and the seventh paragraph) describes the UXB removal action data recorded/not recorded and available/not available, as follows: "The depths of detections, and the types of cultural debris located were not included in the information provided in UXB's final reports; however, the work plan did indicate that the depths of MEC items removed would be recorded in the daily field journals (UXB 1994). Copies of these daily field journals were not available on the administrative record for review and attempts to locate the original copies of these journals in the Amy's records were unsuccessful. In addition, depths were not recorded in the MMRP database for MEC items removed during this removal action." The current text is potentially confusing in that (a) it suggests that depths and locations of cultural debris were recorded, (b) the third sentence suggests that depths of recovered MEC items are available but not entered into the MMRP database, and (c) because it does not discuss locations of recovered items (MEC and other materials) as being recorded, the information may be assumed to be available in the after action reports and the MMRP database. In addition, it does not discuss the availability of data concerning munitions debris and range-related debris that might have been removed during the subject work. Please reevaluate the text and modify it to reduce the potential for misinterpretation as described above. It should be noted that, as part of the historical reviews conducted for the Munitions Response RI/FS program at the former Fort Ord (which was initiated in 1998), the Army has attempted to locate and obtain Fort Ord project documentations from UXB International. Documents obtained from UXB included field journals for some sites. A spot check of the UXB documents indicated that depths of recovered MEC items were not recorded by UXB in daily field journals during its MEC removal work within the CSUMB Off-Campus MRA. In addition, the after-action reports in the Fort Ord Administrative Record and the U.S. Army Corps of Engineers' (USACE's) project repository were checked to locate the daily field journals, but they did not include copies of the daily field journals. Because original records of MEC depths are not available, the MMRP Database has assigned

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
		the depth of zero (on the surface) for MEC items recovered by UXB from within the CSUMB Off-Campus MRA. **Response**: The fifth paragraph has been revised as follows: "UXB's removal actions were conducted over two areas in the CSUMB Off-Campus MRA. From July 1994 to July 1995, UXB conducted a ~~100%~~ subsurface removal action over approximately 69.8 acres (part of which extended into the adjacent County North MRA). The results of this removal action were presented in UXB's final report for CSU (UXB 1995b) and in a comprehensive final report prepared for all of the areas in which UXB conducted a removal action (UXB 1995a). The depths of detections, and the types of ~~cultural~~ other debris located were not included in the information provided in UXB's final reports; however, the work plan did indicate that the depths of MEC items removed would be recorded in the daily field journals (UXB 1994). ***As part of the historical reviews conducted for the Munitions Response RI/FS program at the former Fort Ord, the Army has attempted to locate and obtain Fort Ord project documentations from UXB. Documents obtained from UXB included field journals for some sites. A spot check was conducted by the Army of the UXB documents.*** Copies of these daily field journals are not available on the administrative record. Attempts to locate the original copies of these journals ***by the ESCA RP Team*** in the Army's records were unsuccessful. ***The Army's spot check indicated that depths of recovered MEC were not recorded by UXB in daily field journals during its MEC removal work within the CSUMB Off-Campus MRA.*** ~~In addition,~~ ***Because depths were not recorded in UXB's final reports,*** depths were not ~~recorded~~ ***included*** in the MMRP database for MEC items removed during this removal action ***and the MMRP database has assigned the depth of zero (on the surface) for MEC recovered by UXB from within the CSUMB Off-Campus MRA."*** The seventh paragraph has been revised as follows: "The results of the MEC removal action were presented in UXB's final report for CSU/HFA (UXB 1995c) and in a comprehensive final report prepared for all of the areas in which UXB conducted a removal action (UXB 1995a). The depths of detections, and the types

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
		of ~~cultural~~ other debris located were not included in the information provided in UXB's final reports. ~~In addition,~~ ***As a result,*** depths were not ~~reported~~ ***included*** in the MMRP database for MEC items removed during this removal action ***and the MMRP database has assigned the depth of zero (on the surface) for MEC recovered by UXB from within the CSUMB Off-Campus MRA. UXB's final report included the gird identification in which the MEC were found; however the exact location of the items (such as northing and easting coordinates) were not recorded."***
10	Volume 1 – Remedial Investigation, Page 3-19, Section 3.2.1.4 USA (formerly CMS) 100% Removal Operations	**Comment**: First paragraph, second line from the top of page, a sentence reads: "The MEC and MD items and the depths at which MEC and MD were encountered were recorded for the removal action in MRS-13C…" However, whether the locations of these recovered items were recorded is not discussed. Please provide additional information with regard to the locations of recovered items. **Response**: The following text has been added to the first paragraph as follows: "The MEC and MD items and the depth at which MEC and MD were encountered were recorded for the removal action in MRS-13C and were available in USA's after-action report (USA 2000). ***In addition, USA's after-action reports included the exact location of MEC items (i.e., northing and easting coordinates)."***
11	Volume 1 – Remedial Investigation, Page 3-19, Section 3.2.1.4 USA (formerly CMS) 100% Removal Operations	**Comment**: Second paragraph indicates that quality assurance for the MEC removal action at MRS-13C was conducted by CEHND. However, the after-action report indicates that the work was conducted under a contract with USACE Sacramento District. Please review the statement and correct if necessary. **Response**: Section 2.8 of the after-action report states that the USACE Sacramento District conducted quality assurance at MRS-13C. The text in Section 3.2.1.4 of Volume 1 has been revised as follows: "Every grid in MRS-13C passed the initial QA inspection and was accepted by ~~CEHND~~ ***USACE***."
12	Volume 1 – Remedial Investigation, Page 3-20,	**Comment**: The subsections are titled to indicate that the evaluation is of Schonstedt Model GA-52CX only. However, they provide evaluations of several Schonstedt models used in MEC investigations previously conducted within

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	Section 3.3 Equipment Evaluation	the CSUMB Off-Campus MRA. Please consider modifying the titles of the subsections to reduce the chance of potential confusion. **Response**: The titles in Section 3.3 have been revised as follows: Section 3.3.1: "Schonstedt ~~Model~~ GA~~-52CX~~ ***Series*** Magnetometer" Section 3.3.2: "Evaluation of Schonstedt ~~Model~~ GA~~-52CX~~ ***Series*** Magnetometer Detection Efficiency"
13	Volume 1 – Remedial Investigation, Page 3-21, Section 3.3.2 Evaluation of Schonstedt Model GA-52CX Magnetometer Detection Efficiency	**Comment**: The first sentence describes that the Fort Ord Ordnance Detection and Discrimination Study (ODDS) was conducted "to evaluate the detection efficiency of the Schonstedt GA-52C, GA-52CV, and GA-52CX." The statement is misleading since the purpose of the subject study included evaluating a variety of detection technologies and systems, not just these Schonstedt models. Please modify the sentence to reduce potential misunderstanding. **Response**: The text in Section 3.3.2 has been revised to clarify the purpose of the Fort Ord Ordnance Detection and Discrimination Study as follows: "Parsons Infrastructure & Technology Group, Inc. ("Parsons") previously conducted an ~~Ordnance Detection and Discrimination Study (~~ODDS~~)~~ at the former Fort Ord to evaluate the ***performance of various geophysical equipment, including the*** detection efficiency of the Schonstedt GA-52C, GA-52C~~V~~v, and GA-52C~~X~~x (Parsons ~~2001~~2002)."
14	Volume 1 – Remedial Investigation, Page 3-25	**Comment**: Seventh line, "April 2004" is probably a misprint. **Response**: The cited date has been corrected to "April 1994."
15	Volume 1 – Remedial Investigation, Appendix A	**Comment**: It contains two tables: a summary of MEC and MD recovered from the CSUMB Off-Campus MRA by functional groups and then by OE Model Number. The total numbers of items and records do not match between the two tables. Please review the tables and correct the discrepancy. In addition, descriptions of listed MEC items differ between the tables. Please cite the source of each of the tables and/or provide explanation for the differences. **Response**:

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
		The MEC and MD with known model numbers are presented in Table A-1, Summary of CSUMB Off-Campus MRA MEC and MD by OE Model Number. Items in this table are described using model descriptions. To provide a comprehensive MEC and MD count for the MRA, items with unknown model numbers are summarized on the first line of Table A-1 under the description "NO MODEL ASSIGNED – See Summary of Functional Group." Items presented in Table A-2, Summary of CSUMB Off-Campus MRA MEC and MD by Functional Group (No OE Model Number Assigned), lack known model numbers and, for this reason, specific model descriptions are not available to describe each item. Items in this table are instead identified using their original OE nomenclature. A note has been added to Tables A-1 and A-2 citing the Fort Ord MMRP Database and the CSUMB Off-Campus MRA RQA Process Pilot Study Technical Information Paper as the sources of the data.
16	Volume 2 – Risk Assessment, Page 2-3, Section 2.4 MEC Density	**Comment**: Third paragraph. Third sentence reads: "Since no anomalies were left uninvestigated within the depth of detection and possibly deeper, the fact that the anomalies were not identified as having been in a burial pit does not affect the MEC density." The meaning and purpose of the statement is unclear. **Response**: The cited sentence conveys that because the MEC density score for the MRA is at the lowest possible score of '1' before considering whether the items were found in a burial pit or not found in a burial pit, the fact that the items were not found in a burial pit does not affect the score. The score cannot be lower than '1.' The sentence is stated in Section 2.4, as well as Section 5.1. The following revision has been made in both locations within the Group 2 RI/FS: "Since no anomalies were left uninvestigated within the depth of detection and possibly deeper, ***the MEC density input score of "1" (the lowest possible score) is not affected by*** the fact that the anomalies were not identified as having been in a burial pit ~~does not affect the MEC density~~."
17	Volume 2 – Risk Assessment, Page 5-1, Section 5.1 Depth Below Ground Surface	**Comment**: Second paragraph, first sentence reads: "The MEC depth input score of '1' ('100% of detected MEC removed considering data quality for the sector') did not increase the risk." The meaning of the sentence is unclear. **Response**: The sentence has been revised as follows:

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	Uncertainties	"The MEC depth input score of "1"***,*** ~~(~~***indicating that*** ~~"~~100% of ***the*** detected MEC ***was*** removed considering ***the*** data quality for the sector~~")~~***,*** did not increase the ***overall MEC*** risk ***score***."
18	Volume 3 – Feasibility Study	**Comment**: At various places, words "selected" and "proposed" are used concerning the identification of a preferred alternative in the FS. It may be confusing to some readers since the word "select" is normally associated with the selection of a remedy in a CERCLA Record of Decision and the word "proposed" is normally associated with the proposed remedy which will be described in a Proposed Plan. Suggestion to consistently use "identify" for the preferred alternative in FS to avoid potential confusion. **Response**: The terms "proposed" and "selected" when used in reference to a preferred alternative have been replaced with the term "identified" throughout the text of the Feasibility Study.
19	Volume 3 – Feasibility Study, Page 2-2, Section 2.1.3.1 Deed Notices (under "Ongoing and Future MEC-Related Activities")	**Comment**: The description of the general deed notice in this section is appropriate. However, an actual notice is contained in the early-transfer deed for the properly that this FS specifically addresses, therefore the actual deed notice should be described in place of or in addition to the current text. **Response**: The general deed notice in Section 2.1.3.1 has been replaced with the actual deed clause as follows: ***"The Grantee is hereby notified that, due to the former use of the Property as a military installation, the Property may contain munitions and explosives of concern (MEC). The term MEC means specific categories of military munitions that may pose unique explosives safety risks and includes: (1) Unexploded Ordnance (UXO), as defined in 10 U.S.C. §101(e)(5); (2) Discarded military munitions (DMM), as defined in 10 U.S.C. §2710(e)(2); or (3) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. §2710(e)(3), present in high enough concentrations to pose an explosive hazard. For the purposes of the basewide Military Munitions Response Program (MMRP) being conducted for the former Fort Ord and this EPP, MEC does not include small arms ammunition (i.e. ammunition without projectiles containing explosives, other than tracers, that is .50 caliber or smaller, or for shotguns)."***
20	Volume 3 – Feasibility	**Comment**: First sentence, please replace "MEC" with "military munitions" to read

