Final Track 1
Ordnance and Explosives
Remedial Investigation/Feasibility Study
Former Fort Ord, California

Prepared for

Department of the Army
Corps of Engineers
Sacramento District
1325 J Street
Sacramento, California 95814-2922

With Technical Support from
Hugh S. Sease III, President
Ordnance & Explosives Remediation, Inc. (OER)

MACTEC Project No. 56286 010206

Mary Jo Heassler
Senior Project Geologist

Jeff Fenton
Senior Project Geologist

Bethany Flynn
Associate Geologist

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MACTEC

MACTEC Engineering and Consulting, Inc.
5341 Old Redwood Highway, Suite 300
Petaluma, California 94954 -- (707) 793-3800

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This document was prepared by MACTEC Engineering and Consulting, Inc. (MACTEC, formerly Harding ESE, formerly Harding Lawson Associates [HLA]), at the direction of Parsons Infrastructure and Technology Group on behalf of the U.S. Army Corps of Engineers (USACE)—Sacramento District for the sole use of USACE, the only intended beneficiary of this work. No other party should rely on the information contained herein without the prior written consent of the USACE. This report and the interpretations, conclusions, and recommendations contained within are based in part on information presented in other documents that are cited in the text and listed in the references. Therefore, this report is subject to the limitations and qualifications presented in the referenced documents.

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PLATES

ATTACHMENTS

APPENDIXES

DISTRIBUTION

ACRONYM LIST

A	
AAR	after action reports
ADL	Arthur D. Little, Inc.
AIC	AIC/Diagnostic Environmental/Inc.
AP	Antipersonnel
AP	armor piercing
APC	armor-piercing capped
APERs	antipersonnel
APPT	Appointment
AR	Army Regulation
ARARs	Applicable or Relevant and Appropriate Requirements
Army	U.S. Army
ARTY	Artillery
ASP	Ammo Supply Point
ASR	Archives Search Report
AT	Antitank
ATC	ATC Environmental Inc.
B	
BA	Bivouac Area
BAC	Bayonet Assault Course
BDE	Brigade
bgs	below ground surface
BIV/Biv	Bivouac
BLM	Bureau of Land Management
BM	Bench Mark
BRA	Fort Ord Basewide Range Assessment For Small Arms and Multi-Use Ranges
BRAC	Base Realignment and Closure
BTA	Basic Training Area
BUT	Basic Unit Training
C	
CAISs	chemical agent identification sets
CBR	Chemical, Biological, Radiological
CC	Confidence course
CDFG	California Department of Fish and Game
CEHND	Army Corps of Engineers Huntsville Division
CM	Countermine
CMS	CMS Environmental, Inc.
CNCC	California Natural Coordinating Council
COA	Unknown
CONFID CSE	Confidence Course
CRSE	Course
CSM	Conceptual Site Model
CSUMB	California State University Monterey Bay
ctg	Cartridge

CWM	chemical warfare material
D	
DA	Department of the Army
DDESB	Department of Defense Explosives Safety Board
D/Div	Division
DoD	Department of Defense
DOI	Department of Interior
DOL	Directorate of Logistics
DSS	Unknown
DTSC	California Department of Toxic Substances Control
E	
EE/CA	Engineering Evaluation/Cost Analysis
EFMB	Expert Field Medical Badge
ENGR/Engr	Engineer
EOD	Explosive Ordnance Disposal
ESA	Endangered Species Act
EVAC	Evacuation
F	
°F	degree Fahrenheit
FA	Field Artillery
FAAF	Fritzsche Army Airfield
FBTA	Field Battalion Training Area
FM	Field Manual
FORA	Fort Ord Reuse Authority
FTS	Field Test Site
FTX	field training exercise
FWC	field wire command (or course)
G	
GDA	Guard Duty Area, Gun Defended Area
GIS	Geographical Information System
GP	Group, General Purpose
GPS	Global Positioning System
GTC	Geotechnical Consultants, Inc.
H	
H	Helipad
HA	Historical Areas
Harding ESE	formerly known as Harding Lawson Associates (HLA)
HC	hexachlorethane
HCRS	Heritage Conservation and Recreation Service
HD	sulfur mustard
HE	High Explosive
HEAT	high-explosive antitank
HEP	high-explosive plastic
HFA	Human Factors Applications
HHCA	Hand-to-Hand Combat Area
HLA	Harding Lawson Associates

HMP	Habitat Management Plan
HQ	Headquarters
HSG	Housing
HTW	Hazardous and Toxic Waste
HUMRRO	Human Resources Research Organization
I	
IC	Infiltration Course
INFL	Infiltration
IT	IT Corporation
ITT	Individual Tactical Training
L	
LAW	light antitank weapon
LDSP	Land Disposal Site Plan
LE	Low Explosive
LN	Land Navigation
M	
MACTEC	MACTEC Engineering and Consulting, Inc. (formerly Harding ESE)
MBA	Mine and Booby Trap Area
MCPD	Monterey County Planning Department
MCX	Mandatory Center of Expertise
MG	Machine Gun
Mg/kg	Milligram per kilogram
MP	Mortar Position
MPUSD	Monterey Peninsula Unified School District
MRA	Multi-Range Area
MRCC	Unknown
MSL	mean sea level
MTR/MORT	Mortar
N	
NAV	Navigation
NCO	Non-Commissioned Officer
O	
ODDS	Ordnance Detection and Discrimination Study
OE	Ordnance and Explosives
OEW	Ordnance and Explosive Waste
P	
PA/SI	Preliminary Assessment/Site Inspection
Parsons	Parsons Infrastructure & Technology Group Inc.
PCPTA	Unknown physical training area
PG	Parade Ground
PTA	Physical Training Area
PTL	Primary Target Line, Patrol
PW	Prisoner of War

Q	
QA/QC	Quality Control/Quality Assurance
R	
RAC	Risk Assessment Code
REC	Recreational
RGT	Regiment
REGT	Regiment
RIC	Rifle Instruction Circle
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RRTA	Recoilless Rifle Training Area
RSOP	Reconnaissance, Selection, and Occupation of Position
RWD	Ready waiting deployment
RWO	Ready waiting orders
S	
SAP	Sampling and Analysis Plan
SDA	Squad Defense Area
SGD	Staal, Gardner & Dunne, Inc.
SIA	South Inspection Area
SOP	Standard Operating Procedure
SOW	Scope of Work
SP	Self-propelled
SQ	Square
SQD	Squad
SS	Site Safety Officer
SS/GS	SiteStats/GridStats
ST	Service Test
SUMP	Site Use Management Plan
SUXOS	Senior UXO Supervisor
T	
T	Ton
TD	Target Detection
TE-3D-Bde	Training, Third Brigade
TNG	Training
TOW	Tube-launched, optically tracked, wire-guided
TP	target practice
TS	Training Site
U	
USACE	U.S. Army Corps of Engineers
USAEDH	U.S. Army Design Engineering and Support Center, Huntsville
USEPA	United States Environmental Protection Agency
USFWS	U.S. Department of the Interior, Fish and Wildlife Service
UXB	UXB International, Inc.
UXO	Unexploded Ordnance
W	
WP	White phosphorous

U.S. Army (Army), 1951. *Military Symbols, Department of the Army Field Manual FM21-30.* Departments of the Army and the Air Force. June.

_____, 1985. *Authorized Abbreviations Brevity Codes, and Acronyms. Regulation 310-50.* Department of Army, Headquarters, Washington DC. November 15.

GLOSSARY

Closed Range: A military range that has been taken out of service and either has been put to new uses that are incompatible with range activities or is not considered by the military to be a potential range area. A closed range is still under the control of a Department of Defense (DoD) component. Source: (3).

Engineering Control (EC): A variety of engineered remedies to contain and/or reduce contamination, and/or physical barriers intended to limit access to property. Some examples of ECs include fences, signs, guards, landfill caps, soil covers, provision of potable water, slurry walls, sheet pile (vertical caps), pumping and treatment of groundwater, monitoring wells, and vapor extraction systems. Source: (1).

Expended: The state of an Ordnance and Explosives (OE) item in which the main charge has been expended leaving the inert carrier. Source: (2).

Explosive Soil: Explosive soil refers to mixtures of explosives in soil, sand, clay, or other solid media at concentrations such that the mixture itself is explosive.

(a) The concentration of a particular explosive in soil necessary to present an explosion hazard depends on whether the particular explosive is classified as "primary" or "secondary." Guidance on whether an explosive is classified as "primary" or "secondary" can be obtained from the OE MCX or Chapters 7 and 8 of TM 9-1300-214, Military Explosives.

(b) Primary explosives are those extremely sensitive explosives (or mixtures thereof) that are used in primers, detonators, and blasting caps. They are easily detonated by heat, sparks, impact, or friction. Examples of primary explosives include Lead, Azide, Lead Styphnate, and Mercury Fulminate.

(c) Secondary explosives are bursting and boostering explosives (i.e., they are used as the main bursting charge or as the booster that sets off the main bursting charge). Secondary explosives are much less sensitive than primary explosives. They are less likely to detonate if struck or when exposed to friction or electrical sparks. Examples of secondary explosives include Trinitrotoluene (TNT), Composition B, and Ammonium Picrate (Explosive D).

(d) Soil containing 10 percent or more by weight of any secondary explosive or mixture of secondary explosives is considered "explosive soil." This determination was based on information provided by the USAEC as a result of studies conducted and reported in USAEC Report AMXTH-TE-CR 86096.

(e) Soil containing propellants (as apposed to primary or secondary high explosives) may also present explosion hazards. (ER 1110-1-8153). Source (5).

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

Institutional Control (IC): A legal or institutional mechanism that limits access to or use of property, or warns of a hazard. An IC can be imposed by the property owner, such as use restrictions contained in a deed, or by a government, such as a zoning restriction. Source: (1).

Land Use Controls: A combination of engineering and institutional controls intended to protect human health and the environment. Source: (1).

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

Mortar: A muzzle-loading, indirect fire weapon with either a rifled or smooth bore. It usually has a shorter range than a howitzer, employs a higher angle of fire, and has a tube with a length of 10 to 20 calibers. Source: (6).

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

Non-OE Related Scrap: Non-munitions material found at ordnance sites. This can be banding, wire, trash, auto parts, shipping boxes, or any kind of material that has been abandoned or discarded at an OE site that was never a component of military munitions. (Ferrous rocks that activate geophysical instruments during investigations, which are removed from the site, are classified as "other."). Source: (2).

Non-Transportable OE Item: For the purposes of addressing OE at Fort Ord, non-transportable OE items include those that are non-movable (unsafe to move under any circumstances), and moveable (may be moved by hand only within close proximity to their original position for consolidation and/or to ensure detonations are performed under the safest possible conditions).

