Track 1
Plug-In Approval Memorandum
MRS-6 Expansion Area
Former Fort Ord, California

Prepared for

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

May 6, 2005

United States Department of The Army

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1.0 INTRODUCTION

The Munitions Response Remedial Investigation/Feasibility Study (MR RI/FS; formerly ordnance and explosives [OE] RI/FS) program for the former Fort Ord is being implemented to evaluate and address all areas within the base with regards to known and suspected areas containing munitions and explosives of concern (MEC) from past military training activities. The MR RI/FS program is being completed by grouping areas and sites within the former Fort Ord as a series of "tracks" numbered 0 through 3 that are based on MEC-related characteristics to expedite clean-up, reuse and/or transfer of Fort Ord property. The Track 1 portion of the MR RI/FS program addresses sites where military munitions were suspected to have been used, but based on the RI/FS for each site, it falls 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).

The Record of Decision, No Further Action Related to Munitions and Explosives of Concern—Track 1 Sites, No Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22) dated April, 2005 (Track 1 Record of Decision [ROD]) addresses twenty-one sites,

and also provides a Plug-In process to address future sites that are considered eligible for inclusion into the Track 1 process.

This Approval Memorandum provides the required documentation specified in the Track 1 ROD to allow the expansion area of munitions response site (MRS) -6 into the Track 1 Plug-In process subsequent to finalization of the Track 1 ROD. This memorandum addresses the area from the southern border of MRS-6 to the northern border of MRS-1 (Plate 1). This area, hereafter referred to as the MRS-6 Expansion Area, or "site", 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 debris (MD) found, which are consistent with the characteristics of Site MRS-6 (Plate 1). When the written concurrence from the United States Environmental Protection Agency (USEPA), and acknowledgement from the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) are received, this memorandum will serve as the decision document stating that no further action regarding munitions response is required for the MRS-6 Expansion Area. The following sections provide an overview of Fort Ord; the Track 1 process; and site-specific documentation including history of the area, future use, and rationale for inclusion of the MRS-6 Expansion Area into the Track 1 Plug-In process.

In the Track 1 OE RI/FS (*MACTEC, 2004*), no further munitions response was recommended for 21 suspected munitions response sites (MRSs) at the former Fort Ord. The public comment period for the Track 1 Proposed Plan was completed in November 2004. The Record of Decision selecting no further action regarding munitions response for the 21 MRSs and establishing a plug-in process was completed in April 2005. A Glossary of Munitions Response Program Terms is provided in Appendix A.

1.1 Fort Ord and MR RI/FS Background

The former Fort Ord is located in northern Monterey County approximately 80 miles south of San Francisco (Plate 1). The former Army base is made up of approximately 28,000 acres of land next 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 northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, a small airfield within the Main Garrison was present in what is now the South Parade Ground. In the early 1960s, Fritzsche Army Airfield (FAAF) was completed. The Main Garrison airfield was then decommissioned and its facilities were redeveloped as a motor pool and other facilities. Significant construction activities at the former Fort Ord have not occurred since that time.

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 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 Act (BRAC). No active Army division is stationed at Fort Ord; however, Army personnel operate the areas of Fort Ord still held by the Army (*Army, 2000a*). 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 divisions 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 (*HLA, 1995b*).

In 1998, the Army agreed to evaluate military munitions at former Fort Ord in an MR RI/FS consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). A Federal Facility Agreement (FFA) was signed in 1990 by the Army, US EPA, and the DTSC (formerly the Department of Health Services or DHS) and the Regional Water Quality Control Board. The FFA established schedules for performing remedial investigations and feasibility studies and requires that remedial actions be completed as expeditiously as possible. In April 2000, an agreement was signed between the Army, US EPA, and the DTSC to evaluate military munitions at the former Fort Ord subject to the provisions of the Fort Ord FFA (*SMART, 2000*). The MR RI/FS utilizes a "tracking" process which categorizes areas with similar MEC-related characteristics to expedite clean-up, reuse and/or transfer of Fort Ord property. According to this "tracking process," an area under investigation is assigned one of four tracks, Track 0 through Track 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. Details of the Track 0 program and areas addressed are provided in the Track 0 Record of Decision (*ROD; Army, 2002*), and the Track 0 Explanation of Significant Differences (ESD; Army, 2005b)

Track 1: Sites where military munitions were suspected to have been used, but based on the RI/FS for each site, it falls 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).

Details of the Track 1 program and sites addressed are provided in the Track 1 Record of Decision (*ROD; Army, 2005a*)

Track 2: Sites where MEC items were present, and MEC removal action has been completed.

Track 3: Areas where MEC items are known or suspected to be present, but MEC investigations have not yet been completed.

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 MRS-6 Expansion Area) will be proposed and documented in Approval Memoranda. This memorandum

provides the same level of information that was included in the RI Site Reports in the Track 1 OE RI/FS (*MACTEC, 2004*), and describes the rationale for Track 1 designation. In accordance with the Track 1 ROD, the Approval Memorandum for the MRS-6 Expansion Area 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 this site as Track 1; and
4. A map of the site detailing its location and any pertinent available MEC-related information.

There will be a public review process for all Approval Memoranda, and these memoranda will be primary documents under the Fort Ord Federal Facility Agreement (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 the agency review of 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 EPA and acknowledgement from DTSC are 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 (formerly *The Advance)* 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 all associated Approval Memoranda, will be placed in the former Fort Ord Administrative Record and the local information repositories.

2.0 MRS-6 EXPANSION AREA (MINE AND BOOBY TRAP TRAINING AREA)

Information supporting the determination of the MRS-6 Expansion Area as a Track 1 Plug-In site is based on the findings provided in the Final Track 1 OE RI/FS (*MACTEC, 2004*) and is presented below. This approval memorandum consists of two main parts. The first part, contained in Sections 2.1 through 3.4, includes a presentation and assessment of archival 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 report, which is the Site Evaluation (Section 4.0). The Site Evaluation was conducted in accordance with the procedures described in the *Final Plan for Evaluation of Previous Work* (*Harding Lawson Associates [HLA], 2000b*) and may restate some information presented previously. The Site Evaluation discusses the evaluation of the literature review process (Section 4.1), evaluation of sampling process(es) (Section 4.2), and evaluation of the site walk process (Serction 4.3). These discussions are based upon information from standardized literature review and sampling review checklists (Attachment 1). Section 5.0 provides conclusions and recommendations for the site. References are provided in Section 6.0.

