Basewide Remedial Investigation/Feasibility Study
Fort Ord, California

Volume I - Background and Executive Summary

Prepared for

Department of the Army
Corps of Engineers
Sacramento District
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HLA Project No. 23366 041736

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Draft: July 27, 1994
Draft Final: December 1, 1994
Final: October 18, 1995

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This final version of the Background and Executive Summary addresses comments received on the Draft Final version of the report dated December 1994. Responses to agency comments on the Draft Final report are included in Volume VI of this report.

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1,2,3,4,6,7,8-HpCDD	1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin
1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8,9-Heptachlorodibenzofuran
1,2,3,4,7,8-HxCDD	1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin
1,2,3,4,7,8-HxCDF	1,2,3,4,7,8-Hexachlorodibenzofuran
2,3,4,7,8-PeCDF	2,3,4,7,8-Pentachlorodibenzofuran
1,2,3,7,8-PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
1,2,3,7,8-PeCDF	1,2,3,7,8-Pentachlorodibenzofuran
1,2,3,7,8,9-HxCDD	1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin
1,2,3,7,8,9-HxCDF	1,2,3,7,8,9-Hexachlorodibenzofuran
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2-Methnaphthalene	2-Methylnaphthalene
2-Methylphenol	2-Methylphenol
2-NT	2-Nitrotoluene
2,3,4,6,7,8-HxCDF	2,3,4,6,7,8-Hexachlorodibenzofuran
2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
2,3,7,8-TCDF	2,3,7,8-Tetrachlorodibenzofuran
2,4-DNT	2,4-Dinitrotoluene
2,4,6-TNT	2,4,6-Trinitrotoluene
2,6-DNT	2,6-Dinitrotoluene
3-NT	3-Nitrotoluene
4-Amino-DNT	4-Amino-dinitrotoluene
4-NT	4-Nitrotoluene
AA	Atomic adsorption
AAFES	Army and Air Force Exchange Service
AAL	Applied action level
ACM	Asbestos-containing materials
ADD	Average daily dose
AEC	Army Environmental Center
AEHA	U.S. Army Environmental Hygiene Agency
AF	Absorption factor
AF	Adherence factor (soil to skin)
Ag	Silver
AL	Action level
Alkalinity, Hydrox	Alkalinity, Hydrox. (as HCO_3)
Alkalinity, Bicarb	Alkalinity, Bicarb. (as $CaCO_3$)
Alkalinity, Total	Alkalinity, Total (as $CaCO_3$)
AMBAG	Association of Monterey Bay Area Governments

AP	Armor piercing
APC	Armored personnel carrier
AR200-1	Army Regulation 200-1
ARAR	Applicable or relevant and appropriate requirement
ARB	Air Resources Board
Army	Department of the Army
As	Arsenic
ASP	Ammunition supply point
ASR	Archives search report
AST	Aboveground storage tank
ASTM	American Society for Testing and Materials
AT	Averaging time
atm-m^3/mol	Atmospheres per cubic meter per mole
ATSDR	Agency for Toxic Substances and Disease Registry
B	Below quantitation limits (inorganic) or detected in blank as well as in sample (organic)
B(a)P	Benzo(a)pyrene
B(a)P-TE	Benzo(a)pyrene toxic equivalent
BAM	Behavior assessment model
BbC	Baywood (USDA soil type)
BCP	BRAC Cleanup Plan
BCT	BRAC Cleanup Team
BDC	Below detection limit
Be	Beryllium
BEC	Base Environmental Coordinator
BEHP	bis(2-Ethylhexyl)phthalate
Benzo(b)fluoranthe	Benzo(b)fluoranthene
BEP	bis(2-Ethylhexyl)phthalate
bgs	Below ground surface
BHC	Benzohexachloride
Bis(2ethlhex)phlat	bis(2-Ethylhexyl)phthalate
BNA	Base/neutral/acid extractable compound
BOD	Biological oxygen demand
BRA	Baseline Human Health Risk Assessment
BRAC	Base Realignment and Closure
BS/BSD	Blank spike/blank spike duplicate
BSI	Background Soil Investigation
BTC	Base Transition Coordinator
BTEX	Benzene, toluene, ethylbenzene, xylenes
BW	Basewide
BWBS	Basewide Background Soil Investigation
BWHC	Basewide Hydrogeologic Characterization
BWSDSSI	Basewide Storm Drain and Sanitary Sewer Investigation
BWSWOI	Basewide Surface Water Outfall Investigation
C-4	A type of plastic explosive
C	Chemical concentration in environmental medium
Ca	Calcium
CAIS	Chemical agent identification set
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Act/Administration
Cal-Am	California-American Water Company
CAMU	Corrective action management unit

Carbon Tet	Carbon tetrachloride
CAS	Chemical Abstracts Service
Cat Ex Capacity	Cation Exchange Capacity as Na (sodium)
CBR	Chemical, biological, and radioactive
CCC	California Conservation Corps
CCR	California Code of Regulations
Cd	Cadmium
CDD	Chlorinated dibenzodioxin
CDF	Chlorinated dibenzofuran
CDFG	California Department of Fish and Game
CDI	Chronic daily intake
CDP	Common depth point
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CERFA	Community Environmental Response Facilitation Act
CF	Conversion factor
CFR	Code of Federal Regulations
CGI	Combustible gas indicator
cis-1,2-DCE	cis-1,2-Dichloroethene
CLP	Contract Laboratory Program (EPA)
CNCC	California Natural Coordinating Council
COC	Chemical of concern
COE	U.S. Army Corps of Engineers
COPC	Chemical of potential concern
cPAH	Carcinogenic polycyclic aromatic hydrocarbon
Cr	Chromium
cRfD	Chronic reference dose
CRL	Certified reporting limit
CSL	Chemical Systems Laboratory
Cu	Copper
CV	Coefficient of variation
CVAA	Cold vapor atomic absorption
CWM	Chemical warfare material
%D	Percent difference
DAF	Dermal absorption factor
DBCM	Dibromochloromethane
DBMS	Database management system
DCE	Dichloroethene
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethene
DDNP	Diazodinitrophenol
DDT	Dichlorodiphenyltrichloroethane
DEH	Directorate of Engineering and Housing
DHS	California Department of Health Services (before 7/1/91)
DI	Deionized
Di-n-butyl phlat	Di-n-butylphthalate
Dibenzo(ah)anthrac	Dibenzo(a,h)anthracene
Dinoctylphthalate	Di-n-octylphthalate
DMA	U.S. Defense Mapping Agency
DnB	Di-n-butylphthalate
DNB	Dinitrobenzene

DNT	Dinitrotoluene
DOD	Department of Defense
DOL	Directorate of Logistics
DOT	Department of Transportation
DPR	Department of Pesticide Regulation
DQO	Data quality objective
DRMO	Defense Reutilization and Marketing Office
DTSC	Department of Toxic Substances Control (after 7/1/91)
DWR	California Department of Water Resources
E	Serial dilution analysis not within control limits
EA	EA Engineering, Science and Technology, Inc.
EBS/EBST	Environmental Baseline Survey/Environmental Baseline Survey for Transfer
EC	Effective concentration
ED	Exposure duration
ED1	Exposure in years (to a toxic chemical)
ED2	Exposure in days per year
EDD	Expected daily dose
EF	Exposure frequency
EGSTP	East Garrison Sewage Treatment Plant
EIR	Environmental impact report
EIS	Environmental impact statement
EM	Electromagnetic
EOD	Explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
ERA	Ecologic Risk Assessment
ET	Exposure time
F	Fahrenheit
F	Fischer distribution
FAAF	Fritzsche Army Airfield
FAASTP	Fritzsche Army Airfield Sewage Treatment Plant
Fe	Iron
FFA	Federal Facilities Agreement
FFE	Flame field expedient
FI	Fraction of intake
FO-SVA	Fort Ord-Salinas Valley Aquiclude
FOD	Frequency of detection
FORG	Fort Ord Reuse Group
FOSL	Findings of suitability for lease
FOST	Findings of suitability for transfer
FOSTA	Fort Ord Soil Treatment Area
FOSTS	Fort Ord Soil Treatment System
FP	Firing point
FS	Feasibility study
FSP	Field sampling plan
FUDS	Formerly used defense site
FWS	U.S. Fish and Wildlife Service
GC	Gas chromatograph
GC/MS	Gas chromatography/mass spectrometry
GF	Graphite furnace
GFAA	Graphite furnace atomic absorption

GP	General purpose (bomb)
gpd	Gallons per day
GPR	Ground penetrating radar
GPS	Global Positioning System
GRA	General response action
GTC	Geotechnical Consultants, Inc.
H	Henry's Law constant
HBL	Health-based level
HBPHC	High boiling point hydrocarbon
HBSL	Health-based screening level
HCRS	Heritage Conservation and Recreation Service
HE	High explosive
Hg	Mercury
HHAG	Human Health Assessment Group
HHRA	Human Health Risk Assessment
HI	Hazard index
HIA	High impact area
HLA	Harding Lawson Associates
HMX	Cyclotetramethylene tetranitramine (explosive compound)
HpCDDs (total)	Heptachlorodibenzo-p-dioxins (total)
HpCDFs (total)	Heptachlorodibenzofurans (total)
HPLC	High-pressure liquid chromatography
HQ	Hazard quotient
HxCDDs (total)	Hexachlorodibenzo-p-dioxins (total)
HxCDFs (total)	Hexachlorodibenzofurans (total)
IA	Interim action
IAFS	Interim action feasibility study
IAROD	Interim action record of decision
ICP	Inductively coupled plasma
ICS	Interference check sample
IF	Intake factors
IFR	Interim final report
IR	Ingestion rate (of soil)
IR	Intake rate/inhalation rate
IRIS	Integrated Risk Information System
IWMB	Integrated Waste Management Board
J	Estimated concentration
J&S	Jones and Stokes Associates
JMM	James M. Montgomery Consulting Engineers
K	Potassium
Kd	Distribution coefficient
Kh	Henry's Law constant
K_{oc}	Distribution coefficient divided by soil fraction of organic carbon
K_{ow}	Octanol/water partition coefficient
LADD	Lifetime average daily dose
LAW	Light antitank weapon
LBP	Lead-based paint
LCP	Local coastal program
LCS	Laboratory control samples
LDR	Land disposal restriction
LOAEL	Lowest observed adverse effect level
LRTC	Leadership Reaction Training Compound

LRTS	Leadership Reaction Training Structure
LUFT	Leaking underground fuel tank
MBA	Mine and booby trap area
MBAS	Methylene blue active substances
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MCDH	Monterey County Department of Health
MCL	Maximum contaminant level
MCPD	Monterey County Planning Department
MCPHD	Monterey County Public Health Department
MCX	Mandatory center of expertise
Methylethyl ketone	Methyl ethyl ketone
MG	Machine gun
μg/kg	Micrograms per kilogram
μg/l	Micrograms per liter
mg/kg	Milligrams per kilogram
mg/l	Milligrams per liter
Mg	Magnesium
mgd	Million gallons per day
MGSTP	Main Garrison Sewage Treatment Plant
MIBK	4-Methyl-2-pentanone
Mn	Manganese
MPN	Most probable number
MPWMD	Monterey Peninsula Water Management District
MRTP	Monterey Regional Treatment Plant
MS/MSD	Matrix spike/matrix spike duplicate
MSL	Mean sea level
MW	Monitoring well
N	Nitrogen
Na	Sodium
NA	Not analyzed, not applicable, or not available
NAAQS	National Ambient Air Quality Standard
Nap	Naphthalene
NAS	National Academy of Sciences
NBC	Nuclear, biological, and chemical
NCP	National Contingency Plan (40 CFR 300)
ND	Not detected
NDDB	Natural Diversity Database
NEPA	National Environmental Policy Act
NESHAP	National Emissive Standards for Hazardous Air Pollutants
Ni	Nickel
NIOSH	National Institute of Occupational Safety and Health
NoA	No Action
Nitrate	Nitrate as nitrogen
NOAA	U.S. National Oceanic and Atmospheric Administration
NOAEL	No observed adverse effect level
NoFAROD	No Further Action Record of Decision
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	Net present value
NQTP	Non-QTP (not from Paso Robles Formation [QTp])
NRC	National Research Council
O&M	Operation and maintenance

OaD	Oceano (USDA soil type)
OAF	Oral absorption factor
OB/OD	Open burn/open detonation
OCDD	Octachlorodibenzo-p-dioxin
OCDF	Octachlorodibenzofuran
OEHHA	Office of Environmental Health Hazard Assessment
OEW	Ordnance and explosive waste
Orthophosphate	Orthophosphate as phosphorus
OSHA	Occupational Safety and Health Act/Administration
OU	Operable unit
OVA	Organic vapor analyzer
OVM	Organic vapor monitor
OVSTP	Ord Village Sewage Treatment Plant
PA/SI	Preliminary Assessment/Site Investigation
PAH	Polycyclic aromatic hydrocarbon
PARCC	Precision, accuracy, representativeness, completeness, and comparability
Pb	Lead
PCB	Polychlorinated biphenyl
PCDD	Polychlorinated dibenzodioxin
PCDF	Polychlorinated dibenzofuran
PCE	Tetrachloroethene
PCP	Pentachlorophenol
PD	Percent difference
PEA	Preliminary exposure analysis
PeCDDs (total)	Pentachlorodibenzo-p-dioxins (total)
PeCDFs (total)	Pentachlorodibenzofurans (total)
PEL	Permissible exposure limit
%D	Percent difference
PETN	Pentaerythritol tetranitrate
PM_{10}	Particulates with mean diameter of less than 10 microns
PNA	Polynuclear aromatic hydrocarbon
POL	Petroleum, oil, lubricants
POTW	Publicly owned treatment works
PP	Priority pollutants
ppb	Parts per billion
PPE	Personal protective equipment
ppm	Parts per million
PQL	Practical quantitation limit
PRG	Preliminary remediation goal
PS	Protection standards
PVC	Polyvinyl chloride
QA	Quality assurance
QAPP	Quality assurance project plan
QASAS	Quality Assurance Specialist Ammunition Surveillance
QC	Quality control
QTp	Paso Robles Formation
R	Rejected
RAB	Restoration Advisory Board
RAO	Remedial action objectives
RAP	Remedial action plan
RCRA	Resource Conservation and Recovery Act

RD/RA	Remedial design/remedial action
RDA	Recommended daily allowance
RDX	Cyclotrimethylenetrinitramine (explosive compound)
RfC	Reference concentration
RfD	Reference dose
RI/FS	Remedial investigation/feasibility study
RI	Remedial investigation
RME	Reasonable maximum exposure
ROC	Record of concurrence
ROD	Record of decision
RP	Respirable particulate rate
RPD	Relative percent difference
RSCL	Recommended soil cleanup level
RTS	Remedial technologies screening
RU	Remedial unit
RWQCB	California Regional Water Quality Control Board
SA	Surface area (of exposed skin)
SAAQS	State Ambient Air Quality Standard
SAP	Sampling and analysis plan
Sb	Antimony
SDG	Sample delivery group
SDI	Subchronic daily intake
SDSSI	Storm Drain and Sanitary Sewer Investigation
Se	Selenium
SF	Slope factor
SGD	Staal, Gardner & Dunne, Inc.
ShE	Santa Inez Soil Series
SMAW	Shoulder-fired medium assault weapon
Sn	Tin
SOC	Statement of conditions
SOC	Semivolatile organic compound
SOP	Standard operating procedure
Spec Cond	Specific conductance
Specific Conduct.	Specific conductance at 25°C
SQL	Sample quantitation limit
SRE	Screening risk evaluation
sRfD	Subchronic reference dose
STLC	Soluble threshold limit concentration
SVA	Salinas Valley Aquiclude
SVE	Soil vapor extraction
SWMU	Solid waste management unit
SWOI	Surface Water Outfall Investigation
SWRCB	State Water Resources Control Board
TBC	To-be-considered requirements
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TCDD-TE	2,3,7,8-Tetrachlorodibenzo-p dioxin toxic equivalent
TCDDS (total)	Tetrachlorodibenzo-p-dioxins (total)
TCDFs (total)	Tetrachlorodibenzofurans (total)
TCE	Trichloroethene
TCL	Target cleanup level
TCLP	Toxicity characteristic leaching procedure
TCP	Tricresyl phosphate

TDS	Total dissolved solids
TE	Toxic equivalent
TEF	Toxicity equivalent factor
TFH	Total fuel hydrocarbons
TIC	Tentatively identified compound
Tl	Thallium
TL	Target (cleanup) level
TNB	Trinitrobenzene
TNT	Trinitrotoluene
TOC	Total organic carbon
TOG	Total oil and grease
Tot. Susp. Part.	Total suspended particulates
TPH	Total petroleum hydrocarbons
TPHd	TPH as diesel
TPH-D	TPH as diesel
TPH-D Unknown	TPH-extractable unknown hydrocarbon
TPHg	TPH as gasoline
TPH-G	TPH as gasoline
TPH-G Unknown	TPH-purgeable unknown hydrocarbon
TPHh	TPH of heavy molecular weight (diesel or heavier)
TPHmo	TPH as motor oil
TPH-Motor Oil	TPH as motor oil
TRA	Thomas Reid Associates
trans-1,2-DCE	trans-1,2-Dichloroethene
TRGs	Target remedial goals
TRPH	Total recoverable petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TSS	Total suspended solids
TTLC	Total threshold limit concentration
U	Not detected
UBK	Uptake Biokinetic Model (computer program)
UCL	Upper concentration limit
UF	Uncertainty factor
USA	Underground Service Alert
USAEDH	United States Army Engineer Division, Huntsville
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USCS	Unified Soil Classification System
USGS	United States Geological Survey
UST	Underground storage tank
UXO	Unexploded ordnance
VES	Vertical electrical soundings
VF	Volatilization factor
VOC	Volatile organic compound
WOE	Weight of evidence
WP	White phosphorous (or "Willie Pete")
WP	Work plan
WTP	Water treatment plant
XRF	X-ray fluorescence
Zn	Zinc

1.0 INTRODUCTION

This Basewide Remedial Investigation/Feasibility Study (RI/FS) for Fort Ord (Plate 1) was prepared by Harding Lawson Associates (HLA) for the Army Corps of Engineers (COE), Sacramento District, under contract DACA 05-86-C-0241. The RI/FS is a requirement of the Federal Facilities Agreement (FFA) that was signed in July 1990 by representatives of Fort Ord, the U.S. Army (Army), the U.S. Environmental Protection Agency, Region IX (EPA), the California Department of Health Services, now the California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board, Central Coast Region (RWQCB). The FFA was signed after Fort Ord was added to the National Priorities List (NPL) of Hazardous Waste Sites on February 21, 1990.

This RI/FS consists of six volumes: Volume I presents an overview and background information on Fort Ord and summarizes the results of the Basewide RI/FS; Volume II presents the Remedial Investigations (RI); Volume III presents the Baseline Human Health Risk Assessment (BRA); Volume IV presents the Baseline Ecological Risk Assessment (ERA); Volume V presents the Feasibility Study (FS); and Volume VI presents the response to agency comments received on the draft final version of the RI/FS.

1.1 Chronology of the RI/FS Program

This section presents the chronology of the RI/FS program. Documents that were produced during the various phases of the RI/FS program are mentioned but not specifically referenced. These documents are discussed in detail elsewhere in the RI/FS.

Prior to Fort Ord being placed on the NPL, investigations were conducted at several sites at the installation. Investigations began at the Fritzsche Army Airfield (FAAF) Fire Drill Area (now called OU 1) in 1984 and at the Fort Ord Landfills (now called OU 2) in 1986. After Fort Ord was placed on the NPL in February 1990 and the FFA was signed in July 1990, preliminary assessment/site investigation (PA/SI) reports were produced for a number of other sites that had been identified by the Army. These PA/SI reports are discussed in Sections 4 and 5.