When making a determination as to whether or not an OE item is safe to move from its encountered orientation or location, item-specific variables must be considered that may include but are not limited to: characteristics of the site, type of ordnance, position/location of the item, type of fuzing, and condition of the

item and the fuze. Documents such as EP 385-1-92a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations; TM 60 series and applicable Ordnance Data Sheets are reviewed to assist in making a determination. If there is doubt as to the identity of the item, its condition, or whether it can be handled, the onsite USACE UXO Safety Specialist will make the determination. Source: (2).

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

OE Scrap: OE scrap includes those items which are fragments of functioned ordnance, as designed or intentionally destroyed, and which contain no explosive or other items of a dangerous nature. OE scrap is inert and does not pose a safety risk. Source: (1).

Ordnance and Explosives (OE): OE consists of either (1) or (2) below:

(1) Ammunition, ammunition components, chemical or biological warfare materiel or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity. (HQDA Policy Memorandum "Explosives Safety Policy for Real Property Containing Conventional OE")

(2) Explosive Soil. See definition under "Explosive Soil." (ER 1110-108153).

Source: [5]. Note: Small arms ammunition .50 caliber and below will not be considered to be UXO.

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

Projectile: An object projected by an applied force and continuing in motion by its own inertia, as a bullet, bomb, shell, or grenade. Also applied to rockets and to guided missiles. Source: (4).

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

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

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

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

Transferred Range: A military range that is no longer under military control and has been leased, transferred, or returned to another entity, including Federal entities. This includes a military range that is no longer under military control but was used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager. Source: (3).

Transferring Range: A military range that is proposed to be leased, transferred, or returned from the Department of Defense to another entity, including Federal entities. This includes a military range that is used under the terms of a withdrawal, executive order, special-use permit or authorization, right-of-way, public land order, or other instrument issued by the Federal land manager. An active range will not be considered a "transferring range" until the transfer is imminent. Source: (3).

Transportable OE Item: For the purposes of addressing ordnance and explosives (OE) at Fort Ord, transportable OE items are those that, as determined by the OE contractor (with concurrence of the USACE UXO Safety Specialist), may be transported by vehicle from their original position to an area outside the vicinity for the purposes of storage, consolidation with other items for demolition, or for offsite destruction.

When making a determination as to whether or not an OE item is safe to move from its encountered orientation or location, item-specific variables must be considered that may include but are not limited to: characteristics of the site, type of ordnance, position/location of the item, type of fuzing, and condition of the item and the fuze. Documents such as EP 385-1-92a, Basic Safety Concepts and Considerations for Ordnance and Explosives Operations; TM 60 series and applicable Ordnance Data Sheets are reviewed to assist in making a determination. If there is doubt as to the identity of the item, its condition, or whether it can be handled, the onsite USACE UXO Safety Specialist will make the determination. Source: (2).

Unexploded Ordnance (UXO): Military munitions that have been primed, fuzed, armed, or otherwise prepared for action, and have been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installation, personnel, or material and remain unexploded either by malfunction, design, or any other cause. (40 CFR 266.201). Source: (5). Note: Small arms ammunition .50 caliber and below will not be considered to be UXO.

Sources:

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

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

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

(4) "Unexploded Ordnance (UXO): An Overview", October 1996. DENIX.

(5) Ordnance and Explosives Response Engineer Manual (EM) 1110-1-4009. US Army Corps of Engineers, June 23, 2000.

(6) Department of Defense Dictionary of Military and Associated Terms, Joint Publication 1-02. 12 April 2001 (As Amended Through 17 December 2003).

EXECUTIVE SUMMARY

This Track 1 Ordnance and Explosives Remedial Investigation/Feasibility Study (Track 1 OE RI/FS) report was prepared by MACTEC Engineering and Consulting, Inc. (MACTEC, formerly Harding ESE; formerly Harding Lawson Associates [HLA]) at the direction of Parsons Infrastructure & Technology Group on behalf of the U.S. Army Corps of Engineers (USACE) – Sacramento District for sites at the former Fort Ord in Northern Monterey County, California. Track 1 sites are those sites where ordnance and explosives (OE) was suspected to have been used, but based on the RI/FS for each site, it falls into one of the following three categories:

- Category 1: There is no evidence to indicate OE was used at the site.
- Category 2: The site was used for training, but the OE items used do not pose an explosive hazard, or potentially remaining OE items do not pose an explosive hazard.
- Category 3: The site was used for training with OE, but OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

This Track 1 OE RI/FS presents: (1) an evaluation of archival and field-based investigation data for each candidate Track 1 site, and (2) the rationales for determining whether no further investigation regarding OE is recommended for these sites. To be included in the Track 1 decision process, the results of the evaluation performed for a site must indicate a strong weight of evidence to support no further OE-related investigation as determined by the project team (The Army, USACE, United States Environmental Protection Agency [USEPA], and the California Department of Toxic Substances Control [DTSC], a part of the California Environmental Protection Agency [Cal/EPA]). Site-specific data were evaluated in the RI based on guidance provided in the approved *Final Plan for Evaluation of Previous Work, Ordnance and Explosives Remedial Investigation/Feasibility Study, Former Fort Ord, California* (*HLA, 2000b*). Stand-alone RIs for each candidate Track 1 site are provided in this report and include the following sections:

- Site Description
- Site History and Development
- Potential Ordnance Based on Historical Use of the Area
- History of OE Investigations
- Conceptual Site Model
- Site Evaluation
- Conclusions and Recommendations
- References

For 21 of the 24 candidate Track 1 sites included in this Track 1 OE RI/FS, no further investigation is recommended based on the results of the RI for each site. Recommendations regarding the need for further assessment/investigation of areas adjacent to the sites are also included in the RI summaries provided below. The approval process for the candidate Track 1 sites is described in Section 5.0.

Site OE-1

- 25 acres in the northwestern part of former Fort Ord (Plate 1-1) within residential housing area
- Identified as "Flame Thrower Range" on 1957 training map
- Based on literature review and sampling, site appears to have been used for camouflage training, mine and booby trap training, non-firing mortar training, and flame thrower training
- Portion of site currently occupied by residential housing; remainder planned for development
- Grid sampling performed by Human Factors Applications (HFA) in 1994 and USA Environmental (USA) in 1998 and 1999
- Several inert or expended scrap items and practice mines were found
- Sampling completed in adjacent open areas near existing housing
- Based on review of existing data, it is unlikely that OE would remain at Site OE-1. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-2

- 33.5 acres in eastern portion of the Main Garrison (Plate 2-1)
- Portion of site used for disposal of debris and OE scrap in onsite landfill
- Contents of landfill excavated and removed from site during basewide investigation and remedial action (*HLA, 1995b*)
- Based on interview records, site may have also been used as a chemical training area and landmine warfare training area; no training maps or records indicate such uses
- Grid sampling performed by HFA in 1994
- Two OE scrap items (a practice grenade and a practice bomb) were found and removed during grid sampling
- No chemical agents or land mines were found during subsurface investigations and removal programs
- There is an unconfirmed report that Chemical agent identification sets (CAIS) were buried at the site
- Based on review of existing data, it is not anticipated that OE remains at Site OE-2. Further research should be performed regarding the validity of reports that CAIS were buried in the site vicinity. This site should be retained in the Track 1 process.

Site OE-5

- 30 acres in eastern portion of former Fort Ord adjacent to East Garrison (Plate 5-1)
- Identified based on presence of 3.5-inch rocket motor found suspended in branches of tree

- Site appears to have been used for/been within downrange area of small arms ranges from 1930s until base closure in 1994
- No training areas where OE would be used identified on available historical training maps
- Grid sampling performed by HFA in 1994; no OE items or OE scrap items found on surface
- One expended illumination signal found during 2003 site walk
- Based on evaluation, site does not appear to have been used as 3.5-inch rocket training site
- Because this site was not identified as a training area, and sampling did not identify OE items, it is unlikely that OE would remain at Site OE-5. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-6

- 2 acres in northwest portion of former Fort Ord, west of the town of Marina (Plate 6-1)
- Review of 1950s era documentation (including training maps, aerial photographs, and other Fort Ord maps) indicate mine and booby trap training occurred at the site
- Grid sampling performed by HFA in 1994
- Inert or expended practice mines were found and removed from site and area to the south
- No recorded discoveries of OE within the site footprint or adjacent areas have been identified during over 30 years of nearby residential use
- Expended practice mine fuzes and an expended firing device (M1-type) found during 2004 site walk
- Based on review of existing data, it is not anticipated that OE remains at Site OE-6. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-13A

- 61 acres in northern part of Fort Ord Housing Area (Plate 13A-1)
- Based on literature review, site was identified as a practice mortar training area in 1950s. Residential housing now covers most of site.
- Western part of site used as landfill in 1960s. Several OE items, scrap and live, found during removal of landfill material in 1990s.
- Sampling performed by HFA in 1994. SiteStats/GridStats sampling performed by USA/CMS Environmental, Inc. (CMS) in 1997
- No OE-related items were found in 1994, and 2 OE-related scrap items (an expended grenade fuze and illumination signal) were found in 1997
- Extensive grading of site performed in 1970s prior to construction of housing

- Based on review of existing data, it is not anticipated that OE would be present at Site OE-13A. This site meets the Track 1, Category 2 criteria for no further OE-related investigation.

Site OE-17

- 9 acres in southeastern portion of former Fort Ord (Plate 17-1)
- Based on interviews, sampling, maps, and site reconnaissance in adjacent areas, site was used as practice mine training area; was reportedly used for firing shoulder-launched projectiles in early 1960s; and for troop training and maneuvering from the 1950s to 1980s
- No evidence of use of shoulder-launched projectiles found during sampling, site reconnaissance or records review
- Grid sampling performed by UXB International, Inc. (UXB) in 1994
- 2 OE scrap items and live blank small arms were found
- Recommend areas outside the Site OE-17 boundaries where practice mines were found during reconnaissance activities and by Bureau of Land Management (BLM) be investigated further
- Based on review of existing data, it is not anticipated that OE remains at Site OE-17. However, additional evaluation is recommended to confirm this conclusion. This site should be retained in the Track 1 process.

Site OE-20

- 7 acres in the southwestern portion of the Main Garrison north of Gigling Road and east of Highway 1 (Plate 20-1)
- Identified as potential Recoilless Rifle Training Range through review of Fort Ord historic records completed as part of the Fort Ord Archives Search (*U.S. Army Engineer Division, Huntsville [USAEDH], 1993*)
- Used for various training activities including recoilless rifle, machine gun, and other unknown types of training
- Site vicinity included areas designated as R 57 & 75 and Machine Gun Squares 1 and 2
- Grid sampling performed by HFA in 1994
- No evidence found to suggest training involved the use of OE
- Due to proximity of site to developed areas (e.g., North Bayview Park housing, Highway 1, and the Main Garrison), it is unlikely OE was used at (or within vicinity of) Site OE-20. This site meets the Track 1, Category 1 criteria for no further OE-related investigation.

