SITE OE-22

BEACH RANGES

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3.22 Site OE-22 (Beach Ranges)

This summary report consists of two parts. The first part, contained in Sections 3.22.1 through 3.22.5, 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 ordnance and explosives (OE) investigations, and a conceptual site model. The above-mentioned information was used to support the second part of this report, which is the Site Evaluation (Section 3.22.6). 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 previously. The Site Evaluation discusses the evaluation of the literature review process (Section 3.22.6.1) and evaluation of sampling process(es) (Section 3.22.6.2). These discussions are based on information from standardized literature review and sampling review checklists (Attachment 22-A1). Section 3.22.7 provides conclusions and recommendations for the site. References are provided in Section 3.22.8.

3.22.1 Site Description

Site OE-22 comprises approximately 952 acres and is located on the coastline along the western margin of the former Fort Ord (Plate 22-1). At the time of base closure, the site contained 17 small arms firing ranges, Stillwell Hall, 2 sewage treatment plants, and a former ammunition supply point (ASP). Monterey Bay borders Site OE-22 to the west, Highway 1 and the Main Garrison to the east, beach and dune property owned by the City of Marina to the north, and the City of Seaside to the south (Plate 22-1). The Beach Ranges are identified as Site OE-22 in the Archive Search Report (ASR; *U.S. Army Engineer Division, Huntsville [USAEDH], 1993*).

3.22.2 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 may contribute to misalignments of some map features with respect to the aerial photographs.

Pre-1940s Era

The site lies within two land tracts purchased from private landowners by the U.S. Army (Army) in the late 1940s (*Arthur D. Little, Inc. [ADL], 1994*). Documentation of use of this area prior to the 1940s is limited to topographic maps from 1918 and 1933 (*Department of the Interior [DOI], 1918* and *Army, 1933-34*). These maps showed that the area was undeveloped. In addition, no features indicative of training areas at the site location were shown on the 1918 and 1933 topographic maps. According to an interview conducted with retired Colonel Thomas Gillis who served at the Presidio of Monterey between 1935 and 1939, troops trained in the Beach Ranges prior to 1940 (*Gillis, 1999*).

1940s Era

Review of training maps from the 1940s indicates that ranges were initially developed in the northern part of the site (Plates 22-2 and 22-3; *Army, 1940 and 1945*). Firing was to the west at targets located at the base of the sand dunes. During interviews conducted as part of the former Fort Ord archives search, unconfirmed statements were made about firing from the bay toward the beach ranges during amphibious training activities. In an interview conducted with Mr. Lee Stickler, (a former range control officer), Range 8 (Known Distance Range) was identified as an occasional mortar training area using inert training devices (*Stickler, 1999*).

Additional information concerning training practices in the site vicinity was obtained during interviews with former Army personnel and review of an Army weekly publication. Information from the interviews cannot be confirmed from other sources.

- In an interview conducted as part of the Earth Tech Archive Search (*Earth Tech, 1996*), a former driver of amphibious tanks stated that sometime between 1945 and 1946, 75mm projectiles were fired into Site OE-22 dunes from offshore. There is also a photograph from an October 1944 issue of a Fort Ord weekly publication *The Panorama* that shows explosions on the beach associated with a battle demonstration (*HLA, 1999* and *Panorama, 1944*). The photo of the detonation looks like a line of placed charges all going off at the same time. The detonation footprint looks to be rectangular, rather than round as would be expected if a single shell impacted the beach.

- A 1941 aerial photograph shows disturbed/cleared areas in the northern section of the site that are the likely locations of firing ranges. There are also cleared areas in the vicinity of Stillwell Hall (Plate 22-2).

- The 1946 map shows ranges 10 through 18 in the northern portion of the site. The 1946 ranges included machine gun ranges, pistol and rifle ranges, a skeet range, and 300-yard and 200-yard rifle ranges (Plate 22-3). An Infiltration Course and a Magazine Area (now known as Ammunition Supply Point [ASP]) are identified in the southern portion of the site (Plate 22-4). The map also shows that the general area between the Balloon Track and the Soldiers Club (Stillwell Hall) is referred to as a "Training Area" (*Army*, 1946). A sewage disposal area is shown north of Stillwell Hall. There is an Obstacle Course shown just north of the Balloon Track. The Balloon Track appears to refer to a loop in the railroad line (Plates 22-3 and 22-4).

- A 1949 aerial photograph shows the northern firing ranges, Stillwell Hall, and parallel linear features at the location of Range 4, indicating that the area was being used as a firing range. There are two cleared, circular areas southeast of Stillwell Hall; one of these areas corresponds to the area designated as the obstacle course and the other area corresponds to an area designated as Rifle Instruction Circle (RIC)-4 on a later (1954) training map. The rest of the site was bisected with dirt roads (Plates 22-3 and 22-4).

1950s Era

Eighteen small arms ranges are shown on the 1950s training maps. Non-firing training areas shown within Site OE-22 include "Rifle Instruction Circle 4" and a "Bayonet Assault Course".

- The 1954, 1956, 1957, and 1958 training maps show Ranges No. 1 through 18, a "Bayonet Assault Course" (BAC)-1 and "Rifle Instruction Circle (RIC) 4" (*Army, 1954, 1956, 1957, and 1958*). Range 10A is shown on the 1956, 1957, and 1958 training maps.

- The 1956 aerial photographs show that Ranges No. 1 through 17 have been developed, RIC-4 shows up as a cleared circular area, and there is a network of roads in the vicinity of the ASP (Plates 22-5 and 22-6).

1960s Era

Review of 1960s training maps and aerial photographs indicates that the firing ranges present in the 1950s continued to be used throughout the 1960s. Chemical Biological and Radiological (CBR) training ranges are shown in two areas – Range 17 and near "Target Detection" (TD) Range 6. Range 18 is not shown on the 1961 map or any other map thereafter. Additional information from training maps and aerial photographs is summarized below.

- Ranges 1 through 17 are shown on the 1961 Basic Information Training Facilities map. Range 17 is shown as a CBR training area in the 1961 map only (Plate 22-6). Also, Target Detection training facilities are mostly shown in the southern part of the site. Range 18 is not shown on this map or any other map thereafter (*U.S. Army Corps of Engineers [USACE], 1961*).

- A CBR was noted near the TD-6 training facility on 1961, 1964, and 1968 maps (*USACE, 1961, 1964, and 1968*). RIC-1 is shown east of Stillwell Hall at the former location of the 1954 RIC-4 (Plate 22-5).

- The 1967 and 1972 maps show Ranges 1 through 17, the George Patton Jr. Park Indoor Range located between Ranges 14 and 15, and the Beach Range Headquarters (HQ) located by Range 9 (Plate 22-6; *Army, 1967 and 1972*).

- Mr. Jerry Stratton, Chief of Training at Fort Ord from 1986 to 1988 and Director of Plans, Training and Mobilization (DPTM) from 1988 to 1993, was interviewed by MACTEC for further information concerning chemical training practices at Fort Ord. During his tenure at Fort Ord, he was responsible for the "Chemical School" (Nuclear, Biological, Chemical [NBC] School). Mr. Stratton clarified that "NBC" is a later term for CBR. Mr. Stratton stated that although his tenure was in the 1980s and 1990s, he knew details of past CBR training activities at former Fort Ord. During the interview, Mr. Stratton was asked about the labels "CBR" and "TD CBR" seen near the "Balloon Track" (vicinity of Range 8) at Site OE-22 on maps from 1956 to 1968. He stated that the "CBR" and "TD CBR" area was used to train soldiers in identification of targets while wearing a gas mask. He also said the CBR and TD CBR area at OE-22 would not have been used for gas training because of the proximity of the site to Hwy 1 and the onshore wind direction (*Stratton, 2003*).

1970s Era

Review of 1970s training maps and aerial photographs indicate that the firing ranges present in the 1960s continued to be used throughout the 1970s. Ranges 10 and 13 are not shown in the July 1972 map or any training map thereafter. The July 1972 map shows seven bivouac areas and four Target Detection Ranges.

- The July 1972 map shows the same layout of ranges and training areas as the 1967 map. Ranges 10 and 13 are not shown on the 1972 map or on any other maps thereafter. In addition, seven "Bivouac Areas" (BAs) and "Target Detection Ranges 4, 5, 6, and 9" are shown on the 1972 map (*Army, 1972*).

- The 1976 map shows Ranges 1 through 17 (Range 10 and 13 are not shown), the George Patton Jr. Park Indoor Range, "TD 6 and 9", and training facilities.

1980s Era

Review of 1980s training maps, aerial photographs, and historical maps of the former Fort Ord indicate that use of the firing ranges continued until Fort Ord was closed in 1994. An interview with Russell Hancock, who formerly worked at the ASP, indicated that in about 1985, a series of steel buildings were constructed at the ASP. Berms were constructed around these buildings. During construction of the berms, 105mm rounds were found. It is not known what was specifically meant by "rounds"; however, Mr. Hancock may be referring to unfired shells. It is believed that the found items were ammunition that had been stolen from the ASP, buried, and never retrieved. A geophysical sweep was also performed at the ASP in 1987 in response to reports that guards were stealing ammunition. During the geophysical sweep, pyrotechnics, small arms, and smoke grenades were found. These OE items were also believed to have been stolen and buried in the area (*Russell, 1993*). It is not known if these were expended items.

- The 1980, 1984, and 1987 maps show Ranges 1 through 17, the George Patton Jr. Park Indoor Range between Range 14 and 15 and "TD 6 and 9" (*USACE, 1980* and *1984* and *Army, 1987*). The 1987 map shows "Helipad" (Emergency Evacuation) areas just east of Ranges 3 and 8 (Plates 22-7 and 22-8).

Future Land Use

A state park is planned for Site OE-22. Both open space and recreational areas, including camping, are anticipated.

3.22.3 Potential Ordnance Based on Historical Use of the Area

Interviews, aerial photograph, and historical map review indicate that Site OE-22 was known or suspected of having been used for the following training activities:

- Small arms firing ranges
- Mortar training with inert practice ordnance
- Firing 75mm projectiles from offshore amphibious vehicles
- Infiltration course training
- Rifle instruction
- Bayonet assault
- Chemical, biological, and radiological training
- Target detection
- Bivouac training
- Amphibious assault
- Battle demonstrations
- An ASP was also located within the Site OE-22 boundary.

RICs were used in the practice of aiming/sighting rifles (*HLA, 2000a*). No evidence has been found that would support the use of live ammunition at the RICs (*HLA, 2000a*). OE is not expected to have been used in bivouac areas, bayonet training areas, and target detection areas. As discussed previously, chemical, biological, and radiological training at Site OE-22 would not have included gas training because of the proximity of the site to Highway 1 and the prevailing onshore wind direction. Based on past uses of the site, including small arms firing ranges, mortar training, and amphibious assault training, infiltration course training, CBR training, and battle demonstrations; the following items could be expected at Site OE 22:

- Small arms ammunition
- Practice mortars
- 75mm projectiles
- Detonation charges.

Also, because an ASP was located within the site boundary, it is possible that there may be OE in the area of the ASP if ammunition was not properly transferred from the storage facility or possibly, stolen and buried onsite. Attachment 22-A2 provides information concerning some of these items.

3.22.4 History of OE and Remedial Investigation (RI) and Hazardous and Toxic Waste (HTW) Cleanup Investigations

The following summarizes OE, RI, and HTW investigations conducted at the site that provide information on past use of the site and the presence of potential OE.

OE Investigations

1993 Archives Search Report (ASR)

The purpose of the Archives Search was to identify sites, gather and review historical information to determine the types of munitions used at the former Fort Ord, identify possible disposal areas, and 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 ASR are described in Section 2.0.

Site OE-22 was identified as a site in the 1993 ASR (*USAEDH, 1993*). The following information was provided in the 1993 ASR. A walk-through of the area showed many lead bullets covering the sand dunes. There was also an ammunition storage area (referred to earlier as ammunition supply point [ASP]) located on the beach near Range 3. Amphibious training took place at the former Fort Ord in the early 1940s, which would have taken place at the beach. Also, a 1947 map showed a much larger range fan extending from the coast out over the ocean than more recent maps (1980s). The ASR recommended that surface sweeps of the entire beach area should be considered and future land use may dictate further investigations. Ordnance carried in from the ocean and washing up on the beach may also need to be considered.

Further information concerning the range fan discussed in the ASR is provided in the discussion of the Enhanced Preliminary Assessment of Monterey Bay. Studies regarding the presence of offshore OE are discussed in the following section under Southern Monterey Continental Shelf Investigations: Former Fort Ord Restricted Zone.