In 1990 and 1991, the Army prepared the initial planning documents for the RI/FS (*EA Engineering Science and Technology [EA], 1990, 1991a-d*). Included in these documents were a work plan, sampling and analysis plan, data management plan, and safety and health plan. After review and comment on the draft versions of these documents by the regulatory agencies that signed the FFA, the responsibility for management of the RI/FS project was transferred from the Omaha District COE to the Sacramento District COE. HLA was contracted in 1991 by the Sacramento COE to prepare and implement draft final and final versions or addenda, as appropriate, to the planning documents EA had prepared.

During the period when the planning documents were being finalized, Fort Ord was placed on the Base Realignment and Closure (BRAC) List (July 1991). In December 1991, legislation (Public Law 102-190, commonly known as the Panetta Legislation) was passed; this legislation required that RI/FSs at closing military facilities that are on the NPL be completed within 36 months of passage of the legislation. Therefore, Fort Ord's NPL and BRAC listing and passage of the Panetta Legislation required an accelerated approach to the CERCLA process. This accelerated approach was originally outlined in an Acceleration Action Plan for Fort Ord (*Action Plan, Environmental Restoration Acceleration, Fort Ord, California*, dated March 12, 1993). The acceleration was also incorporated into the approach to the RI/FS and into the following project planning documents:

- Draft final and final versions of the Work Plan (*HLA, 1991c*) and the Sampling and Analysis Plan (*HLA, 1991b*)

- Sampling and Analysis Plan, consisting of the Field Sampling Plan and the Quality Assurance Project Plan

- Addenda to EA's Data Management Plan (*HLA, 1992d*) and Site Safety and Health Plan (*HLA, 1992b*)

- Investigation-Derived Waste Management Plan (*Waste Management Plan, Investigation-Derived Waste Remedial Investigative/Feasibility Study, Fort Ord, California*, dated March 10, 1993)

- Community Relations Plan (*HLA, 1991a*).

1.2 Fort Ord Superfund Process

The accelerated Superfund process at Ford Ord was based, in part, on a risk-based strategy for the RI, which was intended to address potential contaminant transport mechanisms and identify and evaluate areas suspected of being potential sources of contaminants. As a result, the RI, which began in October 1991, consisted of two primary components: (1) basewide studies and (2) site investigations (Plate 1A). The purpose of the basewide studies program was to obtain pertinent physical and chemical information so that potential contaminant transport pathways could be assessed. Five basewide studies were identified:

- Hydrogeologic Characterization

- Background Soil Investigation

- Storm Drain and Sanitary Sewer Investigation

- Surface Water Outfall Investigation

- Biological Inventory.

The purpose of the site investigations was to investigate the nature and extent of contamination, if any, at specifically identified potential source areas. Currently, the site investigation component of the RI program includes 43 potential contaminant source areas or sites. Initially, the work plan identified 39 potential source areas and the FFA identified two operable units that required investigation (*HLA, 1991c*). As the RI investigation program progressed, four additional sites were added to the program.

1.2.1 Site Categorization

After completion of the first phase of RI/FS field work, it was evident that the sites could be categorized based on: (1) whether a release was identified at a site and (2) if a release had occurred, the nature and extent of the release. Therefore, using the initial site characterization information and existing pre-RI/FS data, the 43 sites were categorized as: (1) RI sites, (2) Interim Action (IA) sites, or (3) No Action (NoA) sites (Plate 1A). These three categories are defined as follows and Table 1 presents a list of the individual RI, IA, and NoA sites:

- <u>NoA Sites</u>: NoA sites do not warrant remedial action under CERCLA

- <u>IA Sites</u>: IA sites have limited volume and extent of contaminated soil and, as a result, are easily excavated, as an interim action

- <u>RI Sites</u>: RI sites have sufficient contamination to warrant a full RI, BRA, ERA, and FS.

To accelerate the cleanup process, IA and NoA site categories are supported by records of decision (RODs) as described below. These RODs provide a process for accelerated cleanup of IA sites and transfer of NoA sites under BRAC, rather than delaying cleanup or transfer actions until a basewide ROD for Fort Ord is signed.

1.2.2 No Action Sites

A No Action Record of Decision (NoA ROD) was signed in February 1995 and is based on the U.S. Army's No Action Proposed Plan (*No Action Proposed Plan for Selected Areas at Fort Ord, California, August 30, 1994*). The NoA ROD defines the criteria that a site must meet to qualify as an NoA site and describes the approval process. NoA sites at Fort Ord are either:

- Category 1 sites: already in a protective state and pose no current or potential threat to human health or the environment.

- Category 2 sites: where CERCLA does not provide authority to take any remedial action. These sites may be regulated by state or local agencies and follow their requirements.

The criteria and approach for these sites are conservative and consistent with those presented for the operable units and RI sites. A copy of the No Action ROD is included as Appendix B.

For each proposed NoA site, the evaluation process begins with a site characterization investigation and report. The regulatory agencies review the report and approve it after their comments have been addressed. If the site meets the criteria, a No Action approval memorandum is submitted for public comment and regulatory agency approval. If the approval memorandum is approved, the site is included in the NoA ROD process. If approval is not granted, the site is transferred to the interim action category and follows that flowpath to an IAROD (Plate 1A).

1.2.3 Interim Action Sites

An Interim Action Record of Decision (IAROD) was signed in February 1994. The IAROD was based on the interim action FS and proposed plan (*HLA, 1993c*; *HLA, 1993d*). The IAROD defines criteria that a site must meet to qualify as an IA site and describes an approval process for implementing the interim action. The primary criteria include (1) the maximum depth of affected soil is 25 feet and (2) the volume of affected soil is limited typically to between 500 and 5,500 cubic yards. The cleanup goals and approach for these sites are conservative and consistent with those presented for the operable units and RI sites. A copy of the Interim Action ROD is included as Appendix A.

For each proposed Interim Action (IA) site, the process (Plate 1A) begins with a site characterization investigation and report. The regulatory agencies review the report and approve it after their comments have been addressed. If the site meets the criteria, an Interim Action approval memorandum is submitted for regulatory agency approval. The public is notified that an approval memorandum has been submitted. If the approval memorandum is approved, public notice of the proposed action is provided two weeks before work is started. The interim action is then implemented and a Confirmation Report is prepared. If the report is approved, the site is included in the Interim Action ROD process. If the confirmation report is not approved, it may be resubmitted after additional action is taken to address agency concerns. If it is determined that the contamination is too extensive to be remediated under the IAROD, the site is transferred to the RI category. An RI/FS report will then be prepared for the site and it will be included in the Basewide ROD.

Soil excavated during cleanup will be taken to the Fort Ord Soil Treatment Area (FOSTA) located at the 519th Motor Pool. The FOSTA will serve several purposes:

- As an area to store excavated IA soil pending waste classification as well as for storage of soil until sufficient quantities are obtained for treatment or recycling

- As a treatment area for nonhazardous soil containing petroleum hydrocarbons and solvents.

1.2.4 Time-Critical Removal Actions

Time-Critical Removal Actions are initiated when a site presents a threat to human health or the environment. For these sites, an action memorandum is submitted to the regulatory agencies. Upon approval of the action, the public is notified of the proposed action. The proposed action is then implemented and a Removal Action Report is prepared. If it is determined that no additional action is necessary, the site then follows the No Action process. If additional action is necessary, the site follows the Interim Action process (Plate 1A). If the site does not meet the criteria for interim action, it could become an RI site.

Three Time-Critical Removal Actions were conducted at Fort Ord. Two included the removal of buried containers and contaminated soil and are described in Sections 8.2.10 and 8.2.16 of this volume. One included removal of UXO outside the Impact Area and is described in the *Fort Ord Ordnance and Explosive Waste Time Critical Removal Memorandum*, dated April 20, 1995.

1.2.5 Operable Units

The two operable units at Fort Ord (OU 1, the FAAF Fire Drill Area and OU 2, the Fort Ord Landfills) follow individual paths to the Basewide ROD. A proposed plan was submitted for OU 1 on November 18, 1995. The public comment period has been completed. A ROD is under review. OU 2 has completed the ROD process and the ROD was signed in August 1994.

1.2.6 RI Sites

Once it is determined that the site does not meet the criteria for either the No Action or Interim Action RODs, the site is categorized as an RI site. For each proposed RI site, the process (Plate 1A) begins with a site characterization investigation and report. Then a complete RI, BRA, ERA, and FS are prepared for each RI site. Results of these studies are discussed in this RI/FS. Upon approval of the RI/FS, a proposed plan will be prepared for each site. Public comments will be collected during a public meeting and a 30-day review period for each site. These sites will then be included in the Basewide ROD. The Basewide ROD will incorporate the existing NoA and IA RODs.

1.3 Report Organization

The RI/FS consists of the following six volumes:

- Volume I - Background and Executive Summary
- Volume II - Remedial Investigation
- Volume III - Baseline Human Health Risk Assessment
- Volume IV - Ecological Risk Assessment
- Volume V - Feasibility Study
- Volume VI - Response to Comments.

Each volume is contained in one or more binders that hold the components of that volume. A table of contents listing the contents of each volume by binder is inside the front cover of each binder of the RI/FS.

Volume I presents background information about Fort Ord, a summary of the RI/FS program, and summaries of closely related programs (e.g., BRAC). Volume I is intended to (1) serve as an overview of the RI/FS and (2) provide a guide to the remainder of the document for those readers with specific objectives. Volume II includes the basewide studies and the remedial investigations for the RI sites (Sites 2 and 12, 16 and 17, 3, 31, and 39). Volume III presents the Baseline Human Health Risk Assessment for Fort Ord and Volume IV presents the Ecological Risk Assessment. Volume V presents the feasibility studies for the RI sites. Volume VI presents the responses to agency comments received on the draft final version of the RI/FS. A single master reference list and an acronym list have been prepared for the RI/FS report and are included in each volume.

Responses to agency comments on the Draft RI/FS are included as appendixes to each volume or each site, as appropriate. Responses to comments relating to Volume I are included as Appendix C to this volume.

2.0 BACKGROUND

2.1 Location

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 Southern Pacific Railroad and Highway 1 pass through the western part of Fort Ord, separating the beachfront portions from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively. Land use east of Fort Ord is primarily agricultural.

2.2 History and Land Use

2.2.1 History

Beginning with its founding in 1917, Fort Ord served primarily as a training and staging facility for infantry troops. From 1947 to 1975, Fort Ord was a basic training center. After 1975, the 7th Infantry Division (Light) occupied Fort Ord. Light infantry troops operate without heavy tanks, armor, or artillery. 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 Fort Ord.

In 1917, the U.S. Army bought the present day East Garrison and nearby lands on the east side of 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 use 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 1938, additional agricultural property was purchased for the development of the Main Garrison. At the same time, the beachfront property was donated to the Army. The Main Garrison was constructed between 1940 and the 1960s, starting in the northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, a small airfield within the Main Garrison was present in what is now the South Parade Ground. In the early 1960s, Fritzsche Army Airfield (FAAF) was completed. The Main Garrison airfield was then decommissioned and its facilities were redeveloped as motor pools and other facilities.

2.2.2 Land Use

Fort Ord consists of both developed and undeveloped land. The three principal developed areas are the East Garrison, the 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 are described below.

2.2.2.1 Developed Land

With up to 15,000 active duty military personnel and 5,100 civilians during its active history, developed areas at Fort Ord 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, minimarkets, and fast food facilities.

- Military support/industrial areas included industrial operations, such as motor pools, machine shops, a cannibalization yard (area 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 Junior High, General George S. Patton Elementary, and Gladys Stone schools. High school students attended Seaside High, outside 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 club house, 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 include tactical vehicle storage facilities, defense recycling and disposal areas, a sewage treatment plant, and a small arms range. Also at the East Garrison is recreational open space, including primitive camping facilities, baseball diamonds, a skeet range, and tennis courts. Recreational open space comprises 25 of the approximately 350 acres of the East Garrison.

Fritzsche Army Airfield: The FAAF is in the northern portion of Fort Ord, on the north side of Reservation Road and adjacent to the city limits of Marina. The primary land use is for military/industrial support operations; facilities include air strips, 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 Fort Ord's Main Garrison. The Main Garrison consists of a complex combination of the various land use categories. Facilities include schools; a hospital; housing; commercial facilities, including a dry cleaner and a gasoline service station; and industrial operations, including motor pools and machine shops.

2.2.2.2 Undeveloped Land

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 provide a buffer zone that isolates the Beach Trainfire Ranges (RI Site 3) from the shoreline to the west. In some areas, spent ammunition has accumulated on the dune slopes as the result of years of range operation. Stilwell Hall (a recreation center), numerous target ranges, ammunition storage facilities, and two inactive sewage treatment facilities lie east of the dunes.

Because of the presence of rare and/or endangered species and because of its visual attributes, Monterey County has designated 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 Fort Ord as among the best coastal dunes in California because of significant features including coastal strand vegetation comprising many exotic ice plants and the habitat of the black legless lizard (*Monterey County Planning Department [MCPD], 1984*).

Inland Areas: Undeveloped land in the inland portions of Fort Ord includes infantry training areas and open areas used for livestock grazing and recreational activities such as hunting, fishing, and camping. A large portion of this undeveloped land is occupied by the Inland Trainfire Ranges (part of Site 39); this area was used for advanced military training operations.

These undeveloped areas are primarily left in their natural state, without the development of facilities.

2.2.2.3 Infrastructure

This section describes the systems for water supply, control of stormwater drainage, and transport and treatment of sewage at Fort Ord.

Water Supply

Groundwater is the principal source of water supply for Fort Ord and its neighboring communities. The city of Marina and Fort Ord currently obtain water from wells located near the east boundary of Marina and in the East Garrison, respectively. Historically, seawater intrusion has affected wells in the city of Marina and at Fort Ord for several decades. In response to seawater intrusion, Fort Ord switched from using their water-supply wells in the Main Garrison area to using new wells installed in the vicinity of the East Garrison. The city of Marina, on the other hand, was constrained to the east by the Marina/Fort Ord boundary. Consequently, Marina drilled deeper wells (greater than 1,200 feet) to penetrate aquifers below the zones of seawater intrusion.

Storm Drain System

Construction of the storm drain system at Fort Ord began in the early 1940s. As the base grew, the storm drain system was expanded, but the major lines in the Main Garrison still run from east to west. A complex network of branches feeds into the major lines; these branches collect surface water runoff from housing and recreational areas, motor pools, maintenance yards, and industrial facilities. The primary lines in the Main Garrison discharge surface water runoff at three beach or dune outfalls and at four ocean outfalls directly above the Monterey Bay surf zone. Numerous minor surface water outfalls are present in depressions or open fields in the Main Garrison.

In the East Garrison, the three main storm drain lines run from west to east. These lines and their numerous extensions discharge surface water runoff offbase to a field south of the Salinas River.

At the FAAF, some surface water outfalls discharge into open fields and depressions east and west of the main airfield; however, the main line discharges surface water runoff to an open field south of the Salinas River.

Sanitary Sewer System

Installation of the sanitary sewer system at Fort Ord also began in the early 1940s. Although the system underwent expansion and some reconstruction when new housing areas were built after World War II, the original pipelines are still used. The system was designed to collect, treat, and discharge all domestic and industrial wastewater generated at Fort Ord.

The sewer system collected domestic flows and industrial wastewater without any pretreatment until the mid-1960s, when several oil/water separators were installed in the maintenance shops and motor pools to treat wastewater from vehicle wash racks. Before the mid-1960s, some of the wash racks drained directly to the sanitary sewer system and some drained directly to the storm drains. After the mid-1960s, all of the wash racks drained into oil/water separators and then to the sanitary sewer system.

In the past, the sanitary sewer system was connected to the four sewage treatment plants (STPs) at Fort Ord: the Main Garrison Sewage Treatment Plant (MGSTP), the East Garrison Sewage Treatment Plant (EGSTP), the FAAF Sewage Treatment Plant (FAAFSTP), and the Ord Village Sewage Treatment Plant (OVSTP). Three treatment plants are now closed; only the EGSTP is presently operating and receives only sewage from toilets and showers in the East Garrison. All other sewage currently flows to the main sewage trunk line, which transports sewage to the Monterey Regional Treatment Plant in Marina. All four of the Fort Ord sewage treatment plants were included for investigation under the RI/FS program.

2.3 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 Fort Ord, causing 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 fog is common in the morning 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 only occurs intermittently and within the very steep canyons in the eastern portion of Fort Ord.

2.4 Ecological Setting

Fort Ord is located on California's central coast, a biologically diverse and unique region. The range and combination of climactic, topographic, and soil conditions at Fort Ord support many biological communities. HLA biologists conducted field surveys from 1991 through 1994 to provide detailed site-specific information regarding plant communities, botanical resources, observed and expected wildlife, and biological resources of concern at many of the 39 sites described in the Fort Ord RI/FS Work Plan (*HLA, 1991c*) and at the two additional sites (40 and 41) added to the program after the Work Plan was issued. Plant communities were mapped for the whole base (*Draft Basewide Biological Inventory, Fort Ord, California*, dated December 8, 1992) and for each site evaluated in the Baseline Ecological Risk Assessment (Volume IV of this document). Special-status taxa that occur or potentially occur in the communities at Fort Ord were identified for each site evaluated in the ERA, as discussed in Volume IV.

The 11 plant communities identified at the Fort Ord sites include coast live oak woodland, central maritime chaparral, central coastal scrub, vegetatively stabilized dune, northern foredune grassland, landscaped, valley needlegrass grassland, seasonally wet grassland, vernal pool, upland ruderal, and wet ruderal. Central maritime chaparral is the most extensive natural community at Fort Ord, occupying approximately 12,500 acres in the south-central portion of the base. Oak woodlands are widespread at Fort Ord and occupy the next largest area, about 5,000 acres. Grasslands, primarily in the southeastern and northern portions of the base, occupy approximately 4,500 acres. The other five community types generally occupy less than 500 acres each. The remaining approximately 4,000 acres of the base are considered to be fully developed and do not support 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. Of the 11 plant communities identified at Fort Ord, two are considered rare or declining and of highest inventory priority by the California Department of Fish and Game (*CDFG, 1990d*): central maritime chaparral and valley needlegrass grassland. Special status taxa that occur or potentially occur in the plant communities at Fort Ord were identified for each site, as discussed in Volume IV and include 22 vascular plants, 1 invertebrate, 4 reptiles, 1 amphibian, 9 birds, and 2 mammals.

2.5 Topography and Surface Waters

Elevations at Fort Ord range from approximately 900 feet above mean sea level (MSL) near Impossible Ridge, on the east side of the base, to sea level at the beach. The predominant topography of the area reflects a 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 due to 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. Runoff is into the Salinas Valley.

2.6 Subsurface Conditions

2.6.1 Geology

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.

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 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. 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 Fort Ord is described in detail in Volume II - RI, Basewide Hydrogeologic Characterization.

2.6.2 Hydrogeology

Recent studies of 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], *1987a*). 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. RI/FS sites with recognized groundwater contamination are limited to the Salinas groundwater basin at Fort Ord; therefore, only the Salinas basin is described in detail in this RI/FS report.

The Salinas groundwater basin is relatively large and extends well beyond the boundaries of Fort Ord. At 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 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. Because the 900-foot aquifer is deep and apparently isolated from the aquifers subject to contamination, this aquifer is not included in the scope of this report. These aquifer names reflect local historical water levels and are not directly correlated to present water levels at Fort Ord.

Groundwater extraction by the city of Marina, by Fort Ord, and by irrigation wells in the Salinas Valley have 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 Fort Ord.