2.1 Site Description

The MRS-6 Expansion Area (Mine and Booby Trap Training Area) is located in the northwest portion of the former Fort Ord, west of the town of Marina and comprises of approximately 26.4 acres south of MRS-6 and north of MRS-1 (Plate 1). The location and boundary of the MRS-6 Expansion Area were identified as part of the Track 1 OE RI/FS Site OE-6 investigation. (*MACTEC, 2004*)

2.2 Site History and Development

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

MACTEC. It should be noted that minor discrepancies between source maps, combined with the natural degradation of older source maps and photographs, has resulted in misalignment of some map features. In addition, camera angle and lens distortion introduced into older aerial photographs, combined with changes in vegetation and site features over time has also resulted in misalignments of some map features with respect to the aerial photographs.

1940s Era

The site lies within a land tract purchased from private landowners by the U.S. Army (Army) in late 1940 (*Arthur D. Little, Inc. [ADL], 1994*). Review of 1940s documentation and aerial photographs indicates evidence of training within the boundary of the MRS-6 Expansion Area. Construction of the Main Garrison south of the site and the installation of water supply wells to the east began during the early 1940s. More specific information is provided below:

- Evidence of a disturbed area within and south of the site is visible on aerial photos from 1941 and 1949 (Plate 2). The site appears as if it had been cleared of vegetation based on the presence of straight-line contacts between vegetation and what appears to be dune sand. The fact that the area was cleared indicates that it may have been used by the Army, possibly for troop training. Vegetation patterns appear similar, but less dense, in the 1949 aerial photograph.

- The site is within a larger area identified on 1945 and 1946 Fort Ord maps as a "Well Area, No Artillery Firing or Demolitions". This area incorporates the majority of the Main Garrison. The 1945 Training Facilities map identifies a "Camouflage Area" in the site area (Plate 6-3; *Army, 1945 and 1946b*).

- The 1946, Main Garrison Cantonment Land Use Map (*Army, 1946a*) identifies a "Camouflage Training Area" within the site.

1950s Era

Review of 1950s era documentation including training maps, aerial photographs, and other Fort Ord maps indicates that mine and booby trap training occurred between 1946 and 1954. The following summarizes the results of the 1950s historical map and aerial photograph review:

- An area labeled "Mines & Booby Traps" (Plate 3) was identified on the circa 1954 map. A boundary for this area is delineated on this map (*Army, 1954*).

- The 1954 training map also shows that there were three former practice mortar squares approximately 1,000 feet south of the ASR site boundary (Plate 3). These are shown as cleared areas on the 1956 aerial photograph.

- The Mines and Booby Trap Training Area is not noted on training maps after 1954. There are no training areas within the footprint of the MRS-6 Expansion Area on training maps after 1954.

- The 1956 aerial photograph shows a long stretch of disturbed/cleared area within the MRS-6 Expansion Area. As previously discussed, the absence of vegetation suggests that the area may have been cleared for troop training.

- The 1957 and 1958 Training Area and Facilities maps identify a "Flame Thrower Range" just south of the site (*Army, 1957 and 1958*).

1960s to Present

Housing was constructed south and southeast of the MRS-6 Expansion Area in 1962 (Plate 4). This area is currently designated as Patton Park. No training areas are identified in this area on 1960s training maps or any maps thereafter. More specific information is provided below:

- The 1964 training map shows the "Marina Housing Area" just southeast of the site. Other records indicate that the development was known as Patton Park housing (*ATC/Diagnostic*

Environmental/Inc. [ATC], 1994). There are no training areas shown at the site location on this map or any other training or historical maps thereafter (*Army, 1964b*).

- The 1966 and 1975 aerial photographs show that the area is vegetated with dirt roads transecting the areas within and adjacent to the site. There is residential housing to the east and south.

- A 1999 aerial photograph shows that the area is vegetated, and generally undeveloped, with the exception of a dirt road that runs roughly north-south along the western site boundary. There is residential housing to the southeast and south (Plate 4).

- No recorded discoveries of military munitions within the MRS-6 Expansion Area footprint or adjacent areas have been identified in the 30 years that the nearby housing was occupied.

Proposed Future Land Use

Future reuse of this area includes mixed use of open space and housing in the adjacent area to the south and east.

2.3 Potential Military Munitions Based on Historical Use of the Area

This section identifies the types of military munitions that may have been used in this area. Historical records indicate that the site vicinity was used for mines and booby trap training. General descriptions of mines, booby traps, and booby trap simulators are provided below. A detailed description of mines and booby traps that were potentially used at the site is provided in Attachment 2.

2.3.1 Mines

It is expected that only practice, inert, training, and dummy mines were used in this area as part of training activities based on the proximity of the site to Highway 1, the City of Marina, and barracks. Inert practice mines were found and removed from the MRS-6 Expansion Area and to the south, which is consistent with the assumption that practice mines were used for training at the site. Information concerning practice mines and booby traps that were potentially used for training was obtained from

technical manuals (*Army, 1977a, b*) and *The American Arsenal* (*Hogg, 2001*). The following practice mines have been found during sampling within the MRS-6 Expansion Area and the area to the south:

- M80 Antitank training mine
- M8 Antipersonnel practice mine

Descriptions of these practice and training mines are provided in Attachment 2 and are described as being produced prior to or during the time that the site was used for training (1950s). Therefore, their presence at the site is consistent with knowledge of past training practices.

2.3.2 Booby Traps and Booby Trap Simulators

Booby trap firing devices and booby trap simulators may have been used at the site. Booby traps are actuated when an object is moved or an area is entered, and this action triggers a firing device. Many booby traps use trip wires which release crocked striker-type firing devices. Booby traps may be actuated when a trip wire is pulled or cut, or when a plate, rod or other triggering mechanism is activated by someone or something moving into or through the booby-trapped area. The different types of triggering devices used in booby traps are almost endless. They include fuzes, igniters, and firing devices. Issued firing devices have a standard base coupling (also referred to explosives, blasting caps, and detonating cord employed with live booby traps are normally not used in booby trap training areas because of the risk of injury to the soldiers being trained. If they are used during booby trap training, explosive charges and blasting caps are only used in properly sited demolition areas. Therefore, they are not expected to have been used at the MRS-6 Expansion Area. In training, firing devices could be attached to practice mines or simulated explosive devices to provide realistic training in both the setting and disarming of booby traps (*Hall, 2005*).

Booby trap simulators may also have been used in training. Explosive booby trap simulators are used during maneuvers and during training exercises to teach the installation, detection, and use of booby traps.

Booby trap simulators contain pyrotechnic charges. The charges produce (1) an instantaneous explosion, flash and, sound on initiation, or (2) illumination flame, or (3) whistle.