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	Study, Page 2-3, Section 2.1.4 MEC Incident Reporting (under "Ongoing and Future MEC-Related Activities")	"...because military munitions were used throughout the former Fort Ord's history." **Response**: The cited text has been revised as follows: "There is a potential for MEC to be present on the former Fort Ord because ~~MEC~~ ***military munitions*** were used throughout the former Fort Ord's history."
21	Volume 3 – Feasibility Study, Page 2-5, Section 2.1.7.2 Community Involvement (under "Programs Conducted by the Army")	**Comment**: Please make the following revisions for clarification. Second sentence: "The Amy holds public meetings, Community Involvement Workshops, Technical Review Committee (TRC) meetings, ~~*and*~~ open houses *and tours*, and conducts public information sessions through booths or tables at local community events." Last sentence: "Community involvement activities are documented in ~~a~~ the CRP ~~that is updated annually~~." **Response**: The suggested revisions for the two cited sentences have been made in Section 2.1.7.2 as follows: "The Amy holds public meetings, Community Involvement Workshops, Technical Review Committee (TRC) meetings, ~~and~~ open houses ***and tours,*** and conducts public information sessions through booths or tables at local community events." "Community involvement activities are documented in ~~a~~ ***the*** CRP ~~that is updated annually~~."
22	Volume 3 – Feasibility Study, Page 2-6, Section 2.2.1 Deed Notice (under "Long-Term Management Measures Specific to the CSUMB Off-Campus	**Comment**: Here a general description of MEC-related deed notice is provided. However, a MEC-related notice is included in the early-transfer deed for the subject property, which would be modified upon the selection of a CERCLA remedy. Therefore the actual MEC-related deed notice should be described in place of or in addition to the current text. **Response**: Section 2.2.1 has been revised as follows: "The Army has established a MEC-related deed notice that (1) informs future property owners MEC was found and removed at the reuse area; (2) specifies requirements that must be met prior to performing certain

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

No.	Comment Type / Report Section	Comment/Response
	MRA")	activities at the area; (3) specifies that any modifications to these requirements must be approved by the Army and EPA, and be coordinated with DTSC prior to implementation; and (4) outlines appropriate procedures to be followed in the event that MEC is encountered during development or reuse. ***The following clauses are included in the deeds for transferring ESCA parcels:*** ***"The Grantee is hereby notified that, due to the former use of the Property as a military installation, the Property may contain munitions and explosives of concern (MEC). The term MEC means specific categories of military munitions that may pose unique explosives safety risks and includes: (1) Unexploded Ordnance (UXO), as defined in 10 U.S.C. §101(e)(5); (2) Discarded military munitions (DMM), as defined in 10 U.S.C. §2710(e)(2); or (3) Munitions constituents (e.g., TNT, RDX), as defined in 10 U.S.C. §2710(e)(3), present in high enough concentrations to pose an explosive hazard. For the purposes of the basewide Military Munitions Response Program being conducted for the former Fort Ord and this EPP, MEC does not include small arms ammunition (i.e. ammunition without projectiles containing explosives, other than tracers, that is .50 caliber or smaller, or for shotguns)."*** ***"After response actions are completed, if the Grantee, any subsequent owner, or any other person should find any MEC on the Property, they shall immediately stop any intrusive or ground-disturbing work in the area or in any adjacent areas and shall not attempt to disturb, remove or destroy it, but shall immediately notify the local law enforcement agency having jurisdiction on the Property so that appropriate explosive ordnance disposal (EOD) personnel can be dispatched to address such MEC as required under applicable laws and regulations at no expense to the Grantee."***
23	Volume 3 – Feasibility Study, Page 3-3, Section 3.1.2.5 Construction Monitoring	**Comment**: People who would provide construction monitoring are described as "qualified MEC personnel" and "military munitions specialists." In order to communicate their qualifications more clearly, please instead use relevant standard terms used by the Department of Defense Explosives Safety Board. **Response**: The term "qualified MEC personnel" and "military munitions specialist" have been replaced with the DoD standard term "UXO-qualified personnel."

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Gail Youngblood of the Army, dated November 2, 2009
Detail / Minor Comments

[this page intentionally left blank]

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by LeVonne Stone of the Fort Ord Environmental Justice Network, dated November 16, 2009

No.	Comment Type / Report Section	Comment/Response
1	Cover Letter, General Comment	**Comment:** What equipment was used to detect MEC to a depth below 4 feet? **Response:** The equipment used during the removal actions conducted in the CSUMB Off-Campus MRA was the Schonstedt magnetometer, as described in Section 3.2 of Volume 1 of the Group 2 RI/FS. No changes have been made to the report as a result of this comment.
2	Cover Letter, General Comment	**Comment:** If an anomaly was detected below a depth of 3 to 4 feet per mission from the USACE MEC safety specialist, was this obtained prior to continuing the investigation? How many reports were filed for permission to further investigate? **Response:** Permission from the USACE OE Safety Specialist was obtained prior to continuing the investigation of that specific anomaly. It is unknown how many requests were submitted for continuation of anomaly investigation deeper than 3 or 4 feet. No changes have been made to the report as a result of this comment.
3	Cover Letter, General Comment	**Comment:** Draft Plate 9 indicates miscellaneous MEC and MD. What type of munitions would be included in miscellaneous? **Response:** The miscellaneous items shown on Plate 9 include all types of MEC and MD that are not encompassed in the munitions groupings presented in Plates 1 through 8. Additionally, the term "miscellaneous" is used in this Group 2 RI/FS to describe types of munitions when very few items associated with a particular munitions type were recovered from the CSUMB Off-Campus MRA. No changes have been made to the report as a result of this comment.
4	Specific Comment, Volume 1 – Remedial Investigation, Section 2.2.2,	**Comment:** This section does not address climate change. The Monterey Bay area is expected to experience several serious effects of climate change, including long periods of drought followed by extreme precipitation events that can lead to soil erosion and flooding. For this reason, the remediation process for the CSUMB Off-Campus MRA should be cautious in assuming that storm water runoff and soil erosion will remain low because these conditions may not be true in the near future. A cleanup is meant to permanently restore a site

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by LeVonne Stone of the Fort Ord Environmental Justice Network, dated November 16, 2009

No.	Comment Type / Report Section	Comment/Response
	Climate	for future use so it is important to consider future land conditions. The information in this section should be amended to indicate how the climate change could impact the current rainfall at Fort Ord because of the impact it will have on a cleanup strategy. **Response:** This section provides a summary of current and past general climate conditions within the vicinity of the former Fort Ord. This section is not meant to evaluate future climate change. No changes have been made to the report as a result of this comment.
5	Specific Comment, Volume 1 – Remedial Investigation, First bullet, Page 3-2	**Comment:** This bullet does not make it clear whether or not the asphalt will remain in place at the MRA after the site is cleared for transfer or redevelopment. If the risk posed by this particular area is unclear, it will be necessary to address this issue prior to public use of the site. The RI should make it clear to readers what the plan for this particular 0.75-acre paved area is during and after site remediation in order to mitigate any safety hazards in the future. **Response:** A review of Volume 1 Page 3-2, first bullet does not make reference to asphalt. It is assumed that the comment is referring to the former fuel facility located on the CSUMB Off-Campus MRA. As described in Section 2.6 of Volume 1 of the Group 2 RI/FS, the remaining asphalt pads and structures related to the former fuel facility were removed in January 2009 with UXO construction support. No MEC or munitions debris (MD) items were encountered during the demolition operations. No changes have been made to the report as a result of this comment.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
1	General Comment	**Comment:** The document discusses looking for MEC with the Schonstedt. It even offers an analysis that the three types of Schonstedt used in the 1990's were of equal effectiveness in locating MEC. Not the best, but what was available at the time. This document doesn't report any additional exploration but only your analysis of previous information. Much of the information pertaining to depths MEC was found, you report, has been unfortunately lost. We wish to see an analysis included that gives the depths to which the Schonstedt can detect MEC. Our understanding is that it is about eighteen inches to maybe thirty inches below ground surface (bgs). You report that many areas were cleared by a Schonstedt investigation to three feet and sometimes four feet. It is a sandy loam soil in the area. Why hasn't the FOERSTER M26 magnetometer been used? DTSC asked this several years ago and we cannot find an answer. **Response:** As described in Section 3.2.2, Evaluation of Schonstedt GA-Series Magnetometer Detection Efficiency, the Ordnance Detection and Discrimination Study (ODDS) was previously conducted by Parsons Infrastructure & Technology Group, Inc. to evaluate the performance of various geophysical equipment, including the detection efficiency of the Schonstedt GA-52C, GA-52Cv, and GA-52Cx. Results of the ODDS were presented in Parsons' Final ODDS report (Parsons 2002). FORA utilizes the best available and appropriate detection technology and methods for munitions detection and response. Determination of the best available and appropriate detection technology is based on geology, topography, munitions characteristics, and resource requirements (DOD 6055.09-STD 2008). The Army addressed questions submitted by FOCAG regarding the choice of detection technologies during the removal actions conducted at the former Fort Ord in a letter dated May 10, 2012 (Fort Ord Administrative Record No. BW-2615). No changes have been made to the report as a result of this comment.
2	General Comment	**Comment**: Why is this Track 2 RI/FS removed from the previous Track 2 RI/FS analysis that the FOCAG recently also responded to? (It was a larger area) **Response**: Section 1.0 of Volume 1 of the Group 2 RI/FS explains that a Track 1 Plug-In Approval Memorandum ("the Approval Memorandum") was submitted for the County North MRA by the Army for public review and comment in August 2009 (Fort Ord Administrative Record No. ESCA-0169A). A notice

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
		announcing agency concurrence with the Approval Memorandum was published on March 16, 2010. The Approval Memorandum recommended no further action in the County North MRA. Therefore, this Group 2 RI/FS Report only addresses the CSUMB Off-Campus MRA. No changes have been made to the report as a result of this comment.
3	General Comment	**Comment**: The categories of Tracks 0, 1, 2, and 3 seem to have changed from when introduced by the U.S. Army several years ago. The FOCAG understanding at the time was: (abbreviated) Track 0: No history of UXO Track 1: Some history of UXO, but light, small arms, etc. Track 2: More dangerous Army Range areas requiring more thorough investigation Track 3: The Multi-range Area and areas recognized as being very dangerous. We now see these categories as itemizing what has and what has not been cleaned up. The element of' potential risk seems to have been removed from a numerical identification. What happened? **Response**: The definitions of the Army's Track designations are provided in the Army's Ordnance and Explosives Remedial Investigation/Feasibility Study Work Plan (Administrative Record No. OE-0233M) with further clarification provided in the Explanation of Significant Differences, Final Record of Decision, No Action Regarding Ordnance-Related Investigations (Administrative Record No. OE-0406D). No changes have been made to the report as a result of this comment.
4	General Comment	**Comment**: Area S1.3.2 has been recently cleared of an oak tree forest. The FOCAG understanding is that there is a Draft EIR for residential housing being circulated by the University. This FORA document to which we are responding is a Draft. There will need to be a Draft Final, a Final, then the U.S. Army will have to select a remediation; and then possibly adopt a Record of Decision (ROD). a) How did this area get clear-cut so early and with no permits from Monterey County? Area S1.3.2 is in Monterey County's jurisdiction. b) This calls into question the effectiveness of the LUC's the Land Use Controls that the regulatory agencies are sometimes recommending. **Response**:

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
		This area was removed of vegetation as part of an MEC investigation related to the Residential Quality Assurance Pilot Study which was included in the Group 1 RI/FS Work Plan (Fort Ord Administrative Record No. ESCA-0124). No permits from Monterey County were required. No changes have been made to the report as a result of this comment.
5	General Comment	**Comment**: Given that this S1.3.2 is a known former booby trap and mine field practice range; Given that it is adjacent to, or part of chemical, biological, and radiological (Depleted Uranium) training area; Given that the area was used for tank training and that tanks can fire their ammunition several feet underground, especially in sandy loam soil; Is this FORA's recommendation that this area be used for residential housing? Will LUCs prevent homeowners from planting a tree in their backyard, say ten years from now? **Response**: The Group 2 RI/FS includes a site-specific evaluation of archival and field-based investigation data, the results of a risk assessment, and an evaluation for remedial alternatives considered for the CSUMB Off-Campus MRA. Based upon the results of the evaluation presented in the Group 2 RI/FS, the approximately 50 acres located at the western end of the CSUMB Off-Campus MRA was recommended as appropriate for future residential reuse with appropriate institutional controls, such as the county ordnance ordinance, construction support, and disclosures. No changes have been made to the report as a result of this comment.
6	General Comment	**Comment**: The acronym CBR that stands for chemical, biological and radiological weaponry and testing needs to be spelled out more often in the document for easier reading and understanding. It's potential also needs to be addressed in any summary analysis. Also please address the CDEC program that existed for twenty plus years. Its headquarters was on former Fort Ord. Discuss and analyze depleted uranium and its effectiveness in tank warfare. **Response**: The acronym CBR is defined in the glossary at the beginning of Volume 1 of the Group 2 RI/FS as well as in the text of Section 2.2.1 of Volume 1. Volume 1 of the Group 2 RI/FS also discusses CBR training and its potential to have been conducted within the CSUMB Off-Campus MRA. Discussion of the CDEC program and depleted uranium are not relevant to the Group 2 RI/FS.

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
		No changes have been made to the report as a result of this comment.
7	General Comment	**Comment**: The report states that the testing for residual chemical contamination is the responsibility of the United States Army and is separate from the looking for and removal of MEC. Please analyze and give a time line for testing for the approximately 200 chemical constituents used on former Fort Ord. Isn't separating the exploration of and analysis of the two piecemealing? How can an Army Record of Decision for the area separate the two? **Response**: Investigation of potential contamination issues other than the explosives hazards associated with MEC at the former Fort Ord will continue to be conducted by the Army. The Army has responded to similar comments received from FOCAG. Please refer to the Army's November 17, 2008 response letter (Administrative Record ESCA-0126) and July 9, 2009 response letter (Administrative Record BW-2508). No changes have been made to the report as a result of this comment.
8	General Comment	**Comment**: The pilot study mentioned is very ill defined, with no time line, cost, or expectations identified. Who is paying for this? **Response**: In consultation with the Army, the RQA Pilot Study (Phase I) and RQA Process Implementation Study (Phase II) were completed by the ESCA RP Team in a portion of the CSUMB Off-Campus. The initial phase of the pilot study activities was described in the RQA Pilot Study Work Plan, which was included in Volume 2 of the Group 1 RI/FS Work Plan (ESCA RP Team 2008b). Details of the RQA Process Implementation Study were presented in an addendum to the Final Group 1 RI/FS Work Plan and associated Appendix F: Residential RQA Pilot Study Work Plan (ESCA RP Team 2011a). The activities conducted as part of the initial phase and implementation phase, findings, and conclusion were documented in the Residential Quality Assurance Process Pilot Study Technical Information Paper CSUMB Off-Campus MRA (ESCA RP Team 2012). Section 1.2.4, Regulatory Pathway to Closure, of the RI has been revised to include a brief description of the RQA Pilot Study and RQA Process Implementation Study completed in a portion of the proposed future residential reuse area of the CSUMB Off-Campus MRA. Section 3.5,

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
		Residential Quality Assurance Process Pilot Study, has been added to the RI and describes the pilot study process in greater detail and presents the resulting recommendations. The results of the pilot study and implementation study have also been incorporated into the Group 2 RI/FS. Under the ESCA, and as stated in the Final Finding of Suitability for Early Transfer, the Army has provided funds for FORA to conduct response actions for the ESCA properties; except for those responsibilities the Army retains (Army 2007). The Army-retained conditions are described in Section 1.2.2, Early Transfer Property and Environmental Services Cooperative Agreement, of Volume 1 of this Group 2 RI/FS.
9	General Comment	**Comment**: Parcel 13B has disappeared or as one FOCAG member was told, "has been subsumed". Please explain what happened to 13B? What was formerly found on 13B? What were 13B boundaries? Was it formerly categorized as a Track 1, Track 2, or Track 3 parcel? **Response**: MRS-13B is fully contained within the Parker Flats MRA Phase I boundary and the CSUMB Off-Campus MRA boundary. The portion of MRS-13B within the Parker Flats MRA Phase I boundary has a signed ROD (Fort Ord Administrative Record No. OE-0661). The portion of MRS-13B within the CSUMB Off-Campus MRA is considered part of MRS-31. Volume 1 of the Group 2 RI/FS report provides an evaluation of the historical uses and the results of historical removal actions conducted within the portion of MRS-13B that lies within the CSUMB Off-Campus MRA. As discussed in Section 3.0 of Volume 1 of the Group 2 RI/FS, the portion of MRS-13B in the CSUMB Off-Campus MRA was included in the Phase III removal action performed by HFA (Administrative Record No. OE-0265C). No changes have been made to the report as a result of this comment.
10	General Comment	**Comment**: The number of times that previous UXO notes have been lost, regarding depths and specific location, as repeatedly told about in this document, is very disturbing. Please explain how recorded LUC's can work say twenty years from now, when clean up notes from fifteen years ago have been lost. **Response**: If a land use control measure is selected as part of a remedy, the federal deed and the existing Covenant to Restrict the Use of Property will be amended to document the selected remedy, and they will be recorded with the County in a

Response to Comments
Draft Group 2 Remedial Investigation / Feasibility Study, dated September 17, 2009
Review Comments provided by Mike Weaver of the Fort Ord Community Advisory Group, dated November 20, 2009

No.	Comment Type / Report Section	Comment/Response
		manner that is consistent with federal and state guidance. The LUCs are intended to be in place indefinitely unless periodic reviews by the Army, EPA, and DTSC indicate that the LUCs are no longer necessary. Implementation of the LUCs would be described in a Land Use Controls Implementation Plan (or similar document) that would be prepared following the signed Record of Decision.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

November 19, 2009

Mr. Stan Cook
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Re: EPA Comments on the Draft Group 2 Remedial Investigation / Feasibility Study, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California Dated September 17, 2009

Dear Stan:

Attached are EPA's comments on the Draft Group 2 Remedial Investigation / Feasibility Study, California State University at Monterey Bay Off-Campus and County North Munitions Response Areas, Former Fort Ord, Monterey County, California dated September 17, 2009.

If you have any questions, please do not hesitate to call me at (415) 972-3681 or e-mail me at huang.judy@epa.gov.

Sincerely,

Judy C. Huang, P.E.
Remedial Project Manager

cc:

Roman Racca (DTSC)
Site Mitigation/Office of Military Facilities
8800 Cal Center Drive
Sacramento, CA 95826

Kristie Reimer, AICP
Principal Planner
BRAC / Federal Programs
LFR Inc.
1900 Powell Street, 12th Floor
Emeryville, CA 94608

Ms. Gail Youngblood
Fort Ord Base Realignment and Closure Office
P.O. Box 5008
Monterey, CA 93944-5004

Mr. Thomas Hall (via E-mail)

Review of the
Fort Ord Reuse Authority, Environmental Services Cooperative Agreement (ESCA)
Draft Group 2 Remedial Investigation/Feasibility Study, California State University
Monterey Bay, Off-Campus Munitions Response Area
Former Fort Ord, California
September 17, 2009

GENERAL COMMENTS

1. The *Fort Ord Reuse Authority (FORA) Environmental Services Cooperative Agreement (ESCA) Draft Group 2 Remedial Investigation/Feasibility Study, California State University Monterey Bay Off-Campus Munitions Response Area, Former Fort Ord, California*, dated September 17, 2009 (hereinafter referred to as the Draft GP 2 RI/FS CSUMB OC MRA), contains a number of definitions that are repeated in the Glossary sections of the three volumes of the document. In some instances, the definitions are not consistent in each volume where they are presented. In addition, some of the definitions provided do not match those presented in the most recent version of the Department of Defense Ammunition and Explosives Safety Standards (DoD 6055.09-STD). Please review the definitions that are presented in more than one volume of the document and ensure that they are both correct and consistent. Also, please ensure that the definitions of munitions related terms match those presented in the current version of DoD 6055.09-STD.

2. There are a number of instances where the Draft GP 2 RI/FS CSUMB OC MRA notes the discovery of a munitions item without stating whether or not it was expended. This missing information is valuable in some instances for determining what occurred that resulted in the presence of the item at the location. For example, Section 3.1.2.2 1994 Archives Search Report Supplement 1, of Volume 1 notes that, "During a walk-through of the area, a grenade fuze was found in an area located to the east of the CSUMB Off-Campus MRA." As an example of the usefulness of this information, if the item were expended, it likely came from the use of the associated munition and was separated from that munition by the functioning thereof on the site. However, if the item were not expended, it would be a discarded military munition item that may not indicate use of the associated munition on the site, but the random discarding of the item for unknown reasons.

As the condition of items is of interest in analyzing the reason for their presence on a site and the subsequent potential activities conducted thereon, please provide information as to whether a discovered item was expended or not (if known) when listing them in the narrative portions of the document.

3. A number of the munitions items listed in Appendix B, MEC Items Found by Sector, of Volume 2, Risk Assessment, do not have a risk code assigned, even though the nomenclature and model (M) numbers of these items are known. Please assign a risk code to these items or provide an explanation as to why the data is insufficient to do so. Also, please explain why items with a model (M) number are listed as "Model Unknown."

4. **Applicable or Relevant and Appropriate Requirements:** Although the Army does not consider California laws and regulations concerning Land Use Covenants (LUCs) to be potential ARARs, DTSC and EPA disagrees with this assessment. Please insert the following agree to disagree language as appropriate:

   > "Although the Army determined that there were no potential Federal or State applicable or relevant and appropriate requirements (ARARs) that relate to LUCs at the CSUMB Off-Campus MRA, LUCs will be implemented in a manner consistent with applicable Federal and State guidance. While the Army does not consider California laws and regulations concerning Land Use Covenants to be potential ARARs, the Army entered into a State Covenant to Restrict Use of Property at the time the property was transferred, and after the CSUMB Off-Campus MRA ROD is signed, the existing covenant will be modified, if appropriate, to document the land use restrictions included in the selected remedy. Although DTSC and EPA Region IX disagree with the Army's determination that California laws and regulations concerning Land Use Covenants are not potential ARARs, they will agree-to-disagree on this issue since the Army executed the State Covenant to Restrict Use of Property and agrees that it will be modified, if appropriate, to be consistent with the selected remedy, in a manner acceptable to DTSC."