Site OE-22

- 952 acres on coastline along western margin of former Fort Ord (Plate 22-1)

- Training maps, aerial photographs and interviews indicate site comprised Beach Trainfire Ranges from 1940s until base closure in 1994, and contained 17 small arms firing ranges; an obstacle course; bivouac area; rifle instruction circle; bayonet assault course; chemical, biological, and radiological (CBR) training areas; target detection (TD) training areas; infiltration course, and former ammunition supply point (ASP)

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

- Grid sampling performed by HFA in 1994 and CMS/USA in 1997 and 1998

- OE scrap and OE items found at the site include grenades, practice mortars, a Japanese mortar, subcaliber 25mm projectiles, 105mm rounds within burial pits, and pyrotechnics. Many of these items were found near the ASP and may have been stolen and buried at the site for later retrieval. Substantial quantities of small arms were also found.

- Large areas of the site were disturbed and soil and debris were removed as part of the soil remediation effort. No OE was identified during these efforts.

- State park is planned with open space and recreational areas

- Based on review of existing data, it is unlikely that OE would remain at Site OE-22. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-24B

- 14.2 acres in west-central portion of former Fort Ord (Plate 24B-1) south of Main Garrison and just north of multi-range area (MRA)

- Historical and sampling data indicate site was used as practice hand grenade range in 1940s

- SiteStats/GridStats sampling performed by CMS/USA in 1997

- 225 of 1,600 anomalies were excavated

- One expended grenade fuze was found; non-OE items were found. Non-OE scrap items found included wire, nails, and other types of small metal debris

- Northeast of site, a burial pit containing a rifle grenade smoke and 100 M1 rounds were found. These items would not be expected to have been used at a practice hand grenade training area.

- Subsequent use of area as military housing suggests that OE items that might have been associated with use in 1940s that were discovered during construction activities would have been removed

- Based on review of the existing data, it is not anticipated that OE remains at Site OE-24B. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-24C

- 9.7 acres in west central portion of former Fort Ord, south of Main Garrison, just north of MRA in military housing area (Plate 24C-1)
- Identified as live grenade area on 1945/1946 training maps
- SiteStats/GridStats sampling performed by CMS in 1997
- 265 of 1,850 anomalies were excavated
- MKII high explosive hand grenade fragments, one expended grenade fuze (both considered inert OE scrap), and 3 buried (in a pit) pyrotechnic items were identified during sampling. Non-OE scrap items including nails, screws, and wire were found at the other excavated anomalies
- Subsequent use of area as military housing would suggest that any OE items that might have been associated with the 1940s use of this site that were discovered during construction would have been removed
- No hand grenades or any other WWII era OE items were reported found during the time the housing was occupied. Several incidental finds of 40mm items documented; however, these items were not available for use in 1940s.
- Possibility of live grenades to remain in area should be considered when planning site reuse
- Additional evaluation of Site OE-24C is recommended. This site should be retained in the Track 1 process.

Site OE-24D

- 1.8 acres in the west-central portion of former Fort Ord south of the Main Garrison, approximately 2,700 feet north of the MRA (Plate 24D-1), and within the boundaries of the Fitch Park military housing complex
- Identified as a "Booby Traps" and squad patrol training area based on review of a 1946 historical map.
- The site boundary was northwest of the area shown as "Booby Traps" on 1945 and 1946 training maps.
- SiteStats/GridStats sampling performed by USA/CMS in 1997
- 120 of 331 anomalies were excavated. One OE-related item (identified as "frag") was found. Non-OE scrap items such as nails, metal scrap, wire, etc., were identified as the remaining 119 excavated anomalies.
- The area shown on training maps currently occupied by residential housing; aerial photographs indicate site was graded and developed for housing by 1959

- Based on the historical use of the site, reuse as residential housing for 50 years, and materials found at the site, it is unlikely that OE remains at Site OE-24D. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-24E

- 2.7 acres in west central portion of former Fort Ord, south of Main Garrison, just north of MRA, and within a military housing complex (Plate 24E-1)
- Identified as a Practice Rifle Grenade Range on 1945/1946 training maps
- No evidence of this use was discovered during sampling at the site.
- SiteStats/GridStats sampling performed by USA/CMS in 1997
- 160 of 434 anomalies were excavated; one OE-related item (frag) was found. Non-OE scrap items found included nails, wire, magnets, and a spoon.
- Subsequent use of area for housing suggests OE items that might have been associated with use in the 1940s as practice rifle grenade range would have been removed if found during construction
- Based on review of existing data, it is not anticipated that OE remains at Site OE-24E. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-27X

- 79.5 acres of undeveloped open space in southeastern portion of former Fort Ord (Plate 27X-1)
- Based on the review of Fort Ord training maps, site used as troop training and maneuver area from the 1950s to 1970s and as an overnight bivouac area and medical training area in 1980s
- Grid sampling, 100 percent of detected anomalies excavated, performed by UXB in 1995
- 424 of 425 items found were live, small arms blanks; one expended rifle smoke grenade was found
- Based on review of existing data, it is not anticipated that OE remains at Site OE-27X. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-27Y

- 25 acres in the eastern portion of former Fort Ord along Inter-Garrison Road (Plate 27Y-1)
- Identified as one of 26 training sites (TSs) within Fort Ord Training and Maneuver Areas used as troop training, maneuver, and overnight bivouac areas
- Grid sampling, 100 percent of detected anomalies excavated, performed by UXB in 1995
- 65 of 66 anomalies excavated were live, small arms blanks; one expended illumination signal was found
- Based on review of existing data, it is not anticipated that OE remains at Site OE-27Y. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-32A

- 38 acres in southeastern portion of former Fort Ord (Plate 32A-1) surrounded by undeveloped open space
- Based on training maps and interviews, site may have been used as a tank gunnery range in 1950s, for training with shoulder-launched projectiles in 1950s and 1960s, and as a troop training and maneuver area from 1950s to 1980s
- Grid sampling, 100 percent of detected anomalies excavated, performed by UXB in 1994
- 3 OE scrap items, 2 illumination signals and one expended hand smoke grenade, and live small arms blanks were found. No OE associated with a tank gunnery range or shoulder-launched projectiles was found
- Based on review of existing data, it is not anticipated that OE remains at Site OE-32A. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-32B

- 47 acres in southeastern portion of former Fort Ord (Plate 32B-1). The surrounding area is undeveloped open space.
- Identified on historical training maps (circa 1954 and 1956) as the "Oil Well Road Training Area." Portion of site reportedly used as Tank Gunnery Range in 1950s; site may also have been used for firing of shoulder-launched projectiles.
- Grid sampling, 100 percent of detected anomalies excavated, performed by UXB in 1995
- 263 of 266 anomalies excavated were live, small arms blanks. Three expended OE-related items were found, including a hand grenade safety lever, hand smoke grenade, and ground illumination signal. No evidence found to support use of shoulder-launched projectiles or tanks.
- Based on review of existing data, it is not anticipated that OE remains at Site OE32B. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-39

- 12.1 acres east of General Jim Moore Blvd./south of Gigling Road in Marshall Park housing area (Plate 39-1)
- Identified as Mine and Booby Trap Training Area # 4 on 1957/1958 Training Areas and Facilities maps
- SiteStats/GridStats sampling performed by CMS in 1997
- No OE or OE-related material found during sampling
- Non-OE items found included nails, pipes, wires, and other debris

- Based on evaluation, OE is not anticipated to remain at Site OE-39. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-49

- 28 acres in west central portion of former Fort Ord, south of Main Garrison and just north of military housing (Plate 49-1)
- Identified as a training area and rifle grenade range in 1940s and 1950s based on interviews conducted during Preliminary Assessment/Site Inspection (PA/SI)
- Reconnaissance identified expended smoke signals and small arms ammunition
- Two Explosive Ordnance Incident Reports indicated a single rifle smoke grenade and 100 rounds of M-1 ball and tracer ammunition were found 300 feet outside the southeast boundary of site. In addition, 2 inert 40mm practice projectiles for a M-79 grenade launcher were found inside the site boundary just north of a housing area.
- The area surrounding the site has consisted of housing and schools since 1960s
- Based on review of existing data, it is not anticipated that OE would be present at Site OE-49. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-59A

- 41 acres in eastern portion of former Fort Ord adjacent to East Garrison and Site OE-5
- Identified as a possible 2.36-inch rocket range during interviews conducted during the PA/SI phase of the Fort Ord ASR
- Site appears to have been downrange of small arms ranges from 1930s until base closure in 1994
- No training areas where OE would be used identified on historical training maps
- Eight grids sampled by HFA as part of the Site OE-5 investigation are within Site OE-59A boundaries
- Reconnaissance identified expended pyrotechnic signals and small arms ammunition
- Based on evaluation, site does not appear to have been used as a 2.36-inch rocket range
- Because this site was not identified as a training area, and sampling did not identify OE items, it is unlikely that OE would remain at Site OE-59A. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-62

- 247 acres at the southern end of former Fort Ord adjacent to a raceway (Plate 62-1)
- Identified during an interview with former Fort Ord Fire Chief (Fred Stephani) conducted during PA/SI phase of Fort Ord Archive Search (*USAEDH, 1997*) as a small arms and flare training area

- Based on review of training maps, aerial photographs, and site reconnaissance, used as a troop training and maneuver area from late 1940s through 1980s; southern half of site included in "Noise Buffer Zone" from 1978 to 1987 (no firing of ammunition allowed, including pyrotechnics, explosives, or simulators)

- Reconnaissance identified expended blank small arms ammunition and expended pyrotechnic items. No evidence of fragmentation, fuzes, projectile cases, or other types of training identified.

- Based on review of existing data, it is not anticipated that OE will be found at Site OE-62. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-63

- 28 acres at southern end of former Fort Ord east of a raceway (Plate 63-1)

- Identified during PA/SI phase of Fort Ord Archive Search as a small arms and flare training area

- Based on review of training maps, aerial photographs, and site reconnaissance, most of site included in "Noise Buffer Zone" from 1978 to 1987 (no firing of ammunition allowed, including pyrotechnics, explosives, or simulators)

- Site reconnaissance identified expended blank small arms ammunition and expended pyrotechnic items

- No specific training locations identified during the literature search or site reconnaissance

- Based on review of existing data, it is not anticipated that OE will be found at Site OE-63. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-66

- 41 acres in northeastern portion of former Fort Ord (Plate 66-1)

- Identified during PA/SI phase of Fort Ord Archive Search as a reported signal corps field training area

- Other uses included aviation training, basic unit training, and a bivouac area from 1950s until housing construction in 1989

- Grid sampling performed by UXB in 1995

- 65 of 66 anomalies were live, small arms ammunition (30 caliber and 7.62mm blanks), and one was an OE scrap item (an expended illumination signal)

- Based on the use of the area for residential housing and on the type of training conducted, no OE is anticipated at Site OE-66. This site meets the Track 1, Category 3 criteria for no further OE-related investigation.