Based on review of a 1959 Fort Ord yearbook, booby trapping of mines appears to have been taught at Fort Ord (*Army, 1959*). However, there is no specific information about what booby trap firing devices or simulators were used for training at Fort Ord in 1950s. Firing devices that may have been used as part of booby trap training in the 1950s at Fort Ord include the M5 Pressure Release Firing Device, M1A1 Pressure Firing Device, the M1 Pull Firing Device, the M3 Pull/Release Firing Device, and the M1 Pressure Release Firing Device (See FM 5-31 Boobytraps; September 31, 1965.) These firing devices contain no energetic materials (e.g., pyrotechnic charges), unless a coupling base or activator is attached. As stated above, in training, firing devices are likely to be connected to practice mines, coupling bases, or activators. Descriptions of these firing devices and components are provided in Attachment A2.

2.4 History of Munitions Response Investigations

The following presents a summary of Fort Ord munitions response-related reports and investigations concerning the site.

1993 Archives Search Report

The purpose of the Archives Search was to identify sites, gather and review historical information to determine the types of munitions used at Fort Ord, identify possible disposal areas, identify unknown training areas and recommend follow-up actions. Guidance for conducting archives searches did not exist prior to 1995. The ASR was completed 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 Archives Search included a Preliminary Assessment/Site Investigation (PA/SI) consisting of interviews with individuals familiar with the sites, visits to previously established sites, reconnaissance of newly identified training areas, and the review of data collected during sampling or removal actions.

MRS-6 (formerly Site OE-6) was identified in the 1993 ASR as a mine and booby trap training area (*USAEDH, 1993*) on the basis of maps from circa 1954. The estimated size was 2 acres and the site was identified as being in the vicinity of FR 067595. As shown on Plate 2, this area is north of the MRS-6 Expansion Area boundary shown on the circa 1954 map as the Mines and Booby Trap Area. The method for determining the MRS-6 site boundary was not discussed in the ASR. A detailed description of the identification and investigation of MRS-6 is presented in the Final Track 1 OE RI/FS (*MACTEC, 2004*). This approval memorandum addresses the area south of MRS-6, which encompasses the area shown of the 1954 map more completely.

1994 Human Factors Applications, Inc. (HFA)

The investigations MRS-6 performed by HFA in 1994 took place in MRS-6 and the MRS-6 Expansion Area. Details of the MRS-6 investigation and contract requirements for the scope of work performed by HFA are provided in the Final Track 1 OE RI/FS (*MACTEC, 2004*). Information pertaining to the MRS-6 Expansion Area to the south is presented below. The scope of work for HFA indicated that detailed accounting of all "OEW items/components/scrap" encountered would be performed. However, grid records providing this information are no longer available. The only information regarding items found is summarized in the text of the HFA Final Report (*HFA, 1994*). The report itemized inert or expended munition debris items found. Some debris (not munitions-related) was removed and turned in at the end of the project.

At the request of the Corps of Engineers, Huntsville Division (CEHND) Safety Specialist, on March 16, 1994, HFA established eight sample grids south of MRS-6 and were designated 1-5 through 1-12 in the HFA Final Report (*HFA, 1994*). Because the area was located near the Patton Elementary School, it was designated by HFA as the Monterey Peninsula Unified School District (MPUSD) Area. These are identified as Grids D2J4B4-01, D215J4-01, D214H4-01, D214G0-01, D215G4-01, D215D4-01, D214F8-01, and D214A8-01 and are shown as pink squares on Plate 4. Three of these grids and portions of two other grids are within the boundary of the MRS-6 Expansion Area. It is assumed that the

sample grids were 100 by 100 feet, as specified by the work plan (*HFA, 1993*). During the sampling program, four inert practice antitank mines and one inert practice antipersonnel mine were found and removed (*HFA, 1994*). The locations and depths at which these items were found were not documented. Because the exact locations of these munitions debris items are not known, the locations of the found items are not illustrated on Plate 4, which shows grid locations. According to Mr. Clinton Huckins (USACE Unexploded Ordnance [UXO] Safety Specialist), these items were inert training aids (*Huckins, 2002*). A summary of sampling operations conducted within the MRS-6 Expansion Area (a.k.a "MPUSD Area") is provided in Table 1. Table 2 provides a summary of munitions debris found during sampling operations.

1997 Archives Search Report

This report updated information contained in the 1993 ASR and included the HFA sampling results.

2004 Site Walk

A site walk was conducted at MRS-6 and the MRS-6 Expansion Area on June 2 and 3, 2004, respectively (Plate 5). The site walk was conducted at the request of the USEPA to provide information to supplement data from sampling efforts conducted previously at this site. To investigate this former mine and booby-trap training area, the team utilized a meandering path method for the site walk. The site walk was conducted by a two-person team that included a military munitions specialist. The team performed a visual inspection of the area and recorded their path walked using a real-time kinematic (RTK) GPS unit. The position of any military munitions-related item found was recorded with the GPS. Munitions debris items (an expended firing device [M1], hand grenade safety lever, and expended blank small arms ammunition) were found within the MRS-6 Expansion Area. The hand grenade safety lever (munitions debris) may have been used in training for booby trapping mines, but the presence of only one lever suggests that the item is probably discarded, or is present as a result of general signaling purposes. The presence of expended blank small arms ammunition (munitions debris) at the site is not unusual, because this type of debris is commonly found throughout the former Fort Ord.

3.0 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 CSM for the MRS-6 Expansion Area is based on currently available site-specific and general information including the Phase I EE/CA (*USACE, 1997*), ASR (*USAEDH, 1993*), Draft Final Literature Review Report (*HLA, 2000a*), review of aerial photographs, training maps, sampling results, field observations, and technical manuals. The CSM was developed to help evaluate the adequacy of the investigation completed to date and to identify potential release and exposure pathways. Plate 6 presents a conceptual site model.

3.1 Training Practices

Training practices are discussed below to provide information on the potential types and distribution of military munitions that may have been used at the site, and the potential areas of concern remaining at the site, if any.

Mine Training

There is no available information about how specific training was performed in this area in the 1950s. According to current field manuals, practice and inert mines or explosive booby trap simulators are used in training personnel in the precautions and proper methods to be observed in the care and handling, arming, booby trapping, and disarming mines (*Army, 1997*). High explosive mines are not normally used in training, except for demonstration purposes. The 1997 training manuals indicate that live mines are

used as part of current training practices, but that live mine training and simulator training will not take place concurrently at the same location in order to preclude a live mine being mistaken for an inert mine (*Army, 1997*). Because of the proximity of the MRS-6 Expansion Area to Highway 1, the City of Marina, and barracks, it is unlikely that high explosive mines were used at this site.

