Track 1
Plug-In Approval Memorandum
County North Munitions Response Area
Former Fort Ord, California

February 16, 2010

Prepared for:

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

CONTENTS

APPENDICES

ACRONYMS AND ABBREVIATIONS

AP	Antipersonnel
AOC	Administrative Order on Consent
Army	United States Department of the Army
ASP	Ammo Supply Point
ASR	Archives Search Report
AT	Antitank
BRA	Basewide Range Assessment
BRAC	Base Realignment and Closure
CEHND	Army Corps of Engineers Huntsville Division
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	CMS Environmental, Inc.
CSM	conceptual site model
CSU	California State University
CSUMB	California State University Monterey Bay
DQO	Data Quality Objectives
DSS	Division Support Services
DTSC	California Department of Toxic Substances Control
EPA	United States Environmental Protection Agency
ESCA	Environmental Services Cooperative Agreement
FFA	Federal Facility Agreement
FM	Field Manual
FORA	Fort Ord Reuse Authority
FOSET	Finding of Suitability for Early Transfer
GPS	Global Positioning System
HA	historical area
HE	high explosive
HFA	Human Factors Applications, Inc.
HLA	Harding Lawson Associates
IT	IT Corporation
MACTEC	MACTEC Engineering and Consulting, Inc.
MCX	Mandatory Center of Expertise
MD	munitions debris
MEC	munitions and explosives of concern
mm	millimeter
MMRP	Military Munitions Response Program

MR	Munitions Response
MRA	Munitions Response Area
MRS	Munitions Response Site
NCOA	Non-Commissioned Officers Academy
NERL	National Exposure Research Laboratory
ODDS	Ordnance Detection and Discrimination Study
OE	ordnance and explosives
PA/SI	Preliminary Assessment/Site Inspection
Parsons	Parsons Infrastructure & Technology Group, Inc.
PWP	Programmatic Work Plan
PTA	Physical Training Area
QA/QC	Quality Assurance/Quality Control
RA	Risk Assessment
RAC	Risk Assessment Code
RI/FS	Remedial Investigation/Feasibility Study
RP	Remediation Program
ROD	Record of Decision
SOP	Standard Operating Procedure
SS/GS	Site Stats/Grid Stats
TCRA	Time-Critical Removal Action
TM	Technical Manual
TS	Training Site
USA	USA Environmental, Inc.
USACE	United States Army Corps of Engineers
USAEDH	U.S. Army Design Engineering and Support Center, Huntsville
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
UXB	UXB International, Inc.
UXO	unexploded ordnance

GLOSSARY

Discarded Military Munitions (DMM)

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 unexploded ordnance, 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)) Source: (1)

For the purposes of the basewide Munitions Response Program being conducted at the former Fort Ord, DMM does not include small arms ammunition .50 caliber and below.

Expended

The state of munitions debris in which the main charge has been expended leaving the inert carrier Source: (2).

Feasibility Study (FS)

An evaluation of potential remedial technologies and treatment options that can be used to clean up a site Source: (2).

Impact Area

The impact area consists of approximately 8,000 acres in the southwestern portion of former Fort Ord, bordered by Eucalyptus Road to the north, Barloy Canyon Road to the east, South Boundary Road to the south, and North-South Road to the west Source: (2).

Institutional Control (IC)

A legal or institutional mechanism that limits access to or use of property, or warns of a hazard. An IC can be imposed by the property owner, such as use restrictions contained in a deed, or by a government, such as a zoning restriction. Source: (3)

Land Use Controls (LUC)

LUC are physical, legal, or administrative mechanisms that restrict the use of, or limit access to, real property, to manage risks to human health and the environment. Physical mechanisms encompass a variety of engineering remedies to contain or reduce contamination and/or physical barriers to limit access to real property, such as fences or signs. Source: (3)

Mag and Flag

Magnetometer searches and flagging subsurface contacts. Source: (2)

Magnetometer

An instrument used to detect ferromagnetic (iron-containing) objects. Total field magnetometers measuring the strength of the earth's natural magnetic field at the magnetic sensor location. Gradient magnetometers, sensitive to smaller near-surface metal objects, use two sensors to measure the difference in magnetic field strength between the two sensor locations. Vertical or horizontal gradients can be measured. Source: (2)

Military Munitions Response Program (MMRP)
DoD-established program to manage the environmental, health and safety issues presented by Munitions and Explosives of Concern (MEC). Source: (2)

Military Munitions
Military munitions means 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 thereof.

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).

Munitions Constituents (MC)
Any materials originating from unexploded ordnance (UXO), discarded military munitions (DMM), or other military munitions, including explosive and nonexplosive materials, and emission, degradation, or breakdown elements of such ordnance or munitions constituents (e.g., trinitrotoluene [TNT], cyclotrimethylene trinitramine [RDX]) (10 U.S.C. 2710 (e) (3)). Source: (1)

Munitions Debris
Remnants of munitions (e.g., fragments, penetrators, projectiles, shell casings, links, fins) remaining after munitions use, demilitarizations, or disposal. Source: (2)

Munitions and Explosives of Concern (MEC)
Distinguishes specific categories of military munitions that may pose unique explosives safety risks, such as: UXO, as defined in 10 U.S.C. 101 (e) (5); discarded military munitions, as defined in 10 U.S.C. 2710 (e) (2); or munitions constituents (e.g., TNT, Cyclotrimethylene trinitramine [RDX]), as defined in 10 U.S.C. 2710 (e) (3), present in high enough concentrations to pose an explosive hazard. Source: (1)

For the purposes of the basewide Munitions Response Program being conducted for the former Fort Ord, MEC does not include small arms ammunition .50 caliber and below. Source: (2)

Munitions Response Area (MRA)
Any area on a defense site that is known or suspected to contain UXO, DMM, or MC. Examples are former ranges and munitions burial areas. A MRA comprises of one or more munitions response sites. Source: (2)

Munitions Response Site (MRS)
A discrete location within MRA that is known to require a munitions response. Source: (2)

Mortar
Mortars typically range from approximately 1 inch to 11 inches in diameter or larger, and can be filled with explosives, toxic chemicals, white phosphorus or illumination flares. Mortars generally have thinner metal casing than projectiles but use the same types of fuzing and stabilization. Source: (4)

MEC Sampling
Performing MEC searches within a site to determine the presence of MEC. Source: (2)

Operating Grids
Typically, 100-foot by 100-foot parcels of land as determined by survey and recorded by Global Positioning System (GPS), marked at each corner with wooden stakes. Sites are divided into operating grids prior to the commencement of work by brush removal or OE sweep teams. A single grid may be occupied by only one team at any time, and the grid system facilitates the maintenance of safe distances between teams. They are identified sequentially using an alpha-numeric system (e.g., E-5). Source: (2)

Projectile
An object projected by an applied force and continuing in motion by its own inertia, as a bullet, bomb, shell, or grenade. Also applied to rockets and to guided missiles. Source: (5)

Remedial Investigation (RI)
Exploratory inspection conducted at a site to delineate the nature and extent of chemicals, and in this case OE, present at the site. Source: (2)

Removal Depth
The depth below ground surface to which all ordnance and other detected items are removed. Source: (2)

SiteStats/GridStats
Programs developed by QuantiTech for the Huntsville Corps of Engineers to predict the density of ordnance on sites with spatially random dispersal of ordnance. Source: (2)

Surface Removal
Removal of OE from the ground surface by UXO teams using visual identification sometimes aided by magnetometers. Source: (2)

Transferred Range
A military range that is no longer under military control and has been leased, transferred, or returned to another entity, including Federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager. Source: (6).

Transferring Range
A military range that is proposed to be leased, transferred, or returned from the DoD to another entity, including Federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager. An active range will not be considered a "transferring range" until the transfer is imminent. Source: (6).

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)). Source: (1)

For the purpose of the basewide Munitions Response Program being conducted for the former Fort Ord, UXO does not include small arms ammunition .50 caliber and below.

Sources:

(1) Department of Defense (DoD). 2005. Memorandum for the Assistant Chief of Staff for Installation Management Subject: Munitions Response Terminology. April 21.

(2) Non-standard definition developed to describe Fort Ord-specific items, conditions, procedures, principles, etc., as they apply to issues related to MEC cleanup.

(3) The Interstate Technology and Regulatory Cooperation (ITRC) Work Group (Unexploded Ordnance Work Team). 2000. Compendium of Department of Defense Acronyms, Terms, and Definitions: December.

(4) DoD. 2001. Department of Defense Dictionary of Military and Associated Terms, Joint Publication 1-02. April 12 (as amended through December 17, 2003).

(5) Department of Defense Environmental & Information Exchange. 1996. Unexploded Ordnance: An Overview. October.

(6) DoD. 1997. 32 CFR Part 178; Closed, Transferred, and Transferring Ranges Containing Military Munitions; Proposed Rule. September.

1.0 INTRODUCTION

This Track 1 Plug-In Approval Memorandum ("Approval Memorandum") was prepared for the County North Munitions Response Area (MRA) located within the former Fort Ord in Monterey County, California (Figure 1). The purpose of this Approval Memorandum is to provide the information necessary to allow the County North MRA into the Track 1 Plug-In process. The Track 1 Plug-In process was described in the United States Department of the Army's (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 Risk from Chemical Contamination at Site 3 (MRS-22)," dated April 2005 ("the Track 1 Record of Decision [ROD]"; Army 2005a). The County North MRA has been identified as eligible as a Track 1, Category 3 Plug-In site based on the location, physical features, types of past training activities, and munitions and explosives of concern (MEC) and munitions debris (MD) found.

When written concurrence is received from the United States Environmental Protection Agency (EPA), in consultation with the California Department of Toxic Substances Control (DTSC), this approval memorandum will serve as the decision document stating that no further action regarding munitions response is required for the County North MRA. The following sections provide an overview of the former Ford Ord background, the Track 1 Plug-In process, and site-specific information including history of the area, future use, and rationale for the inclusion of the County North MRA into the Track 1 Plug-In process. A glossary of Munitions Response Program terms is provided in the preceding section.

1.1 Fort Ord and Munitions Response Remedial Investigation/Feasibility Study Background

The former Fort Ord is located in northern Monterey County approximately 100 miles south of San Francisco (Figure 1). The former Fort Ord is made up of approximately 28,000 acres of land adjacent to Monterey Bay and the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and Marina to the north. The former Fort Ord is bounded to the east and north by the Salinas Valley. A southern Pacific Railroad track and Highway 1 pass through the western portion of the former Fort Ord, separating the beach from the rest of the base. Laguna Seca Recreation Area, Toro Park, and Highway 68 border former Fort Ord to the south and southeast.

The U.S. Government bought the present day East Garrison and nearby lands on the east side of Fort Ord in 1917 to use as a maneuver and training ground for field artillery and cavalry troops stationed at the Presidio of Monterey. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed.

In 1940, additional agricultural property was purchased for the development of the Main Garrison. At the same time, the beachfront property was donated to the Army. The Main

Garrison was constructed between 1940 and the 1960s, starting in the northwestern corner of the base and expanding southward and eastward.

Since it was established in 1917, Fort Ord served primarily as a training and staging facility for infantry troops. Fort Ord was a basic training center from 1947 to 1975; served as a base for the 7th Infantry Division after 1975; and was selected for closure in 1991. Fort Ord was officially closed in September 1994 in response to the 1991 Base Realignment and Closure (BRAC) Act. No active army divisions are stationed at the former Fort Ord; however, Army personnel operate the areas of the former Fort Ord still held by the Army. Much of the installation has been or will be disposed to federal, state, local, and private entities through economic development conveyance, public benefit conveyance, negotiated sale, or other means.

Because various Army units used portions of Fort Ord for maneuvers, target ranges, and other training/staging activities, military munitions may be present at the former Fort Ord. In preparation for transfer and reuse of former Fort Ord property, various military munitions-related investigative and removal/remedial activities have been performed since 1993. Potential chemical contamination at the former Fort Ord was investigated under the Basewide Remedial Investigation/Feasibility Study (RI/FS; HLA 1995). In addition, a Basewide Range Assessment (BRA) was conducted by the Army to evaluate the potential presence of chemicals of concern at known or suspected small arms ranges, multi-use ranges, and military munitions training areas within the former Fort Ord (Shaw/MACTEC 2009).

A Federal Facility Agreement (FFA) was signed in 1990 by the Army, the EPA, the DTSC, and the Central Coast Regional Water Quality Control Board. The FFA established schedules for performing remedial investigations and feasibility studies and required that remedial actions be completed as expeditiously as possible. In 1998, the Army agreed to evaluate military munitions at the former Fort Ord in a basewide Munitions Response (MR) RI/FS (formerly ordnance and explosives [OE] RI/FS) consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The basewide MR RI/FS program addressed MEC hazards on 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, the EPA, and the DTSC to evaluate military munitions at the former Fort Ord subject to the provisions of the FFA (SMART 2000). The MR RI/FS utilizes a "tracking" process, which categorizes areas with similar MEC-related characteristics to expedite cleanup, reuse, and/or transfer of former Fort Ord property. According to this "tracking" process, an area under investigation is assigned one of four tracks, Tracks 0 through 3, which are described as follows:

- Track 0: Areas that contain no evidence of MEC and have never been suspected as having been used for military munitions-related activities of any kind.
- Track 1: Sites where military munitions were suspected to have been used, but based on the RI/FS for each site, fall into one of the following three categories:
    - Category 1: There is no evidence to indicate military munitions were used at the site, i.e., suspected training did not occur; or

- Category 2: The site was used for training, but the military munitions items used do not pose an explosive hazard, i.e., training did not involve explosive items; or
- Category 3: The site was used for training with military munitions, but military munitions items that potentially remain as a result of that training do not pose an unacceptable risk based on site-specific evaluations conducted in the Track 1 OE RI/FS. Field investigations identified evidence of past training involving military munitions, but training at these sites involved only the use of practice and/or pyrotechnic items that are not designed to cause injury. In the unlikely event that a live item of the type previously observed at the site is found, it is not expected that the item would function by casual contact (i.e., inadvertent and unintentional contact).