1994 Human Factors Applications, Inc. (HFA) Investigation

Human Factors Applications, Inc (HFA) initially sampled Site OE-22 in 1994. Contract requirements for the scope of work performed by HFA are described in more detail in Section 2.0 of this report. HFA sampling methodology is discussed in Section 3.22.6.2. As discussed in Section 3.22.6.2, the area was surveyed using a Schonstedt Model GA 52/C magnetometer along a maximum 5-foot wide search lane. Sixty 100- by 100-foot grids were 100 percent sampled (all anomalies detected were investigated [Plates 22-7 and 22-8]). All 60 of the sample grids were established within the Site OE-22 boundary. Twenty-four of the sixty grids were located in the vicinity of the ASP. The remaining 36 sample grids were distributed over the remainder of the site in areas where the probability of finding OE items was believed to be high. No other rationale for the sampling was provided in the HFA report. Six OE scrap items were found during the grid sampling: one inert MKII practice hand grenade, one expended M22 smoke grenade, one M205 hand grenade fuze, one M50 series practice mortar fin, and two 40mm cartridge cases. These items are not shown on site plates because their location was not identified in field records. Two hundred and thirty nine pieces of live small arms ammunition were also found and removed (*HFA, 1994*). A summary of sampling operations conducted at Site OE-22 is provided in Table 22-1 and Table 22-2 lists OE scrap found during sampling.

The scope of work for HFA indicated that detailed accounting of all OE items/components/scrap encountered would be performed. However, grid records providing this information are no longer available. Existing information regarding items found is summarized in the text of the HFA OE Sampling and OE Removal report. The report itemized inert OE-scrap found. Some non-OE scrap was removed and turned in at the end of the project.

Enhanced Preliminary Assessment of Monterey Bay, Fort Ord, California - 1995

The enhanced preliminary assessment (EnPA) of Monterey Bay was prepared to describe past Army activities at and around the former Fort Ord that could have affected the restricted zone of Monterey Bay. The EnPA also assessed the likelihood of current or future impacts to the restricted zone as a result of Army activities. The restricted zone configuration that was in effect prior to 1952 described "firing over the water" and covered a danger zone arc that penetrated 14,000 yards into Monterey Bay from the northern portion of the current restricted zone. The size of the danger zone arc suggested the use of large caliber ordnance in this training and firing over the bay. The frequency of the artillery fire or any details on the types of weapons used was not documented. Interviews with soldiers who were trained or stationed at former Fort Ord from 1935 to 1939 and from 1940 to 1941, revealed no knowledge of artillery firing from the base into Monterey Bay. Coastal artillery and harbor defense units were stationed at the former Fort Ord from April 1942 through July 1944. There are no descriptions of the location, frequency, or type of training these units received while they were stationed at the former Fort Ord. There was also no information as to whether live ammunition was used if coastal firing occurred at the base. References to coastal emplacements of 155 mm artillery were found for coastal artillery units at Camp McQuaide north of the restricted area. Specific reference was made to firing with sand-filled projectiles. If firing into the bay occurred at the former Fort Ord by the coastal artillery or harbor defense units stationed there during World War II, sand-filled projectiles might have been used instead of explosive ordnance. Antiaircraft firing with machine guns at targets towed behind aircraft was held at

Indian Head Beach during training exercises at Camp Ord in 1938 and 1939. Small arms fired over the dunes entered the bay until the Beach Ranges were closed in 1991. No reference to the use of larger caliber explosive ordnance was found during the research.

On the basis of the literature review conducted as part of the EnPA, it was concluded that small arms, machine gun, and explosive ordnance may be present on the ocean floor within the current and historical restricted areas. However, the depth of water in portions of the restricted area (168 to 1890 feet) and the nature of currents and sediment transport processes in the bay and canyon area could make the location of OE difficult (*HLA, 1995a*).

Southern Monterey Bay Continental Shelf Investigations: Former Fort Ord Restricted Zone – 1997

In 1995 and 1996, a multibeam bathymetric survey was conducted by the US Department of the Interior in the former Fort Ord Restricted Zone (FORZ; a 7 km area offshore of the former Fort Ord). The stated purpose of the FORZ was to protect boaters from stray rifle and artillery fire that may have bypassed the coastal dunes that were used as backstops for target practice. There was concern by the public that there may be hazardous seafloor debris in the FORZ related to past training practices by the Army. The purpose of the survey was to perform a comprehensive investigation of seafloor morphology in the FORZ to identify any suspect targets that may be anthropogenic (related to human activities). Using the multibeam system, the USGS was unable to identify any targets as anthropogenic debris, although areas of apparent seafloor lumps or suspect targets needing higher resolution surveys were located. Using the higher frequency system, no targets were identified that were judged to be anthropogenic debris (*USGS, 1997*).

1997 CMS Environmental Inc. (CMS) Investigation

CMS sampled the site in July 1997. Contract requirements for the scope of work performed by CMS are described in Section 2.0 of this report. After the sampling was performed, CMS changed its name to USA Environmental (USA) and the Final After Action Report (AAR) was issued under USA letterhead (*USA, 2000*).

In order to evaluate the need for an OE removal action at the site, CMS sampled Site OE-22 using the SiteStats/GridStats (SS/GS) sampling program. SS/GS statistically calculates the number of grids and the percentage of anomalies at a site that require sampling. Following SS/GS protocols, not all grids at a site are investigated and not all of the anomalies in a grid are investigated. CMS divided Site OE-22 into two sectors (north and south) and investigated 22 grids in the northern half of the site and 22 in the southern half of the site (Plates 22-7 and 22-8). Thirty-nine of the grids were 100- by 200-feet in size and five were 50- by 200-foot grids. The grids were surveyed visually and investigated with a GA-52/Cx magnetometer along a maximum 5-foot wide search lane; 775 anomalies were identified. In accordance with the SS/GS approach, 360 of the 775 anomalies were excavated. It should be noted that the number of anomalies excavated differs in the AAR – the text states that 401 anomalies were excavated; however, Tables B1 and B2 in Appendix F and grid records indicated that 360 anomalies were excavated. Review of grid records indicates that approximately 33 of the 44 grids were 100 percent investigated and in the other 11 grids, between 27 and 32 percent of the anomalies were excavated. One OE scrap item (empty, unfuzed Japanese mortar) was found at a depth of 8 inches and removed. During the SS/GS sampling, records were kept regarding the weight of non-OE scrap items found; according to the grid records, 214.5 pounds of non-OE scrap were found.

It should also be noted that a map of the northern part of the site prepared by USA shows two "impact craters" in an apparent blowout in the dune area. These areas were later determined to be natural erosional features in the blowout and were not believed to be related to any ordnance-related training.

Additional sampling was performed by USA at the ASP in 1998. Two inert 25mm subcaliber M379 projectiles and one inert M30 practice hand grenade were found in the ASP area. No grid records were generated for this sampling. Table 22-1 summarizes sampling operations, including the grid identification, sampling method, and contractor. Table 22-2 lists OE items found during sampling.

No further OE action was recommended at Site OE-22 because if OE existed at Site OE-22, evidence would have been found during the 1997 and previous sampling actions or during lead remediation activities (*USA, 2000*).

1997 Phase I Engineering Evaluation/Cost Analysis (EE/CA)

The Phase I EE/CA summarized the findings of the 1993 ASR, and HFA and CMS sampling, and recommended no further action.

1997 Archives Search Report

The 1997 ASR summarized the results of the 1993 ASR and the results of the HFA and CMS OE sampling programs. On the basis of the 1993 ASR and the subsequent sampling, no further action was recommended in accordance with the Phase I EE/CA (*USAEDH, 1997*).

IT Excavation at the ASP

In 2000, IT Corporation excavated three trenches in the vicinity of the ASP to investigate reports of a burial pit that reportedly contained inert LAW rocket launch tubes and may have also contained war souvenirs from the Grenada Conflict. The trenches were excavated at the locations where an eyewitness to the burial action and another informant indicated that the items were buried. No evidence of OE was found in the trenches. The location of the three trenches is shown on Plate 22-8.

RI and HTW Investigations

1992 through 1993 Basewide RI/FS and 1994 Biological Sampling

In 1992 and 1993, as part of the Basewide RI/Feasibility Study (FS), the presence, location, and concentration of spent small arms ammunition were mapped across the site and soil samples were collected from test pits. A Phase II biological sampling program was also conducted in 1994 to evaluate the presence of chemicals of concern in soil and vegetation to provide data for a screening-level ecological risk assessment. During the field mapping and subsequent soil and biological sampling programs, various OE scrap were found including:

- A 4- by 1-inch fragment of rusted OE (model unknown) found at Range No. 3 on December 2, 1993. The OE escort personnel from UXB International, Inc. (UXB) indicated that it was likely a piece of ordnance that was shot from tanks, possibly a 37mm round.

- An inert 20mm round (model unknown) was found on October 12, 1993, in the front part of the Stillwell Hall parking lot.

- A grenade fuze and two spherical grenades were found on May 25, 1994, at Known Distance Range No. 8. It can not be confirmed if these items were inert.

- A Japanese 57mm mortar (model unknown) was found on October 14, 1996, at Range No. 14. It is can not be confirmed whether this item was inert.

It should be noted that the description of the previously mentioned OE items was obtained from incidental OE reports and not from reports documenting the OE sampling programs. At the time that these items were found, there were no established protocols for documenting the make and model of the OE items encountered. The descriptions provided above are the only information available concerning these items. Table 22-3 lists incidental OE items found in the Site OE-22 vicinity.

As part of the RI field program, 23 test pits were hand dug to 3 feet below ground surface (bgs) as described below:

- Five test pits in beach sands in the surf zone

- Five test pits at the base of five of the largest blowouts that showed the most variable distribution of spent ammunition. Spent ammunition refers to slugs of metal from fired small arms rounds.

- Ten test pits in the vicinity of Ranges 11 and 12 (Area 1) and Range 8 (Area 2). Four of these test pits were in areas where surface concentrations of spent ammunition exceeded 10 percent; three test pits in areas where surface concentrations were between 1 and 10 percent; two test pits in areas where spent ammunition was less than 1 percent; and one test pit in an area where no spent ammunition was observed.

- Three test pits in a 'control area' (two test pits within the dune area and one test pit on the beach).

No OE or OE scrap were found in the 23 test pits.

1997- 1998 Remedial Action

Between 1997 and 1998, IT Corporation (IT) conducted a remedial action which included excavating soil in areas of greater than 10 percent surface coverage of spent ammunition and excavation of soil containing 1,860 milligrams per kilogram (mg/kg) or more of lead. At the end of the remedial program, approximately 162,800 cubic yards of soil and vegetation were excavated. Approximately 129,200 cubic yards of this excavated soil was screened at a screening plant to separate spent ammunition from the soil. An estimated 719,000 pounds of spent ammunition recovered at the screening plant were recycled. During the remedial program, two OE scrap items were found: one 57mm recoilless rifle casing at Range 3 and a practice rifle grenade at Ranges 11/12 (*IT, 2000*). It is not known if these items were inert.

Habitat Mitigation and Monitoring (Ongoing)

The California State Parks, Monterey District and the Directorate of Environmental and Resources Management, Presidio of Monterey are currently conducting a habitat mitigation and monitoring program at lead remediation areas at Site OE-22. This program includes native plant revegetation and exotic plant control and monitoring. During this revegetation and monitoring program, no OE has been encountered (*Collins, 2002*).

3.22.5 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 OE 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 OE), and exposure routes (potential scenarios that may result in contact with OE).

The CSM for Site OE-22 is based on currently available site-specific and general information included in interview records, the ASR (*USAEDH, 1993*), the 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 22-10 through 22-13 presents site conceptual models. The CSM on Plate 22-10 shows past use of the site as a firing range with bullets accumulating in front of dunes. It also shows a representational area of the site after remediation of areas with significant accumulation of bullets.

3.22.5.1 Training Practices

Training practices that are known or are suspected to have occurred at Site OE-22 are discussed below to provide information on the potential types and distribution of OE that may have been used at the site, and the potential areas of concern remaining at the site, if any.

Small Arms Firing

Trainees fired small caliber hand-held weapons at the targets from a line of firing points to one or more rows of targets located at the base of the sand dunes. According to the Ford Ord Range/Training Area Operating Procedures and Usage Guide (*Army, 1991*), the following types of small arms ammunition were authorized for use:

- 5.56mm
- 38- and 45-caliber pistol
- 7.62mm
- 7.62 machine gun
- 12 gauge shotguns.

During training, cartridge cases (brass) were routinely collected for reuse. Spent ammunition accumulated on the east-facing sides of the sand dunes that formed the backstops for the targets (*HLA, 1995*). Areas with high spent ammunition densities have been remediated (*IT, 2000*).

