

GROUP 5

Parcel E20c.1.1.1

## CONTENTS

6.0	Group 5 - PARCEL E20c.1.1.1 .....	6-1
6.1	Site Description.....	6-1
6.2	Site History and Development .....	6-1
6.3	Potential Military Munitions Based on Historical Use of the Area .....	6-3
6.4	History of Munitions Response Investigations .....	6-5
6.5	Conceptual Site Model.....	6-5
	6.5.1 Training Practices .....	6-6
	6.5.2 Site Features.....	6-7
	6.5.3 Potential Sources and Location of MEC.....	6-7
	6.5.4 Potential Exposure Routes .....	6-7
6.6	Site Evaluation .....	6-10
	6.6.1 Literature Review .....	6-10
	6.6.2 Reconnaissance Review.....	6-11
6.7	Conclusions and Recommendations .....	6-12
	6.7.1 Conclusions.....	6-12
	6.7.2 Recommendations.....	6-13
6.8	References.....	6-14

## TABLES

G5-1 Military Munitions Found During USACE Site Walk, Parcel E20c.1.1.1

## PLATES

G5-1 Location Map – Group 5 Parcel E20C.1.1.1  
G5-2 Group 5 Parcel E20C.1.1.1; 1941 Aerial Photograph  
G5-3 Group 5 Parcel E20C.1.1.1; 1951 Aerial Photograph  
G5-4 Group 5 Parcel E20C.1.1.1; 1999 Aerial Photograph  
G5-5 Conceptual Site Model, RSOP  
G5-6 Conceptual Site Model, Group 5 Parcel E20C.1.1.1

## ATTACHMENTS

G5-1 Evaluation of Previous Work Checklists

## 6.0 GROUP 5 - PARCEL E20c.1.1.1

Information supporting the determination of Parcel E20c.1.1.1 as a Track 1 Plug-In site is presented in this Approval Memorandum, which consists of two main parts. The first part, contained in Sections 6.1 through 6.4, 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 6.6). 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 in previous sections. The Site Evaluation discusses the evaluation of the literature review process (Section 6.6.1), and evaluation of the reconnaissance review (Section 6.6.2). These discussions are based upon information from standardized literature review and sampling review checklists (Attachment G5-1). Section 6.7 provides conclusions and recommendations for the site. References are provided in Section 6.8.

### 6.1 Site Description

Parcel E20c.1.1.1 comprises approximately 81 undeveloped acres and is located in the west-central portion of the former Fort Ord, south of the Main Garrison and just north of the Impact Area (Plate G5-1). Munitions response site (MRS)-24A lies immediately adjacent to Parcel E20c.1.1.1 within Parcel E20c.1 to the east (Plate G5-2). MRS-24A was identified through a review of a 1945 Fort Ord historical map as part of the Fort Ord Archives Search (*USAEDH, 1997*).

### 6.2 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.

#### *Pre-1940s Era*

This parcel lies within a tract of land purchased from private landowners by the government in 1917 (*Arthur D. Little, Inc. [ADL], 1994*). Documentation of the pre-1940s era use of this area by the Army for training is limited to 1918 and 1933 topographic maps of the area (*Department of the Interior [DOI], 1918, U.S. Army [Army], 1933-34*). No identifiable features or text were associated with this area on the maps. Eucalyptus Road, which currently borders the southern edge of the parcel, is shown on the 1933 topographic map and is close to its present location.

#### *1940s Era*

Review of 1940s documentation and aerial photographs indicates that a practice rifle grenade range (MRS-24A) was present immediately east adjacent to Parcel E20c.1.1.1 in 1940s. More specific information is provided below:

- Aerial photographs from 1941 (Plate G5-2) show a cleared area immediately adjacent to Parcel E20c.1.1.1, in the approximate location of MRS-24A. Four rectangular features, possibly targets, are visible within the cleared area. Training maps from 1945 and 1946 identify MRS-24A as “Practice Rifle Grenade” (*Army, 1945*). No identifiable structures are visible within Parcel E20c.1.1.1 in the aerial photo.
- A live hand grenade training area (MRS-24C) is identified approximately 600 feet to the northeast of Parcel E20c.1.1.1. The Impact Area is located to the south of the parcel. Eucalyptus Road separates Parcel E20c.1.1.1 from the Impact Area. Firing within the Impact Area ranges was directed toward the south and away from the parcel.
- Aerial photographs from 1949 and 1951 show that the majority of the parcel is heavily vegetated. A disturbed/cleared area, which is in the approximate location of MRS-24A, is present immediately adjacent to the parcel (Plate G5-3).

### *1950s Era*

Review of 1950s-era documentation including training maps, aerial photographs, and grading plans indicated that use of the practice rifle grenade training area and nearby training area (MRS-24C) ended sometime prior to 1954 and that the adjacent area to the north was developed as base housing by 1959 (Fitch Park). The following summarizes the results of the 1950s historical map and aerial photograph review:

- Aerial photographs from 1951 indicate that electrical transmission lines and a dirt road are present on the west side of Parcel E20c.1.1.1. The transmission lines and road run north-south, roughly parallel to present day General Jim Moore Boulevard.
- The practice rifle grenade training area (MRS-24A), as well as other nearby training areas (MRS-24B, MRS-24C, MRS-24D, and MRS-24E), are not shown on the circa 1954 map or on maps dated after 1954 (*Army, 1954; 1956; 1957; and 1958*).
- The 1956 training facilities map shows this general area including Parcel E20c.1.1.1 as being assigned to “DIV ARTY” or Division Artillery.
- A Reconnaissance, Selection, and Occupation of Position (RSOP) area is shown on a 1956 Fort Ord Training Facilities map (*Army, 1956*). This area includes the northeastern portion of Parcel E20c.1.1.1 (Plate G5-3). Army field manuals describe RSOP as an activity to assess and prepare for movement of platoon-based or battery-based field artillery. This RSOP training area is not considered a location where ordnance firing would be undertaken.
- Grading plans for the Fitch Park housing area (originally called the East Officer’s Housing Area) dated 1957 are available for the site area (*USACE, 1959*). The grading plans are as-built revisions dated 1959 and show the plans for the development of the housing area bordering Parcel E20c.1.1.1 on the north side.
- Review of 1950s aerial photographs identified two small buildings near Eucalyptus Road, in the MRS-24A vicinity. The buildings are believed to be field latrines or storage buildings.
- A 1959 aerial photograph shows the completed Fitch Park housing area (East Officer’s Housing Area; *USACE, 1960*). The disturbed areas identified on older aerial photographs appear to be covered by

housing or graded over. The cleared area that was the practice rifle grenade area and the RSOP area is still visible.