- Track 2: Sites where MEC items were present and a MEC removal action has been conducted.
- Tract 3: Areas where MEC items are known or suspected to be present, but MEC investigations have not yet been completed.

In connection with the early transfer of a portion of the former Fort Ord, including the County North MRA, the Fort Ord Reuse Authority (FORA) assumed some of the Army's cleanup obligations under an Environmental Services Cooperative Agreement (ESCA) grant. Pursuant to the associated Administrative Order on Consent (AOC) for Cleanup of Portions of the Former Fort Ord, Docket No. R9-2007-003, effective July 25, 2008, and the ESCA, dated March 27, 2007, FORA agreed to conduct the evaluation of MEC hazards on the former Fort Ord and evaluate past removal actions as well as recommend future remedial actions deemed necessary to protect human health and the environment under future uses.

The Track 1 Plug-In process, which addresses future Track 1 sites, is described below.

1.2 Track 1 Plug-In Process

This section describes the Track 1 program and summarizes steps to address future sites eligible for Track 1 through the Plug-In process.

As described in the Track 1 ROD, No Further Action decisions for future Track 1 Plug-In sites (e.g., the County North MRA) will be proposed and documented in Approval Memoranda. This Approval Memorandum provides the same level of information that was included in the remedial investigation (RI) site reports with the Track 1 OE RI/FS Report (MACTEC 2004) and subsequent Approval Memoranda (Army 2005b, 2006a, 2006b). The Approval Memorandum for the County North MRA includes the following:

1. A description of the site;
2. A description of the historical use of the site;
3. Rationale for the designation of the MRA as Track 1; and

4. Maps of the MRA detailing its location and any pertinent available MEC-related information.

There is a public review process for Approval Memoranda, and these Memoranda will be primary documents under the FFA. Each Track 1 Plug-In Approval Memorandum will be submitted and finalized according to the agency consultation process outlined in Section 7 of the FFA. Following agency review of the draft Approval Memorandum and necessary revisions, the Army will submit the Approval Memorandum for a 30-day public review and comment period. A public notice will be posted in a local newspaper announcing the opportunity to review and comment on the proposed decision(s). Subsequently, the Army will submit to the agencies a summary of public comments and responses to the comments, and any needed revisions to the Approval Memorandum, at which time the Approval Memorandum will be considered a draft final document as defined in the FFA. Within 30 days of this submittal, the agencies will, in writing, either concur with or acknowledge the Army's decision(s), or initiate a dispute per Section 12 of the FFA.

When the written concurrence from the EPA in consultation with the DTSC is received, a public notice will be posted in a local newspaper. Planned and completed "No Further Action Related to MEC" site determinations will also be described in Fort Ord environmental cleanup newsletters prepared by the Army for local residents. Notification of these proposed and completed activities will also be distributed to appropriate local agencies. The Proposed Plan and ROD for Track 1 and other tracks, as well as associated Approval Memoranda, have been placed in the former Fort Ord Administrative Record and the local information repositories. A copy of this Memorandum is also available on the former Fort Ord Administrative Record and in the local information repositories.

2.0 COUNTY NORTH MRA - MRS-45 (TACTICAL TRAINING AREA), MRS-27E (TRAINING SITE), PORTION OF MRS-57 (TRAINING SITE), PORTION OF MRS 59B (TRAINING SITE), AND PORTION OF MRS-59:MRS-27F (TRAINING SITE)

The County North MRA includes Munitions Response Sites (MRSs) MRS-45, MRS-27E, a portion of MRS-57, a portion of MRS-59B, and a portion of MRS-59:MRS-27F (Figure 2). Information supporting the determination of the County North MRA as a Track 1 Plug-In site is presented below. This Approval Memorandum consists of two main parts. The first part, contained in Sections 2.1 through 4.0, includes a presentation of site background and investigation data. Specific elements include a review of site history and development, evaluation of potential ordnance at the site, a summary of previous munitions response investigations, and development of a conceptual site model. The above-mentioned information was used to support the second part of this memorandum, which is the Site Evaluation contained in Section 5.0. The Site Evaluation was conducted in accordance with the procedures described in the "Final Plan for Evaluation of Previous Work" (HLA 2000) and may restate some information presented previously. The Site Evaluation discusses the evaluation of the literature review process, reconnaissance review process, sampling and removal actions, site boundaries review, quality assurance/quality control (QA/QC), and

sampling review. These discussions are based upon information from standardized literature review and sampling review checklists (Appendix A). Section 6.0 presents conclusions and recommendations. References are provided in Section 7.0.

2.1 Site Description

The County North MRA is located in the north-central portion of the former Fort Ord, bordered by Inter-Garrison Road to the north, the California State University Monterey Bay (CSUMB) Off-Campus MRA to the west, Gigling Road and the Parker Flats MRA to the southwest, and a portion of Watkins Gate Road and additional former Fort Ord property to the south and east (Figure 1). The County North MRA encompasses approximately 506 acres and fully contains United States Army Corps of Engineers (USACE) property transfer parcels L5.7 and L20.2.1 and portions of USACE property transfer parcels E19a.3 and E19a.4 (Figure 3). The remaining portions of USACE property transfer parcels E19a.3 and E19a.4 are contained in the Parker Flats MRA. A water tower is located in the southeastern portion of the MRA (Figure 2), but is not included as part of the FORA ESCA property transfer. The County North MRA is wholly contained within the jurisdictional boundaries of the County of Monterey.

Within the County North MRA are the following MRSs (Figure 2):

- MRS-59: Combat Range and Troop Training Area; a small portion of this MRS (approximately 6 acres) overlaps the southeastern corner of the County North MRA.
- MRS-57: Combat Range and Troop Training Area; a portion of this MRS (approximately 22 acres) overlaps the south central border of the County North MRA.
- MRS-45: Troop Training Area; encompasses approximately 401 acres and covers the majority of the County North MRA, east of the CSUMB Off-Campus MRA between Gigling and Inter-Garrison Roads.
- MRS-27E: Combat Range, Bivouac Area, and troop Training Area; encompasses approximately 29 acres and is located in the southeastern corner of the County North MRA.
- MRS-27F: Combat Range, Bivouac Area, and Troop Training Area; encompasses a total of approximately 10 acres, of which approximately 2 are located within the boundaries of the southeastern corner of the County North MRA.

MRS-27F is not included in this Approval Memorandum because MRS-27F has already been included in the "Track 1 Plug-In Approval Memorandum, Multiple Sites, Groups 1 – 5, Former Fort Ord, California" (Army 2006b).

The County North MRA is open land, and no fences, gates, or barricades restrict access to the property. Inter-Garrison Road, located along the northern boundary of the MRA, and Gigling Road, located along a portion of the southern boundary of the MRA, are active roadways with vehicle traffic on a daily basis. These are major roadways of the FORA transportation network. Watkins Gate Road also borders a portion of the southern boundary of the MRA and

crosses through the southeastern portion of the MRA. A number of unpaved roadways and dirt trails are located throughout the MRA.

2.2 Site History and Development

The following presents a summary of the site history and development based on archival research and a review of available historical training maps and aerial photographs. Several figures have been prepared that present pertinent features digitized from historical training maps and scanned aerial photographs.

Documentation for use of the County North MRA by the Army prior to the 1940s is limited to topographic and survey plat maps. Based upon a review of a historical topographic map from 1934 and information provided in the Archives Search Reports (ASRs; USACE 1993, 1995, and 1997a), it appears that the majority of the County North MRA was located within the military installation near the historical northern boundary from 1917 until the early 1940s and may have been used for military training purposes during that time. In the early 1940s, the Army purchased and acquired additional land, which extended the northern boundary of the former Fort Ord beyond the County North MRA.

A review of aerial photographs from 1941 and 1949 clearly show trails and other man-made features (such as an unidentified semi-circular structure, a wall-like structure, and a water tower) in the area of the County North MRA indicating that the Army may have used the area for training purposes. However, training maps from the 1940s do not identify any specific type of training that occurred within the MRA boundaries. Evidence of the unidentified semicircular structure and the wall-like structure are not observed on later aerial photographs and the exact historical use of these structures is not known.

Evidence of more extensive use of the MRA for troop training is apparent beginning in the early 1950s. A review of 1950s era training maps indicates that the majority of the MRA was used as a tactical training area throughout the decade. In a training map from 1957, a location labeled “FP-1” (indicating a firing point) is identified within the southern boundary of the adjacent CSUMB Off-Campus MRA (Figure 4). An untitled and undated map shows there is a range fan associated with FP-1 that extends from the southern boundary of the CSUMB Off-Campus MRA across the County North MRA and deep into the impact area to the south. The length of the range fan would indicate that some sort of artillery may have been used, although no indication of the type of artillery that may have been used was shown on the maps. The notation FP-1 and indication of a range fan are not shown on any of the later training maps reviewed. A removal action was conducted on the CSUMB Off-Campus MRA in 1995 and a review of the results provided no indication of FP-1 or other firing points (UXB 1995a and b).

Training maps from the 1960s throughout the early 1990s indicate continued use of the County North MRA for troop training. Training maps throughout the 1960s indicate that the area of the County North MRA was assigned to various brigades whose missions were to conduct basic combat training and combat support training. In addition, a 1961 training map labels the southeastern portion of the MRA as a Non-Commissioned Officers Academy

(NCOA) and a 1968 map shows the same general area now labeled as Division Support Services (DSS; Figures 5 and 6, respectively). In a 1972 training map, notations signifying a confidence course appear in the northeastern portion of the MRA and the words "Training Maneuver Area" are written diagonally across the eastern portion of the MRA (Figure 7). In addition, three different PG&E transmission line easements are shown running throughout the MRA on the 1972 map (Figure 7).

Bivouac areas are noted in the southern portion of the MRA on a 1961 training map (Figure 5). The bivouac area notations are moved further south (into the adjacent Parker Flats MRA) in maps reviewed from the mid to late 1960s until base closure in 1994, but no specific notations regarding the training activities are indicated in the southern portion of the County North MRA (Figures 6 and 7). In addition, the Army's "Track 1 Plug-in Approval Memorandum Multiple Sites, Groups 1-5, Former Fort Ord, California" indicates that in 1976, Training Site-5 (TS-5; later referred to as MRS-27E) and TS-6 (later referred to as MRS-27F) were present and were identified as overnight bivouac areas (Army 2006b). According to training facility maps, TS-5 and a portion of TS-6 were located in the southeastern corner of the County North MRA; their designations and locations remained consistent throughout the 1980s (Figure 8).

2.3 Proposed Future Land Use

Currently, the County North MRA is mostly undeveloped land. There are residual structures that were used in support of the training activities conducted at the MRA, but these structures have been abandoned. The current use for the MRA includes habitat and recreation, including hiking and mountain biking. There is also evidence of trespasser activity and illegal dumping.

The Base Reuse Plan and the Habitat Management Plan (USACE 1997b) identifies that the proposed future use of the County North MRA includes development, habitat reserve with borderland interface, and habitat reuse, which includes habitat reserve and habitat corridor (Figure 3). The development land use category encompasses infrastructure activities such as roadway and utility construction, as well as commercial/retail construction, parks, and borderland activities.

2.4 Potential Military Munitions Based on Historical Use of the Area

No physical evidence has been found to suggest that the MRSs were used for anything other than a troop maneuver and bivouac area. Information gathered during site investigation activities indicates that small arms ammunition, simulators, practice munitions (including mines and hand grenades), and smoke producing and pyrotechnic items (illumination signals) may have been used at the MRSs. The MEC and MD items found in the vicinity of the MRSs are presented on Plates 4-8. A detailed description of the military munitions that were potentially used at the MRSs is provided in Section 4.4.

3.0 HISTORY OF MUNITIONS RESPONSE INVESTIGATIONS

The following sections present a summary of Fort Ord munitions response-related reports and investigations concerning the County North MRA.

3.1 Archives Search Reports

Three ASRs were completed for the former Fort Ord (USACE 1993, 1994, and 1997a). The purpose of the ASRs conducted at the former Fort Ord was to gather and review historical information to determine the types of munitions used at the site, 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 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 sampling or removal actions. The 1997 Revised ASR was conducted in accordance with USACE guidance (USACE 1995).

MRS-27E and MRS-59:MRS-27F: The Revised ASR included 25 training sites (TS-1 through 25, identified in the revised ASR as Site OE-27). MRS-27E (TS-5) and MRS-59:MRS-27F (TS-6) were recommended to undergo sampling as part of overall site investigation. TS-5 (now MRS-27E) and TS-6 (now MRS-59:MRS-27F) are wholly or partially, respectively, within the County North MRA boundaries.