Infiltration Course Training

An infiltration course was shown on a 1946 map in the vicinity of Range 4. Mr. Lee Stickler, a range control officer between 1970 and 1990 who was stationed at the former Fort Ord between 1940 and 1941, was interviewed concerning the presence of the infiltration course. Mr. Stickler was not aware of an

infiltration course at the Beach Ranges. To his knowledge, only small arms, occasional smoke grenades, and for a short time, practice mortars were used at Site OE-22. During his tenure as a range control officer beginning in about 1970, he walked the beach ranges and saw no evidence of infiltration course construction or use of weapons other than small arms in that area. The only infiltration courses that he was aware of were those that he built at Ranges 39 and 40 in the Multi-Range Area (MRA). The courses were set up with machine guns equipped with a height restrictor so that they would always shoot over the heads of trainees. The course(s) were 100 to 150 yards long. The soldiers would come up over a wall and crawl until they got to the "no fire" area. There were charges set up in pits within the infiltration course. According to Mr. Stickler, these charges were not of the type that would produce fragmentation, but would generate a report and smoke. Demolitions experts from Range Control would clear the area after each use (*Stickler, 2003*).

CBR Training

A CBR training area was shown near the Target Detection training facility on 1961, 1964, and 1968 training maps. Mr. Lee Stickler, a range control officer between 1970 and 1990, was interviewed concerning the presence of the CBR training area at OE-22; specifically, whether gas houses were there or whether chemical agent identification sets (CAIS) kits were used in training. Mr. Stickler said he did not recall gas houses in that area, but it was feasible that tents could have been used for training. MACTEC asked if Mr. Stickler had knowledge of where CAISs would have been used, specifically, if they might have been used in any of the CBR areas. He indicated that he had no knowledge of use of the CAIS at that site (*Stickler, 2003*).

According to Mr. Jerry Stratton, Chief of Training at Fort Ord from 1986 to 1988 and DPTM from 1988 to 1993, the "CBR" and "TD CBR" area at Site OE-22 was used to train soldiers in identification of targets while wearing a gas mask. The area would not have been used for gas training because the site was close to Highway 1 and the prevailing wind direction is onshore (from the training area toward the highway).

Practice Mortar Training

In an interview conducted with Mr. Lee Stickler (a former range control officer), Range 8 (Known Distance Range) was identified as an occasional practice mortar training area using inert training devices (*Stickler, 1999*). According to Mr. Stickler, the mortar launchers used here had a range of about 200 to 300 meters. The mortars were launched and then retrieved in order to be used again. Information obtained from the St. Louis District Corps of Engineers indicates that training cartridges, Models M68 and M69, could have been used at a practice mortar range. These practice mortars had a range of 235 and 310 yards, respectively. The mortars consist of an iron pear-shaped body, which had a size and weight that simulated the high explosive (HE) version of the 60mm or 81mm mortar. The practice mortars were assembled by attaching a fin assembly that contained an ignition cartridge. The ignition cartridge, similar to a shotgun cartridge, was used to propel the inert portion of the mortar. If the ignition cartridge failed to function, the mortar would not be fired; therefore, it would not be possible for a live practice mortar to be found downrange as a result of firing. Both the M68 and M69 were reusable rounds and could be collected and reused by inserting a new ignition cartridge. A 1959 Fort Ord Year Book shows mortars set up along a cleared area at what appears to be the Beach Ranges; however, the exact location of the cleared area cannot be determined from the photograph (*Army, 1959*). In the photograph, it appears that the troops were practicing setting up and sighting the mortar launchers.

In a follow-up interview, Mr. Stickler was asked about the use of practice mortars with spotting charges and propellant increments at the Beach Ranges because fins from a M50 practice mortar (which used

propellant increments and has a spotting charge) were found near the ASP. Mr. Stickler stated that as far as he knew, that type of mortar was not used at the former Beach Ranges and agreed that it could have been discarded at the site (*Stickler, 2003*).

Amphibious Training

In an interview conducted as part of the Earth Tech Archive Search (*Earth Tech, 1996*), a former driver of amphibious tanks stated that sometime between 1945 and 1946, 75mm projectiles were fired into Site OE-22 dunes from offshore. It is not known if live or practice rounds were used.

Battle Demonstrations

A photograph from an October 1944 issue of a Fort Ord weekly publication *The Panorama* that shows explosions on the beach associated with a battle demonstration (*HLA, 1999* and *Panorama, 1944*). The photo of the detonation looks like a line of placed charges all going off at the same time. The detonation footprint looks to be rectangular, rather than round as would be expected if a single shell impacted the beach.

Target Detection

According to Mr. Stickler, target detection was associated with land navigation and map reading exercises. It is therefore, unlikely that target detection training would involve firing or placing of ordnance.

Ammunition Supply Point

An ASP is located within the site boundary. This area contains bunkers where ammunition was stored. It is possible that there may be OE in the area of the ASP if ammunition was not properly transferred from the storage facility or possibly, stolen and buried onsite.

3.22.5.2 Site Features

Most of the surface area of Site OE-22 is unpaved and vegetated with ice plant. Where vegetation is absent or removed, dune sand is present at the ground surface. The predominant topography of numerous intersecting rolling hills reflects a morphology typical of the dune sand deposits that underlie the site. The dunes are truncated to the west by steep cliffs formed as a result of waves and winter storms. There are wind erosional features (blowouts) between the dunes. The firing ranges consisted of level areas cleared in the dunes. Firing lines were located on cleared areas on the east side of the ranges; some ranges had multiple firing lines. Target lines were along the west side of the ranges in the front of the dunes. Generally, the area in front of the targets was cleared of vegetation and there were backstops behind the targets. Observation towers and sheds were located to the sides of the firing and target lines. Visual surveys of the area indicated that spent ammunition was concentrated on the dune face behind the targets, with scattered ammunition between the target and firing lines (*HLA, 1995*).

3.22.5.3 Potential Sources and Location of OE

As part of the Basewide RI/FS, Former Fort Ord, California, spent small arms ammunition (bullet and bullet fragments) were mapped at the site (*HLA, 1995b*). Results of the mapping indicated that the concentration of spent ammunition was greatest in an approximate 10- to 30-foot band along the sand dunes immediately behind the target areas. Bullets and bullet fragments were generally absent below a

depth of 1 to 2 feet. Spent ammunition also accumulated at the eroding surface of blowouts, with the highest concentration in the lower third of the blowouts. It was speculated that bullets were eroded out of the surrounding dunes by westerly winds and were transported into the blowouts by gravity (*HLA, 1995b*). It is anticipated that OE potentially fired in the ranges would be similarly distributed.

The distance that practice mortars could have been fired at Range 8 could range from 200 to 300 meters according to one source (*Stickler, 1999*), and from 100 to 1,985 yards according to another source (*Hogg, 2001*), depending on the firing trajectory. Accordingly, practice mortar rounds would be expected in the range area, the sand dunes, or possibly, the beach or offshore. The maximum calculated depth of penetration in sand of the M68 and M69 practice mortars is 0.3 and 0.2 feet, respectively.

Amphibious craft from the 1940s may have been equipped with 0.30 and /or 0.50 caliber machine guns, 37, 57, and 75mm guns, or 75 or 105mm Howitzers. The range of projectiles that may have been shot from amphibious craft ranges from 250 to 12,800 yards (*Hogg, 2001*). Depending on the proximity of the amphibious craft to the beach, the guns and ammunition used, and the trajectory angle, OE could have traveled as far as several miles inland, as well as onto the beach, dunes, and ranges at Site OE-22. The maximum calculated depth of penetration in sand of 37, 57, and 75mm HE projectiles is listed as 3.9, 2.7, and 4.9 feet, respectively (*Earth Tech, 1998*). It should be noted that no OE related to amphibious weapons have been found during investigations at OE-22.

Based on photographs in the 1944 *Panorama* publication, charges appear to have been placed on the beaches during battle demonstrations. It is unlikely that charges are still present at the site because no charges have been found on beaches in the 50 year period following the battle demonstration. It should be noted that the beaches have undergone heavy erosion. As shown on Plate 22-9, since 1949, the dune face has retreated eastward and the former beach area is below the tide line.

The potential for offshore OE from past amphibious training or offshore firing to wash up onto the beach is also low because no OE has been found on the beach in the 50 years since the offshore training and firing over the water occurred, and the predominant transport mechanisms are wave-induced long shore and rip currents (*USGS, 1985*), which would tend to move OE away from the beach area. In addition, the multibeam bathymetric survey conducted by the US Department of the Interior in the FORZ (a 7 km area offshore of the former Fort Ord) was unable to identify any targets as anthropogenic debris, suggesting that there are no significant accumulations of OE offshore.

Interview records indicate that CAIS were not used in CBR training at OE-22. Therefore, CAIS are not expected to be present at the site.

Charges may have been set up in pits in the 1945 infiltration course area. Because the general practice was to clear the infiltration course area after each use (*Stickler, 2003*), it is unlikely that non-detonated charges would remain in this area. In addition, as shown on Plate 22-4, a portion of the infiltration course was excavated as part of the 1997 to 1998 remedial action (*IT, 2000*). No charges were reportedly found in this area during the remediation program.

Also, because an ASP was located within the site boundary, it is possible that there may be OE in the area of the ASP if ammunition was not properly transferred from the storage facility or possibly, stolen and buried onsite.

It should be noted that the site has been extensively walked and mapped, and soil remediation has been performed in the dune area. Eighteen documented OE-related items have been found and removed and are listed as follows:

- One inert MKII practice hand grenade (location and depth not available)
- One expended M22 smoke grenade found in the vicinity of the ASP
- One inert M205 hand grenade fuze found in the vicinity of the ASP
- Fins from one M50 series practice mortar (model unknown) found in the vicinity of the ASP. These fins were reportedly inert.
- Two 40mm cartridge cases (type unknown) found in the vicinity of the ASP. These cartridge cases were reportedly inert.
- One empty, unfuzed Japanese mortar found at a depth of 8 inches
- Two inert 25mm subcaliber M379 projectiles
- One inert M30 practice hand grenade.
- One inert 4- by 1-inch fragment of rusted OE, possibly a 37mm round
- One inert 20mm round
- One grenade fuze. It can not be confirmed that the fuze was inert or expended.
- Two expended smoke grenades (listed as spherical grenades in database). It can not be confirmed that these items were inert or fired.
- One Japanese 57mm mortar. It can not be confirmed that the mortar was inert.
- One 57mm recoilless rifle casing. It can not be confirmed that the rifle casing was inert
- One practice rifle grenade. It can not be confirmed that the rifle grenade was inert.

There are also reports that an unknown number of OE and/or OE scrap items (including smoke grenades, pyrotechnics, and 105mm rounds) were removed in 1985 and 1987 in the vicinity of the ASP. It should be noted that it is not known what was specifically meant by "rounds" but these may have been shells. It is believed that these may have been items stolen from the ASP and buried for later retrieval based on personal communication with Russell Hancock [*Hancock, 1993*]). No 75mm projectiles have been found, and only one 57mm mortar and what may have been a portion of a 37mm projectile have been found. The 57mm mortar was Japanese-made and was unlikely to have been used in training or fired. It is not likely that the site was used as an impact area because (1) the primary use of the site was for small arms firing, (2) only incidental OE items have been found (incidental OE items are OE items that were discovered at the former Fort Ord by the public or by contractors that were not specifically tasked with sampling or removing OE items), and (3) the site is adjacent to the Main Garrison. Therefore, the potential for OE to be present at the site is low.

3.22.5.4 Potential Exposure Routes

Potential exposure to OE, although unlikely, could result from encountering OE items found or potentially present at the site from past training activities. These items include practice mortars. Inert fins from a M50 Series practice mortar were found at the site. As discussed previously, it is believed that

this item was not used for training, but was discarded at the site. Based on conversations with Range Control personnel, it is believed that M68 and M69 training mortars were used at the site. OE potentially remaining at the site may have penetrated or been covered by wind-blown or wave-deposited sand. Beach and dune sands will be eroded during winter storms and coastal winds will cause the dunes to migrate laterally. OE-related items that are non-penetrating can be buried by migrating sand dunes and longshore currents can also erode and transport OE items laterally along the beach. In the future, buried OE items may be brought to the ground surface from wind or wave erosion or, possibly, future construction activities involving soil excavation or grading. At this time, the site is planned to be used as a park, so only minor construction activities are expected.

It is possible that persons visiting the park may come into contact with OE scrap that has been uncovered by wind or wave erosion. As previously discussed, based on the extensive mapping and soil removal performed in the area, the potential for OE to still be present at the site is low.

For each of the OE 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. Additional information on these items is provided in Attachment 22-A2.