### *1960s era to Present*

The Fitch Park housing area, completed in 1959, was occupied from the 1960s to present. The closest training areas in the 1960s appears to be the Impact Area on the south side of Eucalyptus Road.

- A target detection area is shown on a 1961 Training Facilities map. Target detection was associated with land navigation and map reading (*MACTEC, 2004*).
- No training sites are present in this area on training maps from 1964 through 1988.
- Fitch Park housing area exists in the former locations of MRS-24B through E.
- Electrical transmission lines were installed by Pacific Gas & Electric in 1965. The lines run through the very southern portion of Parcel E20c.1.1.1, roughly parallel to Eucalyptus Road. The easement contains no restrictions on excavation. No information is known about any encounters with military munitions during construction activities, and the Army does not have any records of any reports of the finding of munitions and explosives of concern (MEC) or munitions debris (MD) during routine maintenance activities associated with the electrical transmission lines.
- A 1966 aerial photograph shows the grading operations for the construction of an aboveground water storage reservoir on the west side of Parcel E20c.1.1.1. The reservoir and immediately surrounding property was transferred in 1997. The reservoir construction also included the installation of pipelines to transport the water to the golf courses located on the west side of General Jim Moore Boulevard. No information is available on whether military munitions were found during construction activities. The Army has no reports to indicate that military munitions were discovered along the pipeline or in the area of the reservoir during routine maintenance activities.
- In 1994, the Monterey Peninsula Water Management District installed two observation wells within Parcel E20c.1.1.1, adjacent to Eucalyptus Road. No discoveries of munitions-related items were reported during construction of the wells.

### *Proposed Future Land Use*

This parcel is currently undeveloped. The proposed future land use includes residential development.

## 6.3 Potential Military Munitions Based on Historical Use of the Area

Training activities identified on Fort Ord training facilities maps indicate that a portion of Parcel E20c.1.1.1 was used for RSOP training and target detection. Information gathered during the literature review and site investigation activities (site walk) indicate that training with practice rifle grenades occurred east of the parcel in the vicinity of MRS-24A (*USAEDH, 1997*). Based on these types of training activities, potential military munitions that could be found near or within the parcel include 1940s era rifle-fired practice grenades, and possibly rifle-fired smoke grenades, illumination signals, and practice antipersonnel mines. Munitions debris found during site walk within the parcel include inert practice rifle grenades, ten expended 3.5-inch practice rockets buried in a disposal pit at a depth of 24 inches, an expended 3.5-inch practice rocket motor, a mortar tail fin assembly (M2), an expended illumination signal (M21A1) and fragments from unknown and light case munitions,. The term light case munitions is used to differentiate fragmenting munitions from non-fragmenting munitions. Light case

munitions include such things as pyrotechnic signals and flares and other non-fragmenting munitions. No MEC was found during the site walk. With the exception of the practice rifle grenades and the buried 3.5-inch practice rockets, these were single items suggesting that the items are not present as a result of training activities within Parcel E20c.1.1.1. The presence of established mortar and rocket ranges in the Impact Area since the 1940s supports this assumption. The illumination signal may be associated with RSOP training, target detection, or may have been discarded at this location. The MD items found within the parcel are presented on Plate G5-4. General descriptions of rifle-fired practice and smoke-producing grenades, illumination signals, and practice antipersonnel mines, which may be related to training at or near Parcel E20c.1.1.1, are provided below.

### *Practice Rifle Grenades*

Rifle grenades are designed to be fired from U.S. rifles and carbines by a launcher that is attached to the gun muzzle. A special blank cartridge, issued with the grenade, is required to complete the launching. The M11A2 antitank practice rifle grenade was available for use during the 1940s and 1950s. The M11A2 was designed for training in marksmanship. This item was an inert loaded dummy rifle grenade similar in shape and weight to the high explosive antitank (HEAT M9A1) rifle grenade. No explosive charge was associated with this training item. The M11A2 differed from the M9A1 in that the fins could be replaced on the M11A2 if they were damaged or wore out.

### *Rifle Grenades, Smoke*

Rifle-fired smoke grenades were designed to be fired from a grenade launcher or a rifle fitted with a launcher for signaling or laying smokescreens by ground units. The models that were available for use in the 1940s, and early 1950s, include the M19, M20, M22, and M23 Series and T6E1 smoke grenades. It is not known whether training with smoke-producing rifle grenades occurred at MRS-24A, and no smoke-producing rifle grenades have been found within Parcel E20c.1.1.1 or MRS-24A to the east.

### *Practice Mines*

It is possible that practice antipersonnel mines were used as part of RSOP training. According to Field Manual 44-43, after occupying the position, the platoon must provide continuous local security (*Army, 1995*). The security can include the deployment of a hasty protective minefield. A hasty protective minefield supplements weapons, prevents surprise, can disrupt an enemy attack, and gives early warning of enemy advance (*Army, 1996*). The minefield would typically be deployed across likely avenues of approach, within range of and covered by organic weapons. The mines can be buried if time permits to increase effectiveness, but can also be laid on top of the ground in a random pattern. When the platoon leaves the area the mines are to be removed (unless forced to withdraw by the enemy), so it is expected that during training exercises removal of practice mines would have occurred. Only metallic mines are used in hasty protective minefields. Booby traps are not used in hasty protective minefields, because they delay removal of the mines (*Army, 1996*). No practice mines have been found within Parcel E20c.1.1.1 or adjacent MRS-24A.