Site OE-69

- 37 acres in size on the eastern side of former Fort Ord (Plate 69-1)
- Identified as area of possible rifle grenade use based on interviews with former Fort Ord Fire Chief
- No sampling has been conducted
- Two site reconnaissances were performed in 1995 (during the PA/SI) and in 2001 (as part of the Fort Ord Basewide Range Assessment [BRA])
- Based on review of existing data, it is not anticipated that OE will be found at Site OE-69. This site meets the Track 1, Category 1 criteria for no further OE-related investigation.

Site OE-70

- 14 acres on the southeastern side of former Fort Ord, south of Oil Well Road (Plate 70-1)
- Area encompassing Site OE-70 identified as containing firing berms based on interviews with former Fort Ord Fire Chief
- Habitat area managed by BLM and open to public for recreational use
- Site reconnaissance identified presence of expended blank small arms; no evidence of berms or OE use found
- Based on review of training maps, aerial photographs, and site reconnaissance, most of site included in "Noise Buffer Zone" from 1978 to 1987 (no firing of ammunition allowed, including pyrotechnics, explosives, or simulators).
- Based on review of existing data, it is not anticipated that OE will be found at Site OE-70. This site meets the Track 1, Category 1 criteria for no further OE-related investigation.

This document also describes the Track 1 decision-making process including a process for identifying and evaluating sites that meet the definition of Track 1 sites. A "plug in" process by which an Approval Memorandum will be prepared presenting rationale for designating site(s) as Track 1 is also described.

1.0 INTRODUCTION

The former Fort Ord is located near Monterey Bay in northwestern Monterey County, California (Plate 1). Since 1917, portions of the former Fort Ord were used by infantry units for maneuvers, target ranges, and other purposes. Ordnance and explosives (OE) were fired into, fired upon, or used on the facility in the form of artillery and mortar projectiles, rockets and guided missiles, rifle and hand grenades, practice land mines, pyrotechnics, bombs, and demolition materials. As a result, a wide variety of conventional unexploded ordnance (UXO) items have been encountered at sites throughout the former Fort Ord.

OE consists of either: (1) Ammunition, ammunition components, chemical or biological warfare materiel or explosives that have been abandoned, expelled from demolition pits or burning pads, lost, discarded, buried, or fired. Such ammunition, ammunition components, and explosives are no longer under accountable record control of any DOD organization or activity; or (2) Explosive Soil. Small arms ammunition that is .50 caliber and below is not being investigated or considered as UXO or OE under the Track 1 OE RI/FS or Basewide OE RI/FS program. Site assessment, site characterization, remedial design, and remediation activities to address the presence of small arms ammunition .50 caliber and below at the former Fort Ord are being conducted under the Basewide Range Assessment Program (BRA; *IT, 2001*).

On behalf of the U.S. Army Corps of Engineers (USACE) – Sacramento District, MACTEC Engineering and Consulting, Inc (MACTEC, formerly Harding ESE, formerly known as Harding Lawson Associates [HLA]) at the direction of Parsons Infrastructure & Technology Group (Parsons) has prepared this Track 1 Remedial Investigation/Feasibility Study (Track 1 OE RI/FS) with technical support from Mr. Hugh S. Sease III, President, Ordnance & Explosives Remediation, Inc. (OER), whose qualifications are included as Attachment A to this report. The Track 1 sites are those where OE was suspected to have been used, but based on the RI/FS for each site, it falls into one of the following three categories:

- Category 1: There is no evidence to indicate OE was used at the site.
- Category 2: The site was used for training, but the OE items used do not pose an explosive hazard, or potentially remaining OE items do not pose an explosive hazard.
- Category 3: The site was used for training with OE, but OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

Sites selected for inclusion in this document were selected based on the results of reconnaissance (literature review and site visits) or sampling data (results of visual and geophysical inspections and anomaly excavations). The Track 1 candidate sites are listed in Table 1 and are shown on Plate 2.

This Track 1 OE RI/FS is based on the evaluation of previous work conducted for each site according to the guidance provided in the *Final Plan for the Evaluation of Previous Work* (*HLA, 2000b*). To be included in the Track 1 decision process, the results of the evaluation performed for a site must indicate a strong weight of evidence to support no further OE-related investigation as determined by the project team (The Army, USACE, United States Environmental Protection Agency [USEPA], and the California Department of Toxic Substances Control [DTSC], a part of the California Environmental Protection Agency [Cal/EPA]). This report has been prepared in accordance with Parsons Contract No. DACA05-00-D-0003, BOA No. 739219-60000.

1.1 Description of the OE RI/FS Program

The OE RI/FS program is described in detail in the Final OE RI/FS Work Plan (*Army, 2000*). This OE RI/FS only addresses the physical risk from OE. The potential chemical risks are being addressed under the Basewide Range Assessment Program (BRA*; IT, 2001*). Elements of the OE RI/FS program include a literature review, preparation of a Sampling and Analysis Plan (SAP) for additional OE characterization activities, evaluation of previous OE contractors work, performance of an Ordnance Detection and Discrimination Study (ODDS), identification of Applicable or Relevant and Appropriate Requirements (ARARs), evaluation of risks, development of long-term risk management measures, a community relations plan, and a health and safety plan.

The information gathered and evaluated during the literature review and the basewide OE RI/FS will be used to categorize all areas of the former Fort Ord according to actions that have been taken or that are identified as necessary to mitigate OE hazards. The information that will be evaluated to form decisions will include, but not be limited to, the knowledge of the site, the quality of the available information, the work completed, and the intended future land uses. Areas will be managed during the basewide OE RI/FS process within one of four proposed "tracks" (Tracks 0 through 3) as described in the OE RI/FS Work Plan (*Army 2000*). This report addresses the Track 1 sites.

1.2 Track 1 OE RI/FS

This section describes the elements and the purpose of the Track 1 OE RI/FS, and presents background information and the results of the evaluation of previous work for each of the 24 sites identified for inclusion in this report.

1.2.1 Elements of the Track 1 OE RI/FS

Individual site reports are provided for each of the 24 sites. The reports are divided into 2 parts. Part 1 presents background information including a description of the site, the site history and development, a description of the potential ordnance based on historical use of the area, the history of the OE investigations, and a conceptual site model. Part 2 summarizes the evaluation of previous work. As part of the evaluation, archival and sampling data were reviewed and checklists were prepared according to the Plan for Evaluation of Previous Work (*HLA, 2000b*). Information evaluated for each site includes the adequacy of the sampling or reconnaissance conducted, the performance of the geophysical equipment used during investigation, data management, and the appropriateness of the site boundaries. Each site report was prepared as a stand-alone document that can be removed from this report for review. These reports provide the basis for determining that a strong weight of evidence supports no further OE-related action as determined by the project team.

The information used in preparation of the site reports included historical training maps, aerial photographs, OE contractor after action reports (AARs), the archives search reports (ASRs), the ODDS report, field training manuals, technical manuals, and interviews. References for each of the sources used are provided in the individual site reports.

Information from historical training maps and aerial photographs was integrated into a project Geographical Information System (GIS). Data were integrated into the GIS according to procedures described in the Standard Operating Procedures (SOPs) prepared for the project (Appendix A).

1.2.2 Purpose

The RI/FS process as outlined in the EPA guidance (*EPA, 1988*) represents the methodology that the Superfund program has established for characterizing the nature and extent of risks posed by contaminated sites and for evaluating potential remedial options. The purpose of the Track 1 OE RI/FS is to: (1) describe the site conditions and the results of the evaluation of previous work performed for each of the 24 Track 1 candidate sites, and (2) to determine whether the weight of evidence supports no further OE-related investigation as determined by the project team.

The Track 1 OE RI/FS will be used to support the Track 1 Proposed Plan and Record of Decision (ROD) that will identify these sites for no further action and present a "plug in" process that will identify the requirements for inclusion of future sites in Track 1.

1.3 Report Organization

The Track 1 OE RI/FS is organized as follows:

Section 1 – Introduction. This section provides background information on the Track 1 process. The purpose of this report is also included in Section 1.0.

Section 2 – Background. This section presents the Fort Ord OE-related history, describes the physical setting, and presents background information on the basewide OE RI/FS and Track 1 site investigations and sampling.

Section 3 – Track 1 Site Reports. This section provides individual reports for each site. These reports present the site background, a conceptual site model and the results of the evaluation of previous work.

Section 4 - Ongoing and Future OE-Related Activities. This section describes ongoing and future OE-related activities at the former Fort Ord.

Section 5 – Track 1 Decision-Making Process. This section describes the plug in process for inclusion of sites discovered after completion of this report into the Track 1 process.

Section 6 – References. This section provides a list of references to pertinent documents cited in the report.

2.0 BACKGROUND

This section provides a summary of the former Fort Ord OE-related history, a description of its physical setting, the background of the basewide OE RI/FS, and background on Track 1 site investigations and sampling.

2.1 Historical Use

In 1917, the U.S. Army (Army) bought a portion of the present-day Main Garrison and East Garrison, and nearby lands on the east south-central side of the former Fort Ord to use as a maneuver and training ground for field artillery and cavalry troops stationed at the Presidio of Monterey. Before the Army's acquisition of the property, the area was agricultural, as is much of the surrounding land today. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed.

In 1940, additional agricultural property was purchased for further development of the Main Garrison. At the same time, beachfront property was donated to the Army. Building construction in the Main Garrison began in 1940 and continued into the 1960s, starting in the northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, the Army constructed and maintained a small airfield within the Main Garrison in what became the South Parade Ground. In the early 1960s, when the Fritzsche Army Airfield was completed, the Main Garrison airfield was decommissioned and its facilities were redeveloped as motor pools and other facilities.

Military training at the former Fort Ord began in approximately 1917 and continued until base closure in 1994. From 1917 through the 1930s the property was used as a maneuver and training ground primarily for the 11th Cavalry and the 76th Field Artillery stationed at the Presidio of Monterey. During the spring and summer months, the 30th Infantry Regiment stationed at the Presidio of San Francisco also participated in maneuvers as did other National Guard and Army Reserve units (*HLA, 2000a*). Encampments established at the Camp Ord Military Reservation included Camps Clayton, Huffman, and Pacific.

In 1940, the 7th Infantry Division was activated and Fort Ord was named a permanent Army post. Other divisions that trained and embarked to the Pacific and European theaters from Fort Ord during World War II were the 3rd, 27th, 35th, and 43rd Divisions. Following World War II, infantry training became the focus at Fort Ord. Fort Ord was designated the 4th Replacement Training Center. The 4th Infantry Division was organized at Fort Ord in 1947 and the 7th Division was assigned to Korea. In 1948 the 7th Division was relocated to Japan and the 4th Infantry Division assumed the role of training soldiers for future conflicts. In September 1950, the 4th Division was replaced by the 6th Division, which continued the mission of training troops in basic and advanced individual training. The 6th Division remained until the arrival of the 5th Division from Germany in January 1957. The 5th Division was inactivated in June 1957 and Fort Ord then became the United States Army Infantry Training Center from 1957 until 1974. In October 1974, the 7th Infantry Division was reactivated at Fort Ord. The 7th Infantry Division was converted to a light division in 1983; light infantry troops operate without heavy tanks or armor. The former Fort Ord was selected in 1991 for base realignment and closure (BRAC), and the base was officially closed in September 1994.