Cartridge, 60 Millimeter: Target Practice Mortar: M50 Series. The cartridge, 60mm, target practice, M50 series mortar is fired in 60mm mortars M2 and M19 for target practice and contains a spotting charge for observation. The complete round consists of a projectile body, a point detonating fuze (M52 and/or M525 Series), a fin assembly with a two-inch extension, four increments of propellant charge, an ignition cartridge with a percussion primer, and a 0.55 pound black powder spotting charge. The projectile body is of forged steel or pearlitic malleable iron and is threaded internally at the nose to accept the fuze and at the base to accept the fin extension. The body is loaded with an inert plaster filler to simulate the weight and ballistic characteristics of a high explosive cartridge. A pellet of black powder for a spotting charge is loaded in a cavity just below the booster casing of the fuze. When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The flash from the primer ignites the propellant charge. Rapidly expanding gases from the burning propellant expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. The point detonating fuze in the mortar functions on impact, detonating the fuze booster charge and the spotting charge (*Army, 1994*). In order to be potentially functioning, the projectile must have been fired and then failed to function or have been subjected to very rough handling after removal of the projectiles' Safety Pin (Bore Riding Pin). A projectile that has not functioned should be considered armed and could function if dropped nose down impacting the point detonating fuze. If caused to function, the type of injury that could be sustained would be from fragmentation, because the fuze is known to sometimes be blown out of the projectile when the booster and spotting charges function. Although these items have been exposed to the elements for many years, they should be expected to function because the fuze and booster are robustly constructed and well sealed from the environment.

Summary: It is very unlikely that a person could cause an unarmed M50 Series practice mortar to function through casual contact. However, it is possible that the mortar fuze could be armed by intentionally removing the Safety Pin (Bore Riding Pin). If the Safety Pin (Bore Riding Pin) is not present in the fuze, the fuze is considered armed. Once armed the fuze becomes highly sensitive and could function through casual movement. If the fuze functions a person could be exposed a low order detonation and metal fragments from the fuze.

Cartridge, 60 Millimeter, Training Mortar: M69 and Cartridge, 81 Millimeter, Training Mortar: M68. The M69 60mm training cartridge was used for training in the loading and firing of M2 and M19 60mm mortars. The M68 81mm training cartridge was used for training in the loading and firing of 81mm mortar. The complete round consists of an inert projectile, a fin assembly, an ignition cartridge, and a percussion primer. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly. When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The primer detonates the ignition cartridge. The gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight once the cartridge has been fired, it is inert because the propellant has been expended. Since the cartridge is inert (contains no fuze, booster, nor spotting charge), there is no detonation upon impact and the cartridge may be recovered for reuse. The M68 and M69 are unlike other mortar ammunition in that the components are issued separately so that damaged components can be replaced so the M69 and M68 can be reused repeatedly. M68 and M69 mortars that have been fired are inert. An unfired M68 or M69 mortar will contain an unfired percussion primer and an ignition cartridge that are built into the fin assembly (*Army, 1994*). An unfired percussion primer and ignition charge could be caused to function only if the percussion primer was struck sharply perpendicular with a relatively sharp, hard object with sufficient force. Because the ignition cartridge is contained in the fin assembly and is vented, it should not detonate. If caused to function, the type of injury that could be sustained could be burns because of the gases from the ignition charge. Although these items have been exposed to the elements for many years, an unfired fin assembly should be expected to function if properly struck.

Summary: It is very unlikely that a person would be able to cause an unfired cartridge to function through casual contact if one were found at the site and be burned, because it would require a hard, precise blow to the primer to function. A person could not be injured by a fired cartridge if one were found at the site, because it has no parts that function explosively, smoke, or burn.

3.22.6 Site Evaluation

The available data (e.g., archival and reconnaissance data) regarding Site OE-22 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 22-A1. This section presents a summary of the results of the checklist evaluation. It is divided into two sections: (1) an assessment of the literature review and (2) an assessment of the sampling performed at the site.

3.22.6.1 Literature Review

Type of Training and OE Expected

The following summarizes the type of training expected at the site based on the literature review:

- Review of former Fort Ord training maps and aerial photographs indicates that the site area was used primarily as small arms ranges prior to the 1940s until Fort Ord was closed in 1994.

- Interview records indicate that Range 8 (Known Distance Range) was an occasional practice mortar training area using inert training devices.

- Additional archival information indicates that in the 1940s, 75mm projectiles were fired into the sand dunes as part of amphibious training. There are historical documents that indicate that the beach area

was used for amphibious vehicle training. No training maps or other historical records indicate the use of projectiles as part of training activities at the site.

- Training maps from the 1940s through 1980s also indicate non-firing training occurred at Site OE-22 that included firing ranges; an obstacle course; bivouac area; rifle instruction circle; bayonet assault course; chemical, biological, and radiological training areas; infiltration course; and target detection areas.

- It should be noted that the site also contained an ASP. It is possible that there may be some OE in the area of the ASP if ammunition was not properly transferred from the storage facility or possibly, stolen and buried onsite.

Based on these past uses, the following could be expected at the site:

- Small arms ammunition (5.56mm, 38- and 45- caliber pistol, 7.62mm, 7.62 machine gun, and 12 gauge shotgun)

- Practice mortars

- 75mm projectiles.

Subsequent Use of the Area

The site was used for small arms firing ranges from the 1940s until base closure. With the exception of sampling and soil removal programs, the site was inactive after Fort Ord closed in 1994. As previously discussed, the site is planned to be used as a state park.

Establishment of Site Boundaries

Boundaries of the site are defined by the ocean to the west, Highway 1 to the east, and the former Fort Ord boundary as seen in the training maps to the north and south. Small arms ranges are clearly visible on aerial photographs and training maps from 1941 through 1994. The site boundary from the ASR captures the full extent of all the ranges, and therefore, does not need to be revised.

Summary of Literature Review Analysis

It appears that the site was used for small arms weapons firing; mortar training; potentially firing 75mm projectiles from offshore; obstacle course training; rifle instruction; a bayonet assault course; chemical, biological, and radiological training (these types of weapons were not used in training); infiltration training; battle demonstrations; as an Ammunition Supply Point (ASP); and for target detection. Based on past site practices, small arms ammunition, practice mortars, and 75mm projectiles may be present in the site vicinity. The site boundary from the ASR includes all of the beach firing ranges, and therefore, does not need to be revised. Based on the literature review, sampling of the site for OE was warranted.

3.22.6.2 Sampling Review

This section describes the items that were found at the site and how these items support or conflict with 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 OE sampling programs.

Sampling Results (Items Found)

HFA 100 percent sampled sixty 100- by 100-foot grids within the Site OE-22 boundary. There is no documentation of the number of anomalies detected in the HFA report. The following OE items were found and removed. The exact location and depth of discovery of these items was not documented in the HFA report:

- One inert MKII practice hand grenade (location and depth not available)
- One expended M22 smoke grenade found in the vicinity of the ASP
- One inert (expended) M205 hand grenade fuze found in the vicinity of the ASP.
- Fins from one M50 series practice mortar (model unknown) found in the vicinity of the ASP. These fins were reportedly inert.
- Two 40mm cartridge cases (type unknown) found in the vicinity of the ASP. These cartridge cases were reportedly inert.

Two hundred and thirty nine pieces of live small arms ammunition were also found and removed (*HFA, 1994*).

CMS divided the site into two sectors (north and south) for sampling; 22 grids were located in the northern half of the site and 22 in the southern half of the site. Seven hundred and seventy-five anomalies were found and 360 were investigated. One OE scrap item (an empty, unfuzed Japanese mortar) was found at a depth of 8 inches and removed (*USA, 2000*). Because the SS/GS sampling program identifies which anomalies to investigate, the remaining anomalies were not investigated. Review of grid records indicates that approximately 33 of the 44 grids were 100 percent investigated and in the other 11 grids, between 27 and 32 percent of the anomalies were excavated.

Additional sampling was performed by CMS at the former ASP in 1998. The following three inert items were found during sampling of the ASP:

- Two inert 25mm subcaliber M379 projectiles
- One inert M30 practice hand grenade.

Table 22-2 lists OE scrap found during sampling.

Based on information from a telephone interview, an unknown type of 105mm rounds were found during construction of berms at the former ASP in 1985. Because the Army believes that these items were ammunition stolen from the ASP, it is likely that these items had not been fired and probably had no fuzes installed. A geophysical sweep was also performed at the ASP in 1987. During the geophysical sweep, pyrotechnics, small arms, and smoke grenades were found. There is no specific information about the models or quantities of the OE items that were found during the geophysical sweep or if the found items were inert.

During remedial investigations and soil removal programs, the following incidental OE or OE scrap were found at the site:

- One inert 4- by 1-inch fragment of rusted OE, possibly a 37mm round

- One inert 20mm round
- One grenade fuze. It cannot be confirmed that the fuze was inert.
- Two expended smoke grenades (listed as spherical grenades in database).
- One Japanese 57mm mortar. It cannot be confirmed that the mortar was inert.
- One 57mm recoilless rifle casing. It can not be confirmed that the rifle casing was inert
- One practice rifle grenade. It cannot be confirmed that the rifle grenade was inert.

Table 22-3 lists incidental OE found at OE-22 and vicinity.

With the exception of the small arms and training mortars, the OE items found are not consistent with what would be expected based on past training practices at the site. The other OE items found (57mm mortars, grenades, subcaliber M379 25mm projectiles, and "105mm rounds") were not likely from documented training activities, but could have been intentionally or unintentionally discarded at the site or as discussed earlier, may have been stolen from the ASP and buried at the site for later retrieval. Additional information concerning the types of OE found is provided in Attachment 22-A2.

Site Boundaries Review

All sample grids were located within the site boundary (*HFA, 1994 and USA, 2000*). The boundary provided in the CMS AAR is smaller than the ASR Site OE-22 boundary. The boundary is also split into two disconnected north and south sections. It appears that the area around Stillwell Hall was not included in the 1997 CMS sampling program.

Equipment Review

The Schonstedt GA-52/C or the GA-72/Cv was used by HFA, and the Schonstedt GA-52/Cx was used by USA to conduct the geophysical surveys at each grid. 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 -72/Cv, and GA-52/Cx magnetometers was evaluated as part of the Ordnance Detection and Discrimination Study (ODDS; *Parsons Infrastructure & Technology Group Inc. [Parsons], 2001b*). As part of the ODDS, studies were performed to evaluate:

- Signatures of inert OE 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 OE items buried at various depths (seeded tests).

- Geophysical instrument performance at actual OE sites (field trial site testing).

The Schonstedt tools described above 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 Site OE-22; therefore, differences in field conditions, if applicable, should be considered when using information from the ODDS.

For the purposes of evaluating the geophysical equipment used at this site, it is assumed that the OE at Site OE-22 would occur at depths of up to 5 feet below ground surface (bgs), which would correspond to Type V items in the ODDS. This depth is based on the maximum penetration depths of the ordnance potentially present at the site (depth of penetration of 37, 57, and 75mm projectiles is listed as 3.9, 2.7, and 4.9 feet in sand) (*Earth Tech, 1998*). Therefore, Type V seeded test results from the ODDS were used for comparison purposes in evaluating the performance of the geophysical instruments used at this site.

During the seeded tests, the Schonstedt GA-52/C located between 34 (search radius of 1.6 feet and search lane width of 5 feet) and 53 (search radius of 3.3 feet and search lane width of 5 feet) percent of the items buried at approximately 5 feet bgs, the Schonstedt GA-72/Cv located between 38 (search radius of 1.6 feet and search lane width of 5 feet) and 44 (search radius of 3.3 feet and search lane width of 5 feet) percent of the Type V items, and the Schonstedt GA-52/Cx located 34 (search radius of 1.6 feet and search lane width of 5 feet) to 63 (search radius of 3.3 feet and search lane width of 5 feet) percent of the Type V items (*Parsons, 2001b*). 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 OE 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. Because field conditions at the seeded test site and orientations of buried items may not be comparable to Site OE-22 conditions, the results should only be used as an indication that the equipment is capable of detecting the same types of items at equivalent depths.

Results of the ODDS Field Trial Sites (FTS) were also reviewed for potential use in evaluating instrument performance at Site OE-22. Detection rates were calculated for four of the six test sites; the remaining sites did not have enough OE detected to allow calculation of site statistics. The calculated detection rates for the four sites ranged from 64 to 98 percent for the Schonstedt GA-72/Cv, 52 to 96 percent for the Schonstedt GA-52/C, and 97 to 100 percent for the Schonstedt GA-52/Cx, 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 ordnance density. In comparison, Track 1 sites, such as OE-22, are expected to have very low densities of OE scrap. Therefore, the field trial results may not be applicable to Site OE-22.

Although not directly comparable to Site OE-22, the results of the ODDS indicate the effectiveness of the equipment used at this site may be limited by the depth of the OE items.

Sampling Methods Discussion

Sixty 100- by 100-foot grids were established within the site boundary as part of the 1994 HFA sampling program. The grids were 100 percent sampled (100 percent of the anomalies detected in the sampling grids were excavated). Twenty-four of the sixty grids were located in the vicinity of the ASP. The remaining 36 sample grids were placed over the remainder of the site in areas where the probability of finding OE-related items was believed to be high (*HFA, 1994*). The number of anomalies detected was not documented and no grid records were generated by HFA.