MRS-45: Site MRS-45 (formerly OE-45) was divided into two areas (MRS-45 and MRS-45A) to facilitate land transfer. MRS-45A is located outside of the boundary of the County North MRA (Figure 2). Site OE-45 was identified in the 1997 Revised ASR as 401.25 acres east of the California State University (CSU) Footprint with a road network through a campground. At the time of the 1997 Revised ASR, sampling had recently been conducted by the Army's OE contractor CMS (subsequent name change to USA Environmental Inc. [USA]) and results were not yet available. Confirmatory sampling was recommended (USACE 1997a).

MRS-57: Site MRS-57 (formerly OE-57), which is partially contained within the boundaries of County North MRA, was identified in the 1997 Revised ASR as the intersection of Henneckens Ranch Road and Watkins Gate Road and nearby areas. Further site investigation and sampling was recommended (USACE 1997a).

MRS-59: Site MRS-59 (formerly OE-59) was divided into three areas (MRS-59, MRS-59A, and MRS-59B) to facilitate land transfer. Only a small portion of MRS-59 is contained in the southeastern corner of the County North MRA. Site OE-59 was identified during interviews conducted during the PA/SI phase of the archives search (USACE 1997a). The area (identified as area K10 during the interview) reportedly included a 2.36-inch rocket range in the early 1940s. The site was reportedly not active after this time and the interviewee had no firsthand knowledge of the range. Munitions that may have been used at area K10 were reported to have been 2.36-inch rockets. Further site investigation and random sampling was recommended (USACE 1997a).

3.2 Investigation and Removal Operations

Numerous site investigations, sampling investigations, and surface MEC removal actions were performed in the County North MRA, which included:

- 1995: A 4-foot removal action on approximately 2.7 acres of MRS-45 during the removal action in adjacent MRS-31. A portion of the removal action extended into the County North MRA; therefore, some of the data evaluated in this Approval Memorandum was collected by UXB International, Inc. (UXB 1995a and b).
- 1996: PA/SI at MRS-27E, MRS-27F, and MRS-57 in January 1996 and at MRS-59 in February 1996 (USACE 1997a).
- 1997: Site Stats/Grid Stats (SS/GS) sampling of 86 100-foot by 200-foot grids to a depth of 4 feet at MRS-45 between May and July 1997 (USA 2001a).
- 1997: Several field latrines investigated for MEC between March and November 1997 (USA 2001b).
- 2001: Time-Critical Removal Action (TCRA), which entailed a visual surface removal in the southern portion of MRS-45 (north of Parker Flats) between October and November 2001 (Parsons 2002a).
- 2001-2002: TCRA, which entailed a visual surface removal in MRS-57 and the northeastern portion of MRS-45 between December 2001 and February 2002 (Parsons 2002b).
- 2005: Basewide Range Assessment included site reconnaissance and investigation of MRS-27E, MRS-45, MRS-57, and MRS-59 (Shaw/MACTEC 2009).

The areas covered by these activities are shown on Plate 2. Military munitions encountered during these actions are consistent with the historical use of the area for troop training and a Track 1 Category 3 designation. The following subsections describe the methodology used in the investigation and removal operations.

3.2.1 Subsurface Removal Action – UXB International

MRS-45: In June 1994, UXB conducted removal action activities within the CSUMB Off-Campus MRA adjacent to MRS-45. Although this removal action was conducted in the CSUMB footprint, 29 full or partial 100- by 100-foot grids (approximately 2.7 acres) extended beyond the eastern boundary of the CSUMB Off-Campus MRA and were located within the boundary of MRS-45 on the County North MRA.

The removal action approach was described in UXB's Phase II Removal Action Work Plan (UXB 1994). The Work Plan indicated that the Senior Unexploded Ordnance (UXO) Supervisor would maintain a daily journal of operations that would include: identification of each plot; the time required to mark each plot; a map overlay showing each lane; the identification/location/depth of each UXO and/or non-UXO item located; the time required to clear each plot; daily temperature ranges; and any other pertinent data (UXB 1994).

Site perimeter surveys and brush removal were done prior to any MEC removal work in the site area. After the perimeter was established the entire area was divided into 100-foot by 100-foot square grids and a wood stake was placed at each of the four corners of each grid. Once grid boundaries were established the grid was divided into 5-foot-wide search lanes. UXO technicians 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 (UXB 1994).

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 technician 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 feet. In December 1994, the excavation depth requirement changed to 4 feet. If the anomaly could not be uncovered within 4 feet of the surface, the on-site Army Corps of Engineers Huntsville Division (CEHND) safety specialist was asked to determine if deeper excavation was required. Recovered UXO was disposed of on site.

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

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 the multiple areas of the former Fort Ord in which UXB conducted a removal action (UXB 1995a). The depths of detections of MEC, MD, and cultural debris, and the types of cultural debris located were not included in

the information provided in UXB's Final Reports (UXB 1995a and 1995b). This information may have been recorded in the daily field journal kept by the Senior UXO Supervisor, in accordance with the work plan. However, copies of the daily field journals were not available on the administrative record for review by the ESCA RP Team 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 Military Munitions Response Program (MMRP) database for MEC items removed during UXB's removal action.

Although the QC logs were not available for review, statements made in the UXB final reports indicated that there were no QC failures in the resurveyed grids. Failure was triggered by the discovery of a MEC item in the previously swept grid. According to statements made in the final reports, the CEHND performed a QA inspection and no failures were documented (UXB 1995a, 1995b). This removal action resulted in a total of 12 MEC items and 364 MD items encountered within the boundary of MRS-45. Grids were surveyed using 5-foot-wide search lanes utilizing the Schonstedt magnetometers. According to the final report, the area was QA inspected and accepted by the CEHND, and UXB recommended and the CEHND concurred that no further work was required in the area.

3.2.2 Preliminary Assessment / Site Inspection

As part of the PA/SI phase of the Fort Ord ASR of known and suspected munitions response sites, a reconnaissance was conducted by a USACE UXO Safety Specialist in 1996 that included portions of MRS-27E, MRS-45, MRS-57, and MRS-59. The PA/SI was conducted in accordance with USACE guidance (USACE 1995).

MRS-27E: In January 1996, a USACE UXO Safety Specialist conducted a munitions response (site walk) that included MRS-27E as part of a PA/SI (Plate 1; USACE 1997a). MD found included expended flares and illumination signals. No evidence of other types of training or use as an impact area was observed.

MRS-45: A former Tactical Training area was identified during the Fort Ord archives search, later identified at MRS-45 (USACE 1997a). During an initial site walk of the eastern portion of MRS-45 (Plate 1), a grenade fuze was found southwest of the water tank located on Parcel L35.4. It was not noted if the grenade fuze was MEC or MD. A follow-up site walk performed by a USACE UXO Safety Specialist identified a "dud Mark II practice grenade and an inert Mark I practice grenade" (Army 2006b).

MRS-57: In January 1996, a USACE UXO Safety Specialist conducted a munitions response (site walk) that included MRS-57 as part of a PA/SI (Plate 1; USACE 1997a). Military munitions found included an expended 75mm shrapnel projectile, a smoke grenade, and illumination signals (Army 2007). The data was insufficient to determine if the smoke grenade and the illumination signals were MEC or munitions debris (Army 2007). Four expended smoke grenades were found on a dirt road adjacent to MRS-57 during a munitions response (investigation) completed in October 1999 (Army 2007).

MRS-59: In 1996, a USACE UXO Safety Specialist conducted a munitions response (site walk) in an area within MRS-59 as part of a PA/SI (Plate 1; USACE 1997a). The site walk involved walking portions of the site and sweeping the path walked using a Schonstedt Model GA-52Cx magnetometer. The site walk occurred in an area south of the portion of MRS-59 located within the County North MRA. MD (expended pyrotechnics) and two fragments from the incomplete detonation of a 60mm mortar were found; the location is southwest of the portion of MRS-59 that is located within the County North MRA. No evidence of 2.36-inch rockets reportedly used at MRS-59 was observed .

3.2.3 Site Stats / Grids Stats Sampling – USA Environmental

MRS-45: In 1997, USA (formerly CMS Environmental, Inc. [CMS]) conducted sampling at MRS-45 using the SS/GS sampling methodology. Contract requirements for the USA work are described in the Track 1 OE RI/FS (MACTEC 2004). USA conducted the SS/GS sampling in accordance with the procedures described in the Site-Specific Work Plan (CMS 1995). The Site-Specific Work Plan (CMS 1995) makes no mention of Site OE-45, but states, "Other sites determined to be contaminated as the result of ongoing OE sampling on former Fort Ord can be added or substituted for cited acreage as information becomes available." The Scope of Work for Task Order 0001 of Contract Number DACA87-96-D- 0019 does not include any reference to Site OE-45, but Modification 01 added the Tactical Training Area (Site OE-45) to the Task Order.

SS/GS statistically calculates the number of grids and the percentage of anomalies at a site that require sampling. According to the after-action report, 86 100-foot by 200-foot sample grids were located within MRS-45 (Plate 2; USA 2001a). The sample grids at MRS-45 were cleared of vegetation using a combination of manual and brush cutting methods to facilitate MEC surveys, although large oak trees were not removed. USA positioned the sample grids so as to minimize the requirement for vegetation removal (USA 2001a). The cleared areas were divided into 92 100- by 200-foot grids. The SS/GS sampling program determined that sampling 86 of the 92 grids was sufficient for a statistical evaluation of the site.

According to the work plan, instrument operators swung Schonstedt Model GA-52Cx magnetometers from side to side while walking down a maximum 5-foot-wide search lane delineated by lengths of rope laid on the ground (CMS 1995). Schonstedt responses indicative of potential MEC items were marked in the filed with pin flags and the location was excavated until a metal object was encountered or the instrument no longer showed a response. The objects found were mapped and catalogued. In accordance with SS/GS protocol, some of the pin flag locations were not investigated.

This SS/GS Sampling Action resulted in a total of 5,799 samples being collected. Twelve UXO items were found during the operation. Two hundred twenty-five MD items were encountered during this operation, as well as 3,732 live rounds of small arms ammunition (Plate 3). According to the after-action report for MRS-45, no evidence was found during sampling that would indicate that MRS-45 was ever used as an impact area. With the exception of a high explosive (HE) hand grenade fragment and two grids where unknown

fragments were found, no evidence of HE munitions were encountered and MEC and MD that were found in MRS-45 were pyrotechnic or training items (USA 2001a).

3.2.4 Field Latrines – USA Environmental

Between March and November 1997, the ground beneath several field latrines in the County North MRA was investigated (USA 2001b). No MEC was reported during field latrine clearance in County North MRA.

3.2.5 Time-Critical Removal Actions (Visual Surface Removals) - Parsons

MRS-45: Between October and November 2001, a TCRA was conducted by the Army that included the southern portion of MRS-45. Field crews walked open areas and trails, visually searching the surface for MEC and MD. MEC and MD encountered were removed or destroyed (Parsons 2002a). The TCRA was conducted in accordance with the procedures that were described in the Technical Memorandum, Parker Flats and Parker Flats to East Garrison BLM Area OE Surface Removal (Parsons 2001b). The TCRA was conducted to address the potential threat to the public posed by the potential presence of MEC on the ground surface. The surface removal was performed without the use of geophysical equipment and no vegetation was removed (Parsons 2002a). Therefore, only areas relatively clear of vegetation were searched (Plate 2). The field crews used personal digital assistants (PDAs) and geographical positioning system (GPS) to record site data, navigate the site, and record the locations of any MEC and MD that were observed. Two illumination signals were found in the western portion of the County North MRA (Parsons 2002a).

MRS-45 and MRS-57: Between December 2001 and February 2002, an additional TCRA was conducted by the Army that included MRS-57 and the northeastern portion of MRS-45 (Parsons 2002b). The procedures used to conduct the TCRA were the same as was employed during the October and November 2001 TCRA described above. Only areas relatively clear of vegetation were searched (Plate 2). No MEC items were found within the portion of the County North MRA that was inspected during this visual surface removal (Parsons 2002b).

3.2.6 Investigations for the Basewide Range Assessment – Shaw/MACTEC

Portions of MRS-27E, MRS-45, MRS-57, and MRS-59 were investigated as part of the BRA for small arms and multi-use ranges. The sites were assessed for potential hazardous and toxic waste related to military munitions and included a literature search, site reconnaissance, and mapping of the sites. Each site reconnaissance was conducted by a two-person team that included UXO-qualified personnel. Prior to conducting the site reconnaissance, historical features were identified from training maps and aerial photographs and their locations entered into a GPS unit (way-points). The team then conducted the site visit navigating to the way-points. The path of the site walk was recorded digitally with a GPS unit. The following features or items were required to be mapped if present based on a visual search of the site as part of the BRA reconnaissance: (1) targets; (2) firing lines; (3) range fan markers; (4) survey bench marks; (5) areas of stained soil that could indicate petroleum hydrocarbon or bulk explosives contamination; (6) MEC or munitions

debris; (7) potential sample locations based on (a) the presence of spent ammunition or (b) accumulations of MEC or munitions debris; (8) other training related features (e.g., fighting positions, fox holes, etc.); and (9) areas of thick vegetation that could limit access to the investigation area.