2.1.1 History of OE Use

Since 1917, portions of the Installation were used by cavalry and infantry units for maneuvers, target ranges, and other purposes. OE that have been fired into, fired upon, or used on the facility include

artillery and mortar projectiles, rockets and guided missiles, rifle and hand grenades, practice land mines, pyrotechnics, bombs, and demolition materials. A wide variety of conventional UXO items have been located at sites throughout the former Fort Ord, including pyrotechnics and explosives.

2.1.2 Summary of Existing OE Program

Prior to and concurrent with the preparation of the basewide OE RI/FS, the Army had been conducting an OE cleanup that consists of implementing and documenting OE removal actions in areas with imminent OE hazards. These removal actions have not only reduced imminent OE hazards but have also provided information about the type of UXO and level of OE hazard at each of the sites that can be used in the basewide OE RI/FS.

Work for the existing OE program has been conducted in accordance with the following documents:

Time-critical removal actions have been implemented as described in the *Fort Ord Ordnance and Explosive Waste Time-Critical Removal Action Memorandum* (*Army, 1994*).

Non-time-critical removal actions are being addressed in the *Final Action Memorandum, Phase 2 Engineering Evaluation/Cost Analysis, Ordnance and Explosives Sites, Former Fort Ord, Monterey County, California* (*Army, 1999*). The Action Memorandum, Phase 2 EE/CA identifies and describes the rationale for continuing with UXO removal actions at OE sites while the basewide OE RI/FS is being conducted and addresses recommendations for future UXO removal actions.

All removal actions have been implemented in accordance with the Land Disposal Site Plan (LDSP), LDSP amendments, and explosive safety submissions, which have been approved by the Department of Defense Explosives Safety Board (DDESB). These plans are required to describe the nature, extent, and types of known or suspected UXO contamination, the proposed future use of each area, and procedures for mitigating OE hazards in a manner compatible with the proposed land reuse and in accordance with Department of Defense (DoD) safety standards.

Known or suspected OE sites have been identified and listed in the 1997 Draft Revised Archive Search Report (ASR; U.S. Army Engineer Division, Huntsville [*USAEDH], 1997*), which is an update of previous ASRs (*USAEDH, 1993; 1994*). A preliminary site reconnaissance was conducted as part of the ASR to further identify/characterize potential OE sites; the results are contained in the 1997 ASR.

Previously identified, known, or suspected OE sites, identified at the time the ASR was issued, were listed in the Phase 1 Engineering Evaluation/Cost Analysis (Phase I EE/CA; *USAEDH, 1997*) and the Phase 2 Engineering Evaluation/Cost Analysis (Phase 2 EE/CA; *Army, 1998b*). Because past military training activities resulted in the deposition of UXO in some areas on the former Fort Ord, the Phase 1 and Phase 2 EE/CAs (*USAEDH, 1997; Army, 1998b*) were developed to describe the UXO removal and management activities for sites known or suspected to contain UXO. The Phase 1 EE/CA addressed 29 OE sites and subsites (*USAEDH, 1997*). The Phase 2 EE/CA addressed the remaining OE sites, including future sites (*Army, 1998b*). Sites for which no further removal actions were recommended in the Phase 1 EE/CA (*USAEDH, 1997*) were addressed in the *Action Memorandum 1, Phase 1 EE/CA, Twelve Ordnance and Explosives Sites* (*Army, 1998a*). The Phase 2 EE/CA established a "plug-in" evaluation process designed to address any UXO situation on the former Fort Ord (*Army, 1998b*); the Action Memorandum, Phase 2 EE/CA documents the process (*Army, 1999*).

The Phase 2 EE/CA process addressed additional known or suspected OE sites not evaluated in Action Memorandum 1 by developing categories for each site based on: (1) expected type of UXO present, (2) soil type, and (3) future land use of the site (*Army, 199ba*). Five removal alternatives were developed to address each category of site. UXO data were obtained from the ASR prepared in December 1993, the

ASR Supplement prepared in November 1994, and the Revised Draft ASR completed in 1997 (*USAEDH, 1993; 1994; 1997*). The Phase 2 EE/CA provided a summary of the number and types of UXO and ordnance-related scrap found during OE response actions at OE sites on the former Fort Ord at the time the EE/CA was prepared (*Army, 1998b*). Data on UXO and ordnance-related scrap identified since that time, and on an ongoing basis as removal actions are performed at the former Fort Ord, will be provided in after action reports or memoranda and in the basewide OE RI/FS.

2.2 Physical Setting

The following sections summarize the location and general physical setting of the base, including intended land uses.

2.2.1 Location

The former Fort Ord is adjacent to Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco (Plate 1). The base consists of approximately 28,000 acres adjacent to the cities of Seaside, Sand City, Monterey, and Del Rey Oaks to the south and Marina to the north. The Santa Fe Railroad and Highway 1 pass through the western part of the former Fort Ord, separating the beachfront portions from the rest of the base. Laguna Seca Recreation Area and Toro Park border the former Fort Ord to the South and Southeast, respectively, as well as several small communities such as Toro Park Estates and San Benancio.

2.2.2 General History

Beginning with its founding in 1917, Fort Ord served primarily as a training and staging facility for cavalry and infantry troops. From 1947 to 1974, Fort Ord was a basic training center. After 1974, the 7th Infantry Division occupied Fort Ord. Fort Ord was selected in 1991 for decommissioning, but troop reallocation was not completed until 1993. Although Army personnel still operate the base, no active Army division is stationed at the former Fort Ord.

2.2.3 Land Use

The former Fort Ord consists of both developed and undeveloped land. The three principal developed areas are the East Garrison, the Fritzsche Army Airfield (FAAF), and the Main Garrison; these areas collectively comprise approximately 8,000 acres. The remaining 20,000 acres are largely undeveloped areas. Land uses in both the developed and undeveloped areas when the former Fort Ord was active are described below.

2.2.3.1 Developed Land

With up to 15,000 active duty military personnel and 5,100 civilians working onsite during its active history, the former Fort Ord's developed areas resembled a medium-sized city, with family housing, medical facilities, warehouses, office buildings, industrial complexes, and gas stations. Individual land-use categories were as follows:

- Residential areas included military housing, such as training and temporary personnel barracks, enlisted housing, and officer housing.

- Local services/commercial areas provided retail or other commercial services such as gas stations, mini-markets, and fast-food facilities.

- Military support/industrial areas included industrial operations such as motor pools, machine shops, a cannibalization yard (where serviceable parts are removed from damaged vehicles), and the FAAF.

- Mixed land-use areas combined residential, local services/commercial, and military support operations.

- Schools included the Thomas Hayes Elementary, Roger S. Fitch Middle, General George S. Patton Elementary, Marshall Elementary, and Gladys Stone schools. High school students attended Seaside High, outside the former Fort Ord's southwest boundary.

- Hospital facilities included the Silas B. Hayes Army Hospital, medical and dental facilities, and a helipad.

- Training areas included a central track and field, firing ranges, and obstacle courses.

- Recreational areas included a golf course and clubhouse, baseball diamonds, tennis courts, and playgrounds.

The three principal developed areas are described below:

- East Garrison: The East Garrison is on the northeast side of the base, adjacent to undeveloped training areas. Military/industrial support areas at the East Garrison included tactical vehicle storage facilities, defense recycling and disposal areas, a sewage treatment plant, and small arms ranges. The East Garrison also included recreational open space with primitive camping facilities, baseball diamonds, a skeet range, and tennis courts. Recreational open space occupied 25 of the approximately 350 acres of the East Garrison.

- Fritzsche Army Airfield (FAAF): The former FAAF is in the northern portion of the former Fort Ord, on the north side of Reservation Road and adjacent to the city limits of Marina. The primary land use was military/industrial support operations; facilities included airstrips, a motor park, aircraft fuel facilities, a sewage treatment plant, aircraft maintenance facilities, an air control tower, a fire and rescue station, and aircraft hangars.

- Main Garrison: The Southern Pacific Railroad right-of-way and Highway 1 separate the coastal zone from the former Fort Ord's Main Garrison. The Main Garrison consisted of a complex combination of the various land-use categories. Facilities included schools, a hospital, housing, commercial facilities, (including a dry cleaner and a gasoline service station), and industrial operations (including motor pools and machine shops).

2.2.3.2 Undeveloped Land

The two principal undeveloped areas are described below:

Coastal Zone: A system of sand dunes lies between Highway 1 and the shoreline. The western edge of the dunes has an abrupt drop of 40 to 70 feet, and the dunes reach an elevation of 140 feet above mean sea level on the gentler, eastern slopes. The dunes provided a buffer zone that isolated the Beach Trainfire Ranges from the shoreline to the west. Stilwell Hall (a former recreation center), numerous former target ranges, former ammunition storage facilities, and two inactive sewage treatment facilities lie east of the beach.

Because of the presence of rare and/or endangered species and because of its visual attributes, Monterey County has designated the former Fort Ord's coastal zone an environmentally sensitive area. The

California Natural Coordinating Council (CNCC) and the Heritage Conservation and Recreation Service (HCRS) have identified the dunes at the former Fort Ord as among the best coastal dunes in California because of significant features including coastal strand vegetation and the habitat of the black legless lizard (Monterey County Planning Department [*MCPD], 1984*).

Inland Areas: Undeveloped land in the inland portions of the former Fort Ord includes the Multi-Range Area (MRA) and infantry training areas, portions of which were used for livestock grazing and recreational activities such as hunting, fishing, and camping. These undeveloped areas are primarily left in their natural state, with only minor development of facilities.

Central Maritime Chaparral: Central maritime chaparral consists of open to dense shrub stands located in the eastern and southern portions of the former Fort Ord. Central maritime chaparral on the former Fort Ord has been divided into three classifications including mature chaparral, intermediate-age chaparral, and disturbed chaparral. Mature chaparral is composed of shrubs with closed canopies that have very little open ground with little or no herbaceous species. Intermediate-age stands generally exhibit more open ground and herbaceous plant cover with a more diverse species composition. Disturbed chaparral habitat includes areas that were subject to regular disturbance. Disturbed chaparral often exhibits very open, sandy ground with limited herbaceous plant cover.

The Habitat Management Plan (HMP) identifies a number of species of concern on the former Fort Ord. HMP sensitive species are located in central maritime chaparral habitat including sandmat manzanita, Toro manzanita, Hooker's manzanita, Monterey ceanothus, Eastwood's goldenbush, Monterey spineflower, sand gilia, Seaside bird's-beak, and black legless lizards.