3.0 BASE REALIGNMENT AND CLOSURE

The 1991 Defense Base Realignment and Closure Commission (BRAC91) recommended that Fort Ord be closed and troops of the 7th Infantry Division (Light) be relocated to Fort Lewis, Washington. As part of that action, the Army prepared several documents that identify future land uses for Fort Ord following closure. This section identifies the principal sources of information and documents prepared by the Army under the BRAC action; these documents were used in this RI/FS to identify future land use scenarios at Fort Ord. The future land use scenarios were used to form the basis for appropriate exposure assumptions in conducting the risk assessments and for the feasibility studies.

The principal documents used in establishing these future land uses include the Army's Environmental Impact Statement (EIS) prepared to comply with the National Environmental Policy Act (NEPA), the Army's Habitat Management Plan (HMP) prepared to comply with the Endangered Species Act, the local community's draft reuse plan prepared by Fort Ord Reuse Group (FORG), and the results of the real estate screening process. The specific results are not discussed in detail in this RI/FS but are presented in the documents specifically referenced below.

Although Fort Ord was closed in September 1994, the Army retained approximately 5 percent of the property for a Presidio of Monterey (POM) annex and reserve center. The POM annex is on a 1,500-acre parcel near Gigling and North-South Roads. The Army retained a 12-acre parcel near Imjin Gate at Reservation Road for continued use as an Army reserve center.

3.1 National Environmental Policy Act

The 1990 Base Closure Act specifies that NEPA is applicable to base closures during the process of property disposal. To comply with the requirements of NEPA, the Army prepared an EIS. The EIS considered the socioeconomic impacts on the local community resulting from relocating the active Army from Fort Ord. However, the primary focus of the EIS was to evaluate the environmental impacts of disposing excess property at Fort Ord after closure. A final EIS was issued on July 1, 1993 (*COE, 1993*).

The EIS was prepared by the Army in cooperation with local planning entities. A wide range of reuse alternatives was developed in the EIS including (1) high-, medium-, and low-density mixed-use alternatives, (2) an alternative composed of primarily institutional uses (educational, government, and public/quasi-public), (3) an open-space alternative, and (4) an anticipated reuse alternative (the Army's preferred alternative). In the preferred alternative, the property disposal process would result in the transfer of approximately 23,500 acres to federal, state, and local agencies that have applied for lands through the real estate screening process and the sale of approximately 3,000 acres. As noted above, the remaining 1,500 acres at Fort Ord are being retained as the POM annex and reserve center.

For the risk assessments and feasibility studies in this RI/FS, the Army's preferred alternative, Alternative 6R, Anticipated Reuses (Revised), was considered to represent the most likely future land use scenario. Future land uses identified under the Army's preferred alternative formed the basis for most of the assumed future land uses. Subsequent sections of this RI/FS (e.g., risk assessment and feasibility studies) discuss the development of exposure assumptions based on the Army's preferred alternative. Additional details concerning that alternative are presented in the final EIS.

3.2 Endangered Species Act

In early 1994, the Army prepared an *Installation-Wide Multispecies Habitat Management Plan* (HMP [*COE, 1994*]) to comply with the requirements of the Endangered Species Act.

The HMP establishes the guidelines for the conservation and management of wildlife and plant species and habitats that largely depend on Fort Ord land for survival. The HMP was used in this RI/FS to identify additional limitations on future land use that were not previously documented in the EIS. The HMP was developed with input from federal, state, local, and private agencies and organizations concerned with the natural resources and the reuse of Fort Ord. The overall goals of the HMP are (1) to avoid any net loss of populations or important habitat for any of the subject species of the HMP and (2) to promote preservation, enhancement, and restoration of habitat and populations of HMP species while allowing implementation of the community-based reuse plan. Subsequent volumes of this RI/FS discuss use of the HMP in developing exposure assumptions for risk assessments and feasibility studies. Chapters 1 through 4 of the HMP present detailed information concerning the development and implementation of the HMP.

3.3 Local Community Reuse Planning

The results of the local community's reuse planning, which began in late 1992, was also considered in establishing future land use scenarios. FORG was established in October 1992 by Monterey County and the cities of Marina, Seaside, Del Rey Oaks, Monterey, and Sand City as a cooperative planning committee. FORG submitted its Initial Base Reuse Plan to the Army on March 24, 1993 (*FORG, 1993*). The FORG Plan is the local community's draft reuse plan and contains additional possible future land uses at Fort Ord that were not presented in the final EIS.

In April 1994, the Fort Ord Reuse Authority (FORA) was created by the passage of State Senate Bill SB-899. FORA, a 13-member board representing Monterey County and the cities of Marina, Seaside, Carmel, Del Rey Oaks, Sand City, Monterey, Pacific Grove, and Salinas, has been given the responsibility for implementing the local community's reuse planning. FORA issued the Fort Ord Base Reuse Plan on October 14, 1994. FORA issued an updated Fort Ord Base Reuse Plan on December 12, 1994.

3.4 Real Estate Screening

The Army is complying with a federally mandated process for the disposal of excess federal real estate. This real estate screening process follows requirements of the General Services Administration and includes a hierarchical series of steps for establishing the appropriate recipients of real estate when more than one party requests property. This process was used by the COE to identify specific future users of the excess property at Fort Ord and was consistent with the results of the EIS, HMP, and the local community's reuse planning.

The reuse parcel boundaries developed to date are principally the result of the real estate screening process and information contained in the FORG Plan. Of approximately 26,500 acres that will be transferred from the Department of Defense (DOD), approximately 23,500 acres have been identified for use through the real estate screening. The remaining 3,000 acres to be transferred will be further considered by FORA as revisions to the FORG Plan. Conflicts exist in the anticipated future use of some areas. These conflicts will be resolved during subsequent negotiations and through future real estate screenings.

Information developed through the real estate screening has been compiled by the COE on maps of Fort Ord. These maps show the anticipated future use of areas at Fort Ord. Although this information has not been formally published in a separate document, it was obtained from the COE and used with information from the FORG Plan to identify future land uses for the risk assessments and feasibility studies in the RI/FS.

3.5 Summary of Base Realignment and Closure (BRAC) Planning Activities

Future land use scenarios were used to: (1) establish exposure assumptions for risk assessments and (2) develop remedial alternatives for feasibility studies. The specific reuse scenarios that were assumed for the risk assessments and feasibility studies performed for each RI/FS site are presented in subsequent volumes of this RI/FS, as necessary. As noted above, the future land uses at Fort Ord were identified by using information from various sources and programs, including the Army's final EIS and HMP, and the FORG Plan. Additional background information and the results of a detailed analysis of the disposal and reuse of Fort Ord land are contained in those documents. Supplemental EIS information will be developed by the Army, as necessary, on the basis of additional reuse planning and modifications of the FORG Plan by FORA and as a result of additional real estate screenings.

4.0 PREVIOUS INVESTIGATIONS AND RELATED PROGRAMS

The Army has conducted previous investigations at Fort Ord that have included: reviews of chemical use, storage, and disposal; reviews of underground storage tanks (USTs) and site-specific field activities. Table 2 lists the authors and sites for the previous investigations, along with the corresponding HLA sites described in this report. A list of previous investigations follows; these reports are summarized in the Literature Review and Base Inventory (*EA, 1991a*).

There have been nine reviews of chemical use, storage, and disposal at Fort Ord. Seven of these reviews cover chemical use and hazardous waste operations:

- Harding Lawson Associates, 1993. *Draft Verification of Solid Waste Management Units, Fort Ord, California.* Prepared for the COE, Sacramento District.
- EA Engineering, Science, and Technology, 1991a. *Basewide Remedial Investigation/Feasibility Study, Fort Ord, California, Volume 1, Literature Review and Base Inventory Report.* Prepared for the COE, Omaha District and Fort Ord Directorate of Engineering and Housing. November.
  - Section 4.2.3 gives further information on this report.
- Roy F. Weston, Inc., 1990. *Enhanced Preliminary Assessment, Fort Ord, California.* Prepared for the United States Army Toxic and Hazardous Materials Agency, Aberdeen Proving Grounds, Maryland. December.
  - Section 4.2.2 gives further information on this report.
- U.S. Army Environmental Hygiene Agency, 1988. *Interim Final Report, Hazardous Waste Consultation No. 37-26-0176-89, Evaluation of Solid Waste Management Units, Fort Ord, California.* December.
- U.S. Army Environmental Hygiene Agency, 1988. *Hazardous Waste Management Survey, Fort Ord, Monterey, California.* June.
- Environmental Science and Engineering, Inc., 1987. *Update of the Initial Installation Assessment of Fort Ord and Subinstallation.* Prepared for the U.S. Army. March.
- U.S. Army, Chemical Systems Laboratory, Environmental Technology Division, Installation Restoration Branch, 1983. *Installation Assessment of Fort Ord, California.* Report 196. February.

Two of the nine reviews are studies of the USTs on the base:

- Harding Lawson Associates, 1991g. *Underground Storage Tank Management Plan, Fort Ord Complex, Monterey County, California.* Prepared for COE, Sacramento District. September.
  - Section 4.3 gives further information on this report.
- Pace Laboratories, 1988. *Characterization Study of Underground Storage Tanks, Fort Hunter-Liggett and Fort Ord.* Prepared for Directorate of Contracting, Fort Ord, California.

In addition to these nine reviews, there have been reports on the following six site-specific investigation/remediation projects:

- James M. Montgomery Consulting Engineers, 1991c. *Preliminary Assessment/Site Investigation for Fourteen Sites, Final Site Investigation Report, Fort Ord and Fort Hunter Liggett, Monterey County, California.* Prepared for COE, Omaha District. June.
  - Section 4.2.1 gives further information on this report.

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- Harding Lawson Associates, 1993. *Draft Verification of Solid Waste Management Units, Fort Ord, California*. Prepared for the COE, Sacramento District.
- EA Engineering, Science, and Technology, 1991a. *Basewide Remedial Investigation/Feasibility Study, Fort Ord, California, Volume 1, Literature Review and Base Inventory Report*. Prepared for the COE, Omaha District and Fort Ord Directorate of Engineering and Housing. November.
  - Section 4.2.3 gives further information on this report.
- Roy F. Weston, Inc., 1990. *Enhanced Preliminary Assessment, Fort Ord, California*. Prepared for the United States Army Toxic and Hazardous Materials Agency, Aberdeen Proving Grounds, Maryland. December.
  - Section 4.2.2 gives further information on this report.
- U.S. Army Environmental Hygiene Agency, 1988. *Interim Final Report, Hazardous Waste Consultation No. 37-26-0176-89, Evaluation of Solid Waste Management Units, Fort Ord, California*. December.
- U.S. Army Environmental Hygiene Agency, 1988. *Hazardous Waste Management Survey, Fort Ord, Monterey, California*. June.
- Environmental Science and Engineering, Inc., 1987. *Update of the Initial Installation Assessment of Fort Ord and Subinstallation*. Prepared for the U.S. Army. March.
- U.S. Army, Chemical Systems Laboratory, Environmental Technology Division, Installation Restoration Branch, 1983. *Installation Assessment of Fort Ord, California*. Report 196. February.

Two of the nine reviews are studies of the USTs on the base:

- Harding Lawson Associates, 1991g. *Underground Storage Tank Management Plan, Fort Ord Complex, Monterey County, California*. Prepared for COE, Sacramento District. September.
  - Section 4.3 gives further information on this report.
- Pace Laboratories, 1988. *Characterization Study of Underground Storage Tanks, Fort Hunter-Liggett and Fort Ord*. Prepared for Directorate of Contracting, Fort Ord, California.

In addition to these nine reviews, there have been reports on the following six site-specific investigation/remediation projects:

- James M. Montgomery Consulting Engineers, 1991c. *Preliminary Assessment/Site Investigation for Fourteen Sites, Final Site Investigation Report, Fort Ord and Fort Hunter Liggett, Monterey County, California*. Prepared for COE, Omaha District. June.
  - Section 4.2.1 gives further information on this report.

- James M. Montgomery Consulting Engineers, 1990. *Report of Investigation, AAFES Service Station, Fort Ord, California.* Prepared for COE, Omaha District. September.
    - Section 4.1.2 gives further information on this report.
- EA Engineering, Science, and Technology, 1990. *Site Investigations, Fort Ord and Fort Hunter Liggett.* Prepared for COE, Omaha District. February.
    - Section 4.1.1 gives further information on this report.
- Harding Lawson Associates, 1989. *Preliminary Hydrogeologic Investigation, Volumes I, II, III, Fort Ord Landfills, Fort Ord, California.* Prepared for the COE, Sacramento District. May.
- Harding Lawson Associates, 1988. *Investigation of Building 511 Underground Storage Tanks, Fritzsche Army Airfield, Fort Ord.* Prepared for COE, Sacramento District.
- Harding Lawson Associates, 1987b. *Addendum, Remedial Investigation/Feasibility Study of Soil Contamination, Fritzsche Army Airfield Fire Drill Area, Fort Ord, California.* Prepared for COE, Sacramento District. June.

In addition to these reports, HLA prepared a Well Management Plan for the Fort Ord Complex for the Sacramento District COE (*1990b*) to identify and evaluate all existing wells as potential contaminant conduits and to propose a basewide well management approach.

Table 2 shows the relationship between previous investigations and the Fort Ord NPL sites and operable units, as designated by HLA.

4.1 Pre-NPL Site Investigations

4.1.1 Site Investigations (PA/SI)

The Army conducted a preliminary assessment/site investigation (PA/SI) for eight sites, four at Fort Ord and four at Fort Hunter Liggett (*EA, 1990*).

The purpose of this PA/SI was to investigate the potential presence of soil and water contamination at the designated sites, to assess the potential for contaminant migration, to compare the detected concentrations of contaminants to regulatory standards, and to make recommendations for further work at the sites.

The four sites on Fort Ord were:

- Site FTO-005: 707th Maintenance Facility (HLA Site 14)
- Site FTO-006: 14th Engineer's Motor Pool (HLA Site 22).
- Site FTO-008: Cannibalization Area (HLA Site 12)
- Site FTO-010: Fire Department Drill Burn Pit (HLA Site 10)

The investigation's scope included research of the history of each site, drilling of soil borings, installation of wells, collection and analysis of soil and groundwater samples, assessment of the hydrogeology of the sites, and assessment of whether further investigation of each site was warranted.

At the four Fort Ord sites, 22 soil borings were drilled and sampled and 12 wells (3 wells per site) were installed and sampled. Soil and groundwater samples were analyzed for priority pollutant metals, volatile organic compounds (VOCs), extractable organics, and total recoverable petroleum hydrocarbons (TRPH).

Results of the investigation were as follows:

- Site FTO-005: Petroleum contamination in soil. Benzene above action levels in groundwater.
- Site FTO-006: Petroleum contamination in soil. No groundwater contamination above maximum contaminant levels (MCLs) or action levels.

- Site FTO-008: Petroleum contamination in soil. Trichloroethene (TCE) and tetrachloroethene (PCE) above action levels in groundwater.
- Site FTO-010: Petroleum contamination in soil. Benzene above action levels in groundwater.

4.1.2 Investigation of Army and Air Force Exchange Service Main Service Station

In February 1990, the Army investigated the Army and Air Force Exchange Service (AAFES) Main Service Station at Fort Ord to assess the presence, if any, of significant surface or subsurface soil contamination at several locations around the facility *(James M. Montgomery Consulting Engineers, Inc. [JMM], [1991b])*.

The investigation consisted of drilling and sampling six soil borings and surface sampling at six additional locations around the facility. Chemical analyses of the soil samples included total fuel hydrocarbons (TFH); high-boiling-point fuel hydrocarbons (HBPFH); benzene, ethylbenzene, toluene, and xylenes (BTEX); and lead. Additionally, 11 soil samples from the 6 borings were analyzed to evaluate geotechnical parameters.

The chemical analyses indicated the presence of low levels of organic compounds and metals at some of the boring and surface sampling locations. BTEX was not detected in any of the soil samples, but lead (total) was reported in all but five soil samples. Surface soil samples from three locations contained total lead at concentrations that appeared high in comparison with the remainder of the data. These total lead concentrations could be related to the presence of surface water outfalls close to the sampling locations, which drain runoff from the service station.

4.2 Preliminary Assessments/ Site Investigations After NPL Listing

After Fort Ord was added to the NPL in February of 1990, the Army conducted several preliminary assessments and a literature review and base inventory report, as described below.

4.2.1 Fort Ord Preliminary Assessment

In 1990, the Army conducted a PA/SI at 14 potential hazardous waste sites: 10 at Fort Ord (Table 3) and 4 at Fort Hunter Liggett *(JMM, 1991c)*. The field investigations were conducted from February through June 1990 and focused on the assessment of significant contamination and an initial evaluation of the nature and extent of contamination.

At Fort Ord, the investigation consisted of drilling and sampling 35 soil borings and installing 24 monitoring wells. Soil and groundwater samples collected were analyzed for a variety of contaminants based on the history of the particular site. Geophysical surveys were conducted to assist in the placement of wells and soil borings and for ordnance clearance. Results of this investigation are included in the site summaries presented in Sections 8 and 9 of this volume. On the basis of the analytical results, confirmation soil sampling was recommended at JMM Sites 2, 3, 7, 8, and 9. Additional groundwater sampling was recommended at JMM Sites 1 through 8. The corresponding site numbers used for this RI/FS are shown on Table 3.

4.2.2 Enhanced Preliminary Assessment

An enhanced preliminary assessment (PA) report was prepared at the request of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) *(Weston, 1990)*. The purpose of this enhanced PA report was to document the existing environmental conditions at Fort Ord and to provide recommendations for further action. Sixty-one areas requiring environmental evaluation (AREEs) were identified and characterized in the PA. Not all of the AREEs were covered under CERCLA. The AREEs are listed in Table 4.

4.2.3 Literature Review and Base Inventory Report

The Army conducted a literature review and site inventory at Fort Ord from August to October 1990 (*EA, 1991a*). The purpose of this study was to develop a comprehensive list of areas of concern (AOCs). The list included sites where the storage or disposal of hazardous materials or hazardous waste might have contaminated the environment. Ecological, cultural, and hydrogeological settings for these hazardous materials/hazardous waste sites and surrounding areas were also examined.

To conduct the literature review and site inventory in a systematic and comprehensive manner, the base was divided into 20 study zones (herein referred to as EA zones). The EA zones were designated before beginning the literature review and were based on land use (past and present) and location. The original EA zones were subsequently divided into 41 sites as listed in Table 5.

The literature review involved three major components:

- Site inspections
- Interviews with past and current site employees and other knowledgeable individuals
- Record reviews including past reports on site activities, site histories, environmental assessment and contaminant investigations, historical maps, and aerial photographs.

Included as part of this review was an assessment that characterized the level of concern for each source and then prioritized each major EA zone or EA zone component for investigation. Each study zone (and in some cases portions of EA zones) was assigned a category in accordance with the data still needed and the general data quality objectives for the site.

These categories were:

- Category 0: No known contamination and no suspected contamination
- Category 1: No known contamination, but reason to suspect contamination
- Category 2: Known contamination but the nature, extent, or concentration (or all three) of the contamination is not adequately defined to characterize the risks to human health or the environment
- Category 3: Known contamination and data sufficient to permit a baseline risk assessment but insufficient to complete a feasibility study
- Category 4: Data sufficient to complete a feasibility study.

The results of the categorization of EA zones and subzones were used in the preparation of the RI/FS Work Plan (*HLA, 1991c*) and the RI/FS Sampling and Analysis Plan (*HLA, 1991b*).

4.3 Underground Storage Tank Program

This summary section describes the Army's UST program, regulatory compliance objectives, and the goals of the Fort Ord UST Management Plan (*HLA, 1991g*). The Army UST program requires compliance with federal, state, and local requirements as outlined in Army Regulation (AR) 200-1. Army UST standards state that USTs permanently taken out of service or abandoned will be removed from the ground. USTs determined to be leaking and abandoned are emptied, taken out of service, and removed from the ground. Appropriate regulatory officials must be notified.