Under the BRA, MRS-27E was identified as HA-137, MRS-45 was identified as HA-175, MRS-57 was identified as HA-187, and MRS-59 was identified as HA-189 (Plate 1; Shaw/MACTEC 2009).

MRS-27E: The reconnaissance of HA-137 was conducted in 2001. The reconnaissance of HA-137 included walking throughout MRS-27E and some surrounding areas (Plate 1). No evidence of MEC-related items, small arms ammunition, or targets were observed. No evidence of a range or concentrated areas of military munitions were found within HA-137 (Shaw/MACTEC 2009).

MRS-45: The reconnaissance at HA-175 was conducted in 2001. The reconnaissance of HA-175 included walking throughout MRS-45 and adjacent to MRS-45A (Plate 1). No evidence of MEC-related items, small arms ammunition, or targets were observed. Several fighting positions were located in MRS-45. No evidence of a range or concentrated areas of military munitions were found within HA-175 (Shaw/MACTEC 2009)

MRS-57: The reconnaissance at HA-187 was conducted in 2001. The reconnaissance of HA-187 included walking throughout MRS-57 (Plate 1). Blank casings, one signal flare, and two ammunition boxes were found during the site visit; however only blank casings were located within the portion of MRS-57 that is within the boundaries of the County North MRA. No evidence of range or concentrated areas of military munitions were found within HA-187 (Shaw/MACTEC 2009).

MRS-59: The reconnaissance at HA-189 was conducted in 2001. The reconnaissance of HA-189 included walking through and around MRS-59 and MRS-27F (Plate 1). Only a small portion of the northern end of HA-189 was located within the County North MRA. One fighting position was encountered during the reconnaissance, but was located outside of the County North MRA border. No evidence of targets or associated military munitions was encountered. Some of the GPS data are missing for the western portion of HA-189 due to technical difficulties with the equipment; however, this area is located outside of the County North MRA boundary. Site reconnaissance notes indicate that no targets, areas of concentrated small arms spent ammunition, or military munitions were encountered. No evidence of MEC-related items, small arms ammunition, or targets were observed. One fighting position was noted. Access to the southern portion of HA-189 (within MRS-59) was limited to trails and roads due to dense vegetation. No target locations or concentrations of military munitions were found at HA-189 (Shaw/MACTEC 2009).

3.2.7 Adjacent MRS: Track 1 RI/FS Approval Memorandum – U.S. Army

Numerous MRSs located to the east and north of the County North MRA have been identified as Track 1, as discussed below.

Track 1 ROD (MRS-66 and MRS-27Y): Sites MRS-66 and MRS-27Y are located north of the County North MRA (Figure 2). MRS-66 and MRS-27Y were identified in the Track 1 ROD as eligible as Track 1, Category 3 sites because historical research and field investigations identified evidence that past training involving military munitions at this site involved only the use of pyrotechnic items that are not designed to cause injury (Army 2005a). The Track 1 ROD serves as the decision document stating that no further action regarding munitions response is required for MRS-66 and MRS-27Y.

Track 1 Group 2 (MRS-27F, MRS-45A, and MRS-59B): Site MRS-27F is partially located in the County North MRA. MRS-27F is also included in Track 1 Group 2 (MRS-27F, MRS-45A, and MRS-59B; Figure 2). MRS-27F was identified as eligible as a Track 1, Category 3 Plug-In site based on location, physical features, types of past training activities, and MD found (Army 2006b). The EPA provided concurrence to the "Track 1 Plug In - Approval Memorandum, Multiple Sites Groups 1-5" on July 21, 2006 (EPA 2006). The Approval Memorandum serves as the decision document stating that no further action regarding munitions response is required for MRS-27F, MRS-45A, and MRS-59B. While MRS-27F is partially contained within County North MRA, MRS-45A and MRA-59B are adjacent to the County North MRA.

3.2.8 2009 Site Walk

A site walk was conducted in a portion of MRS-45 on April 8, 2009. The site walk was conducted at the request of the EPA and DTSC to provide information to supplement data collected during sampling activities previously conducted at the site. To investigate the area, the team utilized a meandering path method for the site walk. The site walk was conducted by a team that included two UXO-qualified personnel. Several locations were identified during the site walk that required intrusive investigation. The results of the site walk investigation are described in the County North MRA Site Walk Investigation Results Memorandum, attached as Appendix B. The items recovered during the intrusive investigation consisted of approximately 2 pounds of MD (consisting of a practice grenade, an illumination signal, and grenade safety levers), approximately 51 pounds of cultural debris (consisting of wire, metal cans, metals spikes, car parts, and other miscellaneous debris), and approximately 3 pounds of linked small arms ammunition (blanks). No MEC items were identified during the intrusive investigation.

3.3 Results (Items Found)

As summarized in Section 2.4, the investigations of MRSs on the County North MRA have included PA/SI site walks, SS/GS sampling, latrines investigation, TCRA surface removal action, and a 4-foot removal action. During the investigations 20 MEC items were found within the County North MRA including a blasting cap, flares, hand grenades (illumination,

practice, riot, and smoke), practice mines (antipersonnel and antitank), smoke pot, pyrotechnic illumination mixture, illumination ground signals, and airburst simulators. Table 1 identifies the MEC items found on County North MRA. Table 2 summarizes the munitions debris items found during sampling. Locations of MEC and MD found at the County North MRA are shown on Plates 4 through 8. The following MEC items were recovered at the County North MRA:

- Cap, blasting, electric, M6
- Flare, parachute, trip, M48
- Flare, surface, trip, M49
- Fuze, grenade, model unknown
- Grenade, hand, illumination, MKI
- Grenade, hand, practice, MKII
- Grenade, hand, riot, CS, M7A3
- Grenade, hand, smoke, M18 series
- Mine, antipersonnel, practice, M2 (model unknown)
- Mine, antitank, practice, heavy, M10
- Pot, 10 pounds, smoke HC, screening, M1
- Pyrotechnic mixture, illumination
- Signal, illumination, ground, M131
- Signal, illumination, ground, M21A1
- Simulator, projectile, airburst, M74 series

Munitions investigation results are discussed by MRS below:

MRS-27E: The investigation of MRS-27E included a PA/SI site walk and TCRA surface removal action. No MEC were identified in MRS-27E during investigation activities. The munitions debris found included expended flares and illumination signals and is consistent with what would be expected based on past training practices at the site.

MRS-45: The investigation of MRS-45 included PA/SI site walks, 4-foot removal action (approximately 2.7-acre portion), SS/GS sampling, and TCRA visual surface removal. MEC found during the investigations include a grenade fuze found during the PA/SI site walk; three hand grenades (practice, illumination, riot), two trip flares, pyrotechnic mixture, a practice antipersonnel mine, two airburst simulators, and a blasting cap found during the 4-foot removal; a hand grenade (smoke), practice antitank mine, and smoke pot found during SS/GS sampling; and two illumination rounds found during the TRCA surface removal. No evidence was found during sampling that would indicate that MRS-45 was ever used as an impact area. With the exception of a HE hand grenade fragment and two grids where unknown fragments were found, no evidence of HE munitions were encountered and MEC and MD that was found in MRS-45 was pyrotechnic or training in nature (USA 2001a). The

MEC and munitions debris found is consistent with what would be expected based on past training practices at the site.

MRS-57: The investigation of the portion of MRS-57 within the County North MRA included PA/SI site walks, and TCRA visual surface removal. No MEC were identified in MRS-57 during investigation activities. Expended flare and signals were found during the PA/SI site walk. Four expended smoke grenades were also found on a dirt road adjacent to MRS-57. The munitions debris found is consistent with what would be expected based on past training practices at the site.

MRS-59: The only evidence of MEC found during the PA/SI site walk at MRS-59 were fragments from a partially detonated 60mm mortar that were located on the western side of the MRS, outside of the boundaries of the County North MRA. No evidence of projectile fuzes or projectile cases was observed within either MRS-27F or the adjacent MRS-59. Munitions debris, including expended pyrotechnics and small arms ammunition were also found during the reconnaissance. The munitions debris found is consistent with what would be expected based on past training practices at the site.

4.0 CONCEPTUAL SITE MODEL

Conceptual site models (CSMs) are generally developed during the preliminary site characterization phase of work to provide a basis for the sampling design and identification of potential release (functioning of the MEC item; e.g., detonation) and exposure routes. CSMs usually incorporate information regarding the physical features and limits of the area of concern (the site), nature and source of the contamination (in this case MEC), and exposure routes (potential scenarios that may result in contact with MEC).

The CSMs for the County North MRA are based on currently available site-specific removal data and general information including literature reviews, aerial photographs, training maps, available field manuals (FMs) and technical manuals (TMs), and field observations. The CSMs also address training practices that occurred within the CSUMB Off-Campus MRA from acquisition of the property by the Army through base closure. The CSMs address the potential sources and locations of MEC based on the distribution of MEC and MD discovered and removed from the site. They are provided to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways. Appendix C includes a copy of the release and exposure pathways for the County North MRA.

4.1 Training Practices

Training practices are discussed below to provide information on the types of military munitions that may have been used at the site and the possible locations of MEC potentially remaining at the site.

4.1.1 Bivouac Area Training

Bivouac areas at Fort Ord were used for overnight training and field exercise. Use of portions of the County North MRA as a bivouac area was established in the early 1960s. Later use of bivouac areas at Fort Ord are documented in Fort Ord Range Regulation 350-5 (Army 1980). According to the Fort Ord Range Regulation 350-5, the storage of ammunition was not allowed within 100 feet of a bivouac area. Normally, blank cartridges, simulators, pyrotechnics, and smoke items were the only items allowed for storage near bivouac areas. However, field storage of sensitive items, demolition materials, and small arms ammunition (other than blank) was permitted if clearance was obtained from the division ammunition officer (Army 1980). The burial of trash or garbage was prohibited. To discourage the burial or discarding of unspent ammunition, ammunition was inventoried when checked out from the Ammo Supply Point (ASP), daily while stored in the field, and again upon turn in of the unused ammunition at the ASP. Fort Ord range regulations required that a Range Control representative inspect the bivouac areas after each use (Army 1980).

Although the above mentioned reference applies to circa 1980, it is anticipated that similar regulations were also in effect in the 1950s (Army 2006b); however, the possibility exists that burial of items did occur. If the burial of unspent ammunition occurred at the County North MRA, these items would not present a hazard if encountered.

4.1.2 Training and Maneuver Areas

The County North MRA was used to conduct basic combat and tactical training: this includes realistic combat training, tactics, and maneuvers. Use of the County North MRA for these activities would have continued until the maneuver elements were off the installation. As a training and maneuver area the site would have been used for squad, platoon, company, and battalion level maneuvers. Infantry units would have conducted numerous types of combat operations. Patrols, reconnaissance, offensive/defensive, and obstacle breeching are just some of the operations that would have been conducted for a unit to maintain its readiness requirements. Each operation includes specific objectives using infantry troops, sometimes with Combat Engineer support, to gather information and conduct simulated combat operations. Training operations would include the use of blank small arms ammunition, pyrotechnics (simulators and illumination) and smoke producing items (e.g., signals, flares, and smoke grenades). Pyrotechnic, smoke, and small arms (a few MEC and mostly MD) were found throughout the County North MRA suggesting that this area was used for various training activities (Plates 4 through 8; Army 2006b).

4.2 Site Features

The prominent features of the County North MRA include several hills, ridges, and valleys, along with several low areas or depressions. Some of these features have been named over time and include South Tower Hill and East Tower Hill. The area also contains oak woodland, chaparral, and grasslands that may also have played a role in the selection of training activities that occurred over time. The vegetation types found in the County North MRA result in areas that could be used for concealment during certain types of training

exercises, while open areas could be used for other types of training. Some erosion of non-maintained trails is evident within the site. This area is undeveloped and it does include several roads and trails, some of which were present prior to the 1940s.

4.3 Potential Sources and Location of MEC

Potential exposures to MEC, although unlikely, could result from encountering practice mines and mine fuzes, booby trap firing devices, illumination signals, simulators, and practice and smoke producing hand grenades. The items mentioned above are non-penetrating by design and with the exception of practice mines and the associated booby trap firing devices, would be expected to be present at or near the ground surface.

The following MEC items were recovered at the County North MRA:

- Cap, blasting, electric, M6
- Flare, parachute, trip, M48
- Flare, surface, trip, M49
- Fuze, grenade, model unknown
- Grenade, hand, illumination, MKI
- Grenade, hand, practice, MKII
- Grenade, hand, riot, CS, M7A3
- Grenade, hand, smoke, M18 series
- Mine, antipersonnel, practice, M2 (model unknown)
- Mine, antitank, practice, heavy, M10
- Pot, 10 pounds, smoke HC, screening, M1
- Pyrotechnic mixture, illumination
- Signal, illumination, ground, M131
- Signal, illumination, ground, M21A1
- Simulator, projectile, airburst, M74 series

Locations of MEC and MD found at the County North MRA are shown on Plates 4 through 8.

4.4 Potential Exposure Routes

For each of the MEC items potentially remaining at the sites, the following discussions provide information on: (1) how the item was designed to function, (2) the likelihood the item would function if found on site and handled, and (3) the type of injury the item could cause if it functions.