2.2.3.3 Future Land Use

The future land uses presented in this section are primarily based upon the Fort Ord Reuse Authority (FORA) March 1997 Fort Ord Base Reuse Plan (*FORA, 1997*) and the July 1995 USACE and Bureau of Land Management (BLM) Site Use Management Plan (SUMP) (*USACE, 1995b*). Other sources of future land use information include public benefit conveyance, negotiated sale requests, transfer documents, and the Installation-Wide Multispecies HMP (*USACE, 1997*). The Reuse Plan identified approximately 20 land-use categories at Fort Ord (*FORA, 1997*) including habitat management, open space/recreation, institutional/public facilities, commercial, industrial/business park, residential, tourism, mixed use, and others.

2.2.4 Site Features

The following section summarizes site features at the former Fort Ord.

2.2.4.1 Climate

The area's climate is characterized by warm, dry summers and cool, rainy winters. The Pacific Ocean is the principal influence on the climate at the former Fort Ord, and the source of fog and onshore winds that moderate temperature extremes. Daily ambient air temperatures typically range from 40 to 70 degrees Fahrenheit (F), but temperatures in the low 100s have occurred. Thick morning fog is common throughout the year. Winds are generally from the west.

The average annual rainfall of 14 inches occurs almost entirely between November and April. Because the predominant soil is permeable sand, runoff is limited and streamflow occurs only intermittently and within the very steep canyons in the eastern portion of the former Fort Ord.

2.2.4.2 Ecological Setting

The former Fort Ord is located on California's central coast, a biologically diverse and unique region. The range and combination of climatic, topographic, and soil conditions at the former Fort Ord support many biological communities. Field surveys were conducted from 1991 through 1994 to provide detailed site-specific, as well as basewide, information regarding plant communities, botanical resources, observed and expected wildlife, and biological resources of concern. Plant communities were mapped for the whole base as described in the *Draft Basewide Biological Inventory, Fort Ord, California* (*HLA, 1992*).

Several of the former Fort Ord plant communities have been combined for simplification. The 12 plant communities described at former Fort Ord sites include coast live oak woodland (coastal and inland); central maritime chaparral; central coastal scrub; grassland; developed/landscaped and disturbed dunes; dune scrub; iceplant mats; riparian forest; wetlands (including vernal pools and freshwater marsh); and coastal strand. Central maritime chaparral is the most extensive natural community at the former Fort Ord, occupying approximately 12,500 acres in the south-central portion of the base. Oak woodlands are widespread at the former Fort Ord and occupy the next largest area, about 5,000 acres. Grasslands, located primarily in the southeastern and northern portions of the base, occupy approximately 4,500 acres. The other community types generally occupy less than 500 acres each. The remaining approximately 4,000 acres of the base are considered fully developed and not defined as ecological communities.

Special-status biological resources are those resources, including plant and wildlife taxa and native biological communities, that receive various levels of protection under local, state, or federal laws, regulations, or policies. The closure and disposal of former Fort Ord is considered a major federal action that could affect several species of concern and other rare species listed by the California Department of Fish and Game and/or the California Native Plant Society or listed as threatened or endangered under the federal Endangered Species Act (ESA). The U.S. Department of the Interior, Fish and Wildlife Service (USFWS) final Biological Opinion for the Disposal and Reuse of Fort Ord (*USFWS, 1993*) required that a HMP be developed and implemented to reduce the incidental take of listed species and loss of habitat that supports these species. The HMP for former Fort Ord complies with the USFWS Biological Opinion and establishes the guidelines for the conservation and management of wildlife and plant species and habitats that largely depend on former Fort Ord land for survival (*USACE, 1997*). Of the 12 plant communities identified at the former Fort Ord, 2 are considered rare or declining and of highest inventory priority by the California Department of Fish and Game (CDFG) (*CDFG, 1997*): central maritime chaparral and valley needlegrass grassland. Special-status taxa that occur or potentially occur in the plant communities at the former Fort Ord include 22 vascular plants, 1 invertebrate, 4 reptiles, 1 amphibian, 9 birds, and 2 mammals.

From 1994 to the present, baseline and follow-up surveys have been conducted for habitats potentially affected by OE removal activities. These data are presented in annual monitoring reports including *Fort Ord 1994 Annual Monitoring Report for Biological Baseline Studies at Unexploded Ordnance Sites* (*HLA, 1994*); *1995 Annual Biological Monitoring Report for Unexploded Ordnance Removal Sites at Former Fort Ord,* (*HLA, 1995b*); *1996 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites 10 East, 10 West, 11, 12 and 16 Presidio of Monterey Annex* (*HLA, 1996*); *1997 Annual Monitoring Report Former Fort Ord,* (*HLA, 1997*); and *1998 Annual Monitoring Report Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites at Former Fort Ord, Presidio of Monterey Annex, Monterey, California,* (*HLA, 1998*), 1999 *Annual Monitoring Report, Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites on Former Fort Ord, Presidio of Monterey Annex, Monterey, California* (*HLA, 1999b*), *2000 Annual Monitoring Report, Biological Baseline Studies and Follow-up Monitoring at Unexploded Ordnance Sites on Former Fort Ord, Presidio of Monterey Annex, Monterey, California.* (*HLA, 2000c*).

2001 Annual Monitoring Report, Biological Baseline Studies and Follow-up Monitoring, Former Fort Ord, Monterey County (Harding ESE, 2001).

2.2.4.3 Topography and Surface Waters

Elevations at the former Fort Ord range from approximately 900 feet above mean sea level (MSL) near Wildcat Ridge, on the east side of the base, to sea level at the beach. The predominant topography of the area reflects morphology typical of the dune sand deposits that underlie the western and northern portions of the base. In these areas, the ground surface slopes gently west and northwest, draining toward Monterey Bay. Runoff is minimal because of the high rate of surface-water infiltration into the permeable dune sand; consequently, well-developed natural drainages are absent throughout much of this area. Closed drainage depressions typical of dune topography are common.

The topography in the southeastern third of the base is notably different from the rest of the base. This area has relatively well-defined, eastward-flowing drainage channels within narrow, moderately to steeply sloping canyons draining into the Salinas Valley.

2.2.5 Subsurface Conditions

This section summarizes subsurface conditions at the former Fort Ord.

2.2.5.1 Geology

The former Fort Ord is within the Coast Ranges Geomorphic Province. The region consists of northwest-trending mountain ranges, broad basins, and elongated valleys generally paralleling the major geologic structures. In the Coast Ranges, older, consolidated rocks are characteristically exposed in the mountains but are buried beneath younger, unconsolidated alluvial fan and fluvial sediments in the valleys and lowlands. In the coastal lowlands, these younger sediments commonly interfinger with marine deposits.

The former Fort Ord is at the transition between the mountains of the Santa Lucia Range and the Sierra de la Salinas to the south and southeast, respectively, and the lowlands of the Salinas River Valley to the north. The geology of the former Fort Ord generally reflects this transitional condition; older, consolidated rock is exposed at the ground surface near the southern base boundary and becomes buried under a northward-thickening sequence of poorly consolidated deposits to the north. The former Fort Ord and the adjacent areas are underlain, from depth to ground surface, by one or more of the following older, consolidated units:

- Mesozoic granitic and metamorphic rocks
- Miocene marine sedimentary rocks of the Monterey Formation
- Upper Miocene to lower Pliocene marine sandstone of the Santa Margarita Formation (and possibly the Pancho Rico and/or Purisima Formations).

Locally, these units are overlain and obscured by geologically younger sediments, including:

- Plio-Pleistocene alluvial fan, lake, and fluvial deposits of the Paso Robles Formation
- Pleistocene eolian and fluvial sands of the Aromas Sand

- Pleistocene to Holocene valley fill deposits consisting of poorly consolidated gravel, sand, silt, and clay
- Pleistocene and Holocene dune sands
- Recent beach sand
- Recent alluvium.

The geology of the former Fort Ord is described in detail in *Volume II of the Basewide RI, Basewide Hydrogeologic Characterization* (*Harding ESE, 1995a*).

2.2.5.2 Hydrogeology

Recent studies of the former Fort Ord hydrogeology concluded that the base straddles two distinct groundwater basins, the Salinas and Seaside basins (Geotechnical Consultants, Inc. [*GTC*], *1984;* Staal, Gardner & Dunne, Inc. *[SGD], 1987*). The former Fort Ord includes the southwestern edge of the Salinas basin and the eastern portion of the smaller Seaside basin. The Salinas basin underlies the northern and southeastern portions of the base, and the Seaside basin underlies the southern and southwestern areas. Basewide RI/FS sites with recognized groundwater contamination are limited to the Salinas groundwater basin at the former Fort Ord; therefore, only the Salinas basin is described herein.

The Salinas groundwater basin is relatively large and extends well beyond the boundaries of the former Fort Ord. At the former Fort Ord, the Salinas basin is composed of relatively flat-lying to gently dipping, poorly consolidated sediments. Although relatively simple structurally, the sediments are stratigraphically complex, reflecting a variety of depositional environments. Aquifers within the Salinas basin at the former Fort Ord, from top to bottom, include the unconfined A-aquifer, the confined Upper 180-foot aquifer, the confined and unconfined Lower 180-foot aquifer, and the confined 400-foot and 900-foot aquifers. These aquifer names reflect local historical water levels and are not directly correlated to present water levels at the former Fort Ord.

Groundwater extraction by the City of Marina, by the former Fort Ord, and by irrigation wells in the Salinas Valley has historically induced seawater intrusion into the Lower 180-foot and the 400-foot aquifers. Seawater intrusion continues to affect these aquifers. Intrusion into the Upper 180-foot aquifer appears to be limited to the vicinity of the beach at the former Fort Ord (*Harding ESE, 1999*).

2.3 OE RI/FS Background

Since the base was selected for BRAC in 1991 and was officially closed in September 1994, OE removal actions have been performed and documented in preparation for transfer and reuse of the former Fort Ord property. The Ord Military Community (OMC), located within the Main Garrison portion of the former Fort Ord, will be retained by the Army. Since base closure in September 1994, lands outside the OMC have been subject to the reuse process. Some of the property on the Installation has been transferred. A large portion of the Inland Training Ranges was assigned to BLM. Other areas on the Installation have been or will be disposed to federal, state, local, and private entities through economic development conveyance, public benefit conveyance, negotiated sale, or other means.

The expanded reuse of the former Fort Ord increases the possibility of the public being exposed to OE hazards.

In November 1998, the Army agreed to evaluate OE at the former Fort Ord in an OE RI/FS consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The basewide OE RI/FS, which the Army is preparing to address OE hazards on the former Fort Ord, will include input from the community and will require regulatory agency review and approval. The basewide OE RI/FS will evaluate past removal actions as well as recommend future remedial actions deemed necessary to protect human health and the environment under future uses.