According to the work plan, each grid was 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 item locations were plotted on a map and then the items were removed. Subsurface anomalies were marked with yellow flags for excavation and identification, and were uncovered using hand tools (*HFA, 1993*). The general approach to investigation of the anomalies was to dig down until a metal item was found, remove the metal item, then re-check the excavated area. If the Schonstedt no longer indicated buried ferrous items, no further digging was performed. If the Schonstedt continued to indicate the presence of an anomaly, the area was excavated to at least 4 feet bgs.

Site OE-22 was sampled in 1997 by CMS using the SS/GS sampling program. SS/GS is a computer program that is used to statistically estimate the ordnance density of a site or grid during field investigations. It estimates the number of ordnance items at a given site or grid and can be used to assess whether a site has been characterized adequately. The program was designed so that there were equal chances of finding OE and non-OE items.

When using SS/GS, the first step is to divide the site into homogeneous sectors with the same ordnance characteristics, terrain, and past ordnance use. The grids are searched with a magnetometer and the anomalies are marked and recorded. The grids are investigated using 5-foot wide search lanes. The technician walks the lane while moving the magnetometer in a sweeping motion across the width of the lane. SS/GS requires that if a grid has 20 or fewer anomalies, then all of the anomalies should be investigated. If a grid has more than 20 anomalies, 20 anomalies plus 37 percent of all identified anomalies over 20 will be investigated. No grid had less than 5 percent and no more than 40 percent of its anomalies investigated. Excavation of anomalies is performed in accordance with the direction of the program; generally 32 to 40 percent of the flagged anomalies are investigated using this technique (*CMS, 1995*).

The SS/GS methodology was reviewed by the EPA's Federal Facilities Restoration and Reuse Office. The Technical Support Center, EPA National Exposure Research Laboratory (NERL) in Las Vegas, Nevada also provided statistical assistance in reviewing the SS/GS methodology *(NERL, 2000*). Several problems were identified as a result of the review. The primary conclusions were that: 1) the statistical procedures were vague and not well documented, 2) conclusions about site homogeneity were not consistent, 3) the stopping rules were faulty, and 4) the methodology was not able to identify OE clusters at a site. Although these problems associated with the statistical evaluation portion of the program were identified, the information obtained during sampling was useful in identifying the presence and type of OE at the site.

A total of 44 sample grids were selected by the SS/GS program to sample. Site OE-22 was divided into two sectors (north and south); 22 grids were located in the northern half of the site and 22 in the southern half of the site. Thirty-nine of the grids were 100- by 200-feet and five had dimensions of 50- by 200-feet.

A total of 18.64 acres were sampled; 773 anomalies were detected and 360 were investigated. It should be noted that the number of samples collected differs in the AAR – the text states that there were 401 areas sampled but Tables B1 and B2 in Appendix F and grid records (*USA, 2000*) indicate that 360 anomalies were sampled. Review of grid records indicates that 33 of the 44 grids were 100 percent investigated and in the other 11 grids between 27 and 32 percent of the anomalies were excavated. CMS used the same approach to anomaly investigation as did HFA (excavation to buried metal and re-scanning with the Schonstedt). One scrap OE item (an un-fuzed, empty Japanese mortar) was found at a depth of 8 inches and removed. It should be noted that because some anomalies were not excavated using the SS/GS approach, some buried OE or OE scrap may still be present within the sampling grids.

Additional sampling was performed at the former ASP in 1998 by CMS. Two subcaliber 25mm projectiles, M379, and one M30 practice hand grenade were found in the vicinity of the ASP.

Quality Assurance/Quality Control

The QA/QC procedures used by HFA and CMS during sampling are described below.

Field Sampling QA/QC

HFA Sampling

Specific information concerning operational procedures was not documented in the HFA final 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. Information in the final report indicated that a solid steel 81mm mortar, buried at 4 feet bgs was used. The magnetometers were to be tested before starting OE operations in the morning and when operations resumed after lunch. Magnetometers that failed the inspection 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 (10 percent of each grid area was swept again with a magnetometer). If OE was detected during the QC check, the grid was searched again to ensure that there were no other OE present. All grids were to be left in place until the Army Corps of Engineers Huntsville Division (CEHND) Safety Specialist completed the Quality Assurance (QA) check. No QA records for this sampling effort are available. QC reports that included descriptions and results of the QC checks were to be completed daily.

CMS Sampling

Throughout operations, CMS performed daily operational checks and QC inspections. Because of the nature of the SS/GS sampling, QA/QC was limited to inspections of operational activities and documentation. No deficiency reports were written during inspections.

In accordance with the work plan, all instruments requiring maintenance and/or calibration were to be checked prior to the start of each workday. Batteries were to be replaced as needed and the instruments

were to be checked against a known source. The QC specialist was responsible for ensuring that personnel perform operational checks and make appropriate log entries. The QC specialist also was to perform random unscheduled checks of the various sites to ensure that personnel performed the work as specified in the work plan. The QC specialist audited logs prepared by contract personnel (*CMS, 1995*). All grids passed QC inspection.

Subsequent to SS/GS sampling by CMS, the use of the statistical program for site sampling was questioned. Based on several comments concerning the SS/GS statistical program discussed previously, it is not possible to statistically evaluate the adequacy of the SS/GS sampling performed by CMS at this site.

Data Management QA/QC

Parsons, the current OE 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 (*Parsons, 2001a*). This evaluation included a review of field grid records (if available) and the database created by the OE 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 Standard Operating Procedure (SOP) provided as Appendix B of this report (*Parsons, 2001a*). The purpose of the data review was to complete a 100 percent check of all available grid records to identify discrepancies between the after action reports 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 this site, the following conclusions can be made regarding the quality of the data:

HFA Sampling

- The data collected by HFA were useful in providing information concerning the type of OE items present at the site.
- Coordinate data were not collected for locations and depths of found items.
- No QA records for this sampling effort are available.

CMS Sampling

- Grids were surveyed and the grids were located within the 1997 ASR site boundary
- There was coordinate and depth information concerning found OE scrap items
- The data collected are useful in providing information concerning the type of OE items present at the site
- Thirty-three of the 44 grids investigated were 100 percent sampled (all identified anomalies were excavated). Because some anomalies were not excavated using the SS/GS investigative approach, some subsurface OE or OE scrap may still be present within the 11 sampling grids that were not 100 percent sampled.

Review of the SS/GS methodology indicated that the statistical procedures used were vague and not well documented, conclusions about site homogeneity were not consistent, stopping rules were faulty, and the methodology was not able to identify potential OE clusters.

3.22.7 Conclusions and Recommendations

This section presents conclusions and recommendations for Site OE-22 that are based on review of historical information and sampling data collected from the site as summarized above.

3.22.7.1 Conclusions

Site Use and Development

- Fort Ord training maps and aerial photographs indicate that portions of the entire site were used primarily as small arms ranges prior to the 1940s until Fort Ord was closed in 1994.

- Training maps from the 1940s through 1980s indicate that Site OE-22 included firing ranges, an obstacle course, bivouac area, rifle instruction circle, bayonet assault course, chemical, biological, and radiological training areas, infiltration course, and target detection training areas.

- Interview records indicate that Range 8 (Known Distance Range) was an occasional practice mortar training area using inert training devices. Interview records and review of historical newspaper articles indicate that the area was also used for amphibious assault training and battle demonstrations.

- Additional interviews indicate that in the 1940s, 75mm projectiles were fired into the sand dunes as part of amphibious training. No training maps indicate the use of projectiles as part of training activities.

- OE-related items found at the site include grenades, recoilless rifle cartridges, practice mortars, a Japanese mortar, subcaliber M379 25mm projectiles, "105mm rounds," and pyrotechnics. Many of these items were found near the ASP and may be OE that were stolen from the ASP and buried at the site for later retrieval. Substantial quantities of small arms were also found. With the exception of the small arms and practice mortars, the items found are not what would be expected based on past use of the site.

- OE used during training and found at the site includes practice mortars (M50 Series, and M68 and M69 Training Mortars). However, these items, if present at the site, are considered to pose an acceptable risk if encountered for the following reasons:

  Cartridge, 60 Millimeter: Target Practice Mortar: M50 Series. It is very unlikely that a person could cause an unarmed M50 Series practice mortar to function through casual contact. However, it is possible that the mortar fuze could be armed by intentionally removing the Safety Pin (Bore Riding Pin). If the Safety Pin (Bore Riding Pin) is not present in the fuze, the fuze is considered armed. Once armed the fuze becomes highly sensitive and could function through casual movement. If the fuze functions a person could be exposed a low order detonation and metal fragments from the fuze.

  Cartridge, 60 Millimeter, Training Mortar: M69. It is very unlikely that a person would be able to cause an unfired cartridge to function through casual contact if one were found at the site and be burned, because it would require a hard, precise blow to the primer to function. A person

could not be injured by a fired cartridge if one were found at the site, because it has no parts that function explosively, smoke, or burn.

Cartridge, 81 Millimeter, Training Mortar: M68. It is very unlikely that a person would be able to cause an unfired cartridge to function through casual contact if one were found at the site and be burned, because it would require a hard, precise blow to the primer to function. A person could not be injured by a fired cartridge if one were found at the site, because it has no parts that function explosively, smoke, or burn.

- A state park is planned for Site OE-22. Both open space and recreational areas are anticipated.

Sampling Adequacy and Data Quality

- Sixty grids were 100 percent sampled by HFA. Grids were located in the ASP and in areas of the site where the probability of finding OE-related items was believed to be high.

- Forty-four grids were sampled by CMS using the SS/GS sampling program. All of the anomalies were investigated in 33 of the 44 grids. There have been problems identified with SS/GS sampling related to the statistical program used; however, the data are useful in identifying the potential presence of OE. In addition, because not all of the anomalies are investigated using the SS/GS sampling approach, some buried OE or OE scrap may still be present within the sampling grids.

- Schonstedt GA-52/C, GA-72/Cv, and GA-52/Cx magnetometers were used during previous investigations. These instruments were evaluated as part of the ODDS and may be limited by the depth of the OE items (See Equipment Review, Section 3.22.6.2 – Sampling Review).

- Sampling and evaluation of previous work followed published work plans and SOPS.

- The data collected by HFA were useful in providing information concerning the type of OE scrap present at the site; however, coordinate data were not collected for locations and depths of found items, and the instruments used by HFA may be limited by the depth of the OE items (Section 3.22.6.2).

- The data collected by CMS were useful in providing information concerning the type of OE scrap present at the site. In addition, there is accurate survey data for grid locations, and there was coordinate and depth information concerning items found. The instruments used by CMS may be limited by the depth of the OE items (Section 3.22.6.2).

- Although the previous OE sampling efforts performed at Site OE-22 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. Additionally, because the OE items used at Site OE-22 pose an acceptable risk, and there was no OE found in previous investigations at OE-22, further effort to refine the site boundaries or conduct 100 percent sampling of the site would not add significantly to the understanding of the site or change the conclusions of this report.

3.22.7.2 Recommendations

Based on the review of existing data:

- It is not anticipated that OE will be found at Site OE-22. However, there is potential for OE to be present at the site because OE was used throughout the history of the former Fort Ord.

- This site qualifies as a Track 1, Category 3 site because it was used for training and OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

- No further OE-related investigation is recommended; however, as an added precaution the DTSC and State Parks will enter into a Memorandum of Understanding (MOU) for operation and maintenance activities on Site OE – 22. This MOU will be implemented to inspect the beach property for the presence of OE items and lead bullets periodically and after weather induced erosion events. The MOU would also call for proper notification in the case of any discovery of OE items (or potential OE items), during these inspections. The Army will provide ordnance recognition and safety training to all California State Parks employees who work at the former Fort Ord Beach Ranges. In addition, any construction personnel involved in intrusive operations at the site will attend the Army's "ordnance recognition and safety training" to increase their awareness of and ability to identify OE items. Trained construction personnel will contact an appropriate authority, as identified in the MOU, if a potential OE item is encountered. To accomplish that objective, State Parks will notify the Army of planned intrusive activities and the Army will provide ordnance recognition and safety training to workers prior to the start of intrusive work. Additionally, while these intrusive activities are ongoing, the Army will provide ordnance safety refresher education as appropriate.

These conclusions and recommendations are based on the following:

- The sampling results provide no evidence that high explosives (HE) were used at the site. Specifically, no OE related to amphibious training or battle demonstrations have been found.

- The site has been extensively walked, mapped and disturbed, and remediation has been conducted in the dune area. With the exception of the ASP, only OE scrap was found during the OE sampling programs.

- The potential for offshore OE washing up onto the beach and charges from beach demonstrations to be present within the site boundary is low because no OE has been found on the beach in the 50(+) years since the training occurred. It should be noted that the beaches have undergone heavy erosion and the former beach area is now below the tide line, reducing any potential for encounters with any OE and charges from past training activities at the beach.