4.4.1 Cap, blasting, electric, M6

Blasting caps are used for detonating high explosives. The two types of blasting caps are electric and non-electric. Electric blasting caps are used for more precise command detonation. Blasting caps are rated in power, according to the size of their main charge. Military grade blasting caps are designed to ensure positive detonation of less sensitive military explosives. The blasting cap is encased in an aluminum tube only 0.24 inch wide and 2.35 inches long. Electric caps have two lead wires protruding from them. The wires can be various lengths and colors but the most common are 12-foot-long brown wires. Older caps were packaged in boxes with the lead wires accordion folded and secured with a small band of paper. Later versions had the blasting cap secured in a thin cardboard tube 5 inches long with the lead wires wrapped around the outside of the tube (Army 1994a).

Summary: The presence of a single blasting cap in the County North MRA is an anomalous event and not an indication of extensive use of the materials in the County North MRA. If a blasting cap remains in the County North MRA, it is unlikely that a person could cause an intact electric blasting cap to function through casual (inadvertent or unintentional) contact. The blasting cap is sensitive to static electricity, heat, and shock (e.g., being dropped on a hard surface); however, degradation, weathering, and especially wetness can make the blasting cap less sensitive. If the item is made to function, the most likely injury that could result would be loss of digits.

4.4.2 Flare, parachute, trip, M48

This pyrotechnic device is designed to project a parachute-suspended flare to detect infiltrating troops. The flare consists of a hollowed steel base with a 2.5-inch-diameter, 7.3-inch-long tube extending upward, with a smaller 3/8-inch-diameter, 5-inch-long tube adjacent to it, which is threaded to accommodate a M6A1 mine fuze that is shipped with the flare. The fuze is functioned by a pressure of 10 to 12 pounds on the prongs on its head, or by a pull of 6 to 10 pounds on the release pin. When the firing pin hits the primer, a flame sets off a relay charge, which carries the flame to the propelling charge. The propelling charge propels the flare assembly upward and simultaneously ignites the 3-second delay fuze. When the delay fuze burns through, it ignites the expelling charge, which expels the flare and parachute and ignites the quickmatch. The quickmatch ignites a priming charge that sets off the first-fire composition that ignites the pyrotechnic candle, which is suspended by the parachute (Navy 2001).

Summary: It is possible that a person could cause the parachute trip flare to function through casual (inadvertent or unintentional) contact if one remained in a “prepared to function” condition (e.g., fuze was installed in the flare, was armed, and attached to a trip wire or other triggering mechanism, or placed in the ground with the prongs exposed). Upon functioning, injury, such as minor to serious burns, could occur from the ignitable components, or by being struck by the ejecting flare and parachute assembly. If the fuze is not installed, the parachute trip flare would not function through casual (inadvertent or unintentional) contact but could function if exposed to heat or flame (Army 2006b).

4.4.3 Flare, surface, trip, M49

This pyrotechnic device is designed to give warning of infiltrating troops by illuminating the field of the advancing enemy. The trip flare consists of an illuminant assembly, cover loading assembly, and mounting bracket. The illuminant assembly is in an aluminum case containing an ignition increment and three illumination increments. The waterproof cover loading assembly holds a percussion primer, intermediate charge, and a spring loaded striker. A pull on the trip wire causes either the trigger tongue or pull pin to release the lever, which causes the firing pin to strike the primer. The primer sets off the intermediate charge, which ignites the first-fire composition on the ignition increment of the flare (Army 1977a).

Summary: It is possible that a person could cause the surface trip flare to function through causal (inadvertent or unintentional) contact if one remained in a "prepared to function" condition (e.g., attached to a trip wire or other triggering mechanism). If it existed in a fixed position (e.g., attached to a tree), serious injury beyond burns would not be expected because the flare is designed to burn "in place" where it was placed or mounted. If one was in a "prepared to function" condition and left on the ground, it could function upon casual. (inadvertent or unintentional) contact, and it would burn in a manner similar to a road flare, but with greater heat and illumination, and could cause burns (Army 2006b).

4.4.4 Fuze, grenade, model unknown

Grenade fuzes are components of hand grenades. Sections 4.4.6, 4.4.7, and 4.4.8 discuss M10A3, M201A1, and M205 grenade fuzes in the context of individual grenades.

4.4.5 Grenade, hand, illumination, MKI

The MKI Illumination Grenade was used primarily for illumination and signaling. Because of the high temperature generated by the pyrotechnic mixture, these grenades may be used for incendiary purposes against flammable targets. Removal of the safety pin permits release of the safety lever allowing the striker to hit the percussion primer. The primer ignites the quick-match which gives a delay burn of 7 seconds before igniting the train to the illumination charge. Gas pressure causes the upper half of the grenade to separate from the lower half. This exposes the burning illuminating charge which will burn for 25 seconds with approximately 55,000 candlepower. Assuming a MKI illumination grenade was discovered in an unfired condition and caused to function, the type of injuries that could be sustained would be burns from the burning illumination composition. Due to the separating halves and the heat generated, it is unlikely that a person who found a grenade and caused it to function would hold onto it after ignition (Army 1994a).

Summary: It is unlikely that a person would be able to function the MKI illumination grenade through casual (inadvertent or unintentional) contact if one were found at the site and be burned by the illumination mixture: (1) the grenade would have to contain a live fuze that would have the pin pulled, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and the condition of the sheet metal case of the grenade.

4.4.6 Grenade, hand, practice, MK II

The MK II practice hand grenade used the M205 or the M10A3 fuze on earlier models, and was designated to train personnel to arm and throw hand grenades. 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. The primer ignited the delay element in the fuze, which burned for a period of 4.0 and 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). These could be caused to function by incidental contact by movement, i.e., stepping on, picking up, or kicking the grenade. The safety lever is made of thin metal and if exposed to the elements for long periods of time, will deteriorate to eventually allow the safety pin to break free. This will allow the functioning sequence mentioned above to take place. If caused to function, the type of injury that could be sustained would be burns from the black powder spotting charge. The functioning fuze is not designed to have sufficient force to fragment the grenade itself (Army 2006b).

Summary: It is possible that a person could cause a practice grenade to function if one were found at the site and be burned by the black powder filler; the practice grenade itself would not fragment. However, the grenade would have to contain a live fuze, and these components would have been exposed to moisture degradation and weathering for many years, which could decrease their effectiveness (Army 2006b).

4.4.7 Grenade, hand, riot, CS, M7A3

CN/CS riot hand grenades are used to in riot control, counterinsurgencies, and to simulate chemical attacks in training. The grenades are a burning type riot control agent. Each grenade will emit agent 15 to 35 seconds. The grenade body is thin sheet metal and cylindrical in shape. The grenade is filled with agent composition and topped with a starter mixture. The hand grenade fuze M201A1 is a pyrotechnic delay igniting fuze. The body contains a primer, first-fire mixture, pyrotechnic delay column, and ignition mixture. Assembled to the body are a striker, striker spring, safety lever, and safety pin with pull ring. The grenades weigh between 15 and 19 ounces and contain 7 to 12 ounces of agent depending on the model of grenade. It was functioned when a soldier removed the safety clip and pulled the 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. The percussion primer ignited the first fire mixture. The fuze delay element, which burns for 0.7 to 2 seconds, ignition mixture, and grenade starter mixture and filler, are ignited by the preceding component. The pressure sensitive tape is blown off the emission holes from which the agent emits. Assuming an M7/73 series CN/CS grenade was discovered in an unfired condition and caused to function; the type of injuries that could be sustained would be burns from the burning composition. Due to the heat generated, it is unlikely that a person who found a grenade and caused it to function would hold onto it after ignition. The burning agent CN would cause a powerful lachrymal effect and is irritating to the upper respiratory passages. In higher concentrations it is irritation to

the skin, causing a burning and itching sensation. The onset of incapacitation is 15 to 30 seconds and duration from 5 to 20 minutes depending on dosage concentration. The burning agent CS has a powerful lachrymal effect and is irritating to the upper respiratory passages causing coughing, difficulty in breathing and chest tightness. Heavy concentrations will cause nausea and vomiting as well. The onset of incapacitation is 15 to 30 seconds and duration is less than 10 minutes after the person is removed to fresh air (Army 1982).

Summary: It is unlikely that a person would be able to function the CN/CS grenade through casual (inadvertent or unintentional) contact if one were found at the site and be burned or exposed to agent because the grenade: (1) would have to contain a live fuze that would have the pin pulled, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and degrade the condition of the sheet metal case of the grenade.

4.4.8 Grenade, hand, smoke, M18 series

The M18 is a colored smoke hand grenade used for ground-to-air or ground-to-ground signaling. The grenades may be filled with any one of four smoke colors: red, green, yellow, or violet. Each grenade will emit smoke for 50 to 90 seconds. The grenade body is of thin sheet metal and is filled with smoke composition and topped with a starter mixture. The hand grenade fuze M201A1 is a pyrotechnic delay igniting fuze. The body contains a primer, first-fire mixture, pyrotechnic delay column, and ignition mixture. Assembled to the body are a striker, striker spring, safety lever, and safety pin with pull ring. The grenade weighs 19 ounces and contains 11.5 ounces of smoke composition. 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. The percussion primer ignited the first fire mixture. The fuze delay element, which burns for 0.7 to 2 seconds, ignition mixture, and grenade starter mixture and filler, are ignited by the preceding component. The pressure sensitive tape is blown off the emission holes from which the colored smoke emits (Army 1977b). Assuming an M18 smoke grenade was discovered in an unfired condition and caused to function, the type of injuries that could be sustained would be burns from the burning smoke composition. Due to the heat generated, it is unlikely that a person who found a grenade and caused it to function would hold onto it after ignition. Given that these items have been exposed to the elements for many years, moisture can penetrate and degrade the pressure sensitive tape, the smoke composition, and the condition of the sheet metal case of the grenade (Army 2006b).

Summary: It is possible that a person could cause the smoke grenade to function if one were found at the site and be burned, but it would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function (Army 2006b).

4.4.9 Mine, antipersonnel, practice, M2 (model unknown)

Although this item was described as a “mine, antipersonnel, practice, M2”, the M8 is the practice version of the M2, therefore the item was most likely a mine, antipersonnel, practice,

M8 or M8A1. Mines, antipersonnel, practice, M8 and M8A1 were designed to simulate the M2 (bounding) series of antipersonnel mines. They were used for training in the proper methods and precautions to be observed in the care, handling, laying, booby-trapping, arming, and disarming of the M2 and M15 series mines. The fuze firing mechanism is activated by applying pressure (8 to 20 pounds) on any of the three prongs on the M10 or M10A1 combination fuze, or a pull of 3 to 10 pounds of pressure on the trip wire. The fuze firing train ignites the delay element in the projectile, and also propels it about 2 meters into the air. The delay initiates the spotting charge, which explodes with a loud report and emits smoke. The M8A1 mine with the M10A2 fuze functions the same except that the fuze firing train ignites the yellow smoke pellets through a 4 to 5 second delay, expels a plastic plug into the air allowing the yellow smoke to be emitted from the top of the container (Army 1977c). Assuming that a mine was left emplaced and armed, and that it survived many years of degradation from exposure, it could be functioned by incidental contact by applying sufficient pressure to any of the prongs or trip wire on the M10, M10A1, or M10A2 combination fuze by stepping upon the fuze or tripping on the trip wire. If caused to function, the type of injury that could be sustained from the M8 mine would be burns from the 170-grain black powder spotting charge, and possible injury from falling parts. If caused to function, the M8A1 would propel a plastic plug into the air allowing yellow smoke to be emitted from the container. Because the spotting charge of the M8 is black powder, it may still be capable of functioning if it dries out after being exposed to moisture (Army 2006b). There is no black powder spotting charge in the M8A1 mine.

Summary: It is unlikely that a person would be able to trigger the practice antipersonnel mine through casual (inadvertent or unintentional) contact if one were found at the site and be burned or exposed to smoke or falling parts, because the mine: (1) would have to contain a live fuze, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness (Army 2006b).

4.4.10 Mine, antitank, practice, M10

The M10 antitank practice mine consists of a rectangular steel container that is loaded with sand in the field. According to Headquarters Munitions Command data cards, the M10 antitank practice mine was produced between 1946 and 1947. A primary fuze well for the practice fuze is located in the top center of the mine. The fuze (M604) is designed for use in the M10, M12, M12A1, and the M20 antitank practice mines. It is an instantaneous, mechanical, pressure-activated type fuze consisting of a steel body containing the firing pin assembly, cover assembly, primer and smoke charge, and a safety fork. The fuze is issued separately and assembled to the mine in the field. After it is fired and the mine is recovered, a new fuze can be installed and the mine reused. The smoke charge is contained in the fuze. The M10 practice mine can be booby trapped with a regular firing device threaded directly into the secondary fuze well. Functioning of the fuze ignites a smoke charge that emits a cloud of smoke and creates a noise. When booby trapped, the mine is activated by a pull wire (Army 1977a, 1977c, 2006b).

Summary: It is highly unlikely that a person would be able to trigger a practice antitank mine through casual (inadvertent or unintentional) contact or by pulling the pull wire if one were

found at the site and be exposed to smoke and noise, because the mine: (1) would have to contain a live practice fuze and active practice detonator, (2) was designed to be triggered by the weight of a vehicle when not booby-trapped, and (3) these components, including the pull wire, would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness (Army 2006b).