The Army has been conducting OE sampling and removal actions at identified OE sites and will continue these actions to mitigate imminent OE hazards to the public while gathering data about the type of OE and level of OE hazard at each of the sites for use in the basewide OE RI/FS. The Army is performing its activities pursuant to the President's authority under the CERCLA Section 104, as delegated to the Army in accordance with Executive Order 12580 and in compliance with the process set out in CERCLA Section 120. However, regulatory agencies (USEPA] and the DTSC under the California Environmental Protection Agency) have been and will continue to be involved and provide input during OE removal and remedial activities. A Federal Facility Agreement (FFA) was signed in 1990 by the Army, EPA, and California Department of Health Services (now known as DTSC) and the Regional Water Quality Control Board (RWQCB). The FFA established schedules for performing remedial investigations and feasibility studies and requires that remedial actions be completed as expeditiously as possible. In April 2000, an agreement was signed between the Army, EPA, and DTSC to evaluate OE at the former Fort Ord subject to the provisions of the FFA. The basewide OE RI/FS will contain a comprehensive evaluation of all OE-related data for the entire former Fort Ord and will evaluate long-term response alternatives for cleanup and risk management of OE.

2.4 Track 1 Sites Investigation and Sampling Background

OE-related field investigations, sampling, and removal activities were conducted at Track 1 sites by the Army's OE contractors according to contractual and/or work plan requirements in place at the time the work was conducted. Each of the Track 1 Site Reports (Section 3.0) includes: (1) a detailed summary of activities conducted by the OE contractors, and (2) an evaluation of the work conducted based on whether it meets the data quality objectives (DQOs) (included as Attachment B to this report) that were established for the basewide OE RI/FS and Track 1 sites in the Plan for Evaluation of Previous Work (HLA, 2000b). Although Track 1 DQOs were not established at the time the OE contractors conducted field investigations and sampling activities at Track 1 sites, the purpose and objectives of the work conducted at the sites based on contractual and/or work plan requirements and approved methodologies are summarized below, and are evaluated against the Track 1 DQOs in each Site Report.

Three primary OE contractors performed OE-related field investigations, sampling and/or removal actions at the Track 1 sites at the former Fort Ord: (1) Human Factors Applications, Inc. (HFA), (2) CMS Environmental, Inc. (CMS), and (3) UXB International, Inc. (UXB). Several statistical methodologies and software packages developed by the USACE's Huntsville office were used by the Army's OE contractors in the performance of engineering evaluation/cost analysis (EE/CA) investigations for OE at the former Fort Ord, including the SiteStats/GridStats (SS/GS), Ordnance and Explosives Cost-Effectiveness Risk Tool (OECert), and Unexploded Ordnance Calculator (UXO Calculator). These software packages and methodologies were used in various combinations or with other protocols at the former Fort Ord to determine the amount and extent of OE contamination (SS/GS, a grid sampling design tool, was used alone and in combination with UXO Calculator, a UXO density estimating tool), and to assess risks (using OECert) due to the presence of OE at various known and suspected OE sites, including several Track 1 sites. Based on a statistical review of these methodologies presented in the Draft *Evaluation of U.S. Army Corps of Engineers Statistical UXO Sampling And Characterization Methodologies* (Draft Statistical Evaluation Report) (*NERL, 2000*), several concerns were identified

regarding the assumptions and design of the methodologies and their ability to adequately characterize OE at a given site and assess associated risks. For instance, the results of the evaluation indicated statistical procedures developed for the methodologies were vague and not well documented, changes were made to the software without documentation, and procedures used differed from those described in the SS/GS and UXO Calculator documents (*NERL, 2000*).

Although the methodologies or protocols applied during OE investigations varied from site to site, the SS/GS methodology that guided where, how, and how much sampling was performed at a site was used on many of the Track 1 sites. The main concerns identified in the Draft Statistical Evaluation Report regarding the SS/GS methodology included: (1) the conclusions tended to change from one statistical iteration to the next, (2) the rules regarding when to stop sampling were faulty, (3) the statistics were not effective in identifying UXO clusters within a sector, and (4) sector homogeneity versus UXO distribution should be verified.

Although there were problems identified in the Draft Statistical Evaluation Report regarding the methodologies that guided the OE characterization approach at a given site, the site-specific data that was collected during the OE investigations was still provided valuable information that identified the presence and type of OE items at a site. In light of the concerns outlined in the Draft Statistical Evaluation Report regarding the methodologies and the uncertainty involved in any conclusions made based on their use, the OE-related data that was collected at Track 1 sites was reevaluated as summarized in the Site Reports herein (Section 3.0) based on a weight of evidence approach using the DQOs outlined in the Plan for Evaluation of Previous Work (*HLA, 2000b*) rather than on conclusions made using these methodologies. General protocols used by each of the Army's OE contractors to conduct OE-related investigations at suspected or known OE sites at the former Fort Ord are summarized below. Site-specific protocols are described in detail in the Site Reports (Section 3.0).

Human Factors Applications, Inc. (HFA) -- January 1994 through June 1994

Human Factors Applications, Inc. (HFA) was contracted by the U.S. Army Corps of Engineers Huntsville Division (CEHND) to provide unexploded ordnance (UXO) services at Fort Ord. HFA's objective was to determine the presence or absence of unexploded ordnance UXO at sixteen sites distributed throughout Fort Ord. The sites were identified by the U. S. Army corps of Engineers, St. Louis Division and reported in the 1993 Archives Search Report. If UXO was discovered the discovery was to be reported to the CEHND Safety Specialist who was responsible for determining whether the site was to be declared contaminated with UXO. HFA performed sampling operations at Fort Ord from January 1994 through June 1994.

The sampling operation was conducted in two phases, a Grid and Boundary Location Survey, and UXO Surface/Subsurface Sweep and Characterization. Site boundaries were determined using information in the USACE Scope of Work, the Fort Ord Grid and Boundary Survey Plan and discussions with CEHND and Fort Ord representatives during site visits. The sites were investigated using one hundred percent sampling. This method requires that 100 percent of the anomalies detected in the sample grids be excavated. The Schonstedt GA-52/C or the Schonstedt GA-72Cv magnetometers were used to identify anomalies. A maximum search lane width of 5 feet was used during the geophysical survey. According to the HFA work plan, survey grids were randomly located. Grids were generally to be 100 by 100 feet and separated by at least 200 feet. Each grid was given a 100 percent visual surface sweep and a 100 percent subsurface geophysical investigation using the Schonstedt GA-52/C or the Schonstedt GA-72/Cv. Surface contacts and anomalies were marked with yellow flags for excavation and identification. Subsurface contacts were uncovered using hand tools to a maximum depth of 3 feet.

UXB International, Inc. (UXB) – July 1994 through August 1995

UXB International Inc. was contracted by the U.S. Army Corps of Engineers Huntsville Division (CEHND) with the objective of performing ordnance and explosives (OE) sampling and removal actions on selected sites at Fort Ord. The sites selected for sampling/removal action potentially contained OE. As part of the sampling/removal action. UXB was to destroy all unexploded ordnance (UXO) encountered at each site. This action was performed according to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Section 104 and the National Contingency Plan, Sections 300.120(c) and 300.400(e). Additionally, this action was completed under Chapter 12, DOD 6055.9-STD, DOD Ammunition and Explosives Safety Standards (*UXB, 1995*). UXB performed sampling operations at Fort Ord from July 1994 through August 1995.

A thorough review of U.S. Army Corps of Engineers (USACE) provided historical data was performed to determine the sites and their possible level of contamination. Site locations were taken from the 1993 Archives Search Report (ASR) and 1994 ASR Supplement with site perimeters and priorities provided by the Base Realignment And Closure (BRAC) office and CEHND project manager. Site perimeter surveys were done prior to any OE sampling and removal work in the site area. The site investigation results were continuously monitored by the on-site CEHND Safety Specialist who determined whether a site was declared contaminated and if a clearance was required (*UXB, 1995*). Geophysical instruments (magnetometers) were provided by the CEHND. Sample grids were 100 feet by 100 feet square and spaced so that no two grids were any closer than 200 feet, in order to provide maximum dispersion of the sample grids throughout the site. Sample grids were required to cover at least 10 percent of the total area of the site being sampled. Site perimeters and grid separation could be modified by the CEHND Safety Specialist if needed. Once the sample grid locations were established each grid was divided into 5-foot wide search lanes. Each lane was investigated visually while simultaneously searching for subsurface anomalies with the magnetometer. Each anomaly was marked (flagged) and excavated by hand by the UXO Safety Specialist. Grids with high concentrations of sub-surface ferrous metals required a second sweep normally made at an angle of 90 degrees to the first.

Excavation to a depth of 4 feet below ground surface (bgs) (3 feet bgs prior December 14, 1994) was required to identify or confirm the presence of OE. If the anomaly could not be uncovered within 3 or 4 feet bgs, the onsite CEHND Safety Specialist was asked to determine if deeper excavation was required. Quality control (QC) checks were performed on each grid after all UXO operations were complete. UXB QC specialists checked a minimum of 10 percent of each grid to insure that OE removal was done properly. After the QC check was performed, the CEHND Safety Specialist performed a quality assurance (QA) check of the site prior to accepting site work as complete according to contractual specifications.

CMS Environmental, Inc. (CMS)/USA Environmental (August 1995-present)

CMS Environmental Inc., (CMS) was awarded the contract to perform ordnance and explosives (OE) sampling and removal at selected sites within the Former Fort Ord. Work completed falls within part of the Base Realignment and Closure Act (BRAC). This action was performed by CMS was under contract issued by the U.S. Army Engineering and Support Center, Huntsville (CEHNC). The contract was revised on January 31, 1997 (CMS, 1997b). CMS began sampling operations at Fort Ord from August 1995. In June of 1998 CMS was sold and the name of the company became USA Environmental, Inc. (USA). In July 1998 USA began to conduct work on Fort Ord as a subcontractor to CMS. In September 1998 the sale was complete and USA became the prime contractor.

Part of this action constituted the destruction of all on-Site OE encountered. This was implemented in accordance with the Comprehensive Environmental Response Compensation, and Liability Act

(CERCLA), Section 104 and the National Contingency Plan, Sections 300.120(c) and 300.400(e). In addition, this action was completed under Chapter 12, DoD 6055.9-STD, DoD Ammunition and Explosives Safety Standards.

The objective of CMS was to safely locate, identify, sample and/or dispose of all UXO located on the project site down to a depth of four feet below ground surface, unless approval was given based on studies, site conditions or Department of Defense Explosive Safety Board (DDESB) acceptance of a variance from the four foot depth (*CMS, 1997a*). Sampling activities were performed according to guidelines from a sub-plan to the previously approved work plan under contract DACA87-94-D-0030 Task Order 16. Sample grids were 100 by 100 feet square and spaced apart so that no two sample grids were any closer than 200 feet. GridStats/SiteStats (GS/SS) software was utilized on the sample grids to determine the amount and location of sampling, unless otherwise directed by the Contracting Officer (CO).