Information concerning emplacement of minefields in Army training manuals serves as a guide as to how the site vicinity may have been used for mine and booby trap training (FM20-32, Chapter 13 and DA PAM 350-38; *Army, 1997*). Current training in mine warfare tasks includes installation and removal of antipersonnel and antitank mines and anti-handling devices. Training also includes installation, recovery, or transfer of a hasty protective minefield as well as emplacement of tactical minefields, and row, standard pattern, and scatterable minefields. Training also includes breach of minefields (including use of explosives) as well as mine awareness training.

Based on practices described in field manuals, it is likely that during training, the trainees would learn to mark mine locations as well as practice mine removal operations. It is also likely that the trainees would practice clearing a path or lane through the minefield by probing, marking, and possibly destroying the mines with explosives or grappling hooks. Based on the proximity of MRS-6 Expansion Area to Highway 1, the City of Marina, and barracks, it is unlikely that the mines would have been destroyed with explosives during training.

Booby Trap Training

No Fort Ord-specific information is available for booby trap training in the 1950s. Information presented below is based on current training manuals (*Army, 1997*) and from personal communication (*Hall, 2003a*).

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

- In and around buildings, installations, and field defenses.

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

When setting booby traps, the commander establishes a control point that serves as a headquarters and material holding area. Each setting party works in a clearly defined area. Entry to these areas is strictly controlled. The locations of booby traps are recorded. The traps are inspected for safety and camouflage before they are armed.

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

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

If the training was in detecting/avoiding booby traps, the booby trap simulators would provide a training environment similar to that provided by the actual firing devices and could thus be used in lieu of the actual firing devices (*Hall, 2003a*). The functioning of these items is discussed in Attachment A2.

Camouflage Training

There is no specific information about what activities were involved in camouflage training at Fort Ord in the 1940s. However, general principals of camouflage described in a War Department Field Manual FM5-20 (*Army, 1944*) are to use concealment and deception to promote offensive action, to surprise, mislead the enemy, and prevent the enemy from inflicting damage. Concealment includes hiding from view, making it hard to see clearly, arranging obstructions to vision, deceiving and disguising. It is expected that as part of camouflage training, troops would practice concealment of equipment or personnel positions using natural materials (vegetation, earth, sand, or gravel) or using artificial materials including shrimp nets, twine nets, chicken wire netting, cloth garnishing, smooth soft steel or iron wire, steel and glass wool garnishing, rope, wood, and steel stakes and posts. It is unlikely that camouflage training would have employed the use of military munitions.

3.2 Site Features

The mines and booby traps could have been set up anywhere in the site vicinity and would likely be buried or camouflaged.

3.3 Potential Sources and Location of MEC

Practice antipersonnel and practice anti-tank mines could still be present at the site. Some practice mines and/or their fuzes contain a pyrotechnic charge or a smoke producing increment. These mines would likely have been buried shallowly. To be conservative and for comparison to other studies, the depth of burial was assumed to be up to 1 foot bgs (below ground surface). The firing devices used for booby traps and booby trap simulators potentially used at the site may have been left or discarded on the ground surface and currently, may be covered by soil. Firing devices do not contain energetic materials unless the coupling base is attached (*Hall, 2003a*).

3.4 Potential Exposure Routes

Potential exposures to MEC, although unlikely, could result from encountering unexpended practice mines and mine fuzes, coupling bases from firing devices, activators, and booby trap simulators. It should be noted that the items found at the MRS-6 Expansion Area and vicinity during sampling and the site walk were all inert or expended.

For each of the MEC items potentially remaining at the site, the following discussions provide information on: (1) how the item was designed to function, (2) the likelihood the item would function if found onsite and handled, and (3) the type of injury the item could cause if it functions. The M80 antitank training mine and corresponding fuze are completely inert by design and used to simulate handling, arming, disarming, etc. of the M19 heavy nonmetallic mine (*Army, 1977a*). Therefore, there is no risk associated with exposure to this item and it is not discussed below. Additional details on these items, including the M80 training mine, are presented in Attachment A2.

Antipersonnel Practice Mines (M8, M8A1) and Fuzes (M10, M10A1). 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, 1994a*). 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 is black powder, it may still be capable of functioning if it dries out after being exposed to moisture.

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.

Antitank Practice Mines (M12, M12A1, M20) and Fuzes (M604). The fuze, mine, antitank, practice (M604) is designed for use in the M12, M12A1, and the M20 antitank practice mines. The fuze 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. A minimum force of 140 to 240 pounds depressed the pressure plate that caused the Belleville spring to snap into reverse, driving the firing pin into the primer. The primer ignites the smoke composition, which flashes emitting a cloud of smoke and creating a noise. The primer contains 1.62 grains of primary explosive and 2.96 grains of black powder, and the smoke composition weighs 262.3 grains or 0.6 ounces (*Army, 1994a*). The mine was designed to be triggered by the weight of a vehicle, and would require more weight than a large person can apply by just stepping on the pressure plate to trigger it. If caused to function, the type of injuries that could be sustained would be a burn injury from the 262.3 grains of smoke composition.

Summary: It is highly unlikely that a person would be able to trigger a fuze through casual (inadvertent or unintentional) contact if one were found at the site and sustain a burn injury, because the fuze: (1) was designed to be triggered by the weight of a vehicle, 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.

Antitank Practice Mines (M1, M1A1) and Fuzes (M1A1, M1A2). The mine, antitank, practice M1 and M1A1 was designated to simulate the M1 and M1A1 HE antitank mines. The M1 series practice mine may be used with the M1A1 or the M1A2 practice mine fuzes or the M1 dummy mine fuze, which is inert. They were used for training in the proper methods and precautions to be observed in the care, handling, laying, boobytrapping, arming and disarming of the M1 and M1A1 antitank mines. The mine is functioned by applying pressure (200 to 500 pounds) to the pressure plate, which causes the fuze to initiate the firing sequence. The mine may also be functioned using the Activator, Antitank Mine: Practice, MI by assembling the activator to a firing device and inserting the assembly in a secondary fuze well in the mine (*Hall, 2005*). The activator operates when the action of a firing device initiates the igniter charge, which in turn, ignites the smoke charge, releasing a puff of white smoke with accompanying noise (*Army 1994a; Navy, 1947*). The mine could be caused to function by incidental contact by applying sufficient force to the pressure plate of the mine. The mine, being antitank by type, requires more weight than a large person can apply by just stepping on the pressure plate. It would normally require a vehicle to generate the necessary pressure to activate the fuze.