5. **Alternative 4 - Land Use Controls Including Contingency to Address Proposed Change in Site Reuse:** The Report stated that the Contingency in Alternative 4 consists of the Residential Quality Assurance (RQA) process, which could include subsurface investigation. The Report further stated that the effectiveness, implementability, and cost for the RQA are still be evaluated. This part of the Report seems to imply that there is insufficient information, presently, to evaluate Alternative 4 using the Nine Criteria. However, later in the report, Alternative 4 was "evaluated" using the Nine Criteria and determined to be the preferred alternative. Please provide a more comprehensive discussion on the RQA Pilot Study and how the results of the study support Alternative 4's nine criteria evaluation.

SPECIFIC COMMENTS

Volume 1 – Remedial Investigation

1. **Glossary, Page ix:** The definition of Construction Support found here does not match that found in DoD 6055.09-STD. The correct definition is as follows:

   > **Construction Support.** Assistance provided by DoD explosive ordnance disposal (EOD) or UXO-qualified personnel and/or by personnel trained and qualified for operations involving CA, regardless of configuration, during intrusive construction activities on property known or suspected to contain UXO, other munitions that may have experienced abnormal environments (e.g., DMM), munitions constituents in high enough concentrations to pose an explosive hazard, or CA, regardless of

configuration, to ensure the safety of personnel or resources from any potential explosive or CA hazards.

In addition, the definition provided in the Glossary section of Volume 1 indicates that "qualified UXO personnel" may provide this support, which is not always the case. Care must be taken in the use of the terms "UXO Personnel," "UXO Technicians," "qualified UXO personnel," and "UXO-Qualified Personnel," as they are not necessarily interchangeable. In some instances, they appear to be used in a manner that may conflict with Department of Defense Explosives Safety Board (DDESB) Technical Paper 18 (Minimum Qualifications for Unexploded Ordnance (UXO) Technicians and Personnel). The following are the related definitions presented in that document:

- UXO-Qualified Personnel: Personnel who have performed successfully in military EOD positions, or are qualified to perform in the following Department of Labor, Service Contract Act, Directory of Occupations, contractor positions: UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist or Senior UXO Supervisor.

- UXO Technician: Personnel who are qualified for and filling Department of Labor, Service Contract Act, Directory of Occupations, contractor positions of UXO Technician I, UXO Technician II, and UXO Technician III.

The term "UXO Sweep Personnel" is not formally defined, although the training and functions thereof are outlined in the DDESB Technical Paper 18. However, it is listed under the heading of "UXO Related Position Titles and Tasks" in that Technical Paper, as are the UXO Technician I, UXO Technician II, UXO Technician III, UXO Safety Officer, UXO Quality Control Specialist and Senior UXO Supervisor. These positions are UXO personnel per the title of Technical Paper 18. The term "qualified UXO personnel" can mean any of these individuals that are qualified to perform their UXO-related functions (including UXO Technician I and UXO Sweep Personnel). However, the term "UXO-Qualified" does not include UXO Sweep Personnel or UXO Technician I by definition. Care must be exercised in the use of these terms to avoid the presentation of incorrect information by their misuse. This could result in individuals performing functions that they are not fully qualified to perform.

Please replace the noted definition found in the Glossary Section with that found in the current version of DoD 6055.09-STD. Also, please review the use of the noted UXO Personnel terms in the three volumes of the Draft GP 2 RI/FS CSUMB OC MRA and correct them as necessary to comply with the definitions found in DDESB Technical Paper 18.

2. **Section 2.2.1, CSUMB Off-Campus MRA Location and Description, Page 2-2:** The first sentence of the next to last paragraph of this section states that, "The locations and designations of the MRSs are presented in Figure 3." However, a review of Figure 3, CSUMB MRA Facility Profile Physical Features, indicates that this information is not presented on the cited figure. Please review Figure 3 and revise it as necessary to present the missing information.

3. **Section 3.1.1.3, 1950s Era, Page 3-3:** The fourth primary bullet in the section contains the acronym "FBTA," with no definition thereof provided, nor is there a statement that the meaning of this acronym is unknown. Please revise the cited bullet to provide a definition of "FBTA" or a statement that the meaning is unknown.

4. **Section 3.1.1.3, 1950s Era, Page 3-4:** The second bullet on page 3-4 states that, "An undated "Beardsley" map of Fort Ord showed a range fan extending from FP-1 to the southern boundary of the impact area." No explanation of what constitutes a "Beardsley" map is provided. Please revise the cited bullet to define a "Beardsley" map, or provide a definition thereof elsewhere in the document.

5. **Section 3.1.3.2, 1940s Training, Page 3-11:** The subsection entitled "Practice Rifle Grenade Training" contains information on training using munitions items that are not practice rifle grenades. Please review the contents of the subsection and revise the title to better reflect the types of munitions discussed therein.

   Also in the "Rifle Grenade, Smoke" subparagraph of the above noted subsection, the following is found: "Pyrotechnics were generally used for signaling and ground smoke. The M23A1 was used only for signaling. The M22, M22A2, and M19 WP were used for both signaling and smoke screens. The grenades were fired from a rifle equipped with a grenade launcher and functioned on impact. At impact, a firing pin would strike a primer producing a flame, which ignited a starter mixture charge, which in turn, ignited a smoke mixture charge." This functioning description is correct for all of the listed munitions except the M19 series white phosphorous (WP) rifle grenade and the M23A1, which is a colored smoke streamer rifle grenade. The M19 had an internal detonator that exploded and ruptured the case of the munition to disperse the WP filler. The fire from the grenade cartridge that fires the item ignited the M23A1 filler. It then disperses colored smoke as a streamer that follows the trajectory of the grenade, and it does not function on impact as stated in the cited subparagraph. Please correct this in the cited narrative.

6. **Section 3.1.3.3, 1950s to 1980s Training, Page 3-15:** The last sentence of the first paragraph of the subsection entitled "Practice Mortar Training" that is found on page 3-15 states that, "The projectile was fin-stabilized in flight. Since the projectile was inert, there was no detonation upon impact, and the cartridge could be recovered for reuse." As the common definition of the term cartridge is all of the items necessary to fire the weapon once, the expended practice item found downrange is a projectile and not a cartridge, as the propelling elements of what was the mortar cartridge have been expended and the remnants are no longer a cartridge (i.e., not a complete round). Please replace the word "cartridge" with the word "projectile" in the cited sentence.

Volume 2 – Risk Assessment

7. **Section 2.4 MEC Density, Page 2-3:** the first sentence in the last paragraph on page 2-3 notes that, "Additionally, the MEC items evaluated in the risk assessment were non-penetrating and, therefore, would not be expected at depth unless they were deposited in burial pits." The intent of this sentence is unclear and it may be somewhat misleading as

written. Of concern is the statement that the items "…would not be expected at depth…" The term "depth" is nebulous and could be misconstrued to mean at any depth below the surface, which is incorrect. Please revise the cited paragraph to reflect the fact that the items may be found at shallow subsurface depths ands well as on the surface.

Volume 3 – Feasibility Study

8. **Glossary, Page vii:** The definition of the term "Construction Support" does not match that found in DoD 6055.09-STD. Please note the related information found in Specific Comment 1 above and correct the definitions and terminology as requested therein.

9. **Glossary, Page ix:** The definition of the term "Material Potentially Presenting an Explosive Hazard (MPPEH)" does not match that found in DoD 6055.09-STD. It is also inconsistent with the definition of the same term found in the Glossary in Volume 1, which does match that found in DoD 6055.09-STD. Please revise the Volume 3 definition of MPPEH to match that found in the Glossary section of Volume 1.

10. **Section 3.1.2.5, Construction Monitoring, Page 3-3:** The title and contents of this section are confusing. Is this intended to describe the same process evaluated by Section 3.2.2.6, Construction Support? If so, why the disparate titles? Also, why does 3.1.2.5 use the term "qualified MEC personnel (Military munitions specialist[s])" and Section 3.2.2.6 use the differing term "qualified UXO-trained personnel," neither of which is technically correct? Please review the contents of the two cited sections and determine if they are discussions of the same process. If so, please make them consistent and also correct the terminology used to describe the personnel that will be involved. If the two sections describe different processes (i.e., Construction Monitoring and Construction Support are two different processes), please explain this in the appropriate location in Volume 3.

11. **Section 3.1.4.2, Instrument-Aided Surface MEC Remediation, Page 3-5:** This section appears to describe what DoD 6055.09-STD defines as a "Technology-Aided Surface Removal," which is defined as follows:

    > **Technology-Aided Surface Removal.** A removal of UXO, DMM, or CWM on the surface (i.e., the top of the soil layer) only, in which the detection process is primarily performed visually, but is augmented by technology aids (e.g., hand-held magnetometers or metal detectors) because vegetation, the weathering of UXO, DMM, or CWM, or other factors make visual detection difficult.

    If this is what is intended, please change the section title to read, "Technology-Aided Surface Removal" and use this term throughout the Draft GP 2 RI/FS CSUMB OC MRA when discussing this process. If this is not what is intended, please provide an explanation of the intent.

DEPARTMENT OF THE ARMY
FORT ORD OFFICE, ARMY BASE REALIGNMENT AND CLOSURE
P.O. BOX 5008, BUILDING #4463 GIGLING ROAD
MONTEREY, CALIFORNIA 93944-5008

NOV 02 2009

REPLY TO
ATTENTION OF

Base Realignment and Closure

Stan Cook
ESCA Remediation Program Manager
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Subject: *Draft Group 2 Remedial Investigation/Feasibility Study, California State University Monterey Bay Off-Campus Munitions Response Area*, dated September 17, 2009, received on September 18, 2009.

Dear Mr. Cook:

Thank you for an opportunity to review and comment on the subject document. The Army's comments are enclosed. Please note our comments are focused on "big picture" issues such as the consistency with documents previously produced under the Army's cleanup program. A copy of this letter will be furnished to U.S. Environmental Protection Agency (Judy Huang) and California Department of Toxic Substances Control (Roman Racca).

If you have any questions, please contact me. Thank you.

Sincerely,

Gail Youngblood
BRAC Environmental Coordinator
Fort Ord Field Office

Enclosure

DRAFT Group 2 Remedial Investigation/Feasibility Study (RI/FS), California State University Monterey Bay (CSUMB) Off-Campus Munitions Response Area (MRA)

Dated September 17, 2009

Army Comments:

Volume 1: Remedial Investigation (RI)

1. p.1-1, Section 1.0 Introduction. Fourth paragraph describes *Track 1 Plug-In Approval Memorandum, County North Munitions Response Area (MRA), Former Fort Ord, California* as having been released for "approval by the regulatory agencies and the general public" in August 2009. This is not correct. The referenced document was made available for a 30-day public review period on August 28, 2009. Public comments were accepted through September 28, 2009. The Army will request agency concurrence only after considering the public comments that were received during the review period, and revising the approval memorandum if necessary. Please correct the text in this section to reflect the correct Track 1 plug-in process. The same comment applies to other portions of the RI/FS where this information is presented.