### *Illumination Signals*

A single expended illumination signal was found within Parcel E20c.1.1.1. The illumination signal found was an expended M21A1, which is obsolete. Illumination signals may have been used at the RSOP area, the practice rifle grenade range (MRS-24A) or during other training activities that occurred within the parcel or in adjacent areas. Some models of illumination signals (including the M21A1) utilize a parachute system to slow the descent of the illuminant assembly. This could result in that portion of the signal traveling several hundred feet away from the location where it was launched.

## 6.4 History of Munitions Response Investigations

The following presents a summary of Fort Ord munitions response-related reports and investigations conducted at Parcel E20c.1.1.1.

### *1997 Revised Archives Search Report (ASR)*

The purpose of the archives search conducted at 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. The archives search was conducted in accordance with U.S. Army Corps of Engineers guidance (*USACE, 1995*). 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. Requirements for preparation of an archives search are described in Section 2.4 of the Final Track 1 OE RI/FS (*MACTEC, 2004*).

The RSOP and Target Detection areas are shown on maps contained in the ASR, but these areas were not identified as areas requiring investigation at that time.

### *2003 Site Walk*

Between February 24 and March 5, 2003, the USACE conducted an investigation (site walk) within Parcel E20c.1.1.1, and adjacent Parcels E20c.1 and E20c.1.3 (First Tee site study area). The investigation included MRS-24A. The investigation was performed by a USACE UXO Safety Specialist with the support of a UXO technician and a global positioning system (GPS) operator (*USACE, 2003*). The investigation included walking on roads, trails, and accessible areas within the parcel using a hand-held Schonstedt GA-52/Cx magnetometer to search for anomalies. The path investigated was recorded using the GPS unit. The investigation was conducted in accordance with Engineering Manual (EM) 1110-1-4009, which defines surface and subsurface investigation procedures (*USACE, 2000*). The area evaluated included roads, trails, and open space (Plate G5-3). No vegetation was cut during this evaluation. The path walked and the location of any military munitions found was recorded using the GPS. No MEC was found within Parcel E20c.1.1.1. Munitions debris found included seven inert practice antitank rifle grenades, ten expended 3.5-inch practice rockets buried at a depth of 24 inches, an expended 3.5-inch rocket motor, an expended illumination signal (M21A1), a mortar tail fin assembly (M2), and fragments from unknown and light case munitions (Table G5-1).

### *Fuel Break Clearance*

In 2002, a fuel break was cut along the northern boundary of Parcel E20c.1.1.1 and adjacent parcel E20c.1 (Fitch Park Vegetation Clearance). The fuel break was approximately 150 feet wide and extended around the perimeter of the Fitch Park housing area (Plate G5-4). Approximately 23 acres of vegetation was removed. For safety purposes, as the fuel break was being cut, a UXO technician walked ahead of the vegetation removal equipment performing a visual search of the ground surface for MEC. No MEC was found during the fuel break clearance. The safety support was used primarily because the fuel break associated with adjacent Parcel E20c.1 included a portion of the footprint of the live hand grenade training area (MRS-24C) as depicted on a Fort Ord historical training map (*Army, 1945*).

## 6.5 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 developed for Group 5 Parcel E20c.1.1.1 are based on currently available site-specific and general information including the ASR (*USAEDH, 1993*), Phase I EE/CA (*USAESCH, 1997*), 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. Plates G5-5 and G5-6 present the conceptual site models.

### 6.5.1 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.

#### *Practice Rifle Grenade Training*

Range configuration information for practice rifle grenade training was obtained from *Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat (Army, 1983)*. Descriptions for recent training rifle grenades was obtained from TM 43-0001-29 (*Army, 1977c*) and information on World War II grenade launchers and information on the available World War II ordnance was obtained from *The American Arsenal (Hogg, 2001)*. According to the policies and procedures, live rifle grenades are fired behind a protective barrier equivalent to a screen of sandbags 0.5 meter thick or reinforced concrete walls 0.16 meter thick (*Army, 1983*). It is suspected that this would be simulated in the practice training area. The maximum range of the practice rifle grenade M29 (version found in TM 43-0001-29) is 150 meters, therefore it is expected that the training area used would be at least 150 meters in length. According to information in *The American Arsenal*, the depth to which the launcher is inserted into the stabilizer tube determines the range attained by the fired grenade. Therefore, it is expected that targets would be placed at various distances to practice firing at different ranges. Because the practice rifle grenade is inert (cast iron body with stabilizer fin), no MEC associated with practice rifle grenade training would be expected.

#### *Rifle Grenades, Smoke*

General information on the use of rifle fired smoke grenades and smoke signals was obtained from *FM 21-60, Chapter 4, Pyrotechnics (Army, 1987)* and *TM 43-0001-37, Chapter 4, Signals (Army, 1977a)*. Rifle-fired smoke grenades (pyrotechnics) available in the 1940s and 1950s were used by the military for a variety of purposes including visual signals (communication) and smokescreens. Pyrotechnics produce either smoke or light and are consumed in the process. When used for communication, prearranged signals are developed based on the color and characteristics of the pyrotechnic device used. This allows personnel in the field to rapidly transmit prearranged messages over short distances (*Army, 1987*).