Summary: It is highly unlikely that a person would be able to trigger a practice antitank mine through casual (inadvertent or unintentional) contact 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, and (3) these components would have been

exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Booby Trap Firing Devices. The firing devices shown in the table below are all issued with a coupling base firing device consisting of a metal or plastic body and an internal percussion primer (similar to the primer in a small arms cartridge), and are designed to be used to set up booby-traps. They could also be used as a secondary firing device (booby-trap) for most anti-personnel and antitank mines. The firing devices could be set up to fire if a trip wire was pulled, pressure was released as in a weight being removed, or if a line under tension were cut. In each case, triggering the device would cause the spring-loaded firing pin to strike the percussion primer initiating the explosive train. As these items were used in training, no high explosives were used. The percussion primer provided sufficient noise to denote a detonation for training (*Army, 1994b*). It is unlikely that a set up booby trap, which includes one or more of the above firing devices, would remain in operational condition after many years of exposure. These devices are not sealed units. They are designed to be set up in the field quickly to provide temporary area denial or separation of forces. Many booby trap firing devices require trip wires to activate them, which are composed of a thin wire that will not survive long exposure to the elements. The firing devices themselves are not sealed to protect them from exposure to the environment. In the unlikely event that one of these armed devices were made to function, they would likely produce a shock, noise, and flash. They are not likely to cause injury by themselves.

Figure 1. Booby Trap Firing Devices and Related Components

Nomenclature	Type by function	Lbs. Required to function
Firing Device, M1	Pull	3 to 5
Firing Device, M1	Pressure Release	3
Firing Device, M1 and M1A1	Pressure	20
Firing Device, M1	Chemical Delay	6 to 1130 minute delay

Nomenclature	Type by function	Lbs. Required to function
Firing Device, M3	Pull or Release	6 to 10 of Pull & any release of tension
Firing Device M5	Pressure Release	Approx. 5
Coupling Base, Firing Device, M2	Non-metallic	NA
Coupling Base, Firing Device	Metallic	NA
Activator, Antitank Mine, Practice M1	Triggered by firing device	NA

Summary: It is unlikely that a person through casual (inadvertent or unintentional) contact could cause an armed booby trap firing device fitted with a coupling base to function if one were found at the site, and be exposed to the shock, noise, and flash of the coupling base. Booby trap firing devices were designed to be functioned by a thin trip wire or release of pressure that would release a cocked spring loaded firing pin. These small, unsealed, metal parts have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Simulator, Explosive Booby-trap: Flash, M117; Illuminating, M118; Whistling, M119. The booby trap simulators are designed to be used as safe booby traps during maneuvers and in troop training to teach the installation, detection and use of booby traps, and to instill caution in troops exposed to traps set by an enemy. They consist of a cylindrical outer tube (made of Kraft paper), and a flat metal nailing bracket extending from one end of the tube. Located within the outer tube are an initiating charge assembly and an inner tube containing a pyrotechnic charge. Running through the initiating assembly is a length of pull cord. One end of the cord is covered with a friction composition, the other end is coiled and a strip of tape. The M117 simulator has a dimple in the mounting bracket for additional identification at night. Issued with each simulator is a spool of trip wire, an extension spring, three staples, and four nails for booby trap installation. They are nailed against trees with a trip wire attached to the pull cord. It is functioned when a soldier applies pressure to the trip wire, pulling the cord through the ignition

composition assembly, which produces a flash. The flash is transmitted through a flash tube, which ignites the pyrotechnic charge (*Army, 1994c*). It is unlikely that a paper-bodied simulator would survive years of exposure in the field. In the unlikely event that an unfired simulator was discovered and functioned, the type of injuries that would be sustained would be burns and lacerations to the hand from the exploding pyrotechnic charge, if it was being held when it functioned.

Summary: It is unlikely that a person could cause a booby trap simulator to function through casual (inadvertent or unintentional) contact if one were found at the site and be burned or lacerated, because it was made from paper that would have been exposed to moisture, degradation, and weathering for many years, which could decrease its effectiveness.

4.0 SITE EVALUATION

The available data (e.g., archival and reconnaissance data) regarding the MRS-6 Expansion Area were reviewed and evaluated according to procedures described in the *Final Plan for Evaluation of Previous Work* (*HLA, 2000b*). The evaluation process is documented through the completion of a series of checklists. Copies of the checklist are provided as Attachment A1. 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.

4.1 Literature Review

Type of Training and Military Munitions Expected

According to the review of Fort Ord facilities and training maps, the MRS-6 Expansion Area appears on the circa 1954 map labeled as "Mines and Booby Traps." Because the site is identified as "Mines and Booby Traps," it is possible that practice mines, practice or dummy fuzes, firing devices, practice activators, coupling bases, and booby trap simulators may be present at the site. Booby trap simulators can contain pyrotechnic charges. The components of the smoke charges associated with the practice mines contain black powder and/or red phosphorous. The 1945 Training Facilities map identifies the site as a "Camouflage Area." Although there is no information concerning what activities were associated with camouflage training at Fort Ord in the 1940s, it is expected that training would have involved concealing equipment or personnel with natural or artificial materials. It is therefore unlikely that military munitions would have been used during camouflage training. There are no training areas identified in the site on training maps after 1954. There is no historical evidence indicating that the site was used as an impact area at any time.

Subsequent Use of the Area

The site remains undeveloped. The Patton Housing Area, located south of the site, was developed in 1962. No reports of military munitions finds in this area were found during the literature review.

Establishment of Site Boundaries

There is general evidence on the 1956 aerial photograph that the area was in use (based on the presence of roads). However, historical aerial photographs are not helpful in delineating site boundaries as there are no features such as roads or fences that identify it as a training area. The boundary of the MRS-6 Expansion Area is therefore based on the circa 1954 map.

Summary of Literature Review Analysis

Based on the literature review, the area was used for mines and booby trap training in the 1950s. Comparison of a 1954 training map to the ASR boundary shows that the training area is largely coincident with the MRS-6 Expansion Area boundary. Based on the fact that the area was designated as a Mines and Booby Trap training area on a circa 1954 map, there was sufficient evidence to warrant the sampling performed at the site.

4.2 Sampling Review

This section describes the items that were found at the site 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.