The Fort Ord UST Management Plan (*HLA, 1991g*) reported the number and regulatory status of existing USTs at Fort Ord so that recommendations for compliance with UST regulations could be developed (*HLA, 1991g*). During development of the UST Management Plan, UST information and location data were compiled, and a basewide listing of existing

USTs was prepared. This Management Plan List documented various elements of the status of the identified USTs including location, age, materials stored in the tanks, tank size, and whether the tank was in use. Based on information available at the time, the identified USTs were also placed on one of the three following lists:

- Removal List: USTs designated for removal
- Phase II Vapor Recovery List: USTs designated for piping system upgrades with Phase II vapor recovery systems to reduce emissions into the atmosphere from gasoline-dispensing facilities
- Environmental Assessment List: USTs for which additional documentation or environmental assessments are necessary prior to closure.

Appendixes containing UST summary sheets and site plans were included in the Fort Ord UST Management Plan (*HLA, 1991g*).

The results of the field work, site plan development, and a regulatory review were evaluated to formulate recommendations to abandon, replace, or upgrade each UST. Between 1991 and 1993, 133 USTs were removed and 20 of the sites were found to be contaminated. Characterization of the lateral and vertical extent of contamination has been completed at these 20 sites.

USTs containing CERCLA hazardous substances have been evaluated. With the exception of USTs 4495 and 4512, which could not be tested, all identified USTs have been removed or have passed leak tests. USTs 4495 and 4512 have been scheduled for removal in 1995.

The UST program is ongoing with UST removals, site characterizations, and site remediation continuing.

4.4 Asbestos Management Program

The objectives of the asbestos management program at Fort Ord are to (1) identify asbestos-containing materials (ACM) in Army-controlled buildings, (2) evaluate the ACM's friability, condition, and potential for damage, and (3) implement response actions appropriate to the findings. An asbestos survey of approximately 350 nonhousing buildings (i.e., retail stores, office buildings, lavatories, dining halls, barracks, general purpose buildings, vehicle maintenance and storage, oil storage, bus/taxi stations, and ammunition bunkers) performed in 1989 and 1990 found both friable and nonfriable ACM. Subsequently, from October 1991 to April 1993, a basewide asbestos survey of an additional 2,689 nonhousing and barracks structures was performed and both friable and nonfriable ACM were found. Surveys of housing units that are scheduled for transfer began in October 1993 and are expected to be completed in 1994. A summary report for the housing surveys will be made available to the recipients of the property.

4.5 Lead-Based Paint Management Program

The objectives of the lead-based paint (LBP) management program at Fort Ord are to (1) identify and control LBP and lead-contaminated dust in target facilities and (2) eliminate LBP hazards in reuse properties that contain buildings constructed prior to 1978, are planned for transfer prior to January 1995, and are intended to be used for residential purposes. Target facilities are Army-owned or leased facilities constructed prior to 1978 and used regularly by children 6 years or younger or by pregnant women as family housing, child development centers, family child care homes, schools, playgrounds, and similar facilities. LBP surveys of pre-1978 housing areas were conducted by the U.S. Army Environmental Hygiene Agency (AEHA); the scope of the AEHA lead survey was limited to the barracks built during the Korean war.

4.6 Radon Reduction Program

The objectives of the radon reduction program at Fort Ord are to assess indoor levels of radon and mitigate elevated levels of radon. Radon testing using ASTM procedures was originally performed in the 1989-1990 fiscal year. Those surveys included approximately 2,900 housing and office buildings basewide. Army policy dictates that buildings with radon levels above 4 picocuries/liter (pCi/l) be retested for 12 months. Those buildings with levels above 8 pCi/l must undergo complete remediation within 1 to 4 years. All buildings tested at Fort Ord were below levels that would require remediation.

4.7 Radiological Survey Program

The radiological survey program for Fort Ord is outlined in a memorandum titled "Base Closure Actions - Radiological Surveys; Trip Report of Mr. John Manfre to Fort Ord, CA, 14 - 16 Sep 93," dated September 20, 1993 (*Rankin, 1993*). The major points included in the memorandum are:

- Closeout radiological surveys will be required at Fort Ord due to Nuclear Regulatory Commission (NRC) requirements and state interest
- The survey procedures will follow the requirements set forth in NRC Regulatory Guide CR 5489
- AEHA was retained by the COE to serve as one of its radiological base closure consultants. AEHA is considered the project manager for the radiological surveys
- If contamination is found, remediation will be required. Minor remediation/ decontamination will be performed by the survey teams. Major remediation/ decontamination will be handled through the Army Material Command (AMCOM), Low-Level Radioactive Waste (LLRW) Office.

Buildings and areas at Fort Ord identified as potential storage and maintenance areas for licensed radioactive materials or equipment were listed in a memorandum titled "Revised List of Buildings at Fort Ord Recommended for Radiological Decommissioning," dated December 8, 1993 (*Chmar, 1993*).

The radiological survey activities began in January 1994 and were completed in April 1994 for buildings located in BRAC Priorities 1, 2, 3, and 5. The results indicate that there are no radiological health hazards identified as a result of the past use and storage of radioactive commodities in those buildings (*AEHA, 1994a, b*). These AEHA reports do not cover the 138 buildings from the group that were not surveyed because Army material was still being stored in them. These buildings will be surveyed when the material is relocated and a report will be prepared and submitted to the California Department of Toxic Substances Control.

4.8 Non-Stockpile Chemical Material Program

The Non-Stockpile Chemical Material Program Survey and Analysis Report *(U.S. Army Chemical Material Destruction Agency [ACMDA], 1993)* notes that chemical agent identification sets (CAIS) were used at Fort Ord prior to 1974 for field training of troops in an area described as being "off 10th Street Gate Road past the landfill area off Imjin Road." In 1974, four CAIS in inventory were removed from the installation for destruction. There are no records of burial or discovery of CAIS at Fort Ord. The Army report concludes that there is no known need for chemical agent remediation at Fort Ord, and the installation is not believed to present any immediate threat to human health or safety due to chemical agents *(ACMDA, 1993)*.

4.9 Enhanced Preliminary Assessment of Monterey Bay

The purpose of the Enhanced Preliminary Assessment (Enhanced PA) was to describe past Army activities in and around Fort Ord that could have affected the restricted zone, a 4-nautical-mile (nmi) by 4.5-nmi area of Monterey Bay west of Fort Ord, and to assess the likelihood of current and/or future impacts from these activities. The conclusions of the study were as follows:

- Ordnance may be present on the ocean floor within the current and historical restricted areas; however, the depth of the water in the restricted area (168 feet to 1,890 feet) and the nature of the currents and sediment transport process in the bay and canyon area make the location of ordnance difficult.

- Amphibious activities did occur within the restricted area, but no records of releases of chemicals or of disposal of ordnance or other long-term impacts of these activities were located during the research.

- Discharges of treated and untreated effluent occurred through the storm drain outfall, which served as the Main Garrison Sewage Treatment Plant (MGSTP) discharge line until 1984. From 1984 to 1987, MGSTP pumped treated effluent to the Marina outfall. After 1987 the MGSTP was connected to the regional treatment system. Even after the MGSTP was connected to the regional treatment system, overflows and releases occurred. A review of monitoring records from sampling that took place on Indian Head Beach from 1978 to 1984 prior to connection to the Marina outfall showed no constituents at levels of concern given the disturbance of the surf zone by currents and tidal action. Locating any sediments exposed to the sewage releases is difficult due to the movement of sediment in the bay.

- The impacts of the sediment and storm water from the ocean and dune outfall on aquatic receptors are discussed in Volume IV of this RI/FS and were not discussed in the Enhanced PA.

5.0 RCRA/CERCLA INTEGRATION

5.1 Overview

Section 5.0 presents the results of a review of existing documents that relate to Resource Conservation and Recovery Act (RCRA) facilities including Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) at Fort Ord. Also included is a summary of CERCLA documents that address the potential for releases from SWMUs and AOCs. This review was completed to comply with the Fort Ord FFA, which requires that the Army "integrate CERCLA response actions and RCRA corrective action obligations, which relate to the release(s) of hazardous substances, hazardous wastes, pollutants or contaminants." Additionally, the FFA states that remediation of releases performed under the CERCLA program shall "obviate the need for further corrective action under RCRA."

Section 5.2 summarizes current Fort Ord hazardous and solid waste management programs. Section 5.3 summarizes additional investigations and programs under which SWMUs and AOCs were documented or investigated. Section 5.4 identifies the programs under which SWMUs were investigated as part of CERCLA. Section 5.5 summarizes future activities related to the integration of RCRA and CERCLA programs.

5.2 Hazardous and Solid Waste Management Programs

5.2.1 Fort Ord's Hazardous Waste Management Program

Fort Ord's procedures for managing hazardous wastes were identified by reviewing available documents and interviewing personnel responsible for implementation of the program. According to information from these sources, management of hazardous wastes at Fort Ord is conducted in accordance with applicable federal, state, and local laws and regulations (Fort Ord Hazardous Waste Management Plan [HWMP], September 4, 1990; and Army Regulation 200-1). Some sections of the Fort Ord HWMP were not available for review because those sections are being updated as a result of changes in command and operations resulting from Fort Ord's closure.

The spill prevention, containment, and countermeasures (SPCC) section of the HWMP indicates that hazardous materials were stored on Fort Ord. According to Table 1 of the SPCC, these materials included brake fluid, acetylene, paint and paint strippers, batteries, transmission and motor oils, waste oils, acids, solvents, and adhesives. These materials were stored at motor pools, maintenance shops, equipment sheds, and at the Defense Reutilization and Marketing Office (DRMO) Yard. Storage containers typically ranged in volume from 1 to 55 gallons; at a few locations, waste oils were reportedly stored in containers of up to 400 gallons. Compressed gas cylinders were used for gases such as oxygen and acetylene. Table 1 of the SPCC lists known container volumes and quantities; information in this table was current through the end of 1993 and does not show changes in hazardous materials storage resulting from downsizing and closure of operations. Consequently, storage of these materials is expected to be significantly reduced.

According to Ms. Claire Murdo of the Fort Ord Department of Public Works, spill plans contained in the HWMP identify requirements for responding to emergencies and spills. Spill reports were prepared, as necessary, over the past 2 to 3 years and document specific releases but are not currently available for review. However, according to Ms. Murdo and Section VI of the SPCC, during the time period covered by the spill reports, no "reportable-quantity" spills or California-regulated spills occurred. No other information about the management of hazardous wastes or materials at Fort Ord is available for review because Fort Ord is updating hazardous waste and materials management documents in response to base closure.

5.2.2 Fort Ord's Solid Waste Management Program

Information about the status of SWMUs at Fort Ord was reviewed (*AEHA, 1988; HLA, 1993b*). These documents identified operations at each SWMU and stated whether further assessment of the SWMU was required to identify potential releases. This section summarizes information about these SWMUs, including the locations, types, and previous evaluations.

In 1988, the AEHA performed an assessment to identify, describe, and evaluate SWMUs at Fort Ord. The purpose of this assessment was to assist Fort Ord in bringing the SWMUs into compliance with state and federal regulations and to identify SWMUs requiring environmental sampling and/or remedial action. The methods used to identify and assess the SWMUs included:

- A literature search; one of the documents assessed was a review of the installation by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA)
- Site visits and inspection of conditions at each site.

AEHA issued an interim final report entitled *Evaluation of Solid Waste Management Units, Fort Ord, California, September 18-22, 1988,* which identified 58 SWMUs at Fort Ord (Table 6). The report subdivided the SWMUs into three categories:

- SWMUs with no evidence of release to the environment
- SWMUs with evidence of release to the environment
- SWMUs that required environmental sampling to complete the requirements of a RCRA facility assessment (RFA).

Also presented in AEHA's evaluation were the following recommendations to ensure environmental compliance at Fort Ord:

- Include the SWMU evaluation with the RCRA Part B Permit (renewal application for review by state and EPA Region IX regulatory authorities)
- Coordinate with the state and EPA Region IX for visual inspections of the SWMUs
- Complete environmental sampling and/or investigations at seven SWMUs: FTO-001, FTO-002, FTO-010, FTO-014, FTO-25, FTO-026, and FTO-41
- Complete closure for abandoned landfills in accordance with state and federal regulations
- Consolidate hazardous waste from the numerous motor pools at a few temporary storage buildings.

The 1988 SWMU evaluation by AEHA was updated in 1993 in the *Draft Verification of Solid Waste Management Units, Fort Ord, California* dated August 16, 1993. The update included:

- Review of the AEHA SWMU evaluation
- Development of a site map showing the location of each of the 58 SWMUs
- Site visits conducted with Fort Ord personnel to verify the location and status of each SWMU.

The status of the original 58 SWMUs identified by AEHA was summarized in HLA's 1993 update as follows:

- Nine SWMUs have been closed or are no longer in existence
- Nine SWMUs have different associated military units
- Two SWMUs are now used for different purposes than described by AEHA
- One SWMU is still in operation but stores its waste elsewhere

- Thirty-seven SWMUs are essentially unchanged since the AEHA evaluation was prepared.

5.3 Additional Studies Under Which SWMUs Were Investigated

In addition to the SWMU documents discussed above, several other documents discuss the potential release of contaminants to the environment from the SWMUs and related AOCs. An AOC is defined as an area very similar to a SWMU but not specifically identified as one of the 58 SWMUs at Fort Ord. These additional studies are described in the following sections.

5.3.1 Literature Review and Base Inventory Report

The Army conducted a literature review and site inventory at Fort Ord from August to October 1990 (*EA, 1991a*). The purpose of this study was to develop a comprehensive list of AOCs. This report was discussed in Section 4.2.3.

5.3.2 Enhanced Preliminary Assessment Report

An enhanced preliminary assessment (PA) report was prepared at the request of USATHAMA to document existing environmental conditions at Fort Ord and to provide recommendations for further action (*Weston, 1990*). Section 4.2.2 gives further information on this report.

5.3.3 Department of Health Services Notice of Violation

Fort Ord received Notice of Violation for violations of hazardous waste statutes and regulations observed during two inspections by the California Department of Health Services (*DHS, 1988*). These alleged violations were cited during an initial inspection in November 1985. Fort Ord was reinspected in April 1987 to determine compliance. The alleged violations were cited by building number. Each building represents a separate hazardous waste management unit, such as a generation point or storage point, and is managed independently. A "STATUS" determination indicated compliance as observed during the 1987 reinspection.

5.3.4 Environmental Compliance Assessment

The Environmental Compliance Assessment System (ECAS) is a computerized system for Fort Ord that summarizes all regulatory and management findings observed during the environmental compliance assessment at Fort Ord. The environmental compliance assessment program is conducted by the Sacramento District COE as required by the Department of the Army. The ECAS document that was reviewed as part of this RCRA/CERCLA integration was dated January 12, 1993. The regulatory summaries noted where there was noncompliance with an existing federal, state, or local regulatory requirement; noncompliance with future federal, state, or local regulatory requirements; and regulatory health and safety findings (noncompliance with an existing Occupational Safety and Health Administration, Department of Transportation, National Fire Protection Agency, or federal, state, or local health and safety regulatory requirement related to environmental issues).

5.4 Identification of SWMUs and AOCs Investigated in the RI/FS Process

This section summarizes the SWMUs and AOCs investigated during the RI/FS.

5.4.1 General

The documents summarized in Section 5.3 were used to identify sites to be investigated during the RI/FS. From review of these documents, SWMUs and AOCs where there was evidence of release(s) of contaminants to the environment were named as sites or site areas. These SWMUs and AOCs were then investigated as part of the RI/FS.

Each of the documents summarized in Section 5.3 identified the SWMUs and AOCs by a different name and number, and these names and numbers are often different from the RI/FS site names and numbers. Table 6 cross-references the SWMUs, AOCs, and RI/FS sites. Tables 7a through 7z list (for each operable unit and selected RI/FS sites) the SWMUs and AOCs present, evidence of releases, sources of information documenting the releases, and incorporation into the PA/SI, RI/FS, or hazardous waste management programs. For example, as listed in Table 6, FTO-001 is the FAAF - Abandoned Fire Training Pit. The site name for this SWMU is OU 1. OU 1 was investigated prior to Fort Ord's listing as an NPL site. Table 7a describes the evidence of release(s) and actions taken (present condition and status) at OU 1. This information is provided for the SWMUs and identified AOCs that are within RI or OU boundaries.

On the basis of the information documented in Tables 7a through 7z, all but 2 of the 58 SWMUs and all but 7 of the AOCs fall within RI or OU site boundaries and were included in either PA/SI and/or RI investigations. If no evidence of release was identified during the PA/SI or RI investigation planning, a field investigation may not have been conducted at the SWMU or AOC. If the potential for release was identified, the SWMU or AOC was specifically investigated. The two SWMUs that were not within site boundaries were FTO-020 and FTO-021. Both SWMUs were included in the Enhanced PA and the EA Literature Review; no evidence of release was identified at either SWMU. The seven AOCs identified in the ECAS were not located within an RI site and were not included in the RI because no evidence of a release was identified during initial RI planning activities.

5.4.2 RCRA Part B Permit

In 1986, Fort Ord submitted its RCRA Part B Permit application to the State of California and the U.S. EPA. The application identified two RCRA treatment, storage, and disposal units: (1) DRMO Hazardous Waste Storage Yard and (2) Building 111, PCB storage. No Part B was submitted for the Range 36A - Explosive Ordnance Disposal Range (RI/FS Site 5). The DRMO Yard and Building 111 were granted interim status and have operated under an interim status pending approval of the Part B Permit. This permit has not been approved to date and will require formal RCRA closure and withdrawal as a result of the base closure. This RCRA closure will also include areas defined in the original Part A Permit, such as Range 36A and the silver recovery unit at the hospital. The DRMO Yard will be inspected for potential releases after completion of base closure in 1995 and a closure report will be prepared. Corrective actions needed at Range 36A resulting from current use will be conducted as necessary when a closure plan is prepared when the site is no longer needed.

5.5 Future RCRA/CERCLA Integration Activities

Future RCRA/CERCLA integration activities at Fort Ord include the following:

- SWMUs and AOCs where there is evidence of release(s) will continue to be acted on under the CERCLA program. Remedial actions required at SWMUs and AOCs will be addressed as CERCLA response actions.
- SWMUs and AOCs will be reinspected as a result of base closure. A report will be prepared documenting the results of this inspection. If response actions are required, they will be conducted under the CERCLA program.

6.0 SUMMARY OF EXISTING OPERABLE UNITS

6.1 Operable Unit 1 - Fritzsche Army Airfield Fire Drill Area

Operable Unit 1 (OU 1) is the Fritzsche Army Airfield Fire Drill Area (FDA), which was established in 1962 as a training area for the Fort Ord Fire Department (Plate 2). As part of training activities, fuel was discharged from an onsite storage tank into a pit, ignited, and then extinguished. Training activities at the FDA were discontinued in 1985 and the associated structures were removed.

Environmental investigations began at OU 1 in 1984 under RWQCB Cleanup and/or Abatement Orders 84-92, 86-86, and 86-315. The RWQCB also issued Waste Discharge Requirements (WDR) No. 87-189 for operation of the groundwater and soil treatment system and discharge of treated water. Remedial investigations (*HLA, 1987a, b*) were performed after closure of the FDA to document the nature and extent of contamination in soil and groundwater. RI activities began in November 1985 and were completed in 1987. The results of the RI indicated that light and heavy total petroleum hydrocarbons (TPH) were present in the shallow surface soils and that benzene, TCE, trans-1,2-dichloroethene, and methyl ethyl ketone were present in the groundwater.

To address the soil and groundwater contamination identified during the RI, the remedial alternative selected in the FDA RI/FS was constructed (*HLA, 1987a, b*). The remedial alternative consisted of: (1) excavation and treatment of TPH-contaminated soils and (2) installation of a groundwater extraction and treatment system, which began operation in August 1988.