#### *RSOP Training*

General information on RSOP training was obtained from *Field Manual 6-20-1 Tactics, Techniques, and Procedures for the Field Artillery Cannon Battalion (Army, 1990)*, and *Bradley Stinger Fighting Vehicle Platoon and Squad Operations (Army, 1995)*. Reconnaissance, Selection and Occupation of Position ensures the rapid and orderly movement to and occupation of a firing position. Reconnaissance is the



examination of the terrain to determine its suitability for use in accomplishing the mission. The position selected is based upon the best available fields of fire, communications, accessibility, and survivability and must be defensible against ground attack. Upon occupying the position, the platoon must provide continuous local security. Obstacles such as a hasty protective minefield can be used to block, disrupt, or canalize (e.g., direct into a preferred area) enemy attacks (*Army, 1995*).

### 6.5.2 Site Features

This section describes the physical characteristics of the site (Parcel E20c.1.1.1), potential sources of MEC, and potential exposure routes and effects of encountering MEC.

Parcel E20c.1.1.1 lies in the west-central portion of the former Fort Ord, between military housing and the former Impact Area. The parcel is undeveloped and moderately to heavily vegetated with maritime chaparral, coastal scrub and oak woodland. The terrain is generally flat to gently sloping. Manmade features present on the parcels include electrical transmission lines and a large above ground water storage reservoir. Aerial photographs from the 1940s (Plate G5-2) and 1950s indicate that a cleared area was present during this time period immediately adjacent to Parcel E20c.1.1.1 in the vicinity of MRS-24A. Four to five rectangular features (possibly targets) are visible at the western end of the cleared area on the 1941 aerial photograph (Plate G5-2). No structures or other manmade features are visible in the 1941 photograph. The 1951 aerial photograph (Plate G5-3) indicates that the parcel is crisscrossed by several trails and roads, some of which lead to small disturbed or cleared areas. The MRS-24A area appears to have been graded and enlarged during this time. Two structures were present on the edge of the clearing along Eucalyptus Road. This area may have been a concurrent training area that supported the adjacent range located on the south side of Eucalyptus Road.

### 6.5.3 Potential Sources and Location of MEC

Based on the review of site data, the types of military munitions that might be expected within Parcel E20c.1.1.1 include practice and smoke-producing rifle grenades, illumination signals, and practice antipersonnel mines. These items by design are non-penetrating and would be expected to be present at or near the ground surface. No rifle-fired smoke grenades or practice antipersonnel mines have been found within Parcel E20c.1.1.1 or within adjacent MRS-24A. One expended illumination signal was found within the parcel, but no MEC illumination signals have been found. Practice rifle grenades are not included in this discussion because they are inert items and do not pose a risk. Military munitions associated with training activities identified within the parcel are described in Section 6.5.4.

### 6.5.4 Potential Exposure Routes

Parcel E20c.1.1.1 lies adjacent to the Fitch Park housing area. The parcel is covered with thick vegetation, but is accessible to the public. A site walk has been performed and MEC is not expected in this area. Because this area was used for training, there is a possibility for some military munitions items to be present within the parcel, and a possibility exists that MEC items may be uncovered during future development activities. Potential exposures to MEC, although not expected, could result from encountering rifle-fired smoke grenades, illumination signals, and practice antipersonnel mines and mine fuzes. These items are non-penetrating by design and would be expected to be present at or near the ground surface.

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 functioned.

**Grenade, Rifle, Smoke, Colored: M22 and M22A2.** The grenade, rifle, smoke M22 and M22A2 (green, red, violet, and yellow) was designed for signaling and laying smoke screens. The M22 and M22A2 consist of three basic parts: a steel stabilizer assembly, an integral fuze and a body. The fuze is a mechanical impact-igniting type. The body is filled with a burning-type smoke charge that contains a dye to color the smoke. The surfaces of the smoke charge within the body are coated with a starter mixture charge to facilitate ignition. A nose-closing plug covers a small opening or air hole in the nose of the ogive. After being fired from a rifle equipped with a grenade launcher, it was functioned by impact with the ground or other hard target, causing the firing pin to strike the primer (like a small arms primer), which ignites the starter mixture charge, and in-turn starts the smoke charge to burn. The smoke charge, consisting of baking soda, potassium perchlorate, sugar, and dye, burns for approximately 60 seconds (*Army, 1994; Navy, 1947*). These would be very difficult to cause to function by incidental contact. They would have to be thrown against a hard surface, hard enough for the firing pin to overcome the anti-creep spring and strike the primer. If caused to function, the type of injuries that could be sustained would be burns from the burning smoke charge.

**Summary:** It is unlikely that a person could cause a M22 or M22A2 smoke grenade to function through casual contact (inadvertent or unintentional) and be burned if one were found at the site, because the grenade: (1) was designed to be functioned by a hard nose-on impact with the ground or other hard target, 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.

**Grenade, Rifle, Smoke, Colored, Streamer: M23 and M23A1.** The grenade, rifle, smoke, streamer M23 and M23A1 (green, red, violet, and yellow) was designed for signaling with colored streamers. The M23 and M23A1 are almost identical to the M22 and M22A2 described above. The M23 series contain approximately 6.4 ounces of smoke composition. Upon being fired from the rifle, the gas from the grenade cartridge passes from the rifle through orifices in the fuze to ignite the ignition charge in the fuze. The ignition charge in-turn ignites the mixture charge, and the mixture charge then ignites the smoke charge. The smoke charge begins to burn, and during flight, air passing through the air hole in the nose of the grenade forces smoke out the holes in the base of the grenade producing streamers of colored smoke. The smoke charge burns for approximately 12 seconds (*Army, 1994*). There are no moving parts in the fuze that would be subject to mechanical forces to ignite. Because the ignition charge requires flash from the rifle bore to ignite, the M23 and M23A1 would be difficult to cause to function by incidental contact. The rifle grenade would have to be placed in a fire to receive the heat/flash necessary to start the ignition process.