Sampling Results (Items Found)

As summarized in Section 2.4, the investigation of the MRS-6 was conducted in 1994 by HFA (*HFA, 1994*), which included grids within the MRS-6 Expansion Area. In the MRS-6 Expansion Area, five inert practice mines were found. During the site walk in 2004, an expended firing device and hand grenade safety lever were found. As indicated in Attachment 2, these military munitions items were produced prior to or during the time period (1950s) that the site was used for training. This supports that these items were present at the site as a result of past training practices. The grenade lever (munitions debris) may be related, but could also be a remnant of general signaling activities. The HFA report did not

document the location or the depths of the munitions debris items found during grid sampling. Accordingly, the locations of these items are not shown on Plate 4 which shows the grid locations. Locations are available for the munitions debris found during the site walk. Table 2 summarizes the items found during HFA sampling and site walk operations.

No MEC were identified during sampling activities

The munitions debris found (inert practice/training mines, firing device) are consistent with what would be expected based on past training practices at the site. Additional information concerning the types of munitions debris found is provided in Attachment 2.

Site Boundaries Review

The initial HFA sampling at MRS-6 occurred outside (north) of the MRS-6 Expansion Area boundary that is delineated on the circa 1954 map. Subsequent sampling by HFA and the site walk performed in the MRS-6 Expansion Area footprint were within the boundary as identified on the circa 1954 map. The five inert practice mines and firing device found in the MRS-6 Expansion Area are consistent with the area being used as a mine and booby trap training area. The Final Track 1 OE RI/FS (*MACTEC, 2004*) also concluded that between MRS-1 and MRS-6 it appears that the site extends further south than the current ASR site boundary (i.e., MRS-6 Expansion Area).

Equipment Review

The Schonstedt Models GA-52/C or GA-72/Cv magnetometers were used by HFA in the 1994 survey and sampling effort. The HFA report does not specify which Schonstedt model was used at the site. The Schonstedt instruments are passive dual flux-gate magnetometers that are highly sensitive magnetic locators that detect ferrous (iron) metal objects; however, they cannot detect non-ferrous metal objects (e.g., lead, brass, copper, and aluminum). Magnetometers make passive measurements of the earth's natural magnetic field; ferrous metal objects and rocks are detected because they produce localized distortions (anomalies) in the magnetic field. The Schonstedt magnetometers actually detect slight

differences in the magnetic field (the "gradient") by means of two sensors mounted a fixed distance apart within the instruments' staff. Because the magnetic response falls off (changes) greatly even over a short distance, a gradient magnetometer like the Schonstedt GA-52/Cx is especially sensitive to smaller, near-surface ferro-metal objects *(Breiner, 1973).*

The performance of the Schonstedt GA-52/C, GA-52Cx, and GA–72/Cv magnetometers was evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; *Parsons 2001*). Studies were performed as part of ODDS to evaluate:

- Signatures of inert military munitions items suspended in air at varying orientations and distances from the geophysical sensor (static tests).
- The ability of various geophysical instruments to detect and discriminate between different military munitions items buried at various depths (seeded tests).
- Geophysical instrument performance at actual munitions response sites (field trial site testing).

The Schonstedt tools were not evaluated during the static tests; therefore, only the seeded test results and the field trial tests are discussed herein. It is recognized that the ODDS study areas may not represent the same field conditions as the MRS-6 Expansion Area; therefore, differences in field conditions, if applicable, should be considered when using information from the ODDS.

For the purposes of evaluating the geophysical instruments used at this site, it is assumed that practice mines, potentially discarded or left at the MRS-6 Expansion Area, would be located at the surface or potentially buried at depths of up to 2 feet below ground surface. Mines were not specifically evaluated as part of the ODDS. However, other non-penetrating items (signal flares and hand grenades [ODDS Type I]) were evaluated as were penetrating items (2.36-inch and 3.5-inch rockets, rifle grenades, and 14.5 mm projectiles [ODDS Type II]). Therefore, the Type I and II seeded test results were used for comparison purposes in evaluating the performance of the geophysical equipment used at this site.

During the seeded tests, the Schonstedt Model GA-52/C located between 56 (search radius of 1.6 foot and lane width of 5 feet) and 59 (search radius of 3.3 feet and lane width of 5 feet) percent of the Type I items buried at depths ranging from just below the ground surface to 1 foot bgs and the Schonstedt Model GA-72/Cv located between 63 (search radius of 1.6 foot and lane width of 5 feet) and 78 (search radius of 3.3 feet and lane width of 5 feet) percent of the Type I items. The detection rate for Type II items for the Schonstedt Model GA-52/C ranged from 44 (search radius of 1.6 foot and lane width of 5 feet) to 49 (search radius of 3.3 feet and lane width of 5 feet) percent and the detection rate for Type II items for the Schonstedt Model GA-72/Cv ranged from 41 (search radius of 1.6 foot and lane width of 5 feet) to 51 (search radius of 3.3 feet and lane width of 5 feet) percent.

Although not evaluated in the ODDS, practice mines that may contain energetic material generally contain a larger amount of ferrous material than the Type II items evaluated in the ODDS. This should result in a detection rate that would equal or exceed the detection rate for the Type II items. The detection rate percentages presented in the ODDS varied according to the search radius, which ranged from 1.6 to 3.3 feet and the search lane width which was 3 to 5 feet wide. A 5-foot wide search lane was used during the munitions response sampling programs at the site. Results for the 3-foot wide search lanes were not included in the detection percentages presented above because 3-foot search lanes were not used during the site investigations. A standard search radius for investigation anomalies was not specified in work plans or reports, therefore, the detection range for the different search radii are presented above. The anomalies were excavated until a metal object was found.

The seeded test detection rates are considered conservative because 1 foot was added to the item's calculated penetration depth to allow for soil deposition over time. Because the field conditions at the seeded test site and orientation of the subsurface item may not be comparable to the MRS-6 Expansion Area conditions, the results should only be used as an indication that the equipment is capable of detecting the same types of items at depths that are the same as used in the seeded tests.

Results of the ODDS Field Trial Sites (FTS) were also reviewed for potential use in evaluating instrument performance at the site. Detection rates were calculated for four of the six test sites; the remaining sites did not have enough munitions debris detected to allow calculation of site statistics. The calculated detection rates for the combined sites ranged from 52 to 96 percent for the Schonstedt Model GA-52/C and 64 to 98 percent for the Schonstedt Model GA-72/Cv, depending on the search radius used for the calculation. As previously discussed, results for the 3-foot wide search lanes were not included in the detection percentages presented above because 3-foot search lanes were not used during the site investigations. The lower detection rates were for a 1.6-foot search radius and the higher detection rates were for a 3.3-foot search radius. It should be noted that the ODDS field trial sites were selected to represent areas with high munitions debris density. In comparison, Track 1 sites, such as the MRS-6 Expansion Area, are expected to have very low densities of munitions debris. Therefore, the field trial results may not be applicable to this site.