4.4.11 Pot, 10 lb, smoke HC, screening, M1

The M1 HC 10lb smoke pot was designed for training exercises and demonstrations but could be used in combat to mask movement and obscure the enemy. The M1 contains 10 pounds of type-C, HC Smoke mixture. The outer cover of the M1 smoke pot must be removed before use. The M1 smoke pot is initiated manually by rubbing the scrather block (found under the outer cover) against the match-head on top of the pot. Flame from the match-head ignites the starter mixture, which in turn ignites the HC smoke mixture filling. After a delay of about 10 seconds, the smoke particles rise into the air forming a dense white cloud of smoke burning for 5 to 8 minutes. Breathing HC smoke can be hazardous to the respiratory tract and it is considered a carcinogen. Assuming an intact M1 smoke pot was discovered in an unfired condition and caused to function, the type of injuries that could be sustained would be burns from the burning smoke mixture and respiratory problems including coughing. Due to the heat generated during the burning process it is unlikely that a person who found a smoke pot and caused it to function would hold onto it after ignition (Army 1982).

Summary: It is unlikely that a person would be able to function the M1 smoke pot through casual (inadvertent or unintentional) contact if one were found at the site and be burned or injured by the smoke mixture: (1) the smoke pot would have to contain an intact scratch block and match head that would have to be rubbed together to cause an ignition, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and degrade the condition of the sheet metal case of the smoke pot.

4.4.12 Pyrotechnic mixture, illumination

Illumination pyrotechnic mixture is a component of illumination items and is discussed along with the MKI illumination hand grenade in Section 4.4.5.

4.4.13 Signal, illumination, ground, M131

Designed primarily as a distress signal the M131 is a hand-held device containing a single red star illuminant candle with 1.62 oz of illuminant, a parachute, and a small rocket propulsion motor containing 100 grams of black powder. When the metal cap is removed from the base a pull cord (also referred to as a lanyard) is exposed. When the cord is pulled the firing pin strikes the primer and ignites the 2.25-gram expelling charge. The expelling charge ignites the rocket motor carrying the rocket to an altitude of approximately 1,500 feet where the illuminate is ignited and burns at 10,000 candlepower for 30 seconds. Assuming that someone found an intact M131 ground flare in an unfired condition and caused it to function; the type of injuries that could be sustained would be burns from the expelling charge and

burning illuminant, impact from the fired rocket, and falling objects if the rocket goes into the air (Army 1994b).

Summary: It is unlikely that a person would be able to function the M131 through casual (inadvertent or unintentional) contact if one were found at the site and be burned or exposed to smoke or falling parts, because the flare: (1) would have to be opened and functioned as designed, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

4.4.14 Signal, illumination, ground, M21A1

These signals were designed to be fired from a rifle or carbine fitted with a launcher for signaling ground units. They produce a parachute suspended colored star (M17A1, M19A1, and M21A1 [obsolete]). Parachute-suspended signals burn 20 to 30 seconds. The signals are fired by placing the butt of the rifle or carbine firmly on the ground with the barrel inclined at an angle of approximately 15 degrees from vertical. The grenade launching cartridge projects the signal and ignites the propelling charge. The propelling charge sets off the expelling charge. The expelling charge ejects the pyrotechnic composition and ignites the quick match which, in turn, ignites the star or stars (Navy 1982). To prepare the signal for launching, the following steps are required: remove the cork plug from the finned end by pulling on the pull tape; remove the special blank cartridge from the under side of the cork plug (in some cases, these cartridges are packed separately in the shipping container); load the rifle or carbine with the proper grenade cartridge; and secure the rifle or carbine locking device (Army 2006b).

Summary: It is unlikely that a person could cause a rifle-fired M21A1 ground illumination signal to function through casual contact (inadvertent or unintentional) and be burned if one were found at the site, because it (1) would require precise placement of components and a specific model of rifle or carbine equipped with a launcher, and (2) would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function (Army 2006b).

4.4.15 Simulator, projectile, airburst, M74 series

The projectile simulates artillery fire air bursts. They consist of a one-piece aluminum case with an extracting rim, and resemble a large shotgun shell. The case contains a percussion primer mounted in the base, a black powder propelling charge, a delay fuse, and an inner case containing a flash charge. The simulator is fired from Pyrotechnic Pistol AN-M8. The firing pin of the pistol strikes the primer, igniting the propelling charge. The propelling charge expels the self-contained flash charge from the case, at the same time igniting the igniting charge. The igniting charge ignites the delay fuse, and the fuse in turn ignites the flash charge producing a bright flash and a loud noise. The total delay from actuation of the firing pin to ignition of the flash charge is 2 to 3 seconds. Aimed at a 45-degree elevation, the height of burst is about 100 feet (Army 1977a, 2006b).

Summary: It is unlikely that a person could cause an airburst projectile simulator to function through casual (inadvertent or unintentional) contact if one were found at the site and be

injured, because it would require a hard, precise blow to the primer to function. If an airburst projectile simulator is found at the site and subjected to an open flame (i.e., fire), it may function and could cause nonfatal burns and/or lacerations (Army 2006b).

5.0 SITE EVALUATION

The available data (e.g., archival and reconnaissance data) regarding the County North MRA were reviewed and evaluated according to procedures described in the "Final Plan for Evaluation of Previous Work" (HLA 2000). The evaluation process is documented through the completion of a series of checklists. Copies of the checklist are provided as Appendix A. This section presents a summary of the results of the checklist evaluation. It is divided into two sections, an assessment of the literature review and an assessment of the sampling performed at the site.

5.1 Literature Review

5.1.1 Type of Training and Military Munitions Expected

The documented historical use of the County North MRA included troop training and maneuver areas and bivouac areas. MEC items recovered from the County North MRA were primarily associated with practice and pyrotechnic munitions for the following purposes:

MRS-27E: combat range (1940s), maneuver area (1950s) and NCOA (1950-60s), DSS (1960s-90s), driving (1970s), and overnight bivouac area (1980s).

MRS-45: MRS-45 was identified during the review of training facility maps conducted as part of the Fort Ord Archives Search (USACE 1997a). It was identified as a Tactical Training Area on training facilities maps in the mid-1950s (1950s-90s), maneuver area (1950s), and driving (1970s).

MRS-57: Troop training area (1940s – 1990s).

MRS-59: As part of the Archives Search, an interview with a former Fort Ord firefighter (who worked at Fort Ord from 1942 to 1944 and from 1947 to 1978) was conducted. During the interview, the former firefighter indicated that MRS-59 (referred to as K10 in the interview) was used in the early 1940s and included a 2.36-inch rocket range. The site was reportedly not active after this time and the interviewee had no firsthand knowledge of the range. MRS-59 was later subdivided into MRS-59, MRS-59A, and MRs-59B. A review of 1940s era training maps did not identify a 2.36-inch rocket range in the vicinity of MRS-59A, MRS-59B, or MRS-59. A reconnaissance (site walk) was performed as part of the ASR by a USACE UXO Safety Specialist. No evidence of a 2.36-inch rocket range was found. Facility training maps have identified MRS-59 as used for combat range (1940s), maneuver area and tank driving (1950s) and NCOA (1950-60s), DSS (1960s-90s), and driving (1970s).

These sites lie in areas that were previously used as a tactical training area, a bivouac area, combat support training area, and NCOA training area. The expected types of military munitions associated with these activities include practice mines, pyrotechnics (including signals and flares), simulators, smoke grenades, firing devices, and fuzes. Details regarding these types of training are presented in Section 4.1. Other training that may have occurred in this area includes use as a combat range and a 2.36-inch rocket range.

5.1.2 Subsequent Use of the Area

The MRA remains undeveloped. As indicated in the Base Reuse Plan, this area is planned for development (i.e., non-residential, institutional, commercial), habitat reserve with borderland interface, and habitat reuse, which includes habitat reserve and habitat corridor (Figure 3). The general development land use category encompasses infrastructure activities such as roadway and utility construction, as well as commercial/retail construction, parks, and borderland activities.

5.1.3 Establishment of Site Boundaries

The boundaries of MRS-27E and MRS-27F were determined based on the evaluation of training facilities maps that was conducted during the Fort Ord archives search. The boundaries of MRS-27E and MRS-27F were based on a training site boundary (Training Sites 5 and 6) that was shown on training maps from the mid-1970s through the mid-1980s.

The boundary of MRS-45 was determined based on the evaluation of training facilities maps completed as part of the Fort Ord archives search. The area was identified as a Tactical Training Area on a circa 1954 training map and a 1956 training map.

The boundary of MRS-57 was developed during interviews conducted as part of the archives search. The location identified was a general area of potential activities and was not surveyed or based on specific knowledge of the site or training procedures. Following the interview, USACE personnel, including a UXO Safety Specialist, evaluated the area boundary using the interview notes, site walk information, Fort Ord training maps, and aerial photographs. Based on the follow-up evaluation, the MRS-57 boundary was established.

The boundary of MRS-59 was developed during interviews conducted as part of the archives search. The location identified was a general area of potential activities and was not surveyed or based on specific knowledge of the site or training procedures. Following the interview, USACE personnel, including a UXO Safety Specialist, evaluated the area boundary using the interview notes, site walk information, Fort Ord training maps, and aerial photographs. Based on the follow-up evaluation, the MRS-59 boundary was established. For the purpose of property transfer, MRS-59 was subdivided into MRS-59, MRS-59A, and MRS-59B.

5.1.4 Summary of Literature Review Analysis

The County North MRA lies in an area previously used as a tactical training area, a bivouac area, combat support training area, and NCOA training area. The expected types of military

munitions associated with these activities include practice mines, pyrotechnics (including signals and flares), simulators, smoke grenades, firing devices, and fuzes.

MRS-27E, MRS-27F, MRS-45, MRS 57, and MRS-59 lie near or within an area identified on a 1945 map as Combat Ranges. With the exception of fragments from the incomplete detonation of a 60mm mortar found in the northwestern portion of MRS-59 outside of the County North MRA, only practice and non-penetrating military munitions items have been found during site walks that have been conducted in the areas in and around MRS-27E, MRS-27F, MRS-45, MRS-57, and MRS-59.

5.2 Reconnaissance Review

This section describes the various site reconnaissance activities that have been conducted within MRS-27E, MRS-57, MRS-45, and MRS-59. The discussion includes the site reconnaissance method, results of the site reconnaissance, a discussion of the military munitions found, and QA/QC. Site reconnaissance activities that have been performed within these sites include a PA/SI completed as part of the archives search, site walks completed as part of the BRA, and TCRAs that included a visual sweep for potential military munitions laying on the ground surface. The paths of the site reconnaissance performed for the various investigations are shown on Plate 1.

5.2.1 Reconnaissance Methods Discussion

Site reconnaissance evaluations that were conducted in the County North MRA included PA/SIs, TCRAs, and site walks completed as part of the BRA. The methodologies used to conduct these evaluations were described in Sections 3.2.2, 3.2.5, and 3.2.6, respectively.

The PA/SI was conducted in accordance with USACE guidance (USACE 1995). The TCRAs were conducted in accordance with the procedures that were described in the Technical Memorandum, Parker Flats and Parker Flats to East Garrison BLM Area OE Surface Removal (Parsons 2001b). The BRA was conducted in accordance with the Basewide Range Assessment Work Plan (IT 2001).

5.2.2 Site Boundaries Review

The site boundaries for MRS-27E, MRS-27F, MRS-45, MRS 57, and MRS-59 were provided by the USACE and documented in the ASR (USACE 1997a). The sites were reportedly used as a bivouac area, tactical training area, a NCOA, a DSS area, and a 2.36-inch rocket range. A site reconnaissance was performed within or adjacent to each of the sites as a PA/SI, the BRA, or the TCRAs. The munitions items found during these reconnaissance activities were of training or practice type. Based on the evaluation of the reconnaissance data, no modification to the boundaries of the MRSs is necessary.

5.2.3 Quality Assurance/Quality Control

The QA/QC procedures used during the field operations are described below.

Preliminary Assessment Site Inspection – U.S. Army

The site reconnaissance conducted as part of the PA/SI was performed in accordance with USACE guidance (USACE 1995). The site reconnaissance is conducted to look for evidence of past munitions use. Visible evidence found during the site reconnaissance provides information on the type, extent, and magnitude of the munitions present. Physical features that may be present at a former site include impact craters caused by penetrating munitions, the presence of MEC and/or munitions debris on the ground surface, and soil staining associated with the use of bulk explosives. Upon completion of the reconnaissance at each site, a Risk Assessment Code (RAC) worksheet was completed and submitted to the Mandatory Center of Expertise (MCX) and Design Center (CEHND) as required (USACE 1995).

Time-Critical Removal Actions (Visual Surface Removals) - Parsons

The TCRAs that included visual surface sweeps and removal of MEC were conducted in accordance with the procedures that were described in the Technical Memorandum, Parker Flats and Parker Flats to East Garrison BLM Area OE Surface Removal (Parsons 2001b). After the surface removals were completed, visual QC inspections that covered at least 10% of the cleared grids were performed (Parsons 2001b). A QC check on munitions debris removed from the site was also performed. Any item potentially containing energetic materials was removed or marked for demolition, as described in the standard operating procedure for range residue removal (Parsons 2001b).