Upon approval of the proposed remedy (no further OE-related investigation), Site OE-22 will be incorporated into the basewide OE RI/FS 5-year review schedule. The purpose of the 5-year review is to assess whether the remedy at Site OE-22 continues to be protective of human health and the environment. The 5-year review will also document any newly identified site-related data or issues identified during the review and will identify recommendations to address these issues, as appropriate.

3.22.8 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 Magnetometers.*

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

Collins, 2002. Personal Communication between Bill Collins of the Directorate of Environmental and Natural Resources Management, Presidio of Monterey and Bethany Flynn of Harding ESE. November.

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

Earth Tech, 1996. Documentation of Continued Archives Search With Media ADS. USA Today. July 19.

_____, 1998. *Engineering Evaluation/Cost Analysis – Phase 2, Former Fort Ord, Monterey County, California.* April.

Gillis, T., 1999. Interview with Jeff Fenton, Harding Lawson Associates. July 27.

Hancock, R., 1993. Interview with Bruce Wilcer, Harding Lawson Associates. July 13.

HLA, 1995a. *Enhanced Preliminary Assessment of Monterey Bay, Fort Ord, California*.

_____, 1995b. *Basewide Remedial Investigation/Feasibility Study, Fort Ord, California*. Site 3. October 19.

_____, 1999. *Final Enhanced Preliminary Assessment of Monterey Bay, Fort Ord, California.* January 12.

_____, 2000a. *Draft Final 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.

Harding ESE, 2002. *Technical Memorandum, CWM-Related Responses and Reports, Ordnance and Explosives, Remedial Investigation/Feasibility Study, Former Fort Ord, California. Preliminary Draft.*

Hogg, Ian V., 2001. *The American Arsenal*. Greenhill Books. London.

Human Factors Applications, Inc. (HFA), 1993. *Ordnance and Explosive Waste (OEW) Site Operations, Ford Ord-Phase I Work Plan and Accident Prevention Plan*. December.

_____, 1994. *OEW Sampling and OEW Removal Action. Ft. Ord Final Report.* December 1.

IT Corporation (IT), 2000. *Final Remedial Action Confirmation Report and Post-Remediation Risk Assessment, Site 3 Remedial Action, Basewide Remediation Sites, Former Fort Ord, California.* August.

National Exposure Research Laboratory (NERL), 2000. *Evaluation of U.S. Army Corps of Engineers Statistical UXO Sampling and Characterization Methodologies*. Contract No. 68-C5-0091. July.

Panorama, 1944. Battle of Monterey Bay for Under-Secretary of War Robert Patterson. Article. July 7.

Parsons, 2001a. *Draft Ordnance and Explosives, Sampling and Analysis Plan. Former Fort Ord, Monterey, California, Ordnance and Explosive Cleanup.* July.

_____, 2001b. *Draft Ordnance Detection and Discrimination Study (ODDS), Former Fort Ord, Monterey, California*. August.

Stickler, L., 1999. Interview with Jeff Fenton, Harding Lawson Associates. July 29.

_____, 2003. Interview with Mary Jo Heassler, Bruce Wilcer, and Jeff Fenton, MACTEC. April 23.

Stratton, 2003. Interview with Bruce Wilcer, MACTEC. May 16.

USA Environmental, Inc. (USA), 2000. *Final Report, SS/GS Sampling After Action Report, Former Fort Ord, California, Site OE-22 (Beach Ranges).* October 3.

U.S. Army (Army), 1933-34. (prepared under the direction of the Chief of Engineers). Camp Ord and Vicinity. Terrain Map.

_____, 1940. *Fort Ord: Map Locator*.

_____, 1945. *Training Facilities, Fort Ord and Vicinity, California.* Revised August 1945.

_____, 1946. *Master Plan, Fort Ord, California*. April 5.

_____, 1954. *Training Areas That Cannot Be Used At Same Time: (As Presented In Use). Inclusion I to Appendix A to Annex O.* Circa 1954.

_____, 1956. *Map of Fort Ord Training Areas & 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 1 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., 9th Battle Group, 3rd Brigade.

_____, 1967. *Back Country Roads, Field Training Area and Range Map, Fort Ord, California.* January.

_____, 1972. *Field Training Area and Range Map. Appendix 3 to Annex W, Fort Ord Reg 350-1.* Revised 1 July 1972.

_____, 1977a. *Technical Manual, Army Ammunition Data Sheets, Artillery, Ammunition, Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers, and Artillery Fuzes (Federal Supply Class 1310, 1315, 1320, 1390).* April.

_____, 1977b. *Technical Manual, Army Ammunition Data Sheets for Grenades. Tm 43-0001-29.* October.

_____, 1987. *Ranges and Training Area Overlay, Fort Ord and Vicinity*. Revised 15 November 1987.

_____, 1991. *Fort Ord Range/Training Area Operating Procedures and Usage Guide.* June 20.

_____, 1994. *Training Manual TM43-0001-28.*

U.S. Army Corps of Engineers (USACE), 1961. *Basic Information Training Facilities.* Revised as of 30 June.

_____, 1968. *Training Facilities Map.* Engineer District Sacramento. March.

_____, 1980. *Training Facilities Map, Basic Information Maps, Master Plan.* Sacramento Corps of Engineers. March.

_____, 1984. *Training Facilities Map, Basic Information Maps, Master Plan.* Engineer District Sacramento. June.

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

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.

USGS, 1985. *Coast of California Storm and Tidal Waves Study.* Geomorphology Framework Report. Ref. No. CC STWS 85-2. December.

_____, 1997. *Southern Monterey Bay Continental Shelf Investigations: Former Fort Ord Restricted Zone*. Open File Report 97-450.

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

TABLES

Table 22-1. Sampling Operations
Site OE-22
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	Operation Type	Contractor	Instrument	Grid Completion Date
OE-22 -- Beach Ranges	C1D5E5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1D5H4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1D5I7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1E6D2-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1E6G3-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1E6I4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1F6F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1F6H0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1F7I1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H6A8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H6B8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H6D0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7E2-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7F5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7H6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7I5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7I7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H7J2-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H8D6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H8F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H9H1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1H9I2-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I7D6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I7E0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I7E8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available

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OE-22 -- Beach Ranges	C1I7F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I7I0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8B0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8C1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8D3-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8D5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8G1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8H4-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8H7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8I2-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I8I5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9D3-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9E6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9F3-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9H0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9H5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9H7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1I9J8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1J0J3-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	C1J9A7-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D1A0A1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D1A0E9-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D1A0F1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available

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OE-22 -- Beach Ranges	D1A9B0-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D1A9F5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D1A9F8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2A1H1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2F1E5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2F1G6-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2H2A1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2I2C8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2J3E1-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2J3F5-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	D2J3I8-01	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	OE-22	Sampling	HFA	SCHONSTEDT GA-72CV or GA-52C	Not Available
OE-22 -- Beach Ranges	OE-22_B 01	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 02	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 03	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 04	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 05	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 06	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 07	SS/GS	USA	SCHONSTEDT GA-52CX	7/14/1997
OE-22 -- Beach Ranges	OE-22_B 08	SS/GS	USA	SCHONSTEDT GA-52CX	7/14/1997
OE-22 -- Beach Ranges	OE-22_B 09	SS/GS	USA	SCHONSTEDT GA-52CX	7/14/1997
OE-22 -- Beach Ranges	OE-22_B 10	SS/GS	USA	SCHONSTEDT GA-52CX	7/14/1997
OE-22 -- Beach Ranges	OE-22_B 11	SS/GS	USA	SCHONSTEDT GA-52CX	7/10/1997
OE-22 -- Beach Ranges	OE-22_B 12	SS/GS	USA	SCHONSTEDT GA-52CX	7/9/1997
OE-22 -- Beach Ranges	OE-22_B 12	SS/GS	USA	SCHONSTEDT GA-52CX	7/10/1997

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Site	Grid	Operation Type	Contractor	Instrument	Grid Completion Date
OE-22 -- Beach Ranges	OE-22_B 13	SS/GS	USA	SCHONSTEDT GA-52CX	7/10/1997
OE-22 -- Beach Ranges	OE-22_B 14	SS/GS	USA	SCHONSTEDT GA-52CX	7/9/1997
OE-22 -- Beach Ranges	OE-22_B 15	SS/GS	USA	SCHONSTEDT GA-52CX	7/10/1997
OE-22 -- Beach Ranges	OE-22_B 16	SS/GS	USA	SCHONSTEDT GA-52CX	7/9/1997
OE-22 -- Beach Ranges	OE-22_B 17	SS/GS	USA	SCHONSTEDT GA-52CX	7/8/1997
OE-22 -- Beach Ranges	OE-22_B 18	SS/GS	USA	SCHONSTEDT GA-52CX	7/8/1997
OE-22 -- Beach Ranges	OE-22_B 18	SS/GS	USA	SCHONSTEDT GA-52CX	7/9/1997
OE-22 -- Beach Ranges	OE-22_B 19	SS/GS	USA	SCHONSTEDT GA-52CX	7/21/1997
OE-22 -- Beach Ranges	OE-22_B 20	SS/GS	USA	SCHONSTEDT GA-52CX	7/21/1997
OE-22 -- Beach Ranges	OE-22_B 21	SS/GS	USA	SCHONSTEDT GA-52CX	7/21/1997
OE-22 -- Beach Ranges	OE-22_B 22	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 23	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 24	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 25	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 26	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 27	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 28	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 29	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_B 30	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_B 31	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_B 32	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_B 33	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_B 34	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_B 35	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_B 36	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997

Table 22-1. Sampling Operations
Site OE-22
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	Operation Type	Contractor	Instrument	Grid Completion Date
OE-22 -- Beach Ranges	OE-22_BCH 01	SS/GS	USA	SCHONSTEDT GA-52CX	7/15/1997
OE-22 -- Beach Ranges	OE-22_BCH 02	SS/GS	USA	SCHONSTEDT GA-52CX	7/14/1997
OE-22 -- Beach Ranges	OE-22_BCH 03	SS/GS	USA	SCHONSTEDT GA-52CX	7/9/1997
OE-22 -- Beach Ranges	OE-22_BCH 04	SS/GS	USA	SCHONSTEDT GA-52CX	7/8/1997
OE-22 -- Beach Ranges	OE-22_BCH 05	SS/GS	USA	SCHONSTEDT GA-52CX	7/21/1997
OE-22 -- Beach Ranges	OE-22_BCH 06	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_BCH 07	SS/GS	USA	SCHONSTEDT GA-52CX	7/17/1997
OE-22 -- Beach Ranges	OE-22_BCH 08	SS/GS	USA	SCHONSTEDT GA-52CX	7/16/1997
OE-22 -- Beach Ranges	OE-22_DDR 01	Sampling	USA	SCHONSTEDT GA-52CX	11/24/1998
OE-22 -- Beach Ranges	OE-22_DDR 01	Sampling	USA	SCHONSTEDT GA-52CX	11/25/1998
OE-22 -- Beach Ranges	OE-22_DDR 02	Sampling	USA	SCHONSTEDT GA-52CX	11/24/1998

Site = OE Site Number
Sampling = 100 percent of the anomalies detected were excavated to a minimum depth of 4 feet. Deeper anomalies were investigated if directed by the USACE.
SS/GS = Sitestats/Gridstats sampling was performed, selected anomalies were excavated.
HFA = Human Factors Applications, Inc.
USA = USA Environmental
Note: Fields with annotation of "not available" is a void field in the OE database.

Table 22-2. OE Scrap Found During Sampling
Site OE-22
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site	Grid	OE Items	Status	Depth (in)	Quantity
OE-22 -- Beach Ranges	OE-22	Cartridge case, 40mm	Inert	Not available	2
OE-22 -- Beach Ranges	OE-22	Fuze, grenade, hand, practice, M205 series	Inert	Not available	1
OE-22 -- Beach Ranges	OE-22	Grenade, hand, practice, MK II	Inert	Not available	1
OE-22 -- Beach Ranges	OE-22	Grenade, rifle, smoke, M22 series	Inert	Not available	1
OE-22 -- Beach Ranges	OE-22	UNKNOWN MODEL: PROJECTILE, MORTAR, PRACTICE, 60mm, M50 SERIES (FINS ONLY) (OE Model Unknown)	Inert	Not available	1
OE-22 -- Beach Ranges	OE-22_B 31	UNKNOWN MODEL: PROJECTILE, 50MM, JAPANESE, TYPE 89 (NI MORTAR) EMPTY (OE Model Unknown)	Inert	8	2
OE-22 -- Beach Ranges	OE-22_DDR 01	Grenade, hand, practice, M30	Inert	9	1
OE-22 -- Beach Ranges	OE-22_DDR 01	Projectile, 25mm, subcaliber, M379	Inert	13	1
OE-22 -- Beach Ranges	OE-22_DDR 01	Projectile, 25mm, subcaliber, M379	Inert	9	1

Site = OE Site Number
Grid = Grid in which item was found.
Status = Condition of item, either live or inert. Inert indicates no OE hazard.
Depth = inches below ground surface that item was found.
Quantity = Number of like items found.