Results of the ODDS field trials for the field test site (FTS-3) that was closest in military munitions item density to the MRS-6 Expansion Area were also reviewed. Five military munitions items were located at FTS-3 and no additional items were found during sifting of 10 percent of each grid (final quality control sampling). This indicates that it is unlikely that military munitions items would remain at FTS-3 within the grids sampled. Similar results could be expected at other sites such as the MRS-6 Expansion Area, after grid sampling using the Schonstedt magnetometers.

Although not directly comparable to the MRS-6 Expansion Area, the results of the ODDS indicate that with the exception of plastic training mines, the Schonstedt Models GA-52/C and –72/Cv are capable of detecting the ferrous surface and subsurface MEC if present at this site.

Sampling Methods Discussion

Sampling procedures were not described in the 1994 report documenting the military munitions sampling nor were sampling records provided. The following sampling procedures are those that were provided in the work plan (*HFA, 1993*).

According to the work plan, the center of the site and the outer boundaries of the site were to be located and marked. Eight survey grids were located and marked within the original site boundaries. An additional eight grids were also marked within the MRS-6 Expansion Area and adjacent area (MPUSD area). According to the work plan, the grid dimensions were to be 100 by 100 feet and were to be separated by at least 200 feet. Each grid was to be given a 100 percent visual surface and subsurface survey using a Schonstedt Model GA-52/C magnetometer along a maximum 5-foot wide search lane. Surface items were to be marked and then removed. Subsurface contacts (anomalies) were marked with yellow flags for excavation and identification. Subsurface contacts were uncovered using hand tools (*HFA, 1993* and *1994*). Every identified anomaly was investigated (100 percent sampled). The general approach to investigation of the anomalies was to dig down to metal, remove the metal, and check the excavated area with the Schonstedt. If the Schonstedt indicated that there was no buried ferrous material, no further digging was performed. If the Schonstedt continued to indicate buried ferrous items, the area was excavated to at least 4 feet bgs. As noted above, one live small arms cartridge and six practice mines were found at the site and south of the site. The depths at which these items were found were not documented in the HFA report. Schonstedt tools are not capable of detecting brass small arms cartridges; therefore, it is likely that the cartridge was visually identified by field personnel.

Quality Assurance/Quality Control

The QA/QC procedures used during sampling are described below.

Field Sampling QA/QC

Specific information concerning operational procedures was not documented in the HFA report. The following describes field procedures specified in the work plan. According to the HFA work plan, equipment was to be inspected by the Senior UXO Supervisor (SUXOS) and Quality Control/Site Safety Officer (QC/SS) prior to placing it in service. Magnetometers were to be inspected and tested daily on a buried piece of ordnance (test source) to ensure that the magnetometers were operating within specification. The buried test source (inert ordnance item) was to be magnetically similar to a 2.36-inch rocket and buried at a depth of 3 feet, which was shallower than the maximum depth of clearance (4 feet) for their work order. Information in the final HFA report indicated that a solid steel 81mm mortar, buried at 4 feet bgs was used as the test source. The magnetometers were to be tested before starting OE operations in the morning and when operations resumed after lunch. Magnetometers that failed the inspection and test were determined to be in need of repair and were to be removed immediately from service. Random checks were to be performed by the QC/SS and/or the SUXOS during daily operations. The QC/SS was to inspect all records bi-weekly to ensure that they were kept and maintained. After surface and subsurface clearance of each site and prior to removal of grid markers, the QC/SS was to perform the standard minimum 10 percent QC check. If MEC-related items were detected during the QC check, the grid was searched again to ensure that there were no other MEC-related items present. No QA records for this sampling effort are available. All grids were to be left in place until the CEHND Safety Specialist completed his Quality Assurance (QA). QC reports that included descriptions and results of the QC checks were to be completed daily.

QA/QC performed throughout the field sampling is documented in the final report (*HFA, 1994*). According to the report, the project was completed without QC discrepancy. It was not possible to perform a check of the reported results and field grid sampling documentation because they were not available.

Data Management QA/QC

Parsons, the current munitions response contractor, performed a 100 percent QC review of the data associated with the site. This review followed guidelines presented in the Standard Operating Procedures provided as Appendix A of this document. This evaluation included a review of field grid records (if available) and the database created by the munitions response contractor. The USACE followed the QC review with a 10 percent QA of the Parsons' data review. The requirements of the QA review are described in the SOP provided in the Final Track 1 OE RI/FS Report (*MACTEC, 2004*). The purpose of the data review was to complete a 100 percent check of all available grid records to identify discrepancies between the reports documenting field activities and the grid records. Discrepancies were then researched and corrections made, if appropriate, prior to loading the data into the project database.

Data Quality Conclusions

For the MRS-6 Expansion Area, the following conclusions can be made regarding the quality of the data:

- Data collected by HFA indicate that six of eight MPUSD grids fell wholly or partially within the area that was identified on the 1954 Training map as the Mines and Booby Trap training area (i.e., the Expansion Area)

- The data collected by HFA were useful in providing information concerning the type of munitions debris present at the site

- Coordinate data were not collected by HFA for locations of found items

- Information concerning depth of found items was not collected by HFA

- The instruments used for sampling cannot be used to find non-metallic practice mines.

- The data collected and observations made during the site walk at the MRS-6 Expansion Area are useful because only an expended firing device (munitions debris) was found, further supporting the

conclusion that the MRS-6 Expansion Area was used for practice mine and booby-trap training and no further munitions response-related investigation is necessary.

4.3 Site Walk Review

As discussed in Section 2.4, the site walk was conducted in June 2004 by a two-person team that included a military munitions specialist (Plate 5). The team performed a visual inspection of the area and recorded their path walked using a real-time kinematic (RTK) GPS unit. The site walk was conducted to provide supplemental information regarding signs of training or the potential presence of munitions-related items. Munitions debris items (an expended firing device [M1], hand grenade safety lever, and expended blank small arms ammunition) were found within the MRS-6 Expansion Area.

5.0 CONCLUSIONS AND RECOMMENDATIONS

This section presents conclusions and recommendations for the MRS-6 Expansion Area that are based on review of historical information, and sampling and site walk data collected from the site.

5.1 Conclusions

Site Use and Development

- Based on the literature review and site sampling results, the site appears to have been used for mine and booby trap training. The site is currently unoccupied but is adjacent to residential housing.