Basewide Range Assessment

Although the Fort Ord BRA is not a part of the Military Munitions Response Program, many of the Data Quality Objectives (DQOs) identified for the Site Assessment Phase of the BRA investigation are the same DQOs established for the site reconnaissance phase of the current MMRP being implemented at the former Fort Ord. The DQOs for the BRA and the MMRP identify similar information sources used to help answer questions regarding historical site use and to define the boundaries of the area of use. The DQOs for the MMRP site reconnaissance identify various information sources such as compilation of historical information regarding potential munitions at the site (e.g., the review of interview records, field notes, aerial photographs, and historical maps; USACE 1995). The DQOs for the BRA historical review identified similar sources of information including the review of interview records, historical maps, and aerial photographs (IT 2001). As part of the DQOs for a site inspection conducted for the MMRP, documentation of the type and location of MEC and munitions debris, if found, is recorded. As part of the DQOs for the BRA site reconnaissance the quantity, type, and location of MEC and munitions debris found is also recorded. Both programs include using the results of the site inspections to determine if additional work (i.e., sampling for MEC and chemicals associated with MEC) is necessary. The Fort Ord BRA was conducted in accordance with the Basewide Range Assessment Work Plan (IT 2001).

5.3 Sampling Review

This section describes the items that were found in the County North MRA and how these items support historical information concerning past use of the site. Site boundaries are assessed in terms of the items found. There is also a discussion regarding sampling equipment, methods, and quality control measures used during prior munitions response sampling programs.

5.3.1 Site Boundaries Review

The County North MRA encompasses several MRSs, the boundaries of which were established as part of the archives search process. Site boundaries were first presented as part of the 1994 Archives Search Report Supplement No. 1 (USACE 1994). 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 is accurate, based on historical information and removal data, and whether the surveying method used to delineate the site boundaries was accurate. The County North MRA includes MRS-45, MRS-27E, a portion of MRS-57, a portion of MRS-59B, and a portion of MRS-59:MRS-27F (Figure 2). Although some items (including smoke grenades classified as MD and grenade fuzes classified as MD) were found outside of the MRS boundaries during the PA/SI, the items found are consistent with use of the MRA for troop training activities. No evidence of an artillery range or rocket range was found within the County North MRA. Since the Track 1 Plug-In approach is being

recommended for the entire County North MRA, there is no need to expand the MRS boundaries.

5.3.2 Sampling Methods Discussion

The methods used to complete the field activities performed by UXB and USA were described in greater detail in Sections 3.2.1 and 3.2.3, respectively. This section summarizes the QA/QC procedures used by the MEC contractors and the data management procedures. This information is documented in the contractor after-action reports.

5.3.2.1 Quality Assurance/Quality Control

The QA/QC procedures used during the field operations are described below.

Subsurface Removal Action - UXB

The QA/QC procedures used by UXB for the removal action conducted on the CSUMB Off-Campus MRA MRS-31 that crossed the CSUMB Off-Campus MRA - County North MRA boundary into MRS-45 are as follows (UXB 1994, 1995a, 1995b):

- Grids with high concentrations of subsurface ferrous metals required more than one sweep. The second sweep was normally made at an angle of 90 degrees to the first.
- Magnetometers were tested each day to ensure reliability. A solid steel 81mm mortar, a 2.36-inch inert rocket, and a 105mm projectile were buried in the test area at a depth of 4 feet.
- Additionally, QC and QA surveys were performed. QC procedures entailed a resurvey of at least 10% of each grid by a UXB QC Officer. QA procedures generally entailed a second 10% resurvey by USACE personnel.

Grid Stats/Site Stats Sampling – USA

USA conducted sampling at MRS-45 from May 21, 1997 through July 28, 1997. Throughout operations, USA performed daily operational checks and QC inspections. QA/QC performed throughout the sampling operations is documented in the after-action report for MRS-45 (USA 2001a). 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 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 (Army 2006b).

QC inspections of the work were done by a USA Quality Control specialist. Because of the nature of SS/GS sampling, Quality Assurance and Quality Control tests of SS/GS operations

were limited to inspections of operational activities and documentation. No deficiency reports were written during inspections of the work done in MRS-45 (Army 2006b).

Data Management QA/QC

Parsons, under contract with the Army, performed a 100% 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) presented in the Final Track 1 OE RI/FS Report (MACTEC 2004). Parsons' evaluation included a review of the field grid records and the MMRP database. 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 100% check of 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.

A comparison of the Fort Ord MMRP database to the relevant County North MRA after-action reports was performed by the FORA ESCA RP to identify discrepancies, if any, between the after-action reports and the current database. FORA ESCA RP's review indicates there were differences between the after-action report and the final database.

- It appears that some changes were made to model descriptions and condition of items found. Because documentation was generally provided for the change, the data are considered useable for making an informed decision regarding the historical use of the MRA.
- Hazard Codes were assigned by the Army and not by the contractors in the after-action reports. A hazard category could not be assigned for one item as the model was unknown.
- Review of the data collected by UXB indicates that the depth at which items were encountered was not required, or recorded. Although exact location and depth data was not collected for MEC and MD removed during sampling and removal actions, and the exact location of items found cannot be plotted on maps, the location of MEC and MD items was recorded within the grid where the items were encountered.

5.3.2.2 Data Quality Conclusions

The following conclusions can be made regarding the quality of the data:

- Data collected by USA indicate that sample grids associated with the SS/GS sampling fell within the boundary of MRS-45.
- Because some anomalies were not excavated using SS/GS investigative approach, some MEC or MD may still be present within portions of the sample grids within MRS-45.
- Problems have been identified with the statistical methods used in the SS/GS sampling; however, the sampling results are still useful in identifying military munitions potentially present at the site (Army 2006b).

- Removals conducted by UXB were conducted according to the work plan and field QA/QC reported no failures. Review of available documentation indicates that the detected anomalies were investigated and the military munitions identified, both MEC and MD, were removed as required by the contractor work plan. Review of the data collected by UXB indicates that the depth at which items were encountered was not recorded. Although exact location and depth data was not collected for MEC and MD removed during the removal action and the exact location of items found cannot be plotted on maps, the location of MEC and MD items was recorded within the grid where the items were encountered.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The following section presents conclusions and recommendations for the County North MRA based on the review and analysis of the data associated with historical information and sampling and removal data.

6.1 Conclusions

6.1.1 Site Use and Development

Based on the literature review and site reconnaissance, the County North MRA appears to have been used for general training and maneuvers and as a bivouac area. The majority of the County North MRA is currently undeveloped with multiple reuses planned for the area.

6.1.2 Reconnaissance Evaluation and Data Quality

The reconnaissance data collected during reconnaissance activities conducted within and adjacent to MRS-27E, MRS-45, MRS-57, and MRS-59, support the conclusion that: (1) training in and around these areas did not include the use of high explosives, (2) these were not impact areas, and (3) munitions debris found is consistent with use as a general training and maneuver areas (e.g., flares, simulators, practice mines, practice grenades, smoke producing items, blank small arms ammunition, etc.).

- The site reconnaissance conducted at MRS-27E, MRS-45, MRS-57, and MRS-59 and the adjacent sites as part of the PA/SI, was conducted in accordance with USACE guidance.
- The site reconnaissance conducted for the BRA met the DQOs established for that program. Many of the DQOs from the BRA are the same DQOs that are currently in use for the MMRP (Army 2006b).

- The visual surface TCRAs performed within MRS-57 and MRS-45 were conducted in accordance with the Technical Memorandum, Parker Flats and Parker Flats to East Garrison BLM Area OE Surface Removal (Parsons 2001b).
- USACE completed munitions response investigations at MRS-27E, MRS-45, MRS-57, and MRS-59. The investigation was specifically designed to assess the nature of the past military training activities at the site. The Army, with regulatory oversight from the EPA

and the DTSC, conducted a systematic investigation. Although sampling conducted at MRS-45, site walks conducted at MRS-27E, MRS-45, MRS-57, and MRS-59, and a TCRA visual surface removal conducted at MRS-27E, MRS-45, and MRS-57 did not include the entirety of each of the MRSs, the quantity and quality of the information generated is sufficient to assess the potential presence of MEC or MD. Additionally, the MEC potentially remaining in the County North MRA pose an acceptable risk if encountered.

- No evidence of 2.36-inch rockets reportedly used at MRS-59 was observed during site reconnaissance evaluations (Plate 1).

- A site walk was conducted in April 2009 by a team that included two UXO technicians. The team performed a visual inspection of a portion of the County North MRA and recorded their path using a GPS hand-held unit. The site walk was conducted to provide supplemental information regarding signs of training or the potential presence of munitions related items. MD and expended SAA were found during the 2009 site walk.

6.1.3 Sampling and Removal Adequacy and Data Quality

The entire site was not sampled and surface removal action was visual; however, the methods were sufficient to evaluate the County North MRA with respect to military munitions. The quantity and quality of available information is sufficient to make an informed decision regarding the site. Additional MEC sampling at the County North MRA would not add significantly to the understanding of the site or change the conclusions of this report.

- Copies of UXB's daily field journals were not available for review by the ESCA RP Team.
- Review of the available information provided in the after-action report indicates that UXB may not have recorded the depth at which items were encountered. Although exact location and depth data was not collected for MEC and MD removed during the removal action and the exact location of items found cannot be plotted on maps, the location of MEC and MD items was recorded within the grid where the items were encountered.
- Removals conducted by UXB were conducted in general accordance with the field procedures described in the work plan and field QA/QC reported no failures. Review of available documentation indicates that the detected anomalies were investigated and the MEC and MD identified were removed as required by the contractor work plan.
- Data collected by USA indicate that sample grids associated with the SS/GS sampling fell within the boundary of MRS-45.
- Because some anomalies were not excavated using SS/GS investigative approach, some MEC or MD may still be present within portions of the sample grids within MRS-45.
- Problems have been identified with the statistical methods used in the SS/GS sampling; however, the sampling results are still useful in identifying military munitions potentially present at the site (Army 2006b).

- Removals conducted by UXB were conducted according to the work plan and field QA/QC report no failures. Review of available documentation indicates that the detected anomalies were investigated and the military munitions identified, both MEC and MD, were removed as required by the contractor work plan. Review of the data collected by UXB indicates that the depth at which items were encountered was not recorded. Although exact location and depth data was not collected for MEC and MD removed during the removal action and the exact location of items found cannot be plotted on maps, the location of MEC and MD items was recorded within the grid where the items were encountered.
- The sampling methodology used at MRS-45 was SS/GS. Problems with the statistical methods used in the program have been identified; however, the data collected are useful in evaluating the past use and potential distribution of MEC in MRS-45.
- Although MEC sampling efforts conducted in MRS-45 are not consistent with requirements in place today, the quantity and quality of available information is sufficient to make an informed decision regarding the site. The entire site was not sampled; however, the sampling methods were sufficient to indicate that military munitions used in MRS-45 are considered to pose an acceptable risk.

6.1.4 Data Conclusions

Based on the historical use of these sites and the surrounding area, there is a possibility that MEC is present at MRS-27E, MRS-45, MRS-57, and MRS-59; however, the following MEC items, if present at these sites, are considered to pose an acceptable risk if encountered, for the following reasons:

Cap, blasting, electric, M6: The presence of a single blasting cap in the County North MRA is an anomalous event and not an indication of extensive use of the materials in the County North MRA. If a blasting cap remains in the County North MRA, it is unlikely that a person could cause an intact electric blasting cap to function through casual (inadvertent or unintentional) contact. The blasting cap is sensitive to static electricity, heat, and shock (e.g., being dropped on a hard surface); however, degradation weathering and especially wetness can make the blasting cap less sensitive. If the item is made to function, the most likely injury that could result would be loss of digits.

Flare, parachute, trip, M48: It is possible that a person could cause the parachute trip flare to function through casual (inadvertent or unintentional) contact if one remained in a "prepared to function" condition (e.g., fuze was installed in the flare, was armed, and attached to a trip wire or other triggering mechanism, or placed in the ground with the prongs exposed). Upon functioning, injury such as minor to serious burns could occur from the ignitable components, or by being struck by the ejecting flare and parachute assembly. If the fuze is not installed, the parachute trip flare would not function through casual (inadvertent or unintentional) contact but could function if exposed to heat or flame (Army 2006b).

Flare, surface, trip, M49: It is possible that a person could cause the surface trip flare to function through causal (inadvertent or unintentional) contact if one remained in a "prepared to function" condition (e.g., attached to a trip wire or other triggering mechanism). If it

existed in a fixed position (e.g., attached to a tree), serious injury beyond burns would not be expected because the flare is designed to burn "in place" where it was placed or mounted. If one was in a "prepared to function" condition and left on the ground, it could function upon casual (inadvertent or unintentional) contact, and it would burn in a manner similar to a road flare, but with greater heat and illumination, and could cause burns (Army 2006b).

Fuze, grenade, model unknown: Grenade fuzes are components of hand grenades. Section 4.4.6, 4.4.7, and 4.4.8 discuss M10A3, M205, and M201A1 grenade fuzes in the context of individual grenades.

Grenade, hand, illumination, MKI: It is unlikely that a person would be able to function the MKI illumination grenade through casual (inadvertent or unintentional) contact if one were found at the site and be burned by the illumination mixture because: (1) the grenade would have to contain a live fuze that would have the pin pulled, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and degrade the condition of the sheet metal case of the grenade.