2. p.1-5, Section 1.2.3 FORA ESCA Remediation Program. The first paragraph discusses the status of the Army's Basewide Range Assessment (BRA) program under which investigation of potential munitions constituents (MC) is conducted at the former Fort Ord. As correctly described in this section, at the time the Finding of Suitability for Early Transfer (FOSET) was issued for the ESCA properties in November 2007, no further action was recommended for the historical areas (HAs) located within the CSUMB Off-Campus MRA based on an evaluation dated December 2006. Subsequently additional soil sampling was conducted within HA-161 which resulted in a recommendation for an Interim Action to remove soil contamination from one area with an elevated concentration of lead in shallow soil. Additional information is available in *Approval Memorandum, Proposed Interim Action Excavation, IA Areas 29B HA-161, Site 39B – Inter Garrison Training Area, Former Fort Ord, California*, dated March 18, 2009 (Administrative Record Number IAFS-233). The regulatory agencies have approved the proposed Interim Action excavation at HA-161. The Army will provide advance notice to Fort Ord Reuse Authority (FORA) of the planned fieldwork related to this action. In addition, please note that the most current status of HAs are compiled in *Final Comprehensive Basewide Range Assessment Report, Former Fort Ord, California, Revision 1*, June 2009 (Administrative Record Number BW-2300J).

3. p.2-5, Section 2.7 Land Use. The information provided in this section is not incorrect. However, it should be noted that Parcel S1.3.2 is designated in the 1997 Fort Ord Base Reuse Plan as "school/university" with residential infill opportunities, and that the plan to use the parcel for residential and open space uses is based on the CSUMB Master Plan. Current land use restrictions should also be noted. (Same comment applies to Volume 2 Risk Assessment, Section 3.1 and Volume 3 Feasibility Study, Section 2.3.3.)

4. Section 3.0 CSUMB Off-Campus MRA Remedial Investigation. We would like to suggest that stronger discussions about the validation of existing data would better support the conclusions of the RI, the risk assessment and the feasibility study (FS).

- p.3-1, Section 3.0 CSUMB Off-Campus MRA Remedial Investigation. The two major decision points for the RI concern the quality of the available data, but they do not address the availability of sufficient quantity of data. We understand that this finding has already been made prior to the RI/FS (in the RI/FS Work Plan and Summary of Existing Data Report), but it should be re-stated here so a reader does not need to look up additional documents for that information.

- p.3-22, Section 3.4 Collection and Management of Field Data. A review of referenced after-action reports indicates that locations of recovered items (such as MEC and MD) were not always recorded by the munitions response contractor. However, this section does not discuss this topic at all. Please consider providing an evaluation with regard to the availability and quality of item location information. If such an evaluation was determined not to be relevant, please provide the rationale.

5. p.3-21, Section 3.3.2 Evaluation of Schonstedt Model GA-52CX Magnetometer Detection Efficiency. This section provides a qualitative discussion of the limitations of Schonstedt magnetometers and rationales for considering that they were effective [at detecting anomalies] during the previous MEC removal actions at the CSUMB Off-Campus MRA. The second to the last bullet discusses that the majority of MEC items expected at the site were shallow and/or non-penetrating types which generally are readily detectable by the Schonstedt. However, on the previous page, "limitations" included the inability of the Schonstedt to detect non-ferrous items "such as the grenade fuzes found in abundance at the CSUMB Off-Campus MRA." Please provide additional text addressing the listed limitations to better support the stated conclusion.

6. p.4-1, Section 4.2.1 Investigation and Removal Action Design. First paragraph, third sentence states that the objectives of the MEC removal actions conducted at the CSUMB Off-Campus MRA was "to remove detected MEC, munitions debris, and cultural debris." This is not a correct description of MEC removal actions previously conducted by the Army in the subject property. Although munitions debris and other debris may be removed during a course of a removal action, removal of these non-explosive items is not a part of the main removal action objective. Please modify the sentence to avoid potential misunderstanding.

7. p.5-1, Section 5.0 Conceptual Site Model. The information listed here about the site, including the historical training uses and MEC items recovered during the removal actions, indicates that the site was used for military training with military munitions of practice and pyrotechnic types. Based on the information provided in this section it could appear that the site could meet the Track 1, Category 3 criteria requiring no further munitions response action. In order to communicate the appropriateness of evaluating the site further, it should be clarified here that there are indications that suggest possible past uses of high explosive items within portions of the CSUMB Off-Campus MRA. In addition, please clarify the following points regarding these items.

    - p.3-10, Section 3.1.3.1 Pre-World War II Training. This section cites four MKII fragmentation hand grenades as having been recovered from the CSUMB Off-Campus MRA. This is consistent with Appendix A "Summary of CSUMB Off-Campus MRA MEC and MD Data by OE Model Number" (OE Model 148). However, Appendix A "Summary of CSUMB Off-Campus MRA MEC and MD Data by Functional Group (No OE Model Number Assigned)" indicates that perhaps only two of the items could have been MKII fragmentation hand grenades. In addition, p.4-6, Section 4.2.2.5 Hand Grenade Training, first bullet, states "six MKII were found in separate locations across the MRA." Please review these sections and correct the apparent inconsistency.

- p.4-9, Section 4.2.2.7 Miscellaneous Items (under Types of Munitions Removed). At the end of this section, miscellaneous types of items found in the CSUMB Off-Campus MRA are listed, with a note that: "Because a very few of the above-listed miscellaneous items were found during the removal actions..., there was no pattern of use that indicated training with these items in this area." The listed miscellaneous items include "squibs and blasting caps" and "bulk explosives." However, these types of items were described in Section 4.2.2 as having an indication of a pattern of use in the CSUMB Off-Campus MRA (page 4-2). These sections appear to be in conflict with each other. Please review the information again and update these sections as appropriate.

8. The RI should describe that the Residential Quality Assurance (RQA) pilot test fieldwork has been completed in a portion of the site. If the data from the RQA pilot test is available, it should be included as part of the RI/FS evaluation.

Volume 2: Risk Assessment

9. Appendix B, Tables listing MEC items found in the CSUMB Off-Campus MRA. These tables list the MEC items, their munitions model description, risk code, quantity, northing and easting, and depth. The information is presumed to have been obtained from the Fort Ord MMRP Database. It should be noted, however, that precise MEC locations and depths were not recorded during the field work by HFA and the depths of recovered MEC items were not reported by UXB in after-action reports; therefore, the data was not available for entry into the MMRP database. In the absence of these details the MMRP Database has assigned the depth of zero (on the surface) and the northing and easting of the center of the grid so that these items can be displayed on a map. Such data quality issue was not described in the Risk Assessment and these tables. Therefore, a reader might incorrectly interpret that the location and depth information provided here represents the actual and precise locations and depths from which these items were recovered. Please provide a brief text at the end of these tables and/or in the body of the report to clarify the data quality so that a reader is made aware of the issue and be prompted to review a comprehensive data evaluation in the RI or the referenced source documents.

Volume 3: Feasibility Study (FS)

10. Alternative 4 LUCs including Contingency to Address Proposed Change in Site Reuse. The remedial alternative includes a component that would provide additional information, which would remove the existing residential restriction. In the evaluation of alternatives, depending on which of the nine criteria is being evaluated, this component was assumed to be (a) additional subsurface MEC removal or (b) RQA. But in Section 3.2.2.10, effectiveness and technical feasibility of the RQA were described as unknown. Therefore the long-term effectiveness and implementability of Alternative 4 cannot be fully evaluated based on the information presented in the draft RI/FS. Please consider updating the information regarding RQA by providing additional information from the RQA pilot test that is currently in progress within the CSUMB Off-Campus MRA.

11. p.2-6, Section 2.2.2 Annual Monitoring and Five-Year Review Reporting (under "Long-Term Management Measures Specific to the CSUMB Off-Campus MRA"). Here a general description of the five-year review requirements is provided. Please note that CERCLA five-year reviews are conducted as a basewide effort at the former Fort Ord and the status of all of the remedies at the former Fort Ord will be reviewed together. The next five-year review will occur in 2012.

12. FS cost estimates for the remedial alternatives are understood to be FORA costs. Cost estimates for the Long-Term Management Measures need to be clarified if some or all of the costs are intended to be Army costs.

Detail/minor comments:

Volume 1: Remedial Investigation (RI)

1. p.1-1, Section 1.0 Introduction. It would be helpful to add to this section text that indicates the status of munitions response at the site, i.e. subsurface removal of munitions and explosives of concern (MEC) has already been conducted in the entire footprint of the subject MRA. Otherwise this information is not provided until the middle of Section 3.

2. p.1-6, Section 1.2.4 Regulatory Pathway to Closure. Second paragraph, last sentence reads "The Army ROD includes the preparation of a Remedial Design/Remedial Action Work Plan and an Institutional Control Implementation Plan, execution of necessary remedial actions, and preparation of a Remedial Action Completion Report to document that the requirements for closure have been met." The Record of Decision would describe the selected remedy, but would not include documents such as a Remedial Design/Remedial Action Work Plan and a Remedial Action Completion Report. Therefore the current sentence is confusing with regard to the scope of the Record of Decision that would be developed for the CSUMB Off-Campus MRA. Please revise the sentence.

3. p.2-2, Section 2.2.1 CSUMB Off-Campus MRA Location and Description. Second to the last paragraph indicates that the locations and designations of munitions response sites (MRSs) within the CSUMB Off-Campus are presented in Figure 3. However, neither Figure 3 or any other figure included in the RI show the boundaries of MRSs. Please include the boundaries of affected MRSs in one of the figures.

4. p.3-15, Section 3.2 Previous MEC Investigations and Removal Actions. The subsections describe the previously conducted removal actions as "100% removal operations" and "100% removal actions." The use of percentages to categorize MEC investigation activities has been noted as confusing to some people. Please use alternative wording if possible.

5. p.3-17, Section 3.2.1.2 HFA 100% Removal Operations. Third paragraph, fourth sentence describes the 1994 MEC removal action by HFA as a 4-ft removal. However, in Section 3.1.2.3 (p.3-9) it was described as a 3-ft removal action. Please review the information and correct the discrepancy.

6. p.3-17, Section 3.2.1.2 HFA 100% Removal Operations. Fifth paragraph describes the HFA removal action data recorded/not recorded and available/not available, as follows: "The depths of detections, and the types of range-related and cultural debris located were not included in the information provided in the final report (HFA 1994b). In addition, depths were not recorded in the MMRP database for the MEC items removed from during the HFA's removal actions; however, the HFA Phase III work plan did not indicate that the depths of MEC items removed would be recorded as part of the removal action activities (HFA 1994a)." The current text is potentially confusing in that (a) it suggests that locations of range-related and cultural debris were recorded, (b) it suggests that depths of recovered MEC items were recorded by HFA and available, but were not entered into the MMRP database, and (c) because it does not discuss

locations of recovered items as being recorded, the information may be assumed to be available in the after action reports and for inclusion in the MMRP database. In addition, it does not discuss the availability of data concerning munitions debris that might have been removed during the subject work. Please reevaluate the text and modify it to reduce the potential for misinterpretation as described above.

7. p.3-18, Section 3.2.1.3 UXB 100% Removal Operations. Third paragraph, last sentence states that the recovered MEC items were turned into the DRMO. Please check the accuracy of this statement. In addition, the referenced report (UXB, 1994a) is not listed in Section 7.0 References.

8. p.3-18, Section 3.2.1.3 UXB 100% Removal Operations. Fourth paragraph, fourth sentence reads: "Various inert MEC items were buried...within the test area lanes." The buried test items were most likely inert munitions items, not MEC. Please check this information and modify the statement as appropriate.