As part of soil treatment, approximately 4,000 cubic yards of TPH-contaminated soil were removed and temporarily stockpiled, and the excavation was backfilled with clean soil. The excavated contaminated soil was then spread on the ground surface for biotreatment. The groundwater treatment system consists of 2 extraction wells, 11 monitoring wells installed in the uppermost (A-) aquifer, 1 monitoring well installed in the first water-bearing zone beneath the A-aquifer, 4 piezometers screened in the A-aquifer, a granular activated carbon (GAC) treatment system, and an effluent spray system. During the period when both soil and groundwater were treated, extracted groundwater was passed through the GAC system, and nutrients were added to promote microbial growth and facilitate biotreatment. The nutrient-enriched treated water was then sprayed onto the biotreatment areas where the TPH-contaminated soil had been placed. The rate and areas sprayed were monitored and controlled to maintain an adequate moisture content for microbial growth; excess spray was directed to a small area upgradient of the biotreatment area. Microbial growth was also facilitated by routine tilling of the soil. Biotreatment of the contaminated soil was completed by August 1991.

Treatment of groundwater will continue until reaching aquifer cleanup goals or levels that are protective of human health and the environment. Groundwater is monitored as part of a quarterly monitoring program. Table 8 presents the maximum detected concentrations of chemicals in groundwater and the proposed aquifer cleanup goals.

To evaluate the effectiveness and completeness of soil treatment and to demonstrate that the lateral and vertical extent of groundwater contamination has been characterized and that operation of the groundwater extraction system is adequate and effective, a Remediation Confirmation Study was performed from October through November 1993. The risk assessment performed using the results of this investigation indicated that residual chemicals still present in the soil are not a risk to human health or to ecological receptors under the proposed land use, which calls for the property and the surrounding area to be protected habitat as part of the University of California Natural Reserve System. Groundwater capture analysis of the extraction wells and aquifer indicates that groundwater capture is adequate at the FDA and that contaminated groundwater does not appear to be migrating offsite.

The *Draft Final Remediation Confirmation Study, Fort Ord, California*, dated May 3, 1994, has been reviewed and approved by the regulatory agencies. The Proposed Plan for OU 1 proposes no further action for soils and updates the cleanup goals for groundwater. The risk assessment, cleanup goals, and final remedy are consistent with the basewide goals. The groundwater remediation at OU 1 is not anticipated to be affected by the proposed remedial measures at OU 2 or at Sites 2 and 12. The Proposed Plan was submitted November 18, 1994. The final public review has been completed. A public meeting regarding the OU 1 Proposed Plan was held December 8, 1994. The OU 1 ROD is under review.

6.2 Operable Unit 2 - Fort Ord Landfills

Operable Unit 2 (OU 2), the Fort Ord Landfills site, consists of landfills covering approximately 150 acres, the immediate surrounding area, and the underlying contaminated groundwater. The surficial boundaries of OU 2 are shown on Plate 2.

The landfills were used for over 30 years for residential and commercial waste disposal. The landfills include the main landfill and the north landfills. The north landfills were used from 1956 to 1966. The main landfill was operated from 1960 until 1987 and may have received a small amount of chemical waste along with household and commercial refuse. The main landfill facility stopped accepting waste for disposal in May 1987 because of the initiation of interim closure of the facility.

As a result of detections of VOCs in Fort Ord and Marina County Water District (MCWD) water supply wells, the RWQCB issued Cleanup and Abatement Order (CAO) 86-87 that required Fort Ord to initiate studies of soil and groundwater to assess the potential impact of the Fort Ord Landfills on underground water resources. The RWQCB also issued CAO Nos. 86-317 and 88-139 for the investigation and cleanup of groundwater contamination caused by the landfills and WDR No. 87-153 requiring landfill closure by 1989. The Army initiated studies (*HLA, 1988a*) to evaluate whether chemicals from the landfills had affected either soil beneath the landfills or the quality of groundwater beneath the sites, or both.

The *Final Remedial Investigation Report* (*Dames and Moore, 1993*) reported the presence of low levels of semi-volatile organic compounds (SOCs) and pesticides in soil at maximum total detected concentrations of 5.6 milligrams per kilogram (mg/kg) and 0.12 mg/kg, respectively. Metals were also detected in all soil samples. Soil gas sampling detected VOCs and methane at maximum concentrations of 6.0 micrograms per liter (μg/l) and 550,000 μg/l, respectively. VOCs were also detected in groundwater samples collected from both the A-aquifer and the 180-foot aquifer. TCE was the most frequently detected chemical in groundwater with a maximum concentration of 80 μg/l. Other VOCs detected in groundwater samples included: tetrachloroethene (PCE), benzene, cis-1,2-dichloroethene, and dichloromethane.

Using the RI data, a Baseline Risk Assessment (*Dames and Moore, 1993*) and a feasibility study (*Dames and Moore, 1993*) were prepared. These documents provided evaluations of the potential risks to human health and the environment, and alternatives for remediating the soil and groundwater contamination.

The following five remedial alternatives were evaluated in the FS.

- Alternative 1 - No Action: This alternative assumes current site conditions will be unchanged except for implementation of a groundwater monitoring program to assess movement of the plume.
- Alternative 2 - Containment: This alternative consists of containment of groundwater and waste within the present boundaries.
- Alternative 3 - A-Aquifer Cleanup and Landfill Capping: Under this alternative, groundwater extraction wells are screened

only in the A-aquifer, with a system designed to achieve groundwater and chemical removal as well as containment in the A-aquifer. This alternative also includes construction of a landfill cap to minimize exposure and reuse or recharge of treated water to the subsurface.

- Alternative 4 - A-Aquifer Cleanup and Landfill Capping - Interim Action on 180-Foot Aquifer: In addition to the actions identified in Alternative 3, this alternative includes removal and treatment of groundwater and chemicals from the 180-foot aquifer.

- Alternative 5 - A-Aquifer Cleanup and Removal, Treatment, and Disposal of Landfill Waste - Interim Action on 180-foot Aquifer: Groundwater from both the A- and 180-foot aquifers is removed and treated as in Alternative 4. Instead of capping, the waste from the landfill areas is excavated using conventional earthmoving equipment. The excavated waste is then segregated and disposed of appropriately.

The Army's preferred cleanup for OU 2 is Alternative 4 - Upper Aquifer Cleanup and Landfill Capping - Interim Action on the 180-Foot Aquifer. The FFA parties have agreed to approve Alternative 4; a ROD for OU 2 was signed by the FFA parties in August 1994.

The risk assessment, cleanup goals, and final remedy are consistent with the basewide goals. The groundwater remediation at OU 2 is not anticipated to be affected by the remedial measures at OU 2 and at Sites 2 and 12.

7.0 SUMMARY OF BASEWIDE STUDIES

Basewide studies conducted as part of the RI/FS included the hydrogeologic characterization; the background soils, storm drain and sanitary sewer, and surface water outfall investigations; the biological inventory; and the ecological risk assessment.

7.1 Hydrogeologic Characterization

This section summarizes the Basewide Hydrogeologic Characterization performed for the Fort Ord RI/FS. Phase 1 was performed during 1991 and 1992, with results and data gaps from that work presented in the *Draft Final Basewide Hydrogeologic Characterization*, dated June 10, 1994. Phase 2 of the investigation was performed during 1993 and 1994 to fill data gaps identified during Phase 1.

The purpose of this work was to characterize the hydrogeologic conditions at and in the immediate vicinity of Fort Ord. Two primary objectives of the basewide hydrogeologic characterization were to (1) develop a conceptual model of the aquifer systems at Fort Ord in support of the specific RI/FS site investigations being conducted concurrently and (2) evaluate the potential for contaminant transport into and within the groundwater system. To address these objectives, a three-dimensional numerical model was constructed of the Main Garrison area, inclusive of the OU 2 Landfills and the areas that comprise Sites 2 and 12. The numerical model was used in the Sites 2 and 12 Feasibility Study (Volume V) and will be further utilized for pre-design activities for the Fort Ord Landfills (OU 2). This RI/FS report mainly discusses the hydrogeology of the Salinas groundwater basin because groundwater contamination and the potential for groundwater contamination exists primarily in that basin; a detailed discussion of the hydrogeology of the Seaside basin is presented in the *Draft Final Basewide Hydrogeologic Characterization Report* (*HLA, 1994f*).

7.1.1 Method of Investigation

HLA compiled available literature, well logs, and groundwater data from previous studies and ongoing groundwater monitoring activities by Fort Ord and other local communities. To supplement these data, HLA performed additional basewide activities, including: (1) drilling and geophysically logging pilot borings and installing wells; (2) obtaining representative soil samples for chemical and physical analysis; (3) monitoring water levels in selected on- and offbase wells and collecting groundwater and analyzing samples to assess water quality; and (4) conducting seismic reflection surveys. The data from these activities were evaluated to characterize the physical conditions of the aquifer systems, flow pathways between aquifers, regional flow gradients, and groundwater chemistry to develop a conceptual model of the Fort Ord aquifer system.

7.1.2 Findings and Conclusions

7.1.2.1 Groundwater Resources

Groundwater is the principal source of water for Fort Ord and its neighboring communities. Fort Ord is underlain by two groundwater basins, the Salinas basin in the northern portion of the base and the Seaside basin in the southern portion. The Salinas basin is large, and in addition to the greater Salinas Valley includes Fort Ord's Main and East Garrison areas, the FAAF, and the city of Marina. The Seaside basin is comparatively small and includes much of the Fort Ord Inland Ranges, Seaside, and Sand City.

The city of Marina and Fort Ord currently obtain water from wells located near the east boundary of Marina and in the vicinity of the East Garrison, respectively. Seawater intrusion has affected wells in the city of Marina and at Fort Ord for several decades. The eastward movement of seawater from Monterey Bay into the aquifers of the Salinas basin has apparently resulted from historical overpumping of groundwater. In response to seawater intrusion,

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7.1.2.2 Hydrogeology

In the Salinas basin portion of Fort Ord, four aquifers are of primary importance to this investigation and are listed from shallowest to deepest as follows:

- The A-aquifer
- The Upper 180-foot aquifer
- The Lower 180-foot aquifer
- The 400-foot aquifer.

The 180-foot and 400-foot aquifer names at Fort Ord are derived from the aquifer names in common usage in the Salinas Valley. The 180-foot aquifer at Fort Ord has been subdivided into the Upper 180-foot and the Lower 180-foot aquifer. This aquifer was subdivided because of (1) the presence of a silty and clayey sand (called the Intermediate 180-foot aquitard) that is apparently of widespread occurrence throughout much of Fort Ord, (2) observed head (i.e., potentiometric) differences between these two aquifers, and (3) differences in observed tidal response between the Upper and Lower 180-foot aquifers near the coastline at Sites 2 and 12. The absence of a recognized aquitard and similar water-level elevations between the Lower 180- and 400-foot aquifers indicate these two aquifers are hydraulically connected in the Main Garrison area.

Two other aquifers are also present, the 900-foot aquifer penetrated by deep city of Marina wells and the Aromas Sand-Paso Robles aquifer located in the southeast portion of the base. Because the water quality in these two aquifers is unaffected by environmental contamination, they are not described in detail in this report.

A-Aquifer

The A-aquifer is not used for water supply. The A-aquifer is composed of relatively homogeneous older dune sand deposits and contains paleosols, representing buried surface soils within the sands. These relatively fine-grained and irregularly distributed paleosols potentially contribute to preferential flow and contaminant transport in the A-aquifer.

The A-aquifer is unconfined and underlain by the Fort Ord-Salinas Valley Aquiclude (FO-SVA), which separates this aquifer from the underlying Upper 180-foot aquifer. Where the FO-SVA is above sea level, the saturated thickness of the A-aquifer is generally less than 30 feet and the configuration of the top of the FO-SVA strongly influences groundwater flow (i.e., the configuration affects the direction of flow and changes the saturated thickness of the A-aquifer). The FO-SVA pinches out in the western and southern Main Garrison area, resulting in groundwater from the A-aquifer commingling with the Upper 180-foot aquifer. Along the western edge of the FO-SVA, westward-flowing groundwater from the A-aquifer entering the Upper 180-foot aquifer reverses flow direction and flows eastward.

Upper 180-Foot Aquifer

The Upper 180-foot aquifer has historically been used for water supply, but does not currently supply significant volumes of groundwater to either Fort Ord or the city of Marina. The aquifer is within the Valley fill deposits and is composed predominantly of fluvial sand with some gravel. This aquifer is confined where it is overlain by the FO-SVA and unconfined beyond the western extent of the FO-SVA. It receives recharge from the A-aquifer along the edges of the FO-SVA and from surface water infiltration in areas where the FO-SVA is absent.

Except for an area west of the FO-SVA, groundwater flow in the Upper 180-foot aquifer is eastward toward the Fort Ord supply wells. Groundwater flow in the Upper 180-foot aquifer west of the FO-SVA is notably different from flow elsewhere. West of the FO-SVA, water levels are at or slightly above sea level, and a groundwater mound is present in the vicinity of the Fort Ord parade grounds (between the OU 2 Landfill and Sites 2 and 12). Groundwater flow diverges radially from this mound. South of the mound, near Sites 20 and 24, a trough-like groundwater depression has been observed.

Lower 180-Foot and 400-Foot Aquifers

The Lower 180-foot aquifer is also within the Valley fill deposits and is composed of fluvial gravel and sand with clay interbeds. This aquifer is laterally continuous with the 180-foot aquifer of the Salinas Valley and is a major source of water supply to both Fort Ord and farms in the Salinas Valley. The Lower 180-foot aquifer and the 400-foot aquifer have similar water-level elevations in the areas of the Main Garrison and the OU 2 Landfills. Because little hydraulic separation is evident at these locations, their water levels are contoured together and they are considered as a single hydrostratigraphic unit relative to water-level elevations, flow directions, and groundwater modeling. Groundwater flow in the Lower 180- and 400-foot aquifers is eastward toward the Fort Ord supply wells and the Salinas Valley; groundwater levels fluctuate in direct response to seasonal groundwater demand by Fort Ord's supply wells and the Salinas Valley irrigation wells.

7.1.2.3 Groundwater Quality

Groundwater in the Fort Ord aquifer system has been impacted by base activities and by seawater intrusion resulting from the pumping of groundwater for water supply and agricultural purposes. These two water quality conditions are summarized in the following sections.

Contaminants from Base Activities

Base activities have apparently resulted in the presence of organic compounds in the groundwater beneath Fort Ord. Organic contaminants, most commonly trichloroethene (TCE), are present in the A-aquifer at both OU 1 and the OU 2 Landfills.. These organic contaminants form a groundwater plume in the Upper 180-foot aquifer at Sites 2 and 12, and in the A-aquifer, Upper 180-foot aquifer, and the Lower 180-/400-foot aquifers at the OU 2 Landfills. The 1993-1994 quarterly monitoring program detected maximum TCE concentrations of 24 $\mu g/l$ in the A-aquifer related to the OU 2 plume; 120 $\mu g/l$ in the Upper 180-foot aquifer related to Site 12; and 13 $\mu g/l$ in the Lower 180-foot aquifer and 2.2 $\mu g/l$ in the 400-foot aquifer in the vicinity of the OU 2 Landfills.

The distribution of organic contaminants, such as TCE, is generally consistent with groundwater flow directions. TCE from the OU 2 Landfills in the A-aquifer has been transported westward toward the edge of the FO-SVA, apparently commingled with the Upper 180-foot aquifer, and subsequently moved eastward beneath the FO-SVA. Minor contamination of the Lower 180- and 400-foot aquifers has occurred, possibly as the result of leakage through the Intermediate 180-foot aquitard or wells at the OU 2 Landfill screened across the Upper and Lower 180-foot aquifers. Former Fort Ord supply wells in the Main Garrison were destroyed in 1989 to eliminate the potential pathways they provided between the A-, Upper 180-, and Lower 180-foot aquifers.

At Sites 2 and 12, organic contaminants are present in the unconfined portion of the Upper 180-foot aquifer and have moved westward toward Monterey Bay. The groundwater mound situated near the Main Garrison parade grounds apparently acts to separate the Sites 2 and 12 and OU 2 contaminant plumes.

This basewide program also investigated possible upgradient contaminant sources to OU 1 (FAAF Fire Drill Area) and found no groundwater contamination in upgradient boring and well samples. It is concluded that upgradient contamination is not contributing to the OU 1 groundwater plume.

Seawater Intrusion

Historically, seawater has affected groundwater in the 180- and 400-foot aquifers in the vicinity of the city of Marina and the Main Garrison. Recent data indicate a wedge of seawater is currently present in the Upper 180-foot aquifer between Highway 1 and the beach near Sites 2 and 12. Elevated chloride concentrations in the 400-foot aquifer near the southeast corner of the city of Marina (Wells M-09 and MW-OU2-07-400) indicate that seawater intrusion continues to affect water quality in that area; this may be the result of continued pumping of Marina supply well M-09.

It is uncertain if pumping at the active Fort Ord supply wells, on the east side of the base, is sufficient to induce seawater intrusion from the west. It is considered more likely that the Fort Ord supply wells would be affected by seawater intrusion from the north in the 180-foot and 400-foot aquifers in the Salinas Valley proper. In this area, seawater has intruded into the Salinas Valley to within approximately 3 miles of Fort Ord supply well FO-30.

7.1.2.4 Groundwater Model

A numerical groundwater flow model was developed to provide a basis for evaluating groundwater remedial alternatives. Comparison of the predictive simulations with observed conditions indicates that the model approximates the hydrogeologic system and performs adequately as a predictive tool to evaluate various groundwater remediation scenarios. The model has been used to simulate the effects of various groundwater remediation scenarios at Sites 2 and 12.

7.2 Background Soil Investigation

The purpose of the Basewide Background Soil Investigation (Basewide BSI) was to evaluate background soil for organochlorine pesticides and 13 priority pollutant metals. The infrequent detection of pesticides in soil samples from Fort Ord, compared to the very frequent detection of pesticides off the base, precluded estimation of background thresholds or maximum concentrations for pesticides in Fort Ord soil.

The evaluation of background concentrations of metals in soil consisted of the following:

- Developing risk-based preliminary remediation goals (PRGs)
- Compiling a dataset representative of background soil conditions
- Comparing the background concentrations of metals in soil to the PRGs to identify metals with concentrations exceeding PRGs
- Evaluating the spatial distribution of those metals
- Estimating threshold concentrations for metals with background concentrations exceeding PRGs.

PRGs were developed for the 13 priority pollutant metals. PRGs represent the maximum concentration of metals in soil considered to result in estimated daily doses (1) with an estimated probability that one in one million exposed individuals would develop cancer (10^{-6} cancer risk) or (2) expected to be without appreciable risk of adverse noncarcinogenic effects (hazard quotient less than 1.0 [*EPA, 1991d, e*]).

A background dataset of metals concentrations in soil was created by collecting and analyzing 126 soil samples representative of background conditions at Fort Ord. The results for three samples were removed from the background dataset to form the adjusted background dataset (n = 123) as discussed in Volume II, Basewide BSI. The specific metal concentrations in this adjusted background dataset were compared to the corresponding lowest (most conservative) PRGs; arsenic, beryllium, and chromium were identified as metals with background concentrations exceeding the most conservative PRGs.

Data were sorted on the basis of depth and soil parent material into four subsets representative of geochemically significant conditions in

Fort Ord soils. The four conditions are shallow (less than or equal to 2 feet) QTP (soil derived from the Paso Robles Formation), deep (greater than 2 feet) QTP, shallow NQTP (not QTP, i.e., soils derived from the alluvium, older and recent dune sand, Aromas Sand, and Santa Margarita Formation), and deep NQTP.