Grenade, hand, practice, MK II: It is possible that a person could cause a practice grenade to function if one were found at the site and be burned or exposed to metal fragments from the exploding detonator housed within the grenade; the practice grenade itself would not fragment. However, the grenade would have to contain a live fuze and functioning detonator, and these components would have been exposed to moisture degradation and weathering for many years, which could decrease their effectiveness (Army 2006b).

Grenade, hand, riot, CS, M7A3: It is unlikely that a person would be able to function the CN/CS grenade through casual (inadvertent or unintentional) contact if one were found at the site and be burned or exposed to agent because the grenade: (1) would have to contain a live fuze that would have the pin pulled, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and degrade the condition of the sheet metal case of the grenade (Army 2006b).

Grenade, hand, smoke, M18 series: It is possible that a person could cause the smoke grenade to function if one were found at the site and be burned, but the grenade would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function (Army 2006b).

Mine, antipersonnel, practice, M2 (model unknown): It is unlikely that a person would be able to trigger the practice antipersonnel mine through casual (inadvertent or unintentional) contact if one were found at the site and be burned or exposed to smoke or falling parts, because the mine: (1) would have to contain a live fuze, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness (Army 2006b).

Mine, antitank, practice, M10: It is highly unlikely that a person would be able to trigger a practice antitank mine through casual (inadvertent or unintentional) contact or by pulling the pull wire if one were found at the site and be exposed to smoke and noise, because the mine: (1) would have to contain a live practice fuze and active practice detonator, (2) was designed to be triggered by the weight of a vehicle when not booby-trapped, and (3) these components, including the pull wire, would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness (Army 2006b).

Pot, 10 lb, smoke HC, screening, M1: It is unlikely that a person would be able to function the M1 smoke pot through casual (inadvertent or unintentional) contact if one were found at the site and be burned or injured by the smoke mixture because: (1) the smoke pot would have to contain an intact scratch block and match head that would have to be rubbed together to cause an ignition, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness and degrade the condition of the sheet metal case of the smoke pot.

Pyrotechnic mixture, illumination: Illumination pyrotechnic mixture is a component of illumination items and is discussed along with the MKI illumination hand grenade, above.

Signal, illumination, ground, M131: It is unlikely that a person would be able to function the M131 through casual (inadvertent or unintentional) contact if one were found at the site and be burned, impacted or exposed to smoke or falling parts, because the flare: (1) would have to be opened and functioned as designed, and (2) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Signal, illumination, ground, M21A1: It is unlikely that a person could cause a rifle-fired M21A1 ground illumination signal to function through casual contact (inadvertent or unintentional) and be burned if one were found at the site, because it (1) would require precise placement of components and a specific model of rifle or carbine equipped with a launcher, and (2) would have been exposed to moisture, degradation, and weathering for many years, which could decrease the effectiveness of the components that cause it to function (Army 2006b).

Simulator, projectile, airburst, M74 series: It is unlikely that a person could cause an airburst projectile simulator to function through casual (inadvertent or unintentional) contact if one were found at the site and be injured, because it would require a hard, precise blow to the primer to function. If an airburst projectile simulator is found at the site and subjected to an open flame (i.e., fire), it may function and could cause nonfatal burns and/or lacerations (Army 2006b).

Even though the area was not entirely walked, sampled, or covered by a removal action, the quantity and quality of the information generated is sufficient to make an informed decision regarding County North MRA. The investigation (site reconnaissance) was considered to be sufficient to confirm the type of military munitions used in the vicinity of the sites. Additionally, because the MEC potentially remaining pose an acceptable risk if encountered,

further effort to refine the site boundaries or conduct additional sampling of the sites would not add significantly to their understanding, or change the conclusions of this report.

6.2 Recommendations

No Further Action related to MEC is recommended for the County North MRA. MRS-27E, MRS-45, MRS-57, and the portion of MRS-59 within the County North MRA meet the Track 1, Category 3 criteria because historical research and field investigations identified that evidence of past training involving military munitions at these sites involved only the use of practice and pyrotechnic items that are not designed to cause injury. The following MEC items may be present at the site based on past site use: practice antitank mines, practice grenades, fuzes, smoke producing items, booby trap firing devices, and simulators. In the unlikely event that a MEC item is found of the type previously observed in the vicinity of the sites, it is not expected that it could be caused to function through casual contact (i.e., inadvertent and unintentional contact). The MEC types potentially present have been exposed to moisture, degradation, and weathering for many years which could prevent many of them from functioning. Additionally, practice antitank mines are designed to be triggered by the weight of a vehicle, commonly in excess of several hundred pounds.

Digging or underground "intrusive" activities may be planned for the proposed reuse and development. In the interest of safety, reasonable and prudent precautions should be taken when conducting intrusive operations at this site. Because of Fort Ord’s history as a military base, FORA will provide "ordnance recognition and safety training" to those wishing to conduct intrusive activities on the ESCA parcels, including the County North MRA to increase their awareness of and ability to identify MEC items. The Track 1 ROD describes the scope of the safety training (Army 2005). If MEC is discovered during future development activities in the MRA, trained construction personnel should immediately stop any intrusive or ground-disturbing work in the area or in any adjacent areas and should not attempt to disturb, remove or destroy the MEC item, but should immediately notify the local law enforcement agency having jurisdiction on the parcel. The local law enforcement agency will arrange for an appropriate agency to respond.

The Army recommends construction personnel involved in intrusive operations attend an ordnance recognition and safety training. FORA will request notice from future landowners of planned intrusive activities, and in turn will provide ordnance recognition and safety training to construction personnel prior to the start of intrusive work. FORA will provide ordnance recognition and safety refresher training as appropriate.

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Table 1

County North MRA – Summary of MEC Finds

MEC ITEMS	Quantity	Depth (inches)	Type	Contractor	Hazard Category
Fuze, grenade (model unknown)	1	*	ISD	UXB	1
Grenade, hand, practice, MK II	2	*	ISD	UXB	1
Grenade, hand, Illumination, MK I	1	*	ISD	UXB	1
Grenade, hand, riot, CS, M7A3	1	*	ISD	UXB	1
Pyrotechnic mixture, illumination	1	*	ISD	UXB	1
Pot, 10 pounds, smoke, HC, screening, M1 **	1	5	UXO	USA	1
Grenade, hand, smoke, M18 series	1	*	UXO	USA	1
Flare, parachute, trip, M48	1	*	ISD	UXB	2
Flare, surface, trip, M49 series	1	*	ISD	UXB	1
Signal, illumination, ground, M131	1	0	UXO	Parsons	2
Signal, illumination, ground, M21A1	1	0	UXO	Parsons	1
Mine, antipersonnel, practice, M2 (model unknown)	1	*	ISD	UXB	NS
Mine, antitank, practice, M10	3	0	UXO	USA	1
Simulator, projectile, airburst, M74 series	2	*	ISD	UXB	1
Cap, blasting, electric, M6	1	*	ISD	UXB	1
Unknown Dud (model unknown)	1	0	ISD	Range Control	NS
TOTAL	**20**				

Notes:
MRA – Munitions Response Area
MEC – munitions and explosives of concern
UXO – unexploded ordnance
ISD – insufficient data (materials potentially presenting an explosive hazard that could not be classified as unexploded ordnance, discarded military munitions, or munitions debris)
HC – hexachloroethane
NS – not specified
* – depth not recorded
** – Military Munitions Response Program (MMRP) Database identified item as UXO with a quantity of zero.
Reference: Ford Ord MMRP Database

Please note: Munitions descriptions have been taken directly from the Army's MMRP Database and/or other historical documents. Any errors in terminology, filler type, and/or discrepancies between model number and caliber/size are a result of misinformation from the data sources.

Hazard Category	Description
1	MEC that 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	MEC that will cause major injury or, in extreme cases, could cause death to an individual if functioned by an individual's activities
3	MEC that will kill an individual if detonated by an individual's activities

Table 2
County North MRA – Summary of MD Finds

MD ITEMS	Quantity	Depth (inches)	Contractor
37mm Airburst Illumination (Model Unknown)[1]	1	*	UXB
37mm Airburst Simulator (Model Unknown)[1]	2	*	UXB
37mm Airburst Simulator M74[1]	1	*	UXB
40mm Signal Cartridge (Model Unknown)	6	*	UXB
A/T Mine (Model Unknown)	1	*	UXB
Booby Trap, M-1	2	0	USA
Flare, Parachute (Ordnance and Explosive Scrap)	1	*	UXB
Flare, Surface, Trip, M48	1	0	USA
Flare, Surface, Trip, M49	2	*	USA
Flare, Surface, Trip, M49A1	4	0	USA
Flash Grenade Top (Model Unknown)	1	*	UXB
Fragments, Unknown	4 lb	*	USA
Fuze, Grenade, Hand (Model Unknown)	1	*	USA
Fuze, Grenade, Hand, M205, M205A1 & M205A2	1	*	USA
Fuze, Grenade, Hand, M205, M205A1 & M205A2	9	0	USA
Fuze, Grenade, Hand, Practice, M228	25	0	USA
Grenade Fuze (Model Unknown)	36	*	UXB
Grenade Practice (Model Unknown)	1	*	UXB
Grenade, Hand Smoke (Model Unknown)	2	*	UXB
Grenade, Hand, Fragmentation, MK 2	1	*	USA
Grenade, Hand, Illumination, MK1	2	*	USA
Grenade, Hand, Practice, M69	1	*	USA
Grenade, Hand, Practice, MK 2	34	0	USA
Grenade, Hand, Practice, MK 2	8	*	USA
Grenade, Hand, Practice, MK 2	1	4	ESCA RP Team
Grenade, Hand, Smoke, M18	29	0	USA
Grenade, Hand, Smoke, M18	7	*	USA
Grenade, Rifle, Smoke (Model Unknown)	2	*	USA
Grenade, Rifle, Smoke, Green, Red, Violet or Yellow, M22	1	*	USA
Grenade, Rifle, Smoke, Green, Red, Violet or Yellow, M22 & M22A2	16	0	USA
Grenade, Rifle, Smoke, Green, Red, Violet or Yellow, M22 & M22A2	1	3	USA

Table 2
County North MRA – Summary of MD Finds

MD ITEMS	Quantity	Depth (inches)	Contractor
Illumination (Model Unknown)	26	*	UXB
Land Mine, Practice, M1	1	*	USA
Land Mine, with Spotting Charge M1	1	*	USA
Landmine, Practice, M-8	1	0	USA
M125A1 Flare Parachute	1	*	UXB
M127 Flare, Star Cluster	28	*	UXB
M18 Grenade Smoke	1	*	UXB
M18 Smoke Grenade	3	*	UXB
M2 Grenade Body (Ordnance and Explosive Scrap)	1	*	UXB
M60 Fuze Lighter	2	*	UXB
M74 Projo, Simulator, Airburst	7	*	UXB
M97A1 Simulator, Projo (Model Unknown)	1	*	UXB
Mine, Antitank, Practice, Heavy, M10	3	0	USA
MK II Grenade (Model Unknown)	2	*	UXB
MK2 Grenade (Model Unknown)	1	*	UXB
Pot, Smoke, 10 lbs	1	0	USA
Projectile, 40mm, Cluster, White Star, M585	1	0	USA
Projectile, 40mm, Illumination	1	*	USA
Rifle Grenade Smoke (Model Unknown)	1	*	UXB
Signal, Flare, M51A1	6	*	USA
Signal, Illumination, M127	8	*	USA
Signals, Illumination, Ground, Parachute, Red Star, M126A1, White Star, M127A1	5	0	USA
Signals, Illumination, Ground, Clusters, Green Star, M125A1	12	0	USA
Signal, Illumination, Ground, M124 Series	1	3	ESCA RP Team
Signals, Illumination, Ground, Parachute, Red Star, M126A1	18	0	USA
Signals, Illumination, Ground, Parachute, White Star, M127A1	11	0	USA
Signals, Illumination, Ground, Parachute, White Star, M127A1	1	8	USA
Signals, Illumination, Ground, Parachute, White Star, M127A1	2	*	USA
Slap Flare	2	*	UXB
Slap Flare Inside (Model Unknown)	1	*	UXB

Table 2
County North MRA – Summary of MD Finds

MD ITEMS	Quantity	Depth (inches)	Contractor
Smoke Grenade (Model Unknown)	9	*	UXB
Smoke, Grenade	4	0	USACE
Spoon, M49A1 (Model Unknown)	2	0	USACE
Safety Lever, Grenade (Model unknown)	1	0	ESCA RP Team
Safety Lever, Grenade (Model unknown)	1	0	ESCA RP Team
Safety Lever, Grenade (Model unknown)	2	0	ESCA RP Team
Safety Lever, Grenade (Model unknown)	1	7	ESCA RP Team
Trip Flare Fuze (Model Unknown)	1	*	UXB

Notes:
MRA – Munitions Response Area
MD – munitions debris
mm – millimeter
[1] – These items are not fired from the 37mm weapons that are classified as artillery; they are fired by a hand-held pyrotechnic pistol/projector, and do not indicate 37mm artillery weapon use in the County North MRA.
A/T – antitank
lbs – pounds
* – depth not recorded
Reference: Ford Ord MMRP Database

Please note: Munitions descriptions from historical data have been taken directly from the Army's MMRP Database and/or other historical documents. Any errors in terminology, filler type, and/or discrepancies between model number and caliber/size are a result of misinformation from the data sources.