9. p.3-19, Section 3.2.1.3 UXB 100% Removal Operations. Fifth paragraph (and the seventh paragraph) describes the UXB removal action data recorded/not recorded and available/not available, as follows: "The depths of detections, and the types of cultural debris located were not included in the information provided in UXB's final reports; however, the work plan did indicate that the depths of MEC items removed would be recorded in the daily field journals (UXB 1994). Copies of these daily field journals were not available on the administrative record for review and attempts to locate the original copies of these journals in the Army's records were unsuccessful. In addition, depths were not recorded in the MMRP database for MEC items removed during this removal action." The current text is potentially confusing in that (a) it suggests that depths and locations of cultural debris were recorded, (b) the third sentence suggests that depths of recovered MEC items are available but not entered into the MMRP database, and (c) because it does not discuss locations of recovered items (MEC and other materials) as being recorded, the information may be assumed to be available in the after action reports and the MMRP database. In addition, it does not discuss the availability of data concerning munitions debris and range-related debris that might have been removed during the subject work. Please reevaluate the text and modify it to reduce the potential for misinterpretation as described above.

   It should be noted that, as part of the historical reviews conducted for the Munitions Response RI/FS program at the former Fort Ord (which was initiated in 1998), the Army has attempted to locate and obtain Fort Ord project documentations from UXB International. Documents obtained from UXB included field journals for some sites. A spot check of the UXB documents indicated that depths of recovered MEC items were not recorded by UXB in daily field journals during its MEC removal work within the CSUMB Off-Campus MRA. In addition, the after-action reports in the Fort Ord Administrative Record and the U.S. Army Corps of Engineers' (USACE's) project repository were checked to locate the daily field journals, but they did not include copies of the daily field journals. Because original records of MEC depths are not available, the MMRP Database has assigned the depth of zero (on the surface) for MEC items recovered by UXB from within the CSUMB Off-Campus MRA.

10. p.3-19, Section 3.2.1.4 USA (formerly CMS) 100% Removal Operations. First paragraph, second line from the top of page, a sentence reads: "The MEC and MD items and the depths at which MEC and MD were encountered were recorded for the removal action in MRS-13C...." However, whether the locations of these recovered items were recorded is not discussed. Please provide additional information with regard to the locations of recovered items.

11. p.3-19, Section 3.2.1.4 USA (formerly CMS) 100% Removal Operations. Second paragraph indicates that quality assurance for the MEC removal action at MRS-13C was conducted by CEHND. However, the after-action report indicates that the work was conducted under a contract with USACE Sacramento District. Please review the statement and correct if necessary.

12. p.3-20, Section 3.3 Equipment Evaluation. The subsections are titled to indicate that the evaluation is of Schonstedt Model GA-52CX only. However, they provide evaluations of several Schonstedt models used in MEC investigations previously conducted within the CSUMB Off-Campus MRA. Please consider modifying the titles of the subsections to reduce the chance of potential confusion.

13. p.3-21, Section 3.3.2 Evaluation of Schonstedt Model GA-52CX Magnetometer Detection Efficiency. The first sentence describes that the Fort Ord Ordnance Detection and Discrimination Study (ODDS) was conducted "to evaluate the detection efficiency of the Schonstedt GA-52C, GA-52CV, and GA-52CX." The statement is misleading since the purpose of the subject study included evaluating a variety of detection technologies and systems, not just these Schonstedt models. Please modify the sentence to reduce potential misunderstanding.

14. p.3-25. Seventh line, "April 2004" is probably a misprint.

15. Appendix A. It contains two tables: a summary of MEC and MD recovered from the CSUMB Off-Campus MRA by functional groups and then by OE Model Number. The total numbers of items and records do not match between the two tables. Please review the tables and correct the discrepancy. In addition, descriptions of listed MEC items differ between the tables. Please cite the source of each of the tables and/or provide explanation for the differences.

Volume 2: Risk Assessment

16. p.2-3, Section 2.4 MEC Density. Third paragraph. Third sentence reads: "Since no anomalies were left uninvestigated within the depth of detection and possibly deeper, the fact that the anomalies were not identified as having been in a burial pit does not affect the MEC density." The meaning and purpose of the statement is unclear.

17. p.5-1, Section 5.1 Depth Below Ground Surface Uncertainties. Second paragraph, first sentence reads: "The MEC depth input score of '1' ('100% of detected MEC removed considering data quality for the sector') did not increase the risk." The meaning of the sentence is unclear.

Volume 3: Feasibility Study (FS)

18. At various places, words "selected" and "proposed" are used concerning the identification of a preferred alternative in the FS. It may be confusing to some readers since the word "select" is normally associated with the selection of a remedy in a CERCLA Record of Decision and the word "proposed" is normally associated with the proposed remedy which will be described in a Proposed Plan. Suggestion to consistently use "identify" for the preferred alternative in FS to avoid potential confusion.

19. p.2-2, Section 2.1.3.1 Deed Notices (under "Ongoing and Future MEC-Related Activities"). The description of the general deed notice in this section is appropriate. However, an actual notice is contained in the early-transfer deed for the property that this FS specifically addresses, therefore the actual deed notice should be described in place of or in addition to the current text.

20. p.2-3, Section 2.1.4 MEC Incident Reporting (under "Ongoing and Future MEC-Related Activities"). First sentence, please replace "MEC" with "military munitions" to read "…because military munitions were used throughout the former Fort Ord's history."

21. p.2-5, Section 2.1.7.2 Community Involvement (under "Programs Conducted by the Army"). Please make the following revisions for clarification. Second sentence: "The Army holds public meetings, Community Involvement Workshops, Technical Review Committee (TRC) meetings, ~~and~~ open houses *and tours,* and conducts public information sessions through booths or tables at local community events." Last sentence: "Community involvement activities are documented in ~~a~~ *the* CRP ~~*that is updated annually*~~."

22. p.2-6, Section 2.2.1 Deed Notice (under "Long-Term Management Measures Specific to the CSUMB Off-Campus MRA"). Here a general description of MEC-related deed notice is provided. However, a MEC-related notice is included in the early-transfer deed for the subject property, which would be modified upon the selection of a CERCLA remedy. Therefore the actual MEC-related deed notice should be described in place of or in addition to the current text.

23. p.3-3, Section 3.1.2.5 Construction Monitoring. People who would provide construction monitoring are described as "qualified MEC personnel" and "military munitions specialists." In order to communicate their qualifications more clearly, please instead use relevant standard terms used by the Department of Defense Explosives Safety Board.

MH
SC
LB

Fort Ord Environmental Justice Network, Inc.

Mailing address - P.O. Box 361....Marina, CA. 93933
831-582-0803 voice & fax...831-277-5241
www.foejn.org -.ejustice@mbay.net

16 November 2009

Michael Houlemard
Executive Officer, FORA
100 12th street
Marina, CA. 93933

RE: Remedial Investigation/Feasibility Study - Volume 1: Remedial Investigation

Dear Ms. Youngblood:

Please see attached hard copy, enclosed report submitted by Fort Ord Environmental Justice Network, Inc. for inclusion in the Administrative Records.

In addition this report reflects additional comments from the community.

Thank you for your response to my letter dated July 28, 2009 and for your enclosing a copy of the Draft Group 2 Remedial investigation/Feasibility study. It is my understanding that the Draft Group 2 RI/FS consists of the three items: Volume 1, Remedial Investigation, Volume 2, Risk Assessment, and Volume 3, Feasibility Study. However, the letter that was last sent to me was lacking Volume 2 and Volume 3, I only received your letter of response and Volume 1. Furthermore, I have some additional questions that to ask about the Remedial investigation/Feasibility study:

1. What equipment was used to detect MEC to a depth below 4 feet?

2. If an anomaly was detected below a depth of 3 to 4 feet per mission from the USACE MEC safety specialist, was this obtained prior to continuing the investigation? How many reports were filed for permission to further investigate?

3. Draft Plate 9 indicates miscellaneous MEC and MD. What type of munitions would be included in miscellaneous?

If you wish to discuss contents of this report further, please contact LeVonne Stone, FOEJN TAG Program Manager at 831-582-0803

Thank You,

LeVonne Stone, Fort Ord Environmental Justice Network, Executive Director/
TAG Project Manager

Cc: Viola Cooper, USEPA, Region 1X P

Fort Ord Reuse Authority
Comments on
Draft Group 2
Remedial Investigation/Feasibility Study
Volume 1: Remedial Investigation
California State University Monterey Bay Off-Campus Munitions Response Area
Prepared by
Environmental Stewardship Concepts
On behalf of
Fort Ord Environmental Justice Network

Comments prepared for the Fort Ord Administrative record

These comments were prepared at the request of the Fort Ord Environmental Justice Network (FOEJN) to provide technical comment to the Army and summarize the report on landfill gases for the community. FOEJN represents the affected community in the greater Fort Ord area in the clean up of contamination and ordnance related waste.

The Feasibility Study at the CSUMB Off-Campus Munitions Response Area (MRA) analyzes all of the known data pertinent to the site, including historical uses, physical characteristics, munitions detection and removals, and future uses. The objective of any Remedial Investigation is to assess the known data to determine if there are any gaps in information that may need to be filled before beginning a feasibility study that would determine how to restore the site to a quality that is safe for humans and wildlife. The CSUMB Off-Campus MRA Remedial Investigation is based on maps, photographs, military logs, and cleanup documents that provide wealth of information about the site. Using this information, the Fort Ord Reuse Authority obtained a detailed understanding of the weapons used at the site and various uses for specific areas of the MRA, including a fuel station, four weapons training areas, and two practice mortar range areas. The MRA will be redeveloped for residential use and open space so it is important to have a well-informed idea of where to expect munitions and explosives of concern that pose a risk to the community now and in the future. MEC mapping and removal has already occurred at the site, and though the information available for this site is very detailed and there are few apparent data gaps, the Remedial Investigation is cautious in its approach by determining that a Risk Assessment and Feasibility Study are warranted.

Specific comments
Section 2.2.2 Climate: This section does not address climate change. The Monterey Bay area is expected to experience several serious effects of climate change, including long periods of drought followed by extreme precipitation events that can lead to soil erosion and flooding. For this reason, the remediation process for the CSUMB Off-Campus MRA should be cautious in assuming that storm water runoff and soil erosion will remain low because these conditions may not be true in the near future. A cleanup is meant to permanently restore a site for future use so it is important to consider future land conditions.

The information in this section should be amended to indicate how the climate change could impact the current rainfall at Fort Ord because of the impact it will have on a cleanup strategy.

First bullet pg 3-2: This bullet does not make it clear whether or not the asphalt will remain in place at the MRA after the site is cleared for transfer for redevelopment. If the risk posed by this particular area is unclear, it will be necessary to address this issue prior to public use of the site. The RI should make it clear to readers what the plan for this particular 0.75-acre paved area is during and after site remediation in order to mitigate any safety hazards in the future.

"This document has been funded partly or wholly through the use of U.S EPA Technical Assistance Grant Funds. Its contents do not necessarily reflect the policies, actions or positions of the U.S. Environmental Protection Agency. The Fort Ord Environmental Justice Network Inc. does not speak for nor represent the U.S. Environmental Protection Agency."

Fort Ord Community Advisory Group (FOCAG)
P.O. Box 969
Seaside, CA 93955
Email: focagemail@yahoo.com
Phone: (831) 484-6659

SC
LB

Fort Ord Reuse Authority (FOR A)
c/o Stan Cook FOR A ESCA Program Manager
100 12th St, Building 2880
Marina, CA 93933
Via fax: 831-883-3675, with hard copy to follow by U.S. Mail

BRAC
c/o Gail Youngblood
BRAC, Building #4463 Gigling Rd
Monterey, CA 93940
Via fax: 831-393-9188, with hard copy to follow by U.S. Mail

Re: Comments to the Draft Group 2 Remedial Investigation/Feasibility Study,
Dated September 17, 2009 DCN: 09595-09-079-022
California State University Monterey Bay Off-Campus Munitions Response Area

FOR THE ADMINISTRATIVE RECORD

November 20, 2009

Ladies and Gentlemen,

The FOCAG would like to offer some suggestions and questions in the hopes that you'll answer them, consider them, and incorporate them into the Draft Final document. We look forward to receiving it for further analysis after others have commented also.