For arsenic and chromium, analysis of variance (ANOVA) was used to evaluate the significance of depth and soil parent material on background chemical variability. ANOVA was not used on beryllium because of the low frequency of detection for this metal.

The ANOVA of the subsets of arsenic and chromium led to the following conclusions:

- Background soil concentrations of arsenic appear to be controlled by soil parent material.

- Background soil concentrations of chromium appear to be controlled by depth and soil parent material.

Background threshold concentrations were estimated for the four data subsets for arsenic, beryllium, and chromium. The tolerance interval calculation (*EPA, 1989g*) and the maximum value estimation method were used.

The PRGs presented are conservative, health-based reference concentrations in soil. The background threshold concentrations in soil developed represent background conditions for metals that exceed PRGs at Fort Ord.

The PRGs, threshold concentrations, and maximum metals concentrations from the depth- and lithology-specific background data subsets were used as screening tools for the presentation and discussion of soil metals data.

7.3 Storm Drain and Sanitary Sewer Investigation

The purposes of the Basewide Storm Drain and Sanitary Sewer Investigation (Basewide SDSSI) were to assess the integrity of the pipelines and to evaluate the potential presence of contamination in soil beneath the storm drain and sanitary sewer systems.

The investigation consisted of excavating five representative sections of pipe, observing the pipe for fractures and evidence of leakage, collecting soil samples beneath pipe joints for chemical analysis, and backfilling the trench. The work was performed in accordance with the RI/FS Work Plan (*HLA, 1991c*) and the RI/FS Sampling and Analysis Plan (*HLA, 1991b*), which describe the investigative approach for the Fort Ord RI/FS.

The observations of the exposed pipe sections showed no evidence of open fractures. The chemical analyses of the soil beneath the pipe joints revealed that copper, lead, selenium, and zinc were detected at concentrations above levels encountered in background soil but were not above human-health based PRGs. Trichlorobenzene and TPH as diesel (TPHd) were also detected at a few locations in two trenches.

The screening risk evaluation conducted using these data indicated that no adverse health or ecological effects are expected to be associated with the chemicals detected in the trench soil samples. The evaluation of possible chemical migration to groundwater indicated that impacts to groundwater are not expected. On the basis of these data, no further action under the RI/FS program is planned for either the storm drain or the sanitary sewer systems.

7.4 Surface Water Outfall Investigation

The purpose of the Basewide Surface Water Outfall Investigation (Basewide SWOI) was to assess whether there has been transport of contaminants to the surface water outfalls via the surface water drainage storm drain systems and to characterize the impact on soil at the outfalls. The surface water drainage system is made up of aboveground natural and manmade drainages that discharge to or receive discharge from the subsurface storm drain system.

Phase 1

Phase 1 of the investigation consisted of:

- Prioritizing the basewide surface water outfalls based on their potential to transport contaminants to the outfall
- Sampling and analyzing soil gas samples collected at prioritized outfalls
- Obtaining soil boring samples and sediment samples at each prioritized outfall.

Additional Phase 1 investigative and assessment activities completed in 1993 included:

- A source area evaluation
- Additional soil, sediment, and particle size sampling
- Remote video reconnaissance of a portion of the storm drain pipe system
- A human health risk evaluation using the 1992 and 1993 data.

Inorganics were detected in all of the 1992 and 1993 soil and sediment samples. In general, the near-surface (0.0- to 0.5-foot-bgs) soil and sediment samples had higher metals concentrations than the deeper (5.0- to 5.5-foot-bgs) soil samples, both near the outfalls and 20 feet downslope of the outfalls. Concentrations of site-related inorganic chemicals exceeded human-health-based PRGs at 24 of the 32 sampling locations.

Organic compounds were generally detected less frequently than the inorganic compounds. Fluoranthene, dieldrin, 4,4'-DDE, 4,4'-DDT, 4,4'-DDD, endosulfan II, endosulfan sulfate, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, pyrene, phenanthrene, and benzo(g,h,i)perylene were detected in at least one sample. Overall, pesticides and unknown hydrocarbons were detected in 29 and 27 of the 83 soil and sediment samples, respectively. No organic compounds were detected in 18 of the 83 soil and sediment samples. Concentrations of site-related organic chemicals exceeded human-health based PRGs at 24 of the 32 sampling locations.

Phase 2

The human health screening risk evaluation was used to evaluate the Phase 1 soil and sediment samples and identified three sampling locations for further characterization or evaluation. Additional characterization at Sampling Location OF-15 and an evaluation of potential groundwater impacts at Sampling Location OF-11 proceeded under Phase 2 of the Basewide SWOI. Sediment within the storm drain system upgradient of Sampling Location OF-25 and OF-26 is scheduled for removal.

Two additional storm drain outfalls were identified for sampling during a June 9, 1994, site visit to FAAF with previous employees of the base. These two outfalls (Sampling Locations OF-34 and OF-35) discharge into a vegetated drainage channel west of Buildings 533 and 535 at the western end of FAAF. Sampling at these two outfalls was completed under the Phase 2 Basewide SWOI field activities.

Phase 2 sampling took place on September 28 and 30, 1994. Soil samples were obtained from 10 additional soil borings within and surrounding a concrete channel that lies beneath 2.0 to 3.0 feet of soil and extends approximately 61 feet to the west of Sampling Location OF-15. Concentrations of an unknown hydrocarbon, 1,1,1-TCA, and PCE attenuated with distance from the outfall in the soil samples from within the concrete channel; and attenuated to nondetect at a depth of 5.5 feet bgs in samples obtained from soil borings completed around the channel perimeter. Dibromochloromethane and bromoform were detected in a 0.0-foot to 0.5-foot-bgs sample from a soil boring within the buried concrete channel. On the basis of these data, it is recommended that soil within the buried channel at Sampling Location OF-15 be excavated under the IAROD.

Phase 1 results also recommended further evaluation of the potential impacts to groundwater of TPH concentrations at Sampling Location OF-11 that did not attenuate with depth. Further evaluation of the analytical results during Phase 2 determined that the non-attenuated concentration reported at depth incorrectly reported surrogate results and should not have been reported as a detected concentration. Therefore no potential impacts to groundwater were identified. No further action was recommended.

Two PCBs were detected at depth at levels above PRGs in a soil sample from the boring completed adjacent to the outfall at Sampling Location OF-34. No other organics or inorganics detected in the samples obtained at Sampling Location OF-34 were determined to present human health risks. Further characterization of the vertical extent of the PCBs present in the soil will be conducted under the IAROD.

Lead and cadmium were detected at levels above PRGs in the 0.0- to 0.5-foot bgs sample from the soil boring completed adjacent to the outfall at Sampling Location OF-35. An unknown petroleum hydrocarbon was also detected at an estimated concentration of 780 mg/kg in the same near-surface sample. Concentrations of these potential contaminants attenuated below human health risk PRGs with depth and distance from the outfall. On the basis of these data, it is recommended that the soil at Sampling Location OF-35 be excavated under the IAROD.

The remaining outfalls require no further action under this investigation.

7.5 Biological Inventory

The purpose of the Basewide Biological Inventory was to review existing documentation regarding biological resources at Fort Ord, to verify these findings through field surveys, and to identify and fill data gaps as necessary. Results of the biological investigations were used to provide a basis for ecological risk assessments and to develop resource protection guidelines for field work. Results of the 1991 and 1992 biological investigations are presented in HLA's *Draft Basewide Biological Inventory*, dated December 8, 1992. Subsequent investigations were conducted to fill data gaps identified in the initial biological inventory; results of these investigations are incorporated into the Ecological Risk Assessment (ERA, Volume IV).

During the 1991 and 1992 field investigations, limited field surveys were conducted at 34 of the 39 sites described in the RI/FS Work Plan (*HLA, 1991c*). Sites 7, 25, 26, 38, and 39 (Table 1 and Plate 2) were not investigated in the field because plans for intrusive activities at these sites had not yet been developed. Characteristic plant and animal species and resources of concern (i.e., special-status taxa and communities) known or likely to occur were identified during field surveys. In addition, plant communities were identified from aerial photos and mapped for the entire base. Maps showing the locations of plant communities for the entire base and special-status taxa are included in the *Draft Basewide Biological Inventory*.

During 1993 and 1994, comprehensive field surveys were conducted at sites for which additional environmental characterization was necessary for the ERA. The purpose of these surveys was to provide more detailed and site-specific information regarding botanical resources, plant communities, observed and expected wildlife, and biological resources of concern. Plant communities were mapped for each site evaluated in the ERA, as presented in the ERA (Volume IV). The eleven plant community types identified at the Fort Ord sites surveyed included coast live oak woodland, central maritime chaparral, central coastal scrub, vegetatively stabilized dune, northern foredune grassland, landscaped, valley needlegrass grassland, seasonally wet grassland, vernal pool, upland ruderal, and wet ruderal. Special-status taxa that occur or potentially occur in these communities at Fort Ord were identified for each site evaluated in the ERA and include 22 vascular plant, 1 invertebrate, 4 reptilian, 1 amphibian, 9 avian, and 2 mammalian species.

In addition to conducting site-specific field surveys, reference sites were identified for comparison with sites evaluated in the ERA. Reference sites were chosen to establish comparable baseline conditions for nonaffected sites. Reference site locations exhibited plant communities, slope, aspect, and soils similar to sites evaluated in the ERA. Reference sites are discussed further in the ERA.

7.6 Ecological Risk Assessment

The purpose of the Ecological Risk Assessment (ERA) was to assess whether plants or animals might be adversely affected by chemicals at Fort Ord, either now or in the future. The RIs and Basewide SWOI identified 43 potential chemical source areas and 38 surface water outfalls where contaminants might be present. Sites 26 and 38 (see Sections 8.1.9 and 8.1.18) were eliminated because no chemicals were detected. Site characterization is ongoing at Sites 39A and 39B (see Sections 8.2.15 and 8.2.16), and they have not undergone an ERA. Site 4 (Beach Stormwater Outfalls; Section 8.1.2) was evaluated as part of the Basewide SWOI, and Sites 5, 6, 7, 8, and 9 were evaluated as part of Site 39 (see Section 9.5). Eleven of the surface water outfalls discharged to only three locations and were collectively evaluated as three outfalls (OF-01, OF-16, and OF-20). Sampling was not possible at two outfalls, which were not evaluated further (see Volume II, SWOI). Consequently, this ERA summary addresses the remaining 33 potential source areas and 28 outfalls; additional details for the ERAs of the five RI sites (Table 1) are provided in Section 9.0 of this volume. Complete details of the ERA are provided in Volume IV of the RI/FS.

The Ecological Risk Assessment involved:

- Developing conceptual site models to identify endpoints

- Identifying locations where chemicals of potential concern (COPC) are present that have not adversely affected plants or animals.

- Identifying locations where COPCs are present that may be adversely affecting plants or animals, and characterizing the magnitude and extent of those effects.

Following EPA guidelines (*EPA, 1992j*), these tasks were performed in three separate phases: problem formulation, analysis, and risk characterization.

7.6.1 Problem Formulation

In the problem formulation phase, two preliminary hazard assessments were performed; endpoints, candidate indicator species, and COPCs were selected; and three generic conceptual site models were developed: one for coastal sites, one for Site 39, and one for all other inland sites. The generic models identified potentially exposed plant and animal communities, mechanisms by which exposure might occur (complete exposure pathways), indicator species, and measurement and assessment endpoints. Conceptual site models were then developed for each of the 33 potential source areas and 28 surface water outfalls based on the generic models, site characteristics, and the COPCs for the individual sites.

Preliminary Hazard Assessment 1 (PHA1) was a qualitative screening assessment that identified mechanisms by which plants or animals might be exposed to chemicals detected at the sites (complete exposure pathways). Of the potential source areas and outfalls, PHA1 eliminated 13 source areas and 9 outfalls because no complete exposure pathways were identified, and, therefore, potential ecological effects are expected to be negligible (see Table 9). The remaining source areas and outfalls were evaluated in PHA1, which refined the conceptual site models for each site and identified additional analyses needed to quantitatively assess potential ecological effects associated with exposure via those pathways.

7.6.2 Analysis and Risk Characterization

The analysis phase consisted of obtaining the following additional exposure and effects information for use in the risk characterization phase:

- Data on the uptake of chemicals from soil to fruits and seeds

- Data on the effects of metals in soil on plant germination and growth

- Data on the uptake of chemicals from soil into small mammals

- Modeled lifetime average daily doses of COPCs to foxes (one of the indicator species)
- Published data on the uptake and effects of lead from bullets and lead shot into bird species
- Data on community structure and corresponding chemical concentrations in leaf litter
- Aquatic bioassay data.

The risk characterization phase consisted of the risk estimation and description. The analysis and risk characterization were combined in a quantitative screening assessment, a quantitative risk assessment, and a risk description.

Quantitative Screening Assessment

This assessment was based on measured chemical concentrations in soil, food-chain exposure modeling, and published effects of relationships for three indicator species (deer mouse, gray fox, and oats) as receptors. Hazard indices were calculated based on exposure of the three indicator species to the maximum detected concentrations of COPCs evaluated at each site and outfall. Hazard indices of less than 1 indicated that ecological risks were of "no concern." This assessment eliminated three potential source areas and three outfalls because ecological risks were of "no concern" (see Table 10). The remaining source areas and outfalls were further evaluated in the quantitative risk assessment to identify the exposure and toxicity issues to be addressed.

Quantitative Risk Assessment

The deer mouse, gray fox, and oats were also used as indicator species in this assessment to evaluate the potential effect of the COPCs on the assessment endpoints identified in the conceptual site model for each source area and outfall. The assessment endpoints were evaluated using hazard indices based on measured concentrations in soil, plants, and animals, when available, and dose-related effects identified in the analysis phase. The hazard indices were used as measurement endpoints. Nine source areas and 14 outfalls were considered to be of "no concern" to the identified assessment endpoints and were eliminated from further analysis, based on hazard indices of less than 1 (see Table 11). The remaining 8 source areas and one outfall were further evaluated using background exposure (e.g., body burden) information and a quantitative uncertainty analysis using Monte Carlo simulations. This eliminated 6 source areas and the remaining outfall because the background exposure and uncertainty analysis indicated that ecological risks were below levels of concern. The two remaining source areas (Sites 3 and 39) were categorized as of "possible" or "probable concern" and were further evaluated in the risk description.

Risk Descriptions

The risk descriptions consisted of (1) a risk summary, (2) evaluation of the weight of evidence that indicates the effect is likely to occur, and (3) an interpretation of ecological significant (i.e., the importance of the effect in maintaining an ecological value worthy of protection). The risk description indicated that chemicals at Sites 3 and 39 may have exposures above levels of concern for some assessment endpoints. The ERAs for these two sites are summarized in Sections 9.3.3.2 and 9.5.3.2, respectively.

8.0 SUMMARY OF NO ACTION SITES AND INTERIM ACTION SITES

The site investigation component of the RI program includes investigating 41 potential contaminant source areas or sites. This section describes the 18 No Action sites and the 16 Interim Action sites. As previously mentioned in Section 1.2.2, the criteria and approach for these sites are conservative and consistent with those presented for the operable units and RI sites.

8.1 No Action Sites

As defined in Section 1.0, No Action sites are those sites that do not warrant an action such as remediation. Specifically, the No Action Proposed Plan (Appendix B) identifies the following two categories of No Action sites:

- Category 1 Sites are already in a protective state and pose no current or potential threat to human health or the environment.

- Category 2 Sites are sites where CERCLA does not provide the appropriate authority to take any remedial action. These sites may be regulated by state or local agencies and would follow their requirements.

This section summarizes each of the No Action sites. Final proposed categorization of these sites depends upon regulatory agency approval.

8.1.1 Site 1 - Ord Village Sewage Treatment Plant

Site 1 is the abandoned Ord Village Sewage Treatment Plant in the southwest corner of Fort Ord within the coastal dunes (Plate 2). Sewage treatment operations ceased in 1964; currently, the facility is used as a pump station. Treatment facilities consisted of two trickling filters, a sludge digestion tank, a chlorine contact tank, three small sludge drying beds, and one holding pond. Potential sources of contamination include the sludge beds, the holding pond, an aboveground diesel tank, and a mercury-based lubricant used in the trickling filters. Potential chemicals of interest include petroleum hydrocarbons, VOCs, SOCs, mercury and other metals, fecal coliform, and nitrates.

The investigation consisted of the following:

- Drilling eleven 20-foot-deep soil borings and one 100-foot-deep pilot boring and analyzing 33 soil samples

- Installing and sampling (3 rounds) three monitoring wells

- Conducting a groundwater level tidal influence study

- Excavating three exploratory trenches at the trickling filters.

Results of the investigation indicate the following:

- Soil beneath the site consists primarily of sand and silty sand to 100 feet bgs. A very stiff, silty clay was encountered at 100 feet bgs.

- Depth to groundwater is approximately 60 feet bgs; flow directions range from southeast to southwest.

- The tidal change measured in the three monitoring wells ranged from 0.22 to 1.35 feet, decreasing with increasing distance from the shoreline.

- Low concentrations of fecal coliform (i.e., less than 110 most probable number [MPN]) near the present pumping facility, and mercury (11 mg/kg) at a former trickling filter were detected in soil samples. However, the detected mercury concentration was below its PRG.

- Low concentrations of chloroform (0.65 $\mu g/l$) and fecal coliform (2 MPN/100 milliliters) were each detected in one groundwater sample.

- Antimony, cadmium, thallium, chloride, nitrate, and dissolved solids were detected above MCLs in at least one groundwater sample.

These data were used in the Screening Risk Evaluation (SRE) which indicated acceptably low risk to human health. The Basewide Ecological Risk Assessment (Volume IV) for Fort Ord indicated that risks to ecological receptors from chemicals at Site 1 are expected to be negligible. On the basis of these data and the results of the SRE, no further action has been recommended for the soil at Site 1. However, quarterly monitoring of the three wells at the site will continue to confirm the results of the metals analyses. Samples will be collected from the sludge-drying beds and, if necessary, the sludge will be removed as a maintenance procedure prior to property transfer. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 1 - Ord Village Sewage Treatment Plant,* dated August 12, 1994.

8.1.2 Site 4 - Beach Stormwater Outfalls

Site 4 originally consisted of three stormwater outfalls that discharge surface runoff from various areas of the base directly to the coastal dunes. As described in the Work Plan (*HLA, 1991c*) and Sampling Plan (*HLA, 1991b*), an investigation of the soil near the outfalls is included as part of the Basewide Surface Water Outfall Investigation, which was summarized in Section 7. This administrative change will be addressed in the Basewide ROD.

8.1.3 Site 7 - Ranges 40 and 41 Fire Demonstration Area

Site 7, an undeveloped parcel of property in Inland Ranges 40 and 41, was reportedly used for fire and smoke demonstrations. According to an interview with the Fort Ord Directorate of Logistics (DOL), trenches were excavated and flammable materials (mostly gasoline) were placed in the trenches, ignited, and subsequently extinguished. The trenches were reportedly backfilled (*EA, 1991a*). Potential concerns associated with the reported activities are the trench locations and the potential for flammable chemicals in underlying soil and groundwater.

The investigation consisted of the following:

- Reviewing existing site history and previous investigative work by others
- Interviewing Army personnel
- Performing a detailed site reconnaissance to confirm the presence and location (if any) of the trenches.

Results of the investigation and interviews with Range Control personnel are as follows:

- Range 41 is an anti-tank weapons range where subcaliber weapons and possibly mortars were used.
- Range 40 consists of two training areas: Range 40, which was used as a personnel infiltration crawl course and for small arms training, and Range 40A, which was a Flame Field Expediency Range and was investigated as Site 9.
- At Range 40A mixtures of flammable liquids were reportedly placed in drums or canisters and ignited. Several linear depressions approximately 1 foot deep were observed at the site. Range 40A (Site 9), instead of Ranges 40 and 41, is believed to be the fire demonstration area previously described as Site 7 (*EA, 1991a*) Thus, Site 7 is believed to refer to Range 40A, which was investigated as Site 9 and is described in Section 9.5.2.3.