- The following MEC items, if present at the site, are considered to pose an acceptable risk if encountered, for the following reasons:

Antipersonnel Practice Mines (M8, M8A1) and Fuzes (M10, M10A1). It is unlikely that a person would be able to trigger the practice antipersonnel mine through casual 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.

Antitank Practice Mines (M12, M12A1, M20) and Fuzes (M604). It is highly unlikely that a person would be able to trigger a fuze through casual contact if one were found at the site and sustain a burn injury, because the fuze: (1) was designed to be triggered by the weight of a vehicle, 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.

Antitank Practice Mines (M1, M1A1) and Fuzes (M1A1, M1A2). It is highly unlikely that a person would be able to trigger a practice antitank mine through casual contact if one were found at the site and be exposed to smoke and noise, because the mine: (1) would have to contain a live fuze and active

detonator, (2) was designed to be triggered by the weight of a vehicle, and (3) these components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Booby Trap Firing Devices. It is unlikely that a person through casual contact could cause an armed booby trap firing device fitted with a coupling base to function if one were found at the site, and be exposed to the shock, noise, and flash of the coupling base. Booby trap firing devices were designed to be functioned by a thin trip wire or release of pressure that would release a cocked spring loaded firing pin. These small, unsealed metal parts have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

Simulator, Explosive Booby-trap: Flash, M117; Illuminating, M118; Whistling, M119. It is unlikely that a person could cause a booby trap simulator to function through casual contact if one were found at the site and be burned or lacerated, because it was made from paper that would have been exposed to moisture, degradation, and weathering for many years, which could decrease its effectiveness.

Sampling Adequacy and Data Quality

- Schonstedt GA-52/C and GA-72/Cv magnetometers were used by HFA during previous investigations. These instruments were evaluated as part of the ODDS and with the exception of non-metallic mines and small arms ammunition, these instruments are capable of detecting the type of MEC items expected at this site

- The presence of five inert practice mines and an expended firing device found in the MRS-6 Expansion Area is consistent with the conclusion that the practice mine and booby trap area extended further south than the MRS-6 site boundaries.

- The area identified on the 1954 training map as the Mines and Booby Trap training area is coincident with the MRS-6 Expansion Area boundary. At the direction of the CEHND Safety Specialist, this area (designated as the MPUSDA) was sampled by HFA.

- The sampling data was useful in providing information concerning the type of munitions debris present at the MRS-6 Expansion Area. However, coordinate and depth data were not collected for the locations of found munitions debris, and the instruments used for sampling cannot be used to find non-metallic practice mines.

- Although the previous MEC sampling efforts performed at the MRS-6 Expansion Area 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 confirm the types of military munitions items used at the site. Additionally, because the military munitions items used at the MRS-6 Expansion Area are considered to pose an acceptable risk (see Section 3.4), and only munitions debris (i.e., no MEC) was found in previous investigations at the MRS-6 Expansion Area, additional MEC sampling at the site would not add significantly to the understanding of the site or change the conclusions of this report.

- The data collected and observations made during the site walk at the MRS-6 Expansion Area are useful because only an expended firing device (munitions debris) was found, further supporting the conclusion that the MRS-6 Expansion Area was used for practice mine and booby-trap training and no further munitions response-related investigation is necessary.

5.2 Recommendations

Based on review of existing information, MEC is not expected to be found at the MRS-6 Expansion Area, and No Further Action Related to MEC is required for this site. The MRS-6 Expansion Area meets the Track 1, Category 3 criteria because historical research and field investigations identified evidence of past training involving military munitions, and training at this site 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 and antipersonnel mines and fuzes; and booby trap firing devices and simulators. In the unlikely event that a MEC item is found of the type previously observed at the site at the MRS-6 Expansion Area, 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 at the MRS-6 Expansion Area 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.

The U.S. Army Corps of Engineers completed munitions response investigations at the MRS-6 Expansion Area. The Army, with regulatory oversight from the U.S. Environmental Protection Agency (USEPA) and the California Department of Toxic Substance Control (DTSC), conducted a systematic investigation and no explosive material was found. The investigation was specifically designed to assess the nature of the past military training activities at the site.

For the MRS-6 Expansion Area, digging or underground "intrusive" activities are planned for the proposed site reuse and development. No actionable risk was identified through the remedial investigation process. However, in the interest of safety, reasonable and prudent precautions should be taken when conducting intrusive operations at this site. As a basewide effort to promote safety and because of Fort Ord's history as a military base, the Army provides "ordnance recognition and safety training" to anyone who requests that training. Construction personnel involved in intrusive operations at the former Fort Ord may attend the Army's "ordnance recognition and safety training" to increase their awareness of and ability to identify MEC items. Section 1.3.1 (Description of the Remedy) of the Track 1 ROD (*Army, 2005a*) describes the scope of the safety training. Trained construction personnel will contact an appropriate local law enforcement agency if a potential MEC item is encountered. The local law enforcement agency will arrange a response by the Army.

For the MRS-6 Expansion Area, the Army recommends construction personnel involved in intrusive operations at this site attend the Army's "ordnance recognition and safety training." To accomplish that objective, the Army will request notice from the future landowner of planned intrusive activities, and in turn will provide ordnance recognition and safety training to construction personnel prior to the start of intrusive work. The Army will provide ordnance recognition and safety refresher training as appropriate. The Army will amend the Munitions Response Site Security Program to include the implementation procedures for offering and providing ordnance recognition and safety training for specific munitions response sites (MRS), including the MRS-6 Expansion Area, with this recommendation. The Site Security Program will be updated to include the procedures for: (1) requesting the notice; (2) providing the training and refresher training and monitoring the success of the outreach effort; (3) documenting and reporting incidental finds; (4) documenting and reporting on the training activities, and summarizing the success (or effectiveness) of the outreach effort as part of the Site Security Program's annual update.

Because ordnance recognition and safety training is recommended for the MRS-6 Expansion Area, at the time of the next five-year review (2007), the Army, in accordance with the Track 1 ROD (*Army, 2005a*), will assess whether the education program should continue. If information indicates that no MEC items have been found in the course of development or redevelopment of the site, it is expected that the education program may, with the concurrence of the regulatory agencies, be discontinued, subject to reinstatement if a MEC item is encountered in the future.

In the future, should any military munitions-related item be found within the MRS-6 Expansion Area, the Army will take an appropriate immediate action (i.e., removing the found item, recording the incident), and within 90 days of the discovery, submit a plan for appropriate follow-on action to EPA and DTSC for consultation, pursuant to Section 7.7(b) of the Fort Ord Federal Facility Agreement (FFA).

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