1) The document discusses looking for MEC with the Schonstedt. It even offers an analysis that the three types of Schonstedt used in the 1990's were of equal effectiveness in locating MEC. Not the best, but what was available at the time. This document doesn't report any additional exploration but only your analysis of previous information. Much of the information pertaining to depths MEC was found, you report, has been unfortunately lost. We wish to see an analysis included that gives the depths to which the Schonstedt can detect MEC. Our understanding is that it is about eighteen inches to maybe thirty inches below ground surface (bgs). You report that many areas were cleared by a Schonstedt investigation to three feet and sometimes four feet. It is a sandy loam soil in the area.
Why hasn't the FOERSTER M26 magnetometer been used? DTSC asked this several years ago and we cannot find an answer.

S

2) Why is this Track 2 RI/FS removed from the previous Track 2 RI/FS analysis that the FOCAG recently also responded to? (It was a larger area)

3) The categories of Tracks 0, 1, 2, and 3 seem to have changed from when introduced by the U.S. Army several years ago. The FOCAG understanding at the time was: (abbreviated)
Track 0: No history of UXO
Track 1: Some history of UXO, but light. small arms, etc.
Track 2: More dangerous Army Range areas requiring more thorough investigation
Track 3: The Multi-range Area and areas recognized as being very dangerous.

We now see these categories as itemizing what has and what has not been cleaned up. The element of potential risk seems to have been removed from a numerical identification. What happened?

4) Area S1.3.2 has been recently cleared of an oak tree forest. The FOCAG understanding is that there is a Draft EIR for residential housing being circulated by the University. This FOR A document to which we are responding is a Draft. There will need to be a Draft Final, a Final, then the U.S. Army will have to select a remediation, and then possibly adopt a Record of Decision (ROD).
a) How did this area get clear-cut so early and with no permits from Monterey County? Area S1.3.2 is in Monterey County's jurisdiction.
b) This calls into question the effectiveness of the LUC's, the Land Use Controls that the regulatory agencies are sometimes recommending.

5) Given that this S1.3.2 is a known former booby trap and mine field practice range; Given that it is adjacent to, or part of chemical, biological, and radiological (Depleted Uranium) training area;
Given that the area was used for tank training and that tanks can fire their ammunition several feet underground, especially in sandy loam soil;
Is this FOR A's recommendation that this area be used for residential housing?
Will LUC's prevent homeowners from planting a tree in their backyard, say ten years from now?

6) The acronym CBR that stands for chemical, biological and radiological weaponry and testing needs to be spelled out more often in the document for easier reading and understanding. It's potential also needs to be addressed in any summary analysis. Also, please address the CDEC program that existed for twenty plus years. Its headquarters was on former Fort Ord. Discuss and analyze depleted uranium and its effectiveness in tank warfare.

7) The report states that the testing for residual chemical contamination is the responsibility of the United States Army and is separate from the looking for and removal of MEC. Please analyze and give a time line for testing for the approximately 200

chemical constituents used on former Fort Ord. Isn't separating the exploration of and analysis of the two piecemealing? How can an Army Record of Decision for the area separate the two?

8) The pilot study mentioned is very ill defined, with no time line, cost, or expectations identified. Who is paying for this?

9) Parcel 13B has disappeared or as one FOCAG member was told, "has been subsumed". Please explain what happened to 13B? What was formerly found on 13B? What were 13B boundaries? Was it formerly categorized as a Track 1, Track 2, or Track 3 parcel?

10) The number of times that previous UXO notes have been lost, regarding depths and specific location, as repeatedly told about in this document, is very disturbing. Please explain how recorded LUC's can work say twenty years from now, when clean up notes from fifteen years ago have been lost.

Thank you for the opportunity to comment on this Draft. We look forward to reading the comments from the regulatory agencies and others when we receive the Draft Final document.

Sincerely,

Mike Weaver
Co-Chair, The Fort Ord Community Advisory Group (FOCAG)

APPENDIX D

Response to Comments on the Draft Final Group 2 RI/FS

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Gail Youngblood of the Army, dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
1	Volume 1 – Remedial Investigation, Section 7.0 References, Page 7-2	**Comment:** A 2004 document titled "Draft MRS MOCO.2 After-Action Report, Former Fort Ord, California" is listed in the reference section. Please note that munitions and explosives of concern (MEC) removal action was conducted in the MOCO.2 site in two phases, and both phases were reported in *Draft Final Non-Time Critical Removal Action MRS-MOCO.2 NOI Removal Area (Phases 1 and 2) After-Action Report*, dated June 6, 2006 (Administrative Record [AR] number: OE-0580D). **Response:** The reference has been updated to indicate the 2006 Draft Final After Action Report. References made to the 2004 document have been updated accordingly in the Munitions Response Activity Evaluation Checklists Part 2: Removal Evaluation included in Appendix B of Volume 1.
2	Volume 2 – Risk Assessment, Section 3.1, Description of Reuse Areas, Page 3-1	**Comment:** The residential and non-residential future uses are described, but the citation for the source of the information is different from those noted in Volume 3, Feasibility Study. Please check information for consistency. **Response:** Volume 1, Section 2.7, and Volume 2, Section 3.1, have been revised to include references to the CSUMB Master Plan to be consistent with references noted in Volume 3. Additionally, the CSUMB Master Plan has been added to the References section of Volumes 1 and 2.
3	Volume 3 – Feasibility Study, Section 1.2.3, FORA ESCA Remediation Program, Page 1-5, First Paragraph	**Comment:** To be consistent with text used in the recently completed 3rd Five-Year Review for the former Fort Ord site (AR number: BW-2632), please revise the first sentence to read: The purpose of the ESCA RP is to provide the necessary environmental services to FORA, which include characterization, assessment of risk of explosive hazards, FS, remediation alternatives analysis, and performance of remediation (excluding Army-retained conditions described in Section 1.2.2) in accordance with the ESCA and the AOC." **Response:** The text in Section 1.2.3 has been revised as requested. Additionally, corresponding text in Volume 1, Section 1.2.3, and Volume 2, Section 1.1.3, have been revised.
4	Volume 3 – Feasibility Study, Section 1.2.3, FORA ESCA Remediation Program, Page	**Comment:** At the end of the first paragraph, the status of soil remediation for Historical Area 161 within Installation Restoration Program Site 39B is provided. As described in the section, confirmation samples collected following the 2010 soil remediation indicated the residual soil concentrations for lead were below the target cleanup level. Please note that, the 3rd Five-Year Review found that there have been changes in the State of California's health guidance value for

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Gail Youngblood of the Army, dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
	1-5	lead in blood and methodology used for calculating health risk from lead. As a follow-up action an additional evaluation is underway to determine the protectiveness of the human health-based cleanup levels for the Interim Action sites with lead in soil, including Site 39B. This evaluation is expected to be completed by December 2013. **Response:** The following text has been added to the end of the cited paragraph and to corresponding paragraphs in Volume 1, Section 1.2.3, and Volume 2, Section 1.1.3: "***As a follow-up to the 3rd Five-Year Review, an additional evaluation is being conducted by the Army to determine the protectiveness of the human health-based cleanup levels for the Interim Action sites with lead in soil, including Site 39B (Army 2012). This evaluation is expected to be completed by December 2013.***" In addition, the 3rd Five-Year Review has been added to the references lists in Volumes 1, 2, and 3.
5	Volume 3 – Feasibility Study, Section 1.2.3, FORA ESCA Remediation Program, Page 1-6, Third Paragraph	**Comment:** Group 1 is described as consisting of the Parker Flats Phase II and Seaside MRAs. Please delete "Phase II" since Figures 1 and 2 both show Group 2 to include the entire ESCA Parker Flats MRA and the Seaside MRA. **Response:** The cited sentence and corresponding sentences in Volume 1, Section 1.2.3, and Volume 2, Section 1.1.3, have been revised as requested.
6	Volume 3 – Feasibility Study, Section 5.1.2, Compliance with ARARs, Page 5-4	**Comment:** The discussion for Alternative 2 indicates that the implementation of Covenant to Restrict the Use of Property (CRUP) currently in place on the property is "in accordance with the DTSC policy" and "no other ARARs" were identified that apply to the land use control alternative. Please modify the first sentence to refer to the broader federal and state guidelines described in Section 2.4.2, rather than the "DTSC policy." Same comment applies to Section 5.2.2. Since a policy does not meet the definition of ARARs (described in Section 2.4.1), please delete "other" from the second sentence. **Response:** The discussion for Alternative 2 in Section 5.1.2 has been revised as follows: "Alternative 2 (Land Use Controls): The ~~CRUP for~~ residential use restriction would be removed from Sector 1 and continue to be

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Gail Youngblood of the Army, dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
		implemented in Sector 2 in accordance with the ~~DTSC policy~~ ***guidelines set forth by the EPA, DOD, and DTSC***. No ~~other~~ ARARs were identified that apply to implementation of this alternative." The second sentence of Section 5.2.2 has been revised as follows: "Alternative 2 (Land Use Controls) would continue to be implemented in accordance with ~~DTSC policy~~ ***guidelines set forth by the EPA, DOD, and DTSC***."
7	Volume 3 – Feasibility Study, Section 7.0, Approval Process, Page 7-1	**Comment:** Third bullet, for a proposed plan please refer to a 30-day "public comment period" rather than a "review period." **Response:** The cited bullet has been revised as requested.
8	Volume 3 – Feasibility Study, Table 5-1, Summary of Evaluation of Remedial Alternatives	**Comment:** Please correct the definition of MEC noted below the table. **Response:** The definition for MEC has been revised as follows: "MEC = munitions and explosives of ~~control~~ ***concern***"
9	Volume 3 – Feasibility Study, Table 5-5, Summary of Comparison of Remedial Alternatives	**Comment:** • Long-Term Effectiveness & Permanence for Alternative 2 is noted with "has moderate ability to meet CERCLA criteria." Please reexamine the entry since the alternative was described in Section 5 as protective in the long-term, which can be interpreted to relate to "high ability to meet the CERCLA criteria." • Please correct the fifth row heading to read "Reduction of Toxicity, Mobility, or Volume Through Treatment." • Please correct the definition of MEC noted below the table. **Response:** The Long-Term Effectiveness & Performance for Alternative 2 has been revised to indicate that this alternative "has high ability to meet the CERCLA criteria." Additionally, the fifth row heading and the definition for MEC have been revised as requested.