**Summary:** It is unlikely that a person could cause a M23 or M23A1 smoke grenade to function through casual contact (inadvertent or unintentional) and be burned if one were found at the site, because: (1) there are no moving parts in the fuze that could cause it to ignite if handled, (2) the grenade would have to be placed in a fire to receive the heat/flash necessary to start the ignition process, and (3) the ignition components would have been exposed to moisture, degradation, and weathering for many years, which could decrease their effectiveness.

**Signals, Illumination, Ground, Clusters: Green Star, M125A1; Red Star, M158; White Star, M159.** These signals were designed for daytime and nighttime signaling. Star cluster signals consist of 5-star illuminant assemblies and a rocket motor propulsion assembly combined in a hand-held aluminum launching tube. The base of the launching tube contains a primer and an initiating charge. As shipped, the firing pin cap is assembled to the forward end and must be reversed for firing. Stabilizing fins on the tail assembly of the rocket are folded parallel to the axis of the signal. A bolt, which also transfers the initiating charge flash to the propellant, extends into the center of the solid propellant, which fills the propulsion assembly. The illuminant assembly is mounted on top of the propulsion assembly with a delay assembly and an expelling charge between. It was functioned by striking the primer with the firing pin,

which ignites the initiating charge to ignite the rocket propellant. As the rocket emerges from the tube, the fins unfold for flight stability. Before rocket motor burnout, at 200 feet, the black powder expelling charge is ignited performing a two-fold purpose of expelling and igniting the 5-star illuminant assemblies. Burn time is 6 to 10 seconds with burnout occurring at 250 to 300 feet above the ground (*Army, 1977b*). It is unlikely that incidental contact could cause a signal to function because the cap must be removed, placed over the base, and struck sharply. If caused to function, the type of injury that could be sustained would be burns from the initiating charge and possibly the rocket motor.

**Summary:** It is unlikely that a person could cause a M125A1, M158, or M159 ground 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 hard blow to function, and (2) would have been exposed to moisture, degradation, and weathering for 25 or more years, which could decrease the effectiveness of the components that cause it to function.

**Signals, Illumination, Ground, M17A1 through M22A1.** These signals were designed to be fired from a rifle or carbine fitted with a launcher for signaling ground units. They produce either a parachute-suspended colored star (M17A1, M19A1, and M21A1 [obsolete]) or a cluster of free falling colored stars (M18A1, M20A1, and M22A1 [obsolete]). Parachute-suspended signals burn 20 to 30 seconds. Free falling clusters burn 4 to 10 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.

**Summary:** It is unlikely that a person could cause a rifle-fired M17A1 through M22A1 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.

**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, 1977a*). 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 contact (inadvertent or unintentional) and be burned or exposed to smoke or falling parts if one were found at the site, 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.

## 6.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Parcel E20c.1.1.1 was 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 G5-1. 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 reconnaissance evaluation.

### 6.6.1 Literature Review

#### Type of Training and Military Munitions Expected

Training activities identified on training maps within Parcel E20c.1.1.1, included an RSOP area and a target detection area. As discussed in Section 6.2, reconnaissance, selection and occupation of position to assess or prepare for movement of platoon-based or battery-based field artillery is not believed to have involved the use live fire. RSOP training may have included the use of practice antipersonnel mines (*Army, 1995*). Target detection was associated with land navigation and map reading exercises. It is therefore unlikely that target detection training would involve the use of military munitions (*MACTEC, 2004*).

MRS-24A lies immediately adjacent to Parcel E20c.1.1.1. This training site is first identified on a 1945 Training Facilities as “practice rifle grenade.” This site is not shown on training facilities maps after 1946. Military munitions expected at this site include rifle-fired practice and possibly smoke grenades. The practice rifle grenade is an inert item that is similar in shape and weight to the antitank rifle grenade (high explosive).

#### *Subsequent Use of the Area*

With the exception of a large aboveground water storage reservoir built in the mid 1960s, Parcel E20c.1.1.1 remains undeveloped. Military housing was constructed immediately adjacent to the parcel in the late 1950s and early 1960s.

#### *Establishment of Site Boundaries*

The boundary of Parcel E20c.1.1.1 defines the extent of the site as it pertains to the Track 1 plug-in process. The boundary was established based on reuse in support of property transfer and is not based on military munitions training activities.

Adjacent MRS-24A was identified from the review of Fort Ord training facilities maps conducted by the USACE as part of the archives search. The boundary of MRS-24A was determined based on the boundary of a practice rifle grenade training area on a 1945 training facilities map. The current boundary

of MRS-24A encompasses the entire footprint of the practice rifle grenade training area as depicted on the 1945 map.

### *Summary of Literature Review Analysis*

Activities that occurred within Parcel E20c.1.1.1 included RSOP training and target detection. Other than boundaries delineated on training facilities maps, no other records of the RSOP and target detection training areas were identified. No features were observed on the aerial photographs that would correspond to the RSOP and target detection training areas delineated on training maps. MRS-24A was identified as a practice rifle grenade training area in the 1940s and was located immediately adjacent to Parcel E20c.1.1.1. The footprint of the practice rifle grenade training area delineated on facility maps from 1945 and 1946 lies within the current footprint of MRS-24A. A cleared area that is visible on aerial photographs from the 1950s and 1960s also lies entirely within the footprint of MRS-24A.

### 6.6.2 Reconnaissance Review

This section evaluates the site reconnaissance conducted within Parcel E20c.1.1.1. The discussion includes the site reconnaissance method, results of the site reconnaissance, a discussion of the military munitions (if found), and QA/QC. Site reconnaissance activities that have been performed within Parcel E20c.1.1.1 include a reconnaissance (site visit) completed at the request of the Directorate of Environmental and Natural Resources (DENR) to support a proposed lease that was to include Parcel E20c.1.1.1 and adjacent parcels. The path of the reconnaissance (site visit) is provided on Plate G5-3.