Note: Fields with annotation of "not available" is a void field in the OE database.

Table 22-3. Incidental OE Items Found
Site OE-22 and Vicinity
Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study
Former Fort Ord, California

Site or Area	Activity	OE Items	Contractor	Status	Quantity	Depth (in)	Date found
OE-22; Found near Stillwell Hall; front part of parking lot between two access roads	RI	ROUND, 20MM, (UNKNOWN) (OE Model Unknown)	HLA	Inert	1	0	10/12/1993
OE-22 (Beach Ranges); Site 3	RI	4"x1" DIAM RUSTED PIECE OF ORDNANCE (OE Model Unknown)	HLA	Inert	1	0	12/2/1993
OE-22 (Beach Ranges)	RI	GRENADE, FUZE	HLA	Unknown	1	0	5/25/1994
OE-22 (Beach Ranges); Site 3 Range 8	RI	SPHERICAL GRENADES	HLA	Unknown	2	0	5/25/1994
OE-22 (Beach Ranges)	Biological Sampling	JAPANESE, MORTAR, 57MM (OE Model Unknown)	HLA	Unknown	1	0	10/14/1996
OE-22 (Beach Ranges)	1997-1998 Remedial Action	RIFLE, CASING, 57MM (OE Model Unknown)	IT	Unknown	1	Unknown	Unknown
OE-22 (Beach Ranges)	1997-1998 Remedial Action	PRACTICE, RIFLE, GRENADE (OE Model Unknown)	IT	Unknown	1	Unknown	Unknown

Note: This table does not include all incidental OE discussed in the text, but only presents OE entered into the OE database.
Site = OE Site Number.
Status = Condition of item, either live or inert, inert indicates no OE hazard (i.e., OE scrap).
Depth = inches below ground surface that the item was found.
Quantity = Number of like items.
RI = Remedial Investigation

PLATES

Disclaimer

The following plates have been prepared to present pertinent features digitized from historical training maps and scanned aerial photographs. 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 may contribute to misalignments of some map features with respect to the aerial photographs.

ATTACHMENT 22-A1

SITE OE-22

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
LITERATURE REVIEW

DEVELOPMENT AND USE OF THE SURROUNDING AREA

	Yes	No	Inconclusive
4. ***Does subsequent development or use of the area indicate that OE would have been used at the site?***	Yes		

Sources reviewed and comments
The site contains an ammunition supply storage area. As previously discussed, there are reports that 75mm projectiles were fired into the dunes from offshore.

5. ***Does use of area surrounding the site indicate that OE would have been used at the site?***		No	

Sources reviewed and comments
OE would not have been used in the surrounding area (ocean, City of Seaside, City of Marina, Main Garrison). Historical information indicates use as above.

References
USAEDH, 1997; HLA, 2000.

ESTABLISHMENT OF SITE BOUNDARIES

6. ***Is there evidence of training areas on aerial photographs that could be used to establish***	Yes		

Sources reviewed and comments
Small arms ranges are clearly visible on aerial photographs. Boundaries of the site are defined by the ocean to the west, Highway 1 to the east, and the Fort Ord boundary to the north and south.

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

Sources reviewed and comments
other training areas (chemical, biological, radiological, obstacle course, bayonet assault course, rifle instruction circle, target detection areas, bivouac areas). The 18 small arms ranges all fall within the site boundaries as defined above.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
LITERATURE REVIEW

References
Army, 1940, 1945, 1946, 1954, 1956, 1957, 1958, 1967, 1972; USACE, 1961, 1968.

	Yes	No	Inconclusive
8. *Should current boundaries be revised?*		No	

Sources reviewed and comments
The current site boundary (from the ASR) includes all of the small arms ranges.

RESULTS OF LITERATURE EVALUATION

	Yes	No	Inconclusive
Does the literature review provide sufficient evidence to warrant further investigation?	Yes		

Comments
The literature review results indicate the potential for OE to be present at the site.
References
HLA, 2000.

REFERENCES

Army, 1940. Fort Ord: Map Locator.
Army, 1945. Training Facilities, Fort Ord and Vicinity, California. Revised August 1945.
Army, 1946. Master Plan, Fort Ord, California. April 5.
Army, 1954. Training Areas That Cannot Be Used At Same Time: (As Presented In Use). Inclusion I to Appendix A to Annex O. Circa 1954.
Army, 1956. Map of Fort Ord Training Areas & Facilities. Enclosure I to Annex "O". Revised 20 December 1956.
Army, 1957. Map of Fort Ord Training Areas & Facilities. Enclosure I to Annex "H". Revised: 15 July 1957.
Army, 1958. Map of Fort Ord Training Areas & Facilities. Enclosure 1 to Appendix 1 to Annex "H". Revised: 10 January 1958.
Army, 1967. Back Country Roads, Field Training Area and Range Map, Fort Ord, California. January.
Army, 1972. Field Training Area and Range Map. Appendix 3 to Annex W, Fort Ord Reg 350-1. Revised 1 July 1972.
_____, 1977a. Technical Manual, Army Ammunition Data Sheets, Artillery, Ammunition, Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers, and Artillery Fuzes (Federal Supply Class 1310, 1315, 1320, 1390). April.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
LITERATURE REVIEW

	Yes	No	Inconclusive

_____, 1977b. Technical Manual, Army Ammunition Data Sheets for Grenades. Tm 43-0001-29. October.

Earth Tech 1996. Documentation of Continued Archives Search with Media ADS. USA Today. July 19.

Gillis, T., 1999. Interview with Jeff Fenton, Harding Lawson Associates. July 27.

HFA, 1994. Explosive Ordnance Disposal Division, OEW Sampling And OEW Removal Action, FT. ORD FINAL REPORT. December 1.

HLA, 1999. Final Enhanced Preliminary Assessment of Monterey Bay, Fort Ord, California. January 12.

HLA, 2000. Literature Review Report, Ordnance and Explosives Remedial Investigation/Feasibility Study. Former Fort Ord California. January 4.

IT, 2000. Final Remedial Action Confirmation Report and Post-Remediation Risk Assessment, Site 3 Remedial Action, Basewide Remediation Sites, Former Fort Ord, California. August 2000.

Russell, H., 1993. Interview with Bruce Wilcer, Harding Lawson Associates. July 13.

Stickler, L., 1999. Interview with Jeff Fenton, Harding Lawson Associates. July 29.

USA, 2000. Final Report SS/GS Sampling After Action Report, Former Fort Ord, California, Site OE-22 (Beach Ranges). October 3.

USACE, 1961. Basic Information Training Facilities. Revised as of 30 June.

USACE, 1968. Training Facilities Map. Engineer District Sacramento. March.

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

USAEDH, 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by U.S. Army Corps of Engineers St. Louis District.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
1. ***Is there evidence that the site was used as an impact area (i.e., fired OE such as mortars, projectiles, rifle grenades and other launched ordnance)?***	Yes		

Sources reviewed and comments
A possible 37mm round was found and interview records show that a 105 mm rounds were found. It is not known if these were explosive or practice rounds. Interview records indicate that 75-mm projectiles and projectiles from 8-inch Howitzers may have been fired into the area. The area was also used to practice mortar firing.
References
HFA 1994; USA 2000; HLA 1999 and 2000; Russell, 1993.

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

Sources reviewed and comments
Practice mortars potentially used at the site can contain explosives in the propelling charges. The practice mortars found (M50) were expended, but the model found contains black powder as a spotting charge as well as a propellant. Practice grenades were expended, but the model found (M30) has black powder in the charge. 37 and 105 mm rounds were also found; it is not known if these were practice rounds. As previously discussed, 75-mm projectiles were reportedly fired into the site from amphibious vehicles offshore; it is not known if practice rounds or HE were fired.
References
Army 1977a,b; HFA, 1994; Russell, 1993; Earth Tech, 1996; HLA, 1999.

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

Sources reviewed and comments
Smoke grenades were found at the site.
References
HFA, 1994; Russell, 1993.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
4. ***Was sampling and/or reconnaissance performed within the appropriate area?***	Yes		

Sources reviewed and comments
All sample grids were within the site boundary. In addition, the site has been extensively mapped and surveyed.
References
HFA 1994, USA 2000; HLA, 1995.

	Yes	No	Inconclusive
5. ***Does sampling indicate OE and/or ordnance-related scrap are present at the site?***	Yes		

Sources reviewed and comments
Inert OE scrap has been found.
References
HFA 1994; USA 2000; Russell, 1993; IT, 2000.

	Yes	No	Inconclusive
6. ***Were the type(s) of items found consistent with the type of training identified for the site?***	Yes		

Sources reviewed and comments

With the exception of the grenades and incidental OE found in the vicinity of the Ammunition Supply Point, the OE items found are consistent with what would be expected based on past training practices and reported uses of the site.

	Yes	No	Inconclusive
7. ***Were the type(s) of items found consistent with the era(s) in which training was identified?***	Yes		

Sources reviewed and comments
The beach ranges were reportedly used from as early as the mid-1930s until base closure.
References
HLA 2000.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
8. ***Was HE fragmentation found?***			Inconclusive

Sources reviewed and comments
105 mm rounds were found. It is not known if they were practice or contained explosives.
References
Russell, 1993.

	Yes	No	Inconclusive
9. ***Was HE found?***			Inconclusive

Sources reviewed and comments
Items found during sampling were reportedly inert. It is not known if live HE was found during construction of berms at the ASP.
References
HFA, 1994; USA, 2000; IT, 2000.

	Yes	No	Inconclusive
10. ***Were LE found?***			Inconclusive

Sources reviewed and comments
Items found during sampling were reportedly inert. It is not known if live HE or LE were found during construction of the berms or the geophysical sweep at the ASP
References
HFA, 1994; USA, 2000.

	Yes	No	Inconclusive
11. ***Were pyrotechnics found?***	Yes		

Sources reviewed and comments
Pyrotechnics were found in the ammunition storage area.
References
Russell, 1993.

	Yes	No	Inconclusive
12. ***Were smoke producing items found?***			Inconclusive

Sources reviewed and comments
Only inert smoke grenades were found during sampling. It is not known if live smoke grenades were found during the geophysical sweep at the ASP.
References
HFA, 1994; Russell, 1993.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
13. ***Were explosive items found (e.g. rocket motors with explosive components, fuzes with explosive components)?***			Inconclusive

Sources reviewed and comments
Items found during sampling were reportedly inert. It is not known if incidental OE items found at the ASP were live.
References
HFA, 1994; USA, 2000.

14. ***Do items found in the area indicate training would have included use of training items with energetic components?***	Yes		

Sources reviewed and comments
Expended 105 mm and 37 mm rounds were found. In addition, the type of practice mortars and practice grenades that were found are the type that contain black powder.
References
HFA, 1994; USA, 2000.

15. ***Were items found in a localized area (possibly the remnants of a cleanup action)?***		No	

Sources reviewed and comments
The items were found in several ranges as well as in the vicinity of the Ammunition Supply Point.
References
HFA, 1994; USA, 2000; IT, 2000; Russell, 1993.

16. ***Has the site been divided into sectors to focus on areas of common usage, similar topography and vegetation, and/other unique site features?***		No	

Sources reviewed and comments
The site was not divided into sectors.
References
HFA 1994; USA 2000.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
17. ***Should current site boundaries be revised?***		No	

Sources reviewed and comments
The current site boundary (ASR) captures the full extent of all ranges.

	Yes	No	Inconclusive
18. ***Was equipment used capable of detecting items suspected at the site at the maximum expected depth?***			Inconclusive

37 and 75 mm projectiles and 81 mm mortars were evaluated as part of the ODDS. For the purposes of evaluating the geophysical equipment used at this site, it is assumed that the maximum penetration depth of OE potentially present at Site OE-22 was 4.9 feet which corresponds to Type V in the ODDS. The results of the ODDS indicate that the equipment used at this site may be limited by the depth at which the OE items are located.

References
Parsons, 2001; Earth Tech, 1998.

	Yes	No	Inconclusive
19. ***Was equipment used capable of detecting the types of items (e.g., non-ferrous) suspected at the site?***	Yes		

Sources reviewed and comments
Instruments listed in the after action reports are the Schonstedt GA-52/C, GA-52/Cx, and the GA-72/Cv. Items expected are projectiles that contain ferrous metal and, therefore, should be detected by the Schonstedt tools. The Schonstedt tools would not be able to detect small arms ammunition because it does not contain ferrous material.
References
HFA, 1994; USA, 2000.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
20. ***Do the results of the ODDS indicate that items suspected at the site would have been detected by the instrument used at the time of investigation?***			Inconclusive

Sources reviewed and comments

Instruments listed in the after action reports are the Schonstedt GA-52/C, GA-52/Cx, and the GA-72/Cv. Items expected are projectiles which are metallic. Results of the ODDs field tests indicated that the Schonstedt instruments are not as effective at detecting items buried at the maximum depth of penetration of the OE potentially present at the site.