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Gail Youngblood of the Army, dated November 1, 2012

[this page intentionally left blank]

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Dan Amadeo of Marina in Motion,
dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
1	General Comment	**Comment:** Obviously any land projected for transfer for residential use must be evaluated to a degree that upon transfer the land is free of any hazardous materials particularly MEC. In our view, and as previously commented on, this should include all Hazard Code items which can cause injury if in close proximity to a receptor and/or attempts made to modify MEC items or debris for some other use. Clearly efforts made of significantly reduced risks associated with any proposed early transfer but leave some concerns open. **Response:** The ESCA RQA Process includes evaluation of MEC and MD of all Hazard Codes (1, 2 and 3). As described in Section 1.2.4 of Volume 1, details of the RQA Pilot Study and RQA Process Implementation Phase are provided in the Final Group 1 RI / FS Work Plan and associated Field Variance Forms. As stated in Volume 1, the remedial investigation indicated that the investigations conducted in the CSUMB Off-Campus MRA successfully detected, excavated, and recovered MEC items and that the imminent safety hazard was removed; however, it is possible for residual MEC to remain undetected in the CSUMB Off-Campus MRA. The remedial alternatives described in Volume 3 were developed to prevent or reduce the potential for the CSUMB Off-Campus MRA reuse receptors to come in direct contact with MEC items potentially remaining in subsurface soil and minimize potential impacts from such exposures.
1	Question	**Comment:** Were the standards reviewed in the Final Technical Information Paper ESCA Residential Quality Assurance Process Pilot Study applied to the final recommendations? If so, does this process account for Category 1 materials? **Response:** As described in Section 3.2 of Volume 1 of this Group 2 Remedial Investigation/Feasibility Study (RI/FS), the RQA data was collected in a manner consistent with the data quality objectives of the Group 1 RI/FS Work Plan and is included in the risk assessment presented as Volume 2 of this Group 2 RI/FS. The first level of the ESCA RQA Process Implementation Study, Level 1 Initial Evaluation, included evaluation of MEC and MD of Hazard Codes 1, 2 and 3 found in the CSUMB Off-Campus MRA proposed future residential reuse area. No technical challenges were identified during the Level 1 Initial Evaluation for Hazard Code 1 items; therefore, additional evaluation under the ESCA RQA Process was not warranted. The findings of the Level 1 Initial Evaluation are presented in Appendix F of the CSUMB Off-Campus

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Dan Amadeo of Marina in Motion,
dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
		MRA RQA Process Pilot Study Technical Information Paper (ESCA RP Team 2012). No changes have been incorporated into the report based on this comment.
2	Question	**Comment**: Do institutional controls require that developers and/or receiving jurisdictions of the transferred land conduct additional investigation and clearing of MEC and debris? **Response**: FORA previously responded to this comment in Appendix M of the Final ESCA RQA Process Pilot Study Technical Information Paper, California State University Monterey Bay Off-Campus Munitions Response Area (Fort Ord Administrative Record No. ESCA-0257B). The response provided is as follows: Institutional controls do not require additional investigation and clearing for MEC and related debris. However, if a known or suspected MEC item is encountered during ground-disturbing and/or intrusive activities, such as development, the probability of encountering additional MEC will be assessed. An assessment may include additional investigation, which will be coordinated with the Army, EPA, and DTSC. If EPA, in consultation with DTSC, determines that additional investigation is required as part of the assessment, an investigation will be conducted in accordance with an approved work plan. EPA, in consultation with DTSC, will evaluate and approve the results of the investigation. If the probability of encountering MEC is determined to be low, construction may resume with construction support. If the probability of encountering MEC is determined to be moderate/high, the Army and EPA in consultation with DTSC will determine an appropriate follow-up action to be implemented. This institutional control is a Land Use Control (LUC) and, if selected as part of the final remedial action, this institutional control would be described in a Land Use Controls Implementation Plan (LUCIP) or similar document. No changes have been incorporated into the report based on this comment.
3	Question	**Comment**: How can the county ordnance ordinance be enforced if some or all portions of the land is transferred to and under the jurisdiction of a State Agency (e.g. CSUMB)? **Response**: A requirement for construction support is an institutional control. If institutional controls are selected as part of the remedy, the implementation,

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Dan Amadeo of Marina in Motion,
dated November 1, 2012

No.	Comment Type / Report Section	Comment/Response
		maintenance, monitoring, and enforcement of institutional controls would be described by FORA in a LUCIP or similar document. CSUMB entered into a Memorandum of Agreement (MOA), finalized on February 27, 2008, titled Concerning Monitoring and Reporting on Environmental Restrictions on the Former Fort Ord, Monterey County (Fort Ord Administrative Record No. OE-0714A, Appendix D). The MOA lists the requirements for reporting of the implementation of the land use controls placed on the various parcels at the former Fort Ord. No changes have been incorporated into the report based on this comment.
4	Question	**Comment**: Once transferred, what further responsibility does the Army or the regulatory agencies have for additional clearance and specifically monitoring the enforcement of institutional controls by underlying jurisdictions city, county, or state? **Response**: Following the Proposed Plan comment process, the final remedial action decision for the CSUMB Off-Campus MRA will be presented in a Record of Decision (ROD). If institutional controls, or LUCs, are selected as part of the final remedial action, the implementation, maintenance, monitoring, and enforcement of institutional controls would be described by FORA in a LUCIP or similar document. In addition, if the potential to encounter undiscovered MEC on the transferred property remains, the Army will conduct five-year reviews of the final remedy as part of the installation-wide review required by CERCLA and the National Contingency Plan. No changes have been incorporated into the report based on this comment.

Response to Comments
Draft Final Group 2 Remedial Investigation / Feasibility Study, dated October 19, 2012
Review Comments provided by Dan Amadeo of Marina in Motion,
dated November 1, 2012

[this page intentionally left blank]

DEPARTMENT OF THE ARMY
FORT ORD OFFICE, ARMY BASE REALIGNMENT AND CLOSURE
P.O. BOX 5008, BUILDING #4463 GIGLING ROAD
MONTEREY, CALIFORNIA 93944-5008

REPLY TO
ATTENTION OF

NOV 0 1 2012

Fort Ord BRAC Field Office

Stan Cook
ESCA Remediation Program Manager
Fort Ord Reuse Authority
100 12th Street, Building 2880
Marina, CA 93933

Subject: *Draft Final Group 2 Remedial Investigation/Feasibility Study, California State University Monterey Bay Off-Campus Munitions Response Area*, dated October 19, 2012.

Dear Mr. Cook:

Thank you for an opportunity to review and comment on the subject document. The Army's comments are enclosed. Please note our comments are focused on "big picture" issues such as the consistency with documents previously produced under the Army's cleanup program. A copy of this letter will be furnished to U.S. Environmental Protection Agency (Judy Huang) and California Department of Toxic Substances Control (Ed Walker).

If you have any questions, please contact me. Thank you.

Sincerely,

Gail Youngblood
BRAC Environmental Coordinator

Enclosure

DRAFT FINAL Group 2 Remedial Investigation/Feasibility Study (RI/FS), California State University Monterey Bay (CSUMB) Off-Campus Munitions Response Area (MRA)

Dated October 19, 2012

Army Comments:

Volume 1: Remedial Investigation

1. P.7-2. A 2004 document titled "Draft MRS MOCO.2 After-Action Report, Former Fort Ord, California" is listed in the reference section. Please note that munitions and explosives of concern (MEC) removal action was conducted in the MOCO.2 site in two phases, and both phases were reported in *Draft Final Non-Time Critical Removal Action MRS-MOCO.2 NOI Removal Area (Phases 1 and 2) After-Action Report*, dated June 6, 2006 (Administrative Record [AR] number: OE-0580D).

Volume 2: Risk Assessment

2. P.3-1, Section 3.1 Description of Reuse Areas. The residential and non-residential future uses are described, but the citation for the source of the information is different from those noted in Volume 3, Feasibility Study. Please check information for consistency.

Volume 3: Feasibility Study

3. P.1-5, Section 1.2.3 FORA ESCA Remediation Program. First paragraph. To be consistent with text used in the recently completed 3rd Five-Year Review for the former Fort Ord site (AR number: BW-2632), please revise the first sentence to read: The purpose of the ESCA RP is to provide the necessary environmental services to FORA, which include characterization, assessment of risk of explosive hazards, FS, remediation alternatives analysis, and performance of remediation (excluding Army-retained conditions described in Section 1.2.2) in accordance with the ESCA and the AOC."

4. P.1-5, Section 1.2.3 FORA ESCA Remediation Program. At the end of the first paragraph, the status of soil remediation for Historical Area 161 within Installation Restoration Program Site 39B is provided. As described in the section, confirmation samples collected following the 2010 soil remediation indicated the residual soil concentrations for lead were below the target cleanup level. Please note that, the 3rd Five-Year Review found that there have been changes in the State of California's health guidance value for lead in blood and methodology used for calculating health risk from lead. As a follow-up action an additional evaluation is underway to determine the protectiveness of the human health-based cleanup levels for the Interim Action sites with lead in soil, including Site 39B. This evaluation is expected to be completed by December 2013.

5. p.1-6, third paragraph of Section 1.2.3 FORA ESCA Remediation Program. Group 1 is described as consisting of the Parker Flats Phase II and Seaside MRAs. Please delete "Phase II" since Figures 1 and 2 both show Group 2 to include the entire ESCA Parker Flats MRA and the Seaside MRA.

6. P.5-4, Section 5.1.2 Compliance with ARARs (under Evaluation of Remedial Alternatives). The discussion for Alternative 2 indicates that the implementation of Covenant to Restrict the Use of Property (CRUP) currently in place on the property is "in accordance with the DTSC policy" and "no other ARARs" were identified that apply to the land use control alternative. Please modify the first sentence to refer to the broader federal and state guidelines described in Section 2.4.2, rather than the "DTSC policy." Same comment applies to Section 5.2.2. Since a policy does not meet the definition of ARARs (described in Section 2.4.1), please delete "other" from the second sentence.

7. P.7-1, Section 7.0 Approval Process. Third bullet, for a proposed plan please refer to a 30-day "public comment period" rather than a "review period."

8. Table 5-1, Summary of Evaluation of Remedial Alternatives. Please correct the definition of MEC noted below the table.

9. Table 5-5, Summary of Comparison of Remedial Alternatives.

   - Long-Term Effectiveness & Permanence for Alternative 2 is noted with "has moderate ability to meet CERCLA criteria." Please reexamine the entry since the alternative was described in Section 5 as protective in the long-term, which can be interpreted to relate to "high ability to meet the CERCLA criteria."
   - Please correct the fifth row heading to read "Reduction of Toxicity, Mobility, or Volume Through Treatment."
   - Please correct the definition of MEC noted below the table.

LB
SC

Marina in Motion
PO Box 1641, Marina CA 93933

Mr. Stan Cook
FORA ESCA Program Manager
920 Second Ave, Suite A
Marina, CA 93933

November 13, 2012

Subject: Questions and Comments Regarding "Draft Final, Group 2 (Volume 1, 2, 3), Remedial Investigation/Feasibility Study, California State University Monterey Bay Off-Campus Munitions Response Areas," Former Fort Ord, CA dated October 19, 2012

Please accept the questions and comments of Marina in Motion

General Comment:

Obviously any land projected for transfer for residential use must be evaluated to a degree that upon transfer the land is free of any hazardous materials particularly MEC. In our view, and as previously commented on, this should include all Hazard Code items which can cause injury if in close proximity to a receptor and/or attempts made to modify MEC items or debris for some other use. Clearly efforts made of significantly reduced risks associated with any proposed early transfer but leave some concerns open.

Questions:

1. Were the standards reviewed in the Final Technical Information Paper ESCA Residential Quality Assurance Process Pilot Study applied to the final recommendations? If so, does this process account for Category 1 materials?

2. Do institutional controls require that developers and/or receiving jurisdictions of the transferred land conduct additional investigation and clearing of MEC and debris?

3. How can the county ordinance ordinance be enforced if some or all portions of the land is transferred to and under the jurisdiction of a State Agency (e.g. CSUMB)?

3. Once transferred, what further responsibility does the Army or the regulatory agencies have for additional clearance and specifically monitoring the enforcement of institutional controls by underlying jurisdictions city, county, or state?

Dan Amadeo
Marina in Motion

Hand-delivered by Dan Amadeo
11/13/12
Received by
Lena Spilman

3