### Reconnaissance Methods Discussion

#### Site Visit – Parcel E20c.1.1.1

To support the proposed lease of Parcel E20c.1.1.1 and adjacent parcels, the U.S. Army Corps of Engineers, Sacramento District Office (CESPK) was tasked by the DENR to perform a site visit. Between February 24 and March 5, 2003, an investigation team consisting of a USACE UXO Safety Specialist, UXO technician, and a global positioning system (GPS) operator, performed the site walk. The area investigated included roads, trails, and the accessible areas within Parcel E20c.1.1.1, and adjacent Parcels E20c.1 and E20c.1.1.3 (First Tee site study area; Plate G5-3). The site visit involved the USACE UXO Safety Specialist visually searching the path walked while simultaneously searching for subsurface anomalies using a magnetometer. The site visit was conducted in accordance with Engineer Manual (EM) 1110-1-4009 (*USACE, 2000*). If military munitions were found, information including the item location, item nomenclature, disposition (e.g., MEC, munitions debris), depth, quantity, and weight was recorded using the GPS. The weight of munitions debris found was estimated and a total recorded for the entire site. No MEC was found within Parcel E20c.1.1.1 (Plate G5-4). Munitions debris items found included inert practice rifle grenades, ten expended 3.5-inch practice rockets buried at a depth of 24 inches, one expended 3.5-inch practice rocket motor, an expended illumination signal (M21A1), a mortar tail fin assembly (M2), and fragments from unknown and light case munitions (*USACE, 2003*).

#### *Site Boundaries Review – Boundaries of Parcels*

The boundary of Parcel E20c.1.1.1 is based on the property boundary established for the parcel. The boundary defines the extent of the site as it pertains to the Track 1 plug-in process and evaluated in this approval memorandum. No basis for modifying the parcel boundary has been identified.

The site boundary for MRS-24A (within adjacent Parcel E20c.1) was provided by the U.S. Army Corps of Engineers, Huntsville Division and documented in the ASR (*USAEDH, 1997*). The site was reportedly

used as a practice rifle grenade range. A site reconnaissance was performed within and adjacent to the site to determine the presence or absence of MEC in the vicinity of MRS-24A. Although practice antitank rifle grenades (munitions debris) were found outside of the MRS-24A, it is not necessary to expand the boundary of MRS-24A to include the locations of these items because practice antitank rifle grenades are inert by design and do not pose a risk to the public.

### *Quality Assurance/Quality Control*

The site reconnaissance conducted to support the lease of Parcel E20c.1.1.1 and adjacent Parcel E20c.1 was performed in accordance with USACE guidance EM-1110-1-4009. EM-1110-1-4009 provides Quality Assurance/Quality Control (QA/QC) procedures for various phases of a military munitions response including geophysical, location surveying, safety, and techniques. EM-1110-1-4009 also establishes QA/QC requirements for performance objectives, project management, site visits, lessons learned program, and contractor QC plans (*USACE, 2000*). Prior to starting the reconnaissance of Parcel E20c.1.1.1 the magnetometer and GPS unit were checked to ensure that the equipment was functioning properly. Testing of the magnetometer included standardized checks in accordance with the manufacturer's instructions. The GPS unit was correlated with satellite availability prior to beginning the reconnaissance, during the reconnaissance and after periods of rest.

## 6.7 Conclusions and Recommendations

This section presents conclusions and recommendations for Parcel E20c.1.1.1 that are based on the review of historical information and site walk data collected from the parcel.

### 6.7.1 Conclusions

#### *Site Use and Development*

- Based on a literature review and site reconnaissance, this parcel appears to have been used for RSOP and target detection training. Additionally, Parcel E20c.1.1.1 lies immediately adjacent to a former practice rifle grenade training area (MRS-24A). The parcel lies adjacent to military housing and is currently undeveloped. Plans for future development of the parcel includes housing.

#### *Reconnaissance Evaluation*

- The data collected during reconnaissance activities conducted within Parcel E20c.1.1.1, support the conclusion that training at adjacent MRS-24A included the use of practice rifle grenades, with the exception of the practice rifle grenades found on the east side of the parcel and the 3.5-inch practice rockets found in a burial pit at a depth of 24 inches, the munitions debris found within Parcel E20c.1.1.1 were single items and not related to one another indicating that they were not present as the result of munitions-related training at this location.
- The site reconnaissance conducted at Parcel E20c.1.1.1 was conducted in accordance with USACE guidance.
- Munitions debris found during the USACE site walk of Parcel E20c.1.1.1 is consistent with the use of adjacent MRS-24A as a practice rifle grenade range.
- With the exception of ten practice rockets intentionally buried at a depth of 2 feet, all munitions debris detected at Parcel E20c.1.1.1 was found within 8 inches of the ground surface.

- The Schonstedt Model GA-52/Cx magnetometer was used during the site reconnaissance conducted at Parcel E20c.1.1.1. The detection efficiency of the Schonstedt Model GA-52/Cx was evaluated during the Ordnance Detection and Discrimination Study (ODDS; *Parsons, 2002*). The results of the ODDS indicate that the Schonstedt model used during the site reconnaissance is capable of detecting the ferrous surface and subsurface military munitions expected at Parcel E20c.1.1.1.
- Even though the parcel was not entirely walked, the quantity and quality of the information generated is sufficient to make an informed decision regarding Parcel E20c.1.1.1. The investigation (reconnaissance) was sufficient to assess the potential presence of MEC or munitions debris.
- Based on the historical use of Parcel E20c.1.1.1 and the surrounding area, it is unlikely that MEC is present. However, if items expected to have been used during past training remain at the site, they are considered to pose an acceptable risk if encountered, because: (1) the items require assembly of components or significant mechanical or thermal stimulus to function, and (2) injuries would likely be limited to burns, or being struck by falling or ejecting parts (i.e., expected to be non-lethal).