References

Parsons, 2001.

21. ***Do results of the investigation indicate that suspected items could be detected with a high level of confidence at observed and expected depth ranges?***			Inconclusive

Sources reviewed and comments

The equipment used is not as effective at detecting OE at the maximum depths expected. The ODDS does not provide sufficient information to determine levels of confidence.

References

Parsons, 2001.

22. ***Were all the instruments used to evaluate the site maintained and calibrated in accordance with associated work plan and manufacturer's specifications?***	Yes		

Sources reviewed and comments

As stated in the HFA After Action Report, "Each magnetometer was tested each morning and field tested after lunch to determine that it was operating correctly" . According to the USA After Action Report, throughout SS/GS sampling operations, CMS performed daily operational checks and QC inspections of its work. No deficiency reports were written during inspections of the SS/GS sampling work performed at Site OE-22. In addition, each of the four grids subject to 100% OE sampling passed initial QC inspection.

References:

HFA, 1994; USA, 2000.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
23. ***Based on the anticipated target density (UXO items per acre) has the minimal amount of sampling acreage been completed in accordance with the scope of work or contractor work plan?***			Inconclusive

Sources reviewed and comments
SS/GS and 100 percent sampling were used to sample this site. Subsequent to this work, the use of the SS/GS program has been questioned. It appears that the data are of good quality; however, it is not possible to statistically evaluate the adequacy of sampling of this site.

	Yes	No	Inconclusive
24. ***Based on sampling procedure (e.g., grids, transects, and/or random walks) was a percentage of the site completed to provide 95% confidence in a UXO density estimate, and if so provide total area investigated and the UXO density estimate.***			Inconclusive

Sources reviewed and comments
60 100x100-foot grids or 600,000 square feet (approximately 13.8 acres) were sampled by HFA. All of the sample grids were placed within the Site OE-22 boundary. No OE was found.
39 100x200-foot grids and 5 50x200-foot grids or 830,000 square feet (approximately 19.1 acres) were sampled by USA. All of the sample grids were placed within the Site OE-22 boundary. No OE was found.

Total	1,430,000	
OE Density:	not calculated	

References
USA 2000; HFA, 1994.

25. ***What percentage of the anomalies were intrusively investigated?***

Sources reviewed and comments
HFA: 100% sampled (The number of anomalies sampled is was not documented)
CMS: Text states 401 samples, Tables B-1 and B-2 of Appendix B (Intrusive Sampling Summary) list 775 anomalies and 360 sampled. If we use 401 out of 775, percentage sampled is 51.7%, if we use 360 sampled out of 775, percentage sampled is 46.45%

Total % of anomalies investigated	HFA: 100% USA: 51.7% or 46.45%

References
HFA, 1994; USA, 2000.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive
26. ***Was the appropriate data processing scheme used for the site, how was the data processed?***			Not applicable

Sources reviewed and comments
Not applicable, no digital geophysical data were collected.

	Yes	No	Inconclusive
27. ***Has the field data been collected and managed in accordance with quality control standards established for the project?***			Inconclusive

Sources reviewed and comments
According to HFA, 1994, "The project was completed without QC discrepancy,". "Throughout operations at Site OE-22 CMS performed daily operational checks and QC inspections of its work. No deficiency reports were written during inspections of the work performed at Site OE-22." According to USA 2000, "QA checks of operations in Site OE-22 were limited to inspections of operational activities and documentation. No deficiency reports were written during inspections of the work done in Site OE-22."
References
USA, 2000; HFA, 1994.

Result of Sampling Evaluation

	Yes	No	
Does the sampling evaluation provide sufficient evidence to warrant further investigation?		No	

Comments
No further investigation appears to be warranted. OE sampling included 66 grids that were 100 percent sampled and 44 grids that were sampled using SS/GS. In addition, the site has been mapped and soil remediation has been performed in the dune area. Only inert OE-related items (19) have been found and removed. However, due to the reported use of the area as an impact area for offshore firing and the dynamic conditions of the site, the possibility exists that OE could remain at the site.
References
HFA, 1994; USA, 2000, IT, 2000; Russell, 1993; HLA, 1999; HLA, 2000; Earth Tech, 1996.

ATTACHMENT 22-A1
EVALUATION OF PREVIOUS WORK
EVALUATION CHECKLIST: SITE OE-22, BEACH RANGES
SAMPLING EVALUATION

	Yes	No	Inconclusive

REFERENCES

Earth Tech, 1996. Documentation of Continued Archives Search With Media ADS. USA Today. July 19.

Earth Tech, 1998. Engineering Evaluation/Cost Analysis – Phase 2, Former Fort Ord, Monterey County, California.

Harding Lawson Associates (HLA), 1999. Final Enhanced Preliminary Assessment of Monterey Bay, Fort Ord, California. January 12.

HLA, 2000. Literature Review Report, Ordnance and Explosives Remedial Investigation/Feasibility Study. Former Fort Ord California. January 4.

Human Factors Applications, Inc. (HFA), 1994. Explosive Ordnance Disposal Division, OEW Sampling And OEW Removal Action, FT. ORD FINAL REPORT. December 1.

IT Corporation (IT), 2000. Final Remedial Action Confirmation Report and Post-Remediation Risk Assessment, Site 3 Remedial Action, Basewide Remediation Sites, Former Fort Ord, California. August.

Parsons, 2001. Draft Ordnance Detection and Discrimination Study (ODDS), Former Fort Ord, Monterey, California. August.

Russell, H., 1993. Interview with Bruce Wilcer, Harding Lawson Associates. July 13.

USA, 2000. Final Report SS/GS Sampling After Action Report, Former Fort Ord, California, Site OE-22 (Beach Ranges). October 3.

US Department of the Army (Army), 1977a. Technical Manual, Army Ammunition Data Sheets, Artillery, Ammunition, Guns, Howitzers, Mortars, Recoilless Rifles, Grenade Launchers, and Artillery Fuzes (Federal Supply Class 1310, 1315, 1320, 1390). April.

Army, 1977b. Technical Manual, Army Ammunition Data Sheets for Grenades. TM 43-0001-29. October.

United States Army Corps of Engineers, Huntsville (USAEDH), 1997. Revised Archives Search Report, Former Fort Ord, California, Monterey County, California. Prepared by US Army Corps of Engineers St. Louis District.

ATTACHMENT 22-A2

SITE OE-22

ATTACHMENT 22-A2

OE POTENTIALLY PRESENT OR FOUND AT THE SITE
SITE OE-22, BEACH RANGES

Based on the literature review, practice mortars and 75mm projectiles could be present at the site. The 75mm projectiles were reportedly fired into the dunes from amphibious vehicles.

In addition, the following OE items were also found at the site during geophysical sweeps, OE sampling, remedial investigations, and soil removal programs:

- One inert MKII practice hand grenade. According to Headquarters Munitions Command data cards, these grenades were produced between 1944 and 2001.
- One expended M22 smoke grenade. According to Headquarters Munitions Command data cards, these grenades were produced between 1947 and 1969.
- One inert M205 hand grenade fuze
- Inert fins from M50 series practice mortars.
- One inert possible 37mm round
- One inert 20mm round
- One grenade fuze. It is not known if the fuze was inert (expended).
- One 57mm recoilless rifle casing. It is not known if the casing was inert.
- Two expended smoke grenades.
- Two Japanese-made 57mm mortars. One was reportedly unfuzed and empty. The condition of the other mortar was not reported.
- Two inert subcaliber 25mm projectiles, M379
- One practice hand grenade, M30
- 105mm rounds. It is not known if these were inert.
- Pyrotechnics. It is not known if these were expended.

The following provides additional information concerning OE found or potentially present at the site.

Practice Mortars

Ammunition used in mortars consists of projectiles and propelling charges. The shell is furnished with stabilizing fins and a nose fuze. Depending on ammunition and the angle of fire, the distance that a mortar round can be fired ranges from 100 to 1,985 yards (*Hogg, 2001*).

Two M50 series practice mortars were found at the site. A 1977 Army training manual was consulted for additional information concerning these practice mortars. The following provides a description of a 60mm target practice M50A3 (M50A2E1) cartridge.

The M50A3 is fired from a 60mm mortar for target practice and contains a spotting charge for observation. The round consists of a projectile body, a point-detonating fuze, a fin assembly with a 2-inch extension, four increments of a propellant charge, and ignition cartridge with a percussion primer. The projectile body is forged steel or pearlitic malleable iron and is internally threaded to accept the fuze and a fin extension. The body is loaded with an inert plaster filler to simulate the weight and ballistic characteristics of a high explosive cartridge. A pellet of black powder for a spotting charge is loaded in a cavity just below the booster casing of the fuze. When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin. The flash from the primer ignites the ignition cartridge that ignites the propelling charge. Rapidly expanding gases from the burning propellant expel the projectile from the mortar tube. On impact, the projectile functions producing a cloud of smoke (*Army, 1977a*).

Based on conversations with Range Control personnel, it is believed that M68 and M69 practice mortars were used at the site. The M69 60mm training cartridge was used for training in the loading and firing of M2 and M19 60mm mortars. The M68 81mm training cartridge was used for training in the loading and firing of 81mm mortar. The complete round consists of an inert projectile, a fin assembly, an ignition cartridge, and a percussion primer. The pear-shaped, cast iron projectile has no provision for a fuze and is internally threaded at the base to accept the fin assembly. When the cartridge is loaded, it slides down the mortar tube until the percussion primer in the ignition cartridge strikes the firing pin in the base cap of the mortar. The primer detonates the ignition cartridge. The gases from the ignition cartridge expel the projectile from the mortar tube and propel it to the target. The projectile is fin-stabilized in flight. Since the cartridge is inert, there is no detonation upon impact and the cartridge may be recovered for reuse. It is unlike other mortar ammunition in that the components are issued separately so that damaged components can be replaced so the M69 can be reused repeatedly (Army, 1994).

Artillery Associated with Amphibious Vehicles

The American Arsenal was reviewed for further information concerning the types of amphibious vehicles that may have been used for training in the 1940s and the armament used on those vehicles. There are several models of armored, tracked, landing vehicles that may have been used for training at Fort Ord. These include the MK.IV, LVT (A) (1); MK.IV, LVT (A) (4); or the MK.IV, LVT (4). The principal armaments on these vehicles include a 37mm gun with an M6, or a 57, 75, or 105 Howitzer carriage with a. 0.30 or 0.50 caliber machine gun (*Hogg, 2001*). The range of the 75mm Howitzer is 9,760 yards. Semi-fixed rounds are used for ammunition. The 37mm gun is a light antitank weapon, the maximum range is 12,800 yards with HE and 7,500 yards with APC.

105mm Rounds

105mm rounds were reportedly found during a geophysical sweep of the ASP area. The specific models or type of rounds were not specified. The 105mm rounds may include high-explosive shells for antiaircraft guns, practice shells, or high explosive shells or chemical shells used in Howitzers.

Grenades

Practice rifle, hand, and smoke grenades have been found at the site. The following provides additional information concerning the types and models of grenades found.

Practice Rifle Grenades - A practice rifle grenade was found at Ranges 11/12; the model was not specified. Practice rifle grenades generally are constructed of a cast iron body and a stabilizer tube-fin assembly of steel. A separately issued stabilizer tube-fin assembly is available for replacement purposes (*Army, 1977b*).

M30 Practice Grenade - One M30 practice hand grenade was found. According to Army technical manuals, the body of the grenade is cast iron, 3.9 inches long, and 2.25 inches in diameter and is blue with a brown band with white or no markings. The grenade is loaded with 21 grains of a black powder charge and has a pyrotechnic delay-igniting fuze. Assembled to the body are a striker, striker spring, safety lever, safety pin with pull ring, and an igniter assembly (*Army, 1977a*).

MKII Practice Hand Grenade - One inert MKII practice hand grenade was found. Information concerning this grenade was found in *The American Arsenal* (*Hogg, 2001*), which provides information concerning WW II weaponry. The MK II is a standard practice grenade that is loaded with a small charge of black powder in a cloth bag or paper tube. The grenade consists of a cast iron body with a striker spring, fuze body, primer, striker, safety lever, black powder, filling hole plug, and metal powder cap or detonator.

M22 Smoke Grenade - One expended M22 smoke grenade was found. The M22 is a rifle grenade that is used for signaling and for laying smoke screens. The M22 consists of a steel stabilizer assembly, an integral fuze, and a sheet steel 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. The charge is a mixture of baking soda, potassium perchlorate, sugar, and dye to color the smoke.

M205 Hand Grenade Fuze - One M205 hand grenade fuze was found. M205A1 and M205A2 are pyrotechnic delay-igniting fuzes that are used with the M30 practice delay hand grenade and the M62 delay practice grenade.