On the basis of these data, no further action has been recommended at Site 7. Details of this investigation are provided in HLA's letter report *Draft Site Characterization Report, Site 7, Ranges 40 and 41 Fire Demonstration Area, Fort Ord, California,* dated December 30, 1992. Because Site 7 is located within the Inland Ranges, it is also included as part of Site 39.

8.1.4 Site 11 - AAFES Fueling Station

Site 11, the AAFES Main Service Station, is in the Main Garrison (Plate 2). The site consists of a garage for automotive engine work, a small store for auto supplies and sundries, and a fueling center that includes six gasoline USTs, one waste oil UST, and one oil/water separator. The Army previously investigated the USTs and the oil/water separator (*JMM, 1991b*). The investigation consisted of drilling six 20-foot-deep soil borings and collecting six surface soil samples. Twenty-four soil samples (three from each of the borings, plus the six surface samples) were analyzed for total fuel hydrocarbons (TFH), high-boiling-point fuel hydrocarbons (HBPFH), BTEX, and lead.

A screening risk evaluation (SRE) was conducted using the analytical data. Results of the investigation and SRE indicate the following:

- Soil beneath the site consists of yellowish-brown sand and silty sand to a depth of 20 feet below ground surface.
- Petroleum hydrocarbons were detected in three surface soil samples at a maximum concentration of 19 mg/kg, well below the TPH PRG of 500 mg/kg.
- No BTEX was detected.
- Lead was detected at concentrations ranging from 1 to 230 mg/kg, below its PRG of 240 mg/kg.
- Results of the SRE indicate acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure of ecological receptors to contaminants is below levels of concern.

On the basis of these data, no further action under the RI/FS program has been recommended. Future work shall be performed as part of the UST program. Details of the investigation are provided in HLA's *Draft Data Evaluation Report Site 11 - AAFES Fueling Station, Fort Ord, California*, dated September 27, 1994.

8.1.5 Site 13 - Railroad Right-of-Way

Site 13 is a 5,000-foot-long railroad spur and right-of-way adjacent to an industrial area in the Main Garrison. The site is bounded by Third Street, Eleventh Street, Highway 1, and First Avenue (Plate 2). The railroad tracks head north (immediately east of and paralleling Highway 1), then curve eastward into the industrial area.

Potential areas of concern at Site 13 are as follows:

- Surface soil contamination from suspected chemical spillage along the entire railroad right-of-way during transportation and at the loading docks within the industrial area
- Typewriter cleaning chemicals adjacent to Building T-2053 in the southern part of the site.

The site investigation consisted of the following:

- Soil gas sampling at two locations adjacent to Building T-2053 to a depth of 5 feet bgs
- Drilling and sampling 29 soil borings along the railroad right-of-way and at loading docks to a depth of 6.5 feet bgs
- Analyzing 57 soil samples for petroleum hydrocarbons, VOCs, PCBs, pesticides, and metals.

Results of the investigation indicate the following:

- Surface and near-surface materials are sandy topsoil, gravelly railroad fill/base, or asphalt.
- Native soil beneath these surface materials is yellowish-brown, fine to medium sand.
- TPH was detected in very low concentrations in soil gas samples ranging from 0.40 to 0.70 $\mu g/l$. However, these detected concentrations were within the range of TPH concentrations detected in the quality assurance/quality control (QA/QC) blanks

(0.30 to 0.75 $\mu g/l$). No other analytes were detected in the soil gas samples.

- Acetone, a common laboratory contaminant, was detected in one soil sample at a concentration of 0.062 mg/kg, well below the PRG of 220 mg/kg.

- PCE was detected in three soil samples, and unidentified VOCs were detected in six soil samples. No other organic compounds were detected in the soil samples. The PCE concentrations were detected along the boundary with Site 12 and are being addressed as part of the Site 12 characterization.

- Arsenic was the only inorganic compound detected in the soil samples above its PRG value; however, the detected concentrations are below background values. Chromium, for which there is no PRG, was detected at concentrations consistent with background conditions.

- Results of the SRE indicate acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 13 is expected to be negligible.

On the basis of these data, no further action has been recommended at Site 13. The detected PCE concentrations are being addressed as part of the Site 12 characterization. Details of the Site 13 investigation are provided in HLA's *Draft Final Site Characterization Report, Site 13, Railroad Right-of-Way, Fort Ord, California*, dated April 11, 1994.

8.1.6 Site 18 - 1600 Block Facility

Site 18, the 1600 Block Facility in the Main Garrison (Plate 2), is a multipurpose complex that includes maintenance and support facilities for motor pool vehicles, the DOL Busworks Yard, and several light industrial buildings. Potential areas of concern are current and former USTs (waste oil, diesel, and gasoline), six wash racks with associated oil/water separators, five grease racks, drum storage areas at the DOL Busworks Yards and the Training and Audiovisual Service Center (TASC) Plastics Shop, and a dry well at the TASC Graphics Shop. Approximately 99 percent of the site is covered with either asphalt or concrete.

A previous investigation (*JMM, 1991a*) consisted of drilling three soil borings, one near a wash rack, one near a grease rack, and one near two side-by-side USTs. Three monitoring wells were also installed: one along the east site boundary, one in the northwest corner of the site, and one in the southwest corner of the site.

This investigation included drilling eight additional soil borings near the DOL Busworks drum storage area, at three of the oil/water separators, and through the dry well at the TASC Graphics Shop, and collecting three rounds of groundwater samples from the three existing monitoring wells. Visual inspections of the three remaining oil/water separators showed the separators to be in good condition, with no observable cracks or leaks. Soil borings were not drilled at these locations or at the grease racks, all of which are on asphalt or concrete pavement. Twenty-four soil samples and nine groundwater samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicate the following:

- Native soil consists of yellowish-brown sand and silty sand to depths of 41.5 feet bgs (the maximum depth explored). At the dry well, the upper 23 feet was gravelly fill.

- HBPHCs were detected in one soil sample at a concentration of 230 mg/kg, below the TPH PRG of 500 mg/kg.

- Unknown hydrocarbons (in the TPHd analysis) were detected in two soil samples at concentrations of 44 and 73 mg/kg, below the TPH PRG of 500 mg/kg.

- Arsenic was detected in soil at concentrations above its PRG; however, the concentrations are below background threshold values. Chromium, for which there is no PRG, was detected at concentrations below background threshold values

- Nickel and TCE were detected in groundwater at concentrations above federal MCLs. As discussed in Volume II, Basewide Hydrogeologic Characterization, and in the *Draft Final Basewide Hydrogeologic Characterization* report (*HLA, 1994f*), nickel concentrations most likely result from the stainless steel well screen. TCE has been consistently detected in Well MW-18-03. It is suspected that the groundwater contamination is part of the OU 2 plume. This well is being monitored under the Basewide Quarterly Monitoring Program (Volume II, Basewide Hydrogeologic Characterization). Groundwater contamination present at Site 18 will be remediated as part of the OU 2 groundwater plume.

- Results of the SRE indicate an acceptably low risk to human health. The Basewide Ecological Risk Assessment indicates that exposure of ecological receptors to chemicals at Site 18 is expected to be negligible.

On the basis of these data, no further action has been recommended for soil at Site 18. The three monitoring wells are recommended for inclusion in the Quarterly Monitoring Program. Details of the investigation are provided in HLA's *Draft Site Characterization Site 18 - 1600 Block Facility, Fort Ord, California*, dated April 13, 1994.

8.1.7 Site 19 - 2200 Block Facility

Site 19, the 2200 Block Facility in the Main Garrison, is 90 percent paved and consists of storage, administration, and light industrial buildings (Plate 2). Three potential areas of concern are: Building T-2241 (the photographic laboratory, formerly the telephone and telegraph building), where wastes were reportedly discharged through a floor drain into a suspected dry well beneath the building; Building T-2251, where an oily substance reportedly flowed to a drain east of the building during wet weather; and Building T-2253 (a former gasoline service station), where one soil sample collected during tank removal activities in 1991 contained TPHd constituents. The TPHd concentration was 1,400 mg/kg, above the TPH PRG of 500 mg/kg.

The investigation consisted of drilling two soil borings (one near Building T-2251 and the other near Building T-2253) and collecting one soil sample from the bottom of the concrete vault (the suspected dry well inside Building T-2241). Six soil samples were analyzed for petroleum hydrocarbons, VOCs, PCBs, pesticides, and metals.

Results of the investigation indicate the following:

- Native soil beneath the site consists of yellowish-brown, fine to coarse sand to depths of 61 feet bgs.

- The suspected dry well in Building T-2241 is a concrete vault most likely associated with former telephone/telegraph operations. Sand was found over the concrete bottom of the vault.

- The soil sample collected from the bottom of the vault contained chlordane at a concentration of 3,000 μg/kg, above its PRG value of 140 μg/kg. The sand is scheduled for removal in 1994.

- No petroleum hydrocarbons were detected in samples from the two borings.

On the basis of these data, no further action has been recommended at Site 19 under the NPL Program. Additional investigations at the former UST at Building 2253 will be conducted under the UST Management Program. Details of the investigation are provided in HLA's *Draft Site Characterization Site 19 - 2200 Block Facility, Fort Ord, California*, dated October 27, 1993.

8.1.8 Site 23 - 3700 Block Motor Pool Complex

Site 23, the 3700 Block Motor Pool Complex, is an approximately 19-acre parcel in the eastern portion of the Main Garrison where vehicle maintenance activities were performed (Plate 2). Potential areas of concern include six former USTs (three pairs), three former grease racks, three oil/sand interceptors with oil/sand separators, and three hazardous waste storage sheds.

A previous investigation consisted of drilling three soil borings and installing three monitoring wells (*JMM, 1991a*). The borings were at the former USTs, and the monitoring wells were along the east site boundary, in the central portion of the site, and along the west site boundary to determine the groundwater flow direction.

The site characterization investigation consisted of drilling and sampling nine soil borings: six at the former grease racks and one each at the oil/sand interceptors, an oil/sand separator, and a former UST location. Twenty-seven soil samples and nine groundwater samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigations indicate the following:

- Native soil beneath the site consists of sand with some yellowish-brown silty sand and clayey sand to depths of approximately 15 feet bgs. From 15 feet to 61.5 feet bgs, soils consist of sand.
- Soil contamination was not detected in samples collected at the oil/sand separator.
- Near the former USTs, HBPHCs were detected at concentrations up to 420 mg/kg, below the TPH PRG of 500 mg/kg.
- Benzene and toluene were detected at maximum concentrations of 5 μg/kg and 97 μg/kg, respectively, during the UST removals.
- Eight metals were detected below PRGs or background concentrations.
- No VOCs were detected in soil.
- At the former wooden grease rack, TOG was detected at concentrations up to 140 mg/kg (below the TPHd PRG of 500 mg/kg).
- No organics were detected in groundwater.
- No inorganics were detected in groundwater above MCLs.

On the basis of these data, no further action has been recommended at Site 23 under the NPL Program. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 23 - 3700 Block Motor Pool Complex, Fort Ord, California*, dated October 10, 1994.

8.1.9 Site 25 - Former Defense Reutilization and Marketing Office (DRMO)

Site 25, the DRMO, is a vacant, unpaved, 11-acre field in the Main Garrison (Plate 2). The site was used for storage of decommissioned equipment, including electrical transformers, from 1950 to 1972. Miscellaneous materials such as waste oil, diesel fuel, and possibly solvents may have also been stored onsite; however, there are conflicting reports about such storage. Before 1950, the site served as a prisoner-of-war camp and included officers' quarters, a mess hall, a warehouse complex, and an administrative building. Since 1972, the site has periodically been used for military training and heavy vehicle/equipment parking.

A previous investigation (*JMM, 1991c*) consisted of drilling six 20-foot-deep soil borings. Analytical results showed concentrations that were very low for 4,4'-DDE, 4,4'-DDT, dieldrin, and PCB 1254 (i.e., maximum concentration of 0.88 mg/kg). Cadmium, mercury, and zinc were detected at concentrations above background but below PRGs.

A risk assessment was performed using these data. Results of the risk assessment indicate acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 25 is expected to be below levels of concern.

On the basis of these data, no further action is recommended at Site 25. Details of the investigation are provided in HLA's *Draft Risk Assessment, Site 25 - Former DRMO, Fort Ord, California*, dated June 18, 1993.

8.1.10 Site 26 - Sewage Pump Stations, Buildings 5871 and 6143

The Imjin sewage pump station is in Building 5871, and the Clark sewage pump station is in Building 6143. Both buildings are southwest of the FAAF. There have been eight documented sewage spills from these stations since 1988; however, soil contamination from the sewage spills is not expected.

On the basis of nature of the spills and the site condition and as agreed upon with the regulatory agencies during the planning stages, no investigations have been performed and none are planned for Site 26 (*HLA, 1991c*).

8.1.11 Site 27 - Army Reserve Motor Pool

Site 27, the Army Reserve Motor Pool, is immediately south of the FAAF (Plate 2). Potential areas of concern are the wash rack and the associated oil/water separator, a 500-gallon waste oil UST, and a hazardous materials storage area. The assessments of the existing waste oil UST and the hazardous materials storage area are being handled under the current UST Management Program and the RCRA-type facility program (Section 5), respectively.

The investigation centered on the wash rack and the associated oil/water separator and consisted of drilling one 21.5-foot-deep soil boring. Three soil samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicated the following:

- Native soil beneath the site consists of yellow sand to 21.5 feet.
- No petroleum hydrocarbons were detected.
- Arsenic was detected above its PRG value; however, the concentrations were below the background threshold value. Chromium, for which there is no PRG, was detected at concentrations below the background threshold value.
- Results of the SRE indicate acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 27 is expected to be negligible.

On the basis of these data, no further action has been recommended at Site 27. As noted above, the two remaining areas of concern are being handled separately. Details of the investigation are provided in HLA's *Draft Final Site Characterization, Site 27 - Army Reserve Motor Pool, Fort Ord, California*, dated May 16, 1994.

8.1.12 Site 28 - Barracks and Main Garrison Area

Site 28 consists of three buildings in the Main Garrison Area: the Visual Information Center (Building T-2842), the Photo Developing Unit (Building T-2850), and the Print Shop (Building T-2353) (Plate 2).

Potential chemicals of concern associated with Site 28 include solvents, PCE, and chemicals used for photograph development.

The investigation consisted of the following:

- Performing a soil gas survey consisting of 10 soil gas samples around the Visual Information Center and the Print Shop
- Drilling and sampling six 20-foot-deep soil borings at soil gas anomalies
- Collecting three surface soil samples from drains that discharge beneath the Photo Developing Unit
- Analyzing 21 soil samples for VOCs and metals.

Results of the investigations indicate the following:

- VOCs (maximum concentration 4.8 $\mu g/l$) and TPH (maximum concentration 18.0 $\mu g/l$) were detected in soil gas samples but were not detected in soil samples collected at these locations.

- Tentatively identified organic compounds were detected at low concentrations (7.7 to 7.9 μg/kg) in soil samples.

- Detected metals concentrations were below PRGs. Chromium, for which there is no PRG, was detected at concentrations considered to represent background conditions.

- The SRE indicated acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 28 is expected to be negligible.

On the basis of these data, no further action has been recommended for Site 28. Details of the investigation are provided in HLA's *Draft Site Characterization, Site 28 - Barracks and Main Garrison Area, Fort Ord, California*, dated February 25, 1994.

8.1.13 Site 29 - Defense Reutilization Marketing Office

Site 29, the Defense Reutilization Marketing Office, is in the East Garrison (Plate 2), and centers around Buildings 110 and 111, where PCB-containing transformers may have been stored in the past, and an unpaved field adjacent to the DRMO hazardous materials storage area. Potential contaminants are PCB-containing waste oil, metals, and PCBs.

The investigation consisted of drilling 29 6.5-foot-deep soil borings and analyzing 58 soil samples for petroleum hydrocarbons, PCBs, pesticides, and metals.

Results of the investigation indicate the following:

- Native soil beneath the site consists of dark yellowish-brown silty sand and clayey sand.

- The field is essentially vacant; however, there are several rolls of chain-link fence, fenceposts, culverts, concrete and crushed asphalt rubble, and other nonhazardous debris.

- Unknown TPHd (identified in the TPHd analysis) and total oil and grease (TOG) were detected in approximately half the samples. The samples in which the highest TOG concentrations were detected were collected at locations where crushed asphalt or former asphalt roads were present. The asphalt is believed to be the source of the TOG detections. The maximum unknown TPHd concentration was 280 mg/kg, below the TPH PRG of 500 mg/kg.

- No PCBs were detected in the soil.

- Arsenic was detected at concentrations above its PRG, but below background values. Chromium, for which there is no PRG, was detected at concentrations below background values.

- Results of the SRE indicate an acceptably low risk to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 29 is expected to be below levels of concern.

On the basis of these data, no further action has been recommended for Site 32. Details of the investigation are provided in HLA's *Draft Final Site Characterization, Site 29 - Defense Reutilization Marketing Office, Fort Ord, California*, dated April 29, 1994.

8.1.14 Site 32 - East Garrison Sewage Treatment Plant

Site 32, the East Garrison Sewage Treatment Plant in the northern portion of the East Garrison (Plate 2), consists of sludge beds, a percolation pond, and Dotton-sedimentation tanks. Potential contaminants include TPH as gasoline (TPHg), TPHd, VOCs, metals, fecal coliform bacteria, and nitrogen.

Previous investigation work (*JMM, 1991c*) consisted of installing three monitoring wells west, north, and southeast of the site. The site characterization investigation consisted of drilling three 20-foot-deep soil borings within the sludge beds and the percolation pond. Nine soil samples and nine groundwater samples were analyzed for petroleum hydrocarbons, VOCs, PCBs, pesticides, metals, and fecal coliforms.

Results of the investigation indicate the following:

- Native soils beneath the site consist of yellowish-brown sand and silty sand.
- Two tentatively identified VOCs, two unknown VOCs, and hexanol were detected at very low (i.e., less than 7 μg/l) concentrations in soil.
- Fecal coliform was detected at estimated concentrations of 170 and 2 MPN/10g in two soil samples.
- Beryllium was detected in soil at a concentration above its PRG; however, this concentration was considered to represent background conditions. Chromium, for which there is no PRG, was also detected at a concentration considered to represent background conditions.
- Groundwater was measured at depths of approximately 185 to 233 feet bgs and the flow direction ranges from north to northwest.
- Groundwater samples were collected from three monitoring wells and Fort Ord Supply Well FO-32 during three sampling rounds. Nitrate concentrations in groundwater were detected above the federal MCL of 10 mg/l in two samples from two separate wells during one sampling round (May 1992). Fecal coliform concentrations in groundwater were detected in the first sampling round (April 1992) above the RWQCB standard of 2.2 MPN per 100 milliliters in two wells. Subsequently, these two wells were disinfected, then resampled. Coliform was not detected in subsequent rounds. Orthophosphate, for which there are no standards, was also detected in one sample during one sampling round (May 1992).
- Results of the SRE indicate an acceptably low risk to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 32 is expected to be negligible.

On the basis of these data, no further action has been recommended under the RI/FS program. Samples will be collected from the sludge beds and, if necessary, the sludge will be removed as a maintenance procedure prior to property transfer. Details of the investigation are provided in HLA's *Draft Data Evaluation and Recommendation Report, Site 32 - East Garrison Sewage Treatment Plant, Fort Ord, California*, dated August 6, 1993.

8.1.15 Site 33 - Golf Course

Site 33 consists of a pesticide mixing area, an unpaved surface drainage adjacent to the mixing area, and a former storage area at the golf course, in the southwest portion of Fort Ord (Plate 2). Potential chemicals of concern are pesticides, herbicides, fungicides, and metals.