### 6.7.2 Recommendations

Based on review of existing information, MEC is not expected to be found at Parcel E20c.1.1.1, and No Further Action related to MEC is required for this parcel. Parcel E20c.1.1.1 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. MEC items that may be present on the parcel based on past site use likely consist of illumination signals, and possibly rifle-fired smoke grenades, and practice antipersonnel mines. In the unlikely event that a MEC item is found of the type previously observed or possibly present at Parcel E20c.1.1.1, 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 Parcel E20c.1.1.1 have been exposed to moisture, degradation, and weathering for many years which could prevent many of them from functioning.

For Parcel E20c.1.1.1, 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 these parcels. 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. If MEC is discovered during future development activities on Parcel E20c.1.1.1, 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 (e.g., an EOD unit) to respond.

For this parcel, the Army recommends construction personnel involved in intrusive operations attend the Army's ordnance recognition and safety training. The Army 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. The Army will provide ordnance recognition and safety refresher training as appropriate. Parcel E20c.1.1.1 should be added to the list of Track 1 sites with management controls shown in the *Munitions Response Site (MRS) Security Program* (*Army,*

2005b). This document presents the elements of the ordnance recognition and safety training, notification procedures, and Army and local law enforcement responsibilities. In accordance with the Track 1 ROD (Army, 2005a), the Army 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.

## 6.8 References

Arthur D. Little, Inc. (ADL), 1994. *Final Community Environmental Response Facilitation Act (CERFA) Report, Fort Ord Monterey, California. Real Estate Fort Ord (Military Reservation)*. April.

Breiner, 1973. *Applications Manual for Portable Magnetometer*.

CMS Environmental (CMS), 1995. *Site-Specific Work Plan*. July 21.

Department of Interior (DOI), 1918. *California (Monterey County) Monterey Quadrangle*. Franklin K. Lane, Secretary, U.S. Geological Edition of 1913, reprinted 1918.

Directorate of Environmental and Natural Resources (DENR), 2003. *Memorandum For Record, OE-24A Site-Walk with Regulators*.

Hall, Thomas of TechLaw, 2003. *Comments on Draft Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study, Former Fort Ord, California*. February 25.

\_\_\_\_\_, 2005. Personal communication with Bruce Wilcer of MACTEC. November 4 and 10.

Harding Lawson Associates (HLA), 2000a. *Literature Review Report, Ordnance and Explosives, Remedial Investigation/Feasibility Study, Former Fort Ord, California*. January 4.

\_\_\_\_\_, 2000b. *Final Plan for Evaluation of Previous Work, Ordnance and Explosives, Remedial Investigation/Feasibility Study, Former Fort Ord, California*. December 4.

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

IT Corporation (IT), 2001. *Basewide Range Assessment Work Plan and Contractor Quality Control Plan Small Arms and Multi-Use Ranges Fort Ord, California*. Revision 0. July.

MACTEC Engineering and Consulting, Inc. (MACTEC), 2004. *Final Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study, Former Fort Ord, California*. June 21.

MACTEC Engineering and Consulting, Inc. (MACTEC) / Shaw Environmental, Inc. (Shaw), 2005. *Final Comprehensive Basewide Range Assessment Report, Former Fort Ord, California*. Revision 0. March 31.

National Exposure Research Laboratory (NERL), 2000. *Evaluation of U.S. Army Corps of Engineers Statistical UXO Sampling and Characterization Methodologies*. Office of Research and Development, U.S. Environmental Protection Agency. July.

Parsons Infrastructure & Technology Group, Inc. (Parsons), 2001. *Draft Ordnance Detection and Discrimination Study (ODDS), Former Fort Ord, Monterey, California*. August.



- \_\_\_\_\_, 2002. *Final Technical Information Paper Surface Removal, BLM Area East of Parker Flats, Former Fort Ord, Monterey, California, Ordnance and Explosives (OE) Cleanup*. April.
- Shaw Environmental, Inc. (Shaw), 2004. *Draft Final Investigation Report, Military Munitions Sampling, First Tee site study area, Former Fort Ord, California*. Revision 0. May.
- U.S. Department of the Army (Army), 1933-34. *Camp Ord and Vicinity (prepared under the direction of the Chief of Engineers)*.
- \_\_\_\_\_, 1938. *Topographic Map, Camp Ord and Vicinity*.
- \_\_\_\_\_, 1944. *Camouflage, Basic Principals, FM 5-20*. February.
- \_\_\_\_\_, 1945. *Training Facilities, Fort Ord and Vicinity, California*. Revised August 1945.
- \_\_\_\_\_, 1946a. *Main Garrison Cantonment Land Use Map, 53-1-9, 2a*. March 20.
- \_\_\_\_\_, 1946b. *Master Plan, Fort Ord, California*. April 5.
- \_\_\_\_\_, 1954. *Training Areas That Cannot Be Used At Same Time: (As Presented In Use)*. Circa 1954.
- \_\_\_\_\_, 1956. *Map of Fort Ord Training Area and Facilities. Enclosure I to Annex O*. Revised 20 December 1956.
- \_\_\_\_\_, 1957. *Map of Fort Ord Training Areas & Facilities. Enclosure I to Annex "H"*. Revised: 15 July 1957.
- \_\_\_\_\_, 1958. *Map of Fort Ord Training Areas & Facilities. Enclosure I to Appendix 1 to Annex "H"*. Revised: 10 January 1958.
- \_\_\_\_\_, 1959. *Year Book, U.S. Army Training Center, Infantry, Fort Ord, California. Headquarters and Headquarters Co., 9<sup>th</sup> Battle Group, 3<sup>rd</sup> Brigade*.
- \_\_\_\_\_, 1964a. *Technical Manual, Demolition Materials, TM 9-1375-200*. January.
- \_\_\_\_\_, 1964b. *Field Training Areas & Range Map, Fort Ord. Appendix 2, Annex O*. April 27.
- \_\_\_\_\_, 1967. *Back Country Road, Fort Ord, California. Field Training Area and Range Map*. January.
- \_\_\_\_\_, 1968. *U.S. Army Training Center Infantry, Company D, 4<sup>th</sup> Battalion, 1<sup>st</sup> Brigade*. June.
- \_\_\_\_\_, 1977a. *Technical Manual, Army Ammunition Data Sheets for Land Mines (FSC 1345), Department of the Army Headquarters, TM 43-0001-36*. February 14.
- \_\_\_\_\_, 1977b. *Technical Manual, Army Ammunition Data Sheets: Military Pyrotechnics (Federal Supply Class 1370). TM 43-0001-37*. February.
- \_\_\_\_\_, 1977c. *Technical Manual, Army Ammunition Data Sheets for Grenades. TM 43-0001-29*. October.
- \_\_\_\_\_, 1980. *Range Regulations, Fort Ord Regulation 350-5, HQS 7<sup>th</sup> Inf. Div. & Ft Ord, CA*. September 9.