Depending on direction from the USACE sites were sampled using either the SS/GS methodology or 100 percent sampling. 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 visually inspected and electronically investigated using a magnetometer and identified anomalies are located, 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. Excavation of anomalies is performed in accordance with direction of the program; generally 32 to 40 percent of the flagged anomalies are investigated using this technique (*CMS, 1995*).

In 100 percent grid sampling, 100- by 100-foot grids were selected, surveyed and investigated with a magnetometer along maximum 5-foot wide search lanes. Whenever a subsurface anomaly or metallic surface object was encountered, it was investigated. Near surface anomalies were excavated with hand tools. While digging, a magnetometer was used to check and verify the location of the anomaly (*CMS, 1995*).

Historical Reviews and Reconnaissance Activities

Archives Search Reports

Three Archive Search Reports (ASRs) were completed for the former Fort Ord. The first was completed in 1993 by the St. Louis Corps of Engineers based on a Scope of Work provided by the Huntsville Corps of Engineers and example ASRs prepared by others. A Supplement to the 1993 ASR was prepared in November 1994. This supplement was prepared based on a Scope of Work and guidance published in June 1994. The ASR was updated in 1997 following USACE guidance *Procedures for Conducting Preliminary Assessments at Potential Ordnance Response Sites* (*USACE, 1995a*).

The purpose of the ASRs conducted at the former Fort Ord were to gather and review historical information to determine the types of munitions used at the site, identify possible disposal areas, identify unknown training areas, and recommend follow-up actions. The 1995 guidance specified that the ASR include information on historical records, site visits, follow-up actions, prior documentation, and characterization and evaluation for potential OE response sites.

Basewide Range Assessment

The purpose of the Basewide Range Assessment (BRA) is to conduct site assessment activities to gather data that will be used to evaluate the potential for chemical contamination at suspected small arms and multi-use ranges and training areas at the former Fort Ord. As part of the BRA, the site assessment process includes conducting literature reviews, site reconnaissance and mapping, and site investigation sampling. The results of the assessment will be used to determine whether the areas may be recommended for the remedial phase that includes site characterization, risk evaluation, and remedial action.

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

3.0 TRACK 1 SITE REPORTS

See individual Site Reports.

4.0 ONGOING AND FUTURE OE-RELATED ACTIVITIES

This section describes ongoing and future OE-related activities at the former Fort Ord. Some of these programs are described in detail in the *Ordnance and Explosives Site Security Program Summary* (*Army, 2001*).

4.1 Five-Year Review

A review of the OE investigation conducted at Track 1 sites will be conducted within 5 years after implementation of the selected remedy. The purpose of the 5-year review is to determine whether the remedy at a site continues to be protective of human health and the environment after a period of 5 years from the time the remedy was implemented (or from the time of a previous five-year review). The methods, findings, and conclusions of the five-year review are documented in a Five-Year Review report. In addition, the Five-Year Review report documents provide newly identified site-related data or issues that are identified during the review, and the report identifies recommendations to address them as appropriate.

4.2 Deed Notice

The following general notice will be included in the deed for transferring any former Fort Ord property.

> "Ordnance and Explosives investigations indicate that it is not likely that OE are located within the property. However, there is a potential for OE to be present because OE were used throughout the history of Fort Ord."

4.3 OE Incident Reporting

OE investigations indicate that it is not likely that OE are located within the Track 1 property. However, there is a potential for OE to be present because OE were used throughout the history of Fort Ord. In the event OE is discovered by a future user of the land, a process has been developed for reporting such finds to an appropriate local law enforcement agency. The local law enforcement agency will arrange a response by the Army. This process is documented and must be acknowledged by the future grantee, its successors or assigns. Competent explosive ordnance personnel will promptly be dispatched to dispose of any discovered ordnance at no expense to the grantee. A "Safety Alert" pamphlet and the Ordnance and Explosives Incident Reporting Form are provided to the property users.

4.4 OE Recognition and Safety Training

The Army offers OE recognition and safety training to anyone conducting ground disturbance activities (digging holes, excavating trenches, repairing underground utilities, etc.) at the former Fort Ord. The Army or the Army's representative conducts a 30-minute training session. This training session includes a lecture on what OE might be found and the procedure to follow if something is found. The "Safety Alert" brochure is also distributed. Trained construction personnel will contact an appropriate local law enforcement agency if a potential military munitions item is encountered. The local law enforcement agency will then arrange a response by the Army. The following organizations have received OE recognition training: California State University Monterey Bay (CSUMB), U.S. Army Corps of Engineers (USACE) contractors, Pacific Gas & Electric, Pacific Bell, and the Bureau of Land Management. OE recognition training can be scheduled by contacting the Fort Ord Base Realignment and Closure (BRAC) office at (831) 242-7919.

At the following sites: OE-1, OE-6, OE-13A, OE-24B, OE-24D, OE-24E, and OE-39,the Army will request notice from the landowner of planned intrusive activities and in turn 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 conduct weekly site visits and provide refresher education as appropriate. At the time of the next 5-year review, the Army will assess whether the education program should continue. If experience indicates that no explosive items have been found in the course of development or redevelopment of the site, it is anticipated that the education program may, in consultation with the regulatory agencies, be discontinued, subject to reinstatement if an explosive item is encountered in the future.

4.5 School Education

Since 1997, the former Fort Ord has had an Ordnance and Explosives Safety Education Program. The OE safety education program is offered to local schools annually. The objective of this program is to provide school-age children with the ability to recognize the visible attributes of various OE items likely to exist on the former Fort Ord, associate danger with OE items and former Fort Ord OE areas, and understand the actions to be taken when a possible item is observed. This program has a three-tiered approach that includes distribution of the "Safety Alert" to organizations and agencies who provide information to the local community, a 1-hour OE safety presentation for local elementary and middle schools for 5th, 6th, and 7th grade students, and distribution of the "Safety Alert" to parents of children in the local schools and high school students. Representatives from the Army conduct the OE safety presentation.

4.6 Community Involvement

The Army is committed to develop opportunities to assist community members in understanding and participating in the cleanup decision-making process. The Army holds public meetings, Community Involvement Workshops, Technical Review Committee (TRC) meetings, and open houses and conducts public information sessions through booths or tables at local community events. The Army provides public and media tours of former Fort Ord cleanup activities, distributes fact sheets, and makes presentations to special interest and community groups as necessary to address specific community concerns or explain significant cleanup activities. The Army also maintains document repositories available to the public including the administrative record and several information repositories at local libraries. Additionally, the Army administers a public environmental cleanup web site and mails monthly cleanup updates. The web site provides background information, a description of current activities, documents available for public comment, maps, notices, and agendas for upcoming public meetings. The monthly cleanup update includes information on recent cleanup activities, recently published documents and fact sheets, and is mailed to those who have requested to be on the community relations mailing list and distributed at community involvement events. Community involvement activities are documented in Community Relations Plan that is updated annually.

4.7 Local and State Ordinances

Some local jurisdictions have established ordinances to monitor or control intrusive activities in specified areas of the former Fort Ord to manage risks of encountering potential OE.

5.0 TRACK 1 DECISION-MAKING PROCESS

The section summarizes the documentation and management procedures that will be followed for Track 1 sites.

5.1 Track 1 ROD Process

Subsequent to this Track 1 OE RI/FS, the Track 1 OE RI/FS Proposed Plan will present the No Action decision for the Track 1 sites as described in Section 3.0 of this report (Plate 5-1). Consistent with the requirements of CERCLA, notification about the proposed decision will be published in a major local newspaper and distributed for public review. A 30-day public comment period and a public meeting will be held. Subsequently, the Track 1 OE RI/FS Record of Decision (ROD) outlining the decision and action will be prepared by the Army for review and approval by the EPA and DTSC. After the agency review period, the final agency-approved action and response to public comments will be issued and made available to the public.

5.2 Track 1 Plug-In Process

This section identifies a process for identification and evaluation of sites that may be identified as Track 1 sites in the future. This plug in process may also be used for sites identified as candidate Track 1 sites based on the results of initial sampling efforts, but that require limited additional investigation, as agreed upon by the Army and the Regulatory Agencies, to meet the requirements for inclusion in Track 1. Sites that meet the requirement for Track 1 will be proposed for Track 1 through a "Plug-In" process by which an Approval Memorandum will be prepared presenting the rationale for designating the site(s) as Track 1. When approved by the regulatory agencies, the Approval Memorandum will become the decision document for the specific sites(s). Section 5.2.1 summarizes the definition of eligible Track 1 sites. Section 5.2.2 summarizes the documentation and management procedures to be followed during the "Plug-In" process.

5.2.1 Definition of Track 1 Eligible Sites

Track 1 sites at former Fort Ord are those sites that were identified as areas where OE use was suspected to have been used, but based on the RI/FS for each site, it falls into one of the following three categories:

- Category 1: There is no evidence to indicate OE was used at the site.
- Category 2: The site was used for training, but the OE items used do not pose an explosive hazard, or potentially remaining OE items do not pose an explosive hazard.
- Category 3: The site was used for training with OE, but OE items that potentially remain pose an acceptable risk based on site-specific evaluations conducted in the RI/FS.

The existing site archival and sampling information are evaluated by completing a checklist for each site as presented in the Work Plan for the Evaluation of Previous Work (*HLA, 2000b*). The main sources of information relied upon for completion of the checklist include the following:

- Site-Specific After Action Reports prepared by the OE Contractors
- Historical training maps

- Aerial photographs
- The Revised Archives Search Report
- Results of the Ordnance Detection and Discrimination Study

5.2.2 Track 1 Approval Memorandum

After the Track 1 OE RI/FS Record of Decision is signed, decisions for future Track 1 areas will be proposed and documented in Approval Memoranda that describe the rationale for Track 1 designation.

The Approval Memorandum for each future Track 1 parcel will include the following:

1. A description of the area
2. A description of the historical use of the area
3. A description of the OE investigation
4. Rationale for the designation of the area as Track 1
5. Checklist documenting review of existing historical and sampling data
6. Map(s) of the area.

Each Approval Memorandum will be made available for a 30-day public review period. Subsequently, when the Approval Memorandum is approved by the regulatory agencies, a public notice will be posted in a local newspaper. Completed and planned actions for the sites will be described in the newsletter, the Advance, prepared by the Army for local residents. When approved by the regulatory agencies, an Approval Memorandum for a specific Track 1 site will become the decision document for that site(s).

The Proposed Plans and RODs for Track 1 and other tracks (Tracks 0, 2 and 3), and all Approval Memoranda will be placed in the Fort Ord Administrative Record and the local information repositories.

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