The investigation consisted of the following:

- Drilling and sampling one 10-foot-deep soil boring
- Drilling and sampling seven 5-foot-deep soil borings
- Analyzing 18 soil samples for herbicides, pesticides, and metals
- Performing an SRE where risks to human health were evaluated on the basis of an occupational exposure scenario, with the assumption that the site will remain a golf course.

Results of the investigation indicate the following:

- Pesticides, herbicides, and metals were detected; the highest concentrations (up to 11 mg/kg) were in near-surface soil samples.
- Eight metals were detected in soil samples above background concentrations but below the alternate PRGs for the occupational scenario.

- Results of the SRE indicate that, if an occupational scenario is assumed, the risks to human health are acceptably low. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at the site is expected to be below levels of concern.

On the basis of these data, no further action has been recommended at Site 33. Details of the investigation are provided in HLA's *Draft Site 33 Data Summary Report*, dated March 29, 1994.

8.1.16 Site 35 - FAAF Aircraft Cannibalization Yard

Site 35, the FAAF Aircraft Cannibalization Yard, is an approximately 11-acre undeveloped area across which aircraft debris has been scattered, west of the northern portion of FAAF (Plate 2). The FAAF burn pit is approximately 800 feet north of the site. Debris consists of helicopter and small plane fuselages, jet engines, and wing sections. Potential contaminants associated with the site are engine oils and fuels that may have leaked from the aircraft parts and possibly solvents from aircraft cannibalization activities.

The investigation consisted of collecting and analyzing 32 soil gas samples for VOCs at the site and north of the site (toward the FAAF burn pit); drilling three soil borings; analyzing nine soil samples for petroleum hydrocarbons, VOC, and metals; and performing an SRE.

Results of the investigation indicate the following:

- Native soil beneath the site consists of yellowish-brown sand and silty soil to depths of 20.5 feet bgs.
- Very low concentrations (up to 0.5 $\mu g/l$) of several VOCs were detected in several soil gas samples.
- No VOCs or any other hydrocarbons were detected in subsequent soil samples.
- Beryllium was detected above its PRG value; however, the detected concentrations are below background levels.
- Results of the SRE indicate an acceptably low potential risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at the site is expected to be below levels of concern.

On the basis of these data, no further action has been recommended at Site 35. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 35 - FAAF Aircraft Cannibalization Yard, Fort Ord, California*, dated June 25, 1993.

8.1.17 Site 36 - FAAF Sewage Treatment Plant

Site 36 is the inactive FAAF Sewage Treatment Plant near the northern border of Fort Ord (Plate 2). The facility consists of an Imhoff tank, two evaporation ponds, and two sludge beds. Potential contaminants include TPHg, TPHd, VOCs, metals, fecal coliform bacteria, and Kjeldahl nitrogen.

Previous investigation work included drilling one 10-foot-deep soil boring and installing one monitoring well.

The investigation consisted of drilling seven additional 20-foot-deep soil borings, and analyzing 21 soil samples for VOCs, metals, and fecal coliform. Eighteen soil samples were analyzed for petroleum hydrocarbons, Kjeldahl nitrogen, and phosphorous. Nine soil samples were analyzed for SOCs, pesticides, and PCBs. The one existing well was sampled during three rounds and water samples were analyzed for VOCs, petroleum hydrocarbons, metals, fecal coliform, Kjeldahl nitrogen, and phosphorous.

Results of both investigations indicate the following;

- No organic compounds were detected.
- Detected metal concentrations were below either PRGs or background values.
- Results of the SRE indicated acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that

exposure by ecological receptors to chemicals at Site 36 is expected to be negligible.

On the basis of these data, no further action has been recommended for Site 36. Samples will be collected from the sludge beds and, if necessary, the sludge will be removed as a maintenance procedure prior to property transfer. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 36 - FAAF Sewage Treatment Plant Fort Ord, California*, dated October 12, 1994.

8.1.18 Site 37 - Trailer Park Maintenance Shop

Site 37, the Trailer Park Maintenance Shop, is near the northwest portion of Fort Ord (Plate 2) and serves as the maintenance storage yard for the adjacent trailer park. Potential areas of concern are the waste oil drum storage area, degraded and stained asphalt at a former location of an aboveground tank, and the storm drain inlet that collects runoff from the site.

The investigation consisted of drilling three soil borings, one at each of the three areas of concern. Nine soil samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicate the following:

- Native soil beneath the site consists of pale yellow sand and silty sand to 21.5 feet bgs.

- TOG and an unknown TPHd (identified in the TPHd analysis) were detected at concentrations of 63 and 15 mg/kg, respectively, below the TPH PRG value of 500 mg/kg.

- Arsenic was detected above its PRG value; however, the detected concentrations were below background values.

- Results of the SRE indicate acceptably low risks to human health. The Basewide Ecological Risk Assessment indicates that exposure by ecological receptors to chemicals at Site 37 is expected to be negligible.

On the basis of these data, no further action has been recommended for this site. Details of the investigation are provided in HLA's *Draft Final Site Characterization Report, Site 37 - Trailer Park Maintenance Shop, Fort Ord, California*, dated March 18, 1994.

8.1.19 Site 38 - AAFES Dry Cleaners

Site 38 is a dry cleaning facility in the Main Garrison (Plate 2). The site consists of two existing USTs and one former UST all of which contained Stoddard solvent.

Previous investigations included drilling two soil borings (*JMM, 1991a*) and collecting soil samples during the tank removal. Results indicate no detectable VOCs, BTEX, or TPH.

On the basis of these data, no further action is recommended under the RI/FS program; however, additional work may be necessary under the UST Management Program. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 28 - AAFES Day Cleaners, Fort Ord, California*, dated July 12, 1994.

8.2 Interim Action Sites

As defined in Section 1.0, IA sites have limited soil contamination that could easily be excavated as an interim action, and treated or disposed of on or off Fort Ord. As defined in the IAROD, the primary criteria for an IA site is that (1) the maximum depth of affected soil must be 25 feet and (2) the volume of affected soil must be limited, typically from 500 to 5,500 cubic yards.

The criteria and approach for these sites are conservative and consistent with those presented for the Operable Units and RI sites.

This section summarizes each of the IA sites. Approval memoranda will be prepared for these sites in accordance with the IAROD. Final proposed categorization of these sites depends upon regulatory agency approval.

8.2.1 Site 6 - Range 39, Abandoned Car Dump

Site 6 is an approximately 400-foot by 1,000-foot undeveloped parcel 1.5 miles southeast of the intersection of Eucalyptus and Parker Flats roads, where vehicles, scrap metal, and other items were dumped (Plate 2). The site is on a ridge east of and overlooking Inland Range 39.

Potential sources of contamination include the following:

- Abandoned automobiles, military tanks, tank turrets, and one armored personnel carrier
- Scrap metal and concertina wire
- Drums
- A wooden ammunition box
- Other wood debris.

Most of these abandoned items are concentrated in the southern portion of the site. One drum, labeled fog oil, appeared to be leaking; stained surface soil was noted adjacent to the drum. A second drum was labeled "chlorinated hydrocarbons." All drums have been removed by the Army. According to the Army, any ammunition boxes assembled before 1985 may have been treated with pentachlorophenol; the assembly date for the ammunition box at the site is not known.

The investigation consisted of drilling and sampling 22 5-foot-deep soil borings, and analyzing the 44 soil samples for petroleum hydrocarbons and metals.

Results of the investigation indicate the following:

- Native soil is yellowish-brown sand and silty sand.
- Unknown TPHd (identified in the TPHd analysis) were detected in surface samples from several borings at concentrations ranging from 11 to 92 mg/kg, well below the TPHd PRG of 500 mg/kg.
- Unknown hydrocarbons (also identified in the TPHd analysis) were detected in the surface sample from the soil boring adjacent to the fog oil drum at a concentration of 19,000 mg/kg; its concentration decreased to 160 mg/kg in the 4.5-foot-deep sample.
- Arsenic and beryllium were the only two inorganic compounds detected at concentrations above PRG values; however, the detected concentrations are considered to represent background conditions. Chromium, for which there is no PRG, was detected at concentrations considered to represent background conditions.

On the basis of these data, no further work has been recommended at Site 6, except for the area immediately surrounding the fog oil drum. The stained surface soil associated with the fog oil drum has been recommended for soil excavation under the IAROD. Details of this investigation are provided in HLA's *Draft Site Characterization Report, Site 6 Range 39, Abandoned Car Dump, Fort Ord, California*, dated November 18, 1992. Because Site 6 is located within the Inland Ranges, it is also included as part of Site 39.

8.2.2 Site 8 - Range 49, Molotov Cocktail Range

Site 8, an undeveloped parcel at Inland Range 49, is a former training area where troops practiced using Molotov cocktails (Plate 2). Potential concerns associated with Site 8 are flammable liquids (possibly leaded gasoline, transmission oil, and motor oil) in soils adjacent to the two armored vehicles that were used as practice targets for the Molotov cocktails.

The investigation consisted of collecting one surface soil sample in the area of stained soils near the targets. The sample was analyzed for petroleum hydrocarbons and lead.

Results of the investigation indicate the following:

- Stained surface soil is present in the immediate vicinity of the targets.

- Unknown TPHd (identified in the TPHd analysis) was detected in the surface sample at a concentration of 4,200 mg/kg.
- Total lead was detected at a concentration of 39.4 mg/kg, well below its PRG value of 240 mg/kg.

On the basis of these data, the contaminated soil in the immediate vicinity of the targets at Site 8 has been recommended for excavation under the IAROD, as outlined in HLA's *Site 8 Approval Memorandum*, dated June 4, 1994.

8.2.3 Site 10 - Burn Pit

Site 10 is a former burn pit approximately 160 feet south of the Fort Ord Fire Station in the Main Garrison (Plate 2). The site is an unlined, rectangular pit (approximately 45 feet long, 25 feet wide, and 2 feet deep) into which flammable liquids were placed, ignited, and subsequently extinguished for firefighting training. A 2-inch-diameter pipe apparently was used to regulate fluid levels in the pit, and a narrow drainage ditch exits the pit to the south. The southern portion of the 2-inch-diameter pipe is buried within surface soils. The pit is no longer in use and is partially overgrown with grass.

Flammable liquids reportedly used at the burn pit include jet fuel (JP-4), gasoline, diesel, solvents, and waste oil (potentially containing solvents and PCBs). Potential contaminants associated with Site 10 are unburned fuels, by-products from fuel combustion (such as dioxins and furans), VOCs, SOCs, and PCBs.

A previous investigation (*EA, 1990*) included drilling one soil boring and installing three monitoring wells within and near the pit.

The site characterization investigation consisted of the following:

- Collecting and analyzing 29 soil gas samples for VOCs within and near the pit
- Installing one pilot boring/piezometer nest and three additional monitoring wells at distances of 260 to 540 feet from the pit (the closest existing monitoring well was 50 feet from the pit)
- Drilling and sampling six 30-foot-deep soil borings within and near the pit
- Collecting eleven surface soil samples within and fairly close to the pit (within a 100-foot radius)
- Excavating and sampling along the south end of the buried 2-inch-diameter pipe
- Analyzing 29 soil samples for one or more of the following: petroleum hydrocarbons, SOCs, VOCs, metals, pesticides, PCBs, and dioxins
- Analyzing 18 groundwater samples for petroleum hydrocarbons, VOCs, SOCs, and metals.

Results of the investigations indicate the following:

- Native soil underlying the site consists predominantly of sand, with minor amounts of silt and clay to depths of approximately 290 feet bgs. A 50-foot-thick clay layer was encountered in Well MW-10-06-180 from approximately 290 to 340 feet bgs.
- The Fort Ord-Salinas Valley Aquiclude (FO-SVA) does not extend beneath the burn pit; however, it was encountered approximately 250 feet northeast of the burn pit in Well MW-10-04-180.
- First-encountered groundwater occurs beneath the burn pit in the 180-foot aquifer at approximately 240 to 260 feet bgs.
- In the Site 10 region, the overall groundwater flow direction in the 180-foot aquifer is northeasterly. Locally, near the burn pit, flow is southwesterly. Differences in apparent groundwater flow direction are attributed to heterogenous subsurface geology.
- Petroleum hydrocarbons (maximum concentration of 24 μg/l), BTEX (maximum

concentration of 0.2 μg/l), and PCE (maximum concentration of 1.5 μg/l) were detected in one or more soil gas samples. The highest concentrations were detected in one shallow soil gas sample within the burn pit.

- Total recoverable petroleum hydrocarbons (TRPH) and TPHd were detected in samples from soil borings within the pit at concentrations up to 14,900 and 5,200 mg/kg, respectively. These concentrations are above the TPH PRG of 500 mg/kg and were detected to depths of approximately 10 feet bgs. Several VOC and SOC compounds were detected at low concentrations, well below chemical-specific PRGs.
- Dioxins and furans were detected above PRGs in shallow soil samples within and immediately downwind of the burn pit.
- Previous groundwater samples (*EA, 1990*) detected benzene, chromium, and nickel above federal and/or state MCLs.
- Recent groundwater sampling did not confirm these previous detections in any of the six wells.

On the basis of these data, shallow soils within (and possibly near) the burn pit have been recommended for excavation under the IAROD. Details of the investigation are provided in HLA's *Draft Data Evaluation and Recommendations Report, Site 10 - Burn Pit, Fort Ord, California*, dated June 9, 1993 and *Draft Data Summary Report Site 10 - Burn Pit, Fort Ord, California*, dated September 27, 1994.

8.2.4 Site 14 - 707th Maintenance Facility

Site 14 is an approximately 19-acre area at the northwest corner of the intersection of 3rd Street and 6th Avenue in the Main Garrison (Plate 2). The site was used as a maintenance and fueling facility for military vehicles, beginning in the early 1950s.

Potential areas of concern include gasoline, diesel, and waste oil at USTs; hazardous materials storage areas; grease racks; wash racks; and oil/water separators.

A previous investigation (*EA, 1990*) included drilling 10 soil borings and installing three monitoring wells. Composite samples were collected from excavated soils associated with a former waste oil UST. Additional soil samples were collected during removal of nine gasoline USTs.

The site characterization investigation included drilling 25 soil borings to depths of 11.5 to 31.5 feet bgs and installing one monitoring well. Twenty-two of the 25 soil borings were drilled at wash racks, grease racks, and hazardous materials storage areas. The three remaining borings and the monitoring well were drilled at former UST locations where soil contamination had previously been indicated. Seventy-five soil samples and 12 groundwater samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigations indicate the following:

- Native soil beneath the site consists of yellowish-brown sand, silty sand, and clayey sand to a depth of 138 feet bgs. The FO-SVA was encountered at 139 feet bgs.
- No TPHg or TPHd was detected. However, in the TPHd analysis, unknown hydrocarbons were detected adjacent to the former waste oil UST at concentrations of 1,000 to 1,400 mg/kg, above the TPH PRG of 500 mg/kg.
- TRPH/TOG was detected in several samples from one or more of the grease racks at concentrations above the TPH PRG of 500 mg/kg.
- Arsenic was the only metal detected at concentrations above its PRG and background threshold value at the location of the former waste oil UST. Chromium, for which there is no PRG, was detected at concentrations representing background conditions.

- During EA's initial groundwater sampling, benzene and mercury were detected above federal MCLs.

- During HLA's groundwater sampling program, benzene was not detected. Very low concentrations of toluene were detected in one well during one sampling event. Three metals (antimony, cadmium, and nickel) were periodically detected above federal MCLs. All other metals (chromium, mercury, selenium, lead, and zinc) were detected below federal MCLs.

On the basis of these data, two areas at Site 14 have been recommended for excavation under the IAROD: the area immediately surrounding the former waste oil UST and the areas beneath the grease racks. Details of this investigation are provided in HLA's *Draft Site Characterization Report, Site 14 - 707th Maintenance Facility, Fort Ord, California*, dated October 29, 1993 and *Draft Data Summary Report, Supplemental Site Investigation, Site 14 - 707th Maintenance Facility, Fort Ord, California*, dated August 29, 1994.

8.2.5 Site 15 - Directorate of Engineering and Housing (DEH) Yard

Site 15, the DEH Yard is an approximately 10-acre, developed parcel in the Main Garrison (Plate 2). The site consists mainly of administration buildings, with some areas used for light industry and/or storage. Potential chemicals and areas of concern associated with Site 15 are as follows:

- PCBs associated with former electrical transformer storage in the west and west-central portions of the site

- Pesticide mixing and storage near Buildings T-4897 and T-4913 in the north and north-central portions of the site

- PCBs and pesticides in surface soils near the storm drain in the southwest corner of the site

- Two former fuel USTs (gasoline and diesel) in the northern portion of the site.

Previous investigation work was limited to the collection of soil samples during UST removals in 1991. No TPHg, TPHd, or BTEX was detected during the UST investigation.

HLA's investigation focused on potential PCBs and pesticides and consisted of the following:

- Drilling and collecting 27 soil samples from 9 soil borings from 5.5 to 20.5 feet bgs.

- Collecting 25 surface and near-surface soil samples.

- Analyzing 3 soil samples for petroleum hydrocarbons and metals, and 52 (27 samples from soil borings and 25 surface/near-surface samples) soil samples for pesticides and VOCs.

Results of the investigation indicate the following:

- No organic chemicals (i.e., petroleum hydrocarbons and VOCs) were detected near the storm drain.

- No PCBs were detected.

- Metals were detected below PRGs or background concentrations.

- The pesticide chlordane was detected at concentrations up to 4,000,000 μg/kg in near-surface soil samples immediately northeast of Building T-4913. These concentrations were above the chlordane PRG value of 140 μg/kg.

On the basis of these data, the shallow chlordane-contaminated soil in the vicinity of Building T-4913 has been recommended for excavation under the IAROD. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 15 - DEH Yard, Fort Ord, California*, dated November 19, 1992 and *Draft Data Summary Report, Site 15 DEH Yard, Fort Ord, California.*

8.2.6 Site 20 - South Parade Ground and 3800 and 519th Motor Pools

Site 20 is in the Main Garrison and consists of the 9.5-acre South Parade Ground, the 27-acre troop training area west of the parade ground, the 6-acre 3800 Motor Pool, and the 20-acre 519th Motor Pool (Plate 2). Potential sources of contamination and areas of concern associated with Site 20 are as follows:

- A fenced storage compound and one former UST at the South Parade Ground
- A potential landfill in the northwest portion of the troop training area
- Two oil/water separators, three former or existing wash racks, three former grease racks, four flammable materials storage areas, and four former USTs at the 3800 Motor Pool
- Eight buildings used as office buildings, electrical supply buildings, vehicle repair facilities, and storage for flammable materials; one wash rack; one oil/water separator; and potential undocumented USTs at the 519th Motor Pool. Part of the 519th Motor Pool is a former airfield; the potential undocumented USTs may have been associated with the former airfield. Two of the vehicle repair facilities were formerly aircraft hangers.

A previous investigation (*JMM, 1990*) was limited to drilling seven soil borings adjacent to two former USTs and the hazardous/flammable materials storage areas at the 3800 and 519th Motor Pools. Six monitoring wells were installed within the two motor pools. Soil samples were collected during removal of the two other former USTs at the 3800 Motor Pool.

The site characterization investigation consisted of the following:

- Drilling 15 soil borings at the 3800 Motor Pool wash racks and grease racks and at the single former UST at the parade ground
- Conducting surface geophysical surveys
- Excavating 11 trenches at geophysical anomalies
- Collecting and analyzing 15 soil gas samples for VOCs
- Drilling one pilot boring and installing one additional well
- Analyzing 75 soil samples and 31 groundwater samples for petroleum hydrocarbons, VOCs and metals