- \_\_\_\_\_, 1981. *Technical Manual, Army Ammunition Data Sheets for Demolitions Materials. TM 43-0001-38.* June.
- \_\_\_\_\_, 1983. *Policies and Procedures for Firing Ammunition for Training, Target Practice, and Combat. Army Regulation 385-63 MCO P3570.1A.* October 15.
- \_\_\_\_\_, 1987. *Visual Signals, Field Manual (FM) 21-60.* September 30.
- \_\_\_\_\_, 1990. *Field Manual 6-20-1 Tactics, Techniques, and Procedures for the Field Artillery Cannon Battalion, Headquarters Department of the Army, Washington, D.C.* November 29.
- \_\_\_\_\_, 1994. *Technical Manual TM 43-0001-29, Ammunition Data Sheets for Grenades.* June.
- \_\_\_\_\_, 1995. *Field Manual 44-43, Bradley Stinger Fighting Vehicle Platoon and Squad Operations, Headquarters Department of the Army, Washington, D.C.* October 3.
- \_\_\_\_\_, 1996. *Infantry Squad Operations, Army Correspondence Course, IN0201, Edition B.* January 15.
- \_\_\_\_\_, 1997. *Standards in Weapons Training, Army Pamphlet 350-38. Headquarters Department of the Army, Washington, D.C. DA PAM 350-38.* July.
- \_\_\_\_\_, 2000. *Field Manual 3-23.30 Grenades and Pyrotechnic Signals.* September.
- \_\_\_\_\_, 2002. *Final Record of Decision, No Action Regarding Ordnance-Related Investigation, Former Fort Ord, California.* June 19.
- \_\_\_\_\_, 2005a. *Record of Decision, No Action Related to munitions and Explosive of Concern – Track 1 Sites, no Further Remedial Action with Monitoring for Ecological Risks from Chemical Contamination at Site 3 (MRS-22), Former Fort Ord, California.* March 10.
- \_\_\_\_\_, 2005b. *Explanation of Significant Differences, Final Record of Decision, No Action Regarding Ordnance-Related Investigation, Former Fort Ord, California.* April 5.
- U.S. Army Corps of Engineers (USACE), 1959. *Fort Ord 900 Capehart Housing Units East Officers Area Section 3 Grading Plan. As Built, Changes Made.* San Francisco District. 10 February 1959.
- \_\_\_\_\_, 1960. *Fort Ord Aerial Photo Contour Map Main Garrison.* San Francisco District. March 21 (Aerial Photograph taken in 1959).
- \_\_\_\_\_, 1995. *Procedures For Conducting Preliminary Assessments At Potential Ordnance Response Sites.* ETL 1110-1-165. April.
- \_\_\_\_\_, 1997. *Installation-Wide Multispecies Habitat Management Plan (HMP) for Former Fort Ord, California.* April.
- \_\_\_\_\_, 2000. *EM-1110-1-4009, U.S. Army Corps of Engineers, Engineering and Design, Ordnance and Explosives Response.* June 23.
- \_\_\_\_\_, 2003. *Site Visit Report, Parcels E20c.1.1.1 and E20c.1.1.2, Former Fort Ord, Monterey, California, Ordnance and Explosives (OE) Cleanup.* April.

U.S. Army Engineering and Support Center – Huntsville (USAESCH) and U.S. Army Corps of Engineers (USACE), Sacramento District, 1997. *Engineering Evaluation/Cost Analysis- Phase I, Former Fort Ord, Monterey County, California, Final*. September.

U.S. Army Engineer Division, Huntsville (USAEDH), 1993. *Archives Search Report Fort Ord California, Monterey County, California*. Prepared by U.S. Army Corps of Engineers St. Louis Division. December.

\_\_\_\_\_, 1997. *Revised Archives Search Report Fort Ord California, Monterey County, California*. Prepared by U.S. Army Corps of Engineers St. Louis Division. December.

\_\_\_\_\_, 2000. *Basic Safety Concepts and Considerations for Ordnance and Explosives Operations*. March 7.

USA Environmental Inc. (USA), 2000a. *Final OE Removal After Action Report, Inland Range Contract, Former Fort Ord, California, Site OE-3*. November 9.

\_\_\_\_\_, 2000b. *Final OE Sampling After Action Report, Inland Range Contract, Former Fort Ord, California, Site OE-24A*. December 28.

U.S. Navy (Navy), 1947. *NAVSEA OP 1664, U.S. Explosive Ordnance*, Published by Direction of Commander, Naval Sea Systems Command, 28 May, changes 15 January 1969.

\_\_\_\_\_, 1982. *Pyrotechnic, Screening, Marking, and Countermeasure Devices*. Technical Manual NAVSEA SW050-AB-MMA-010, NAVAIR 11-5-7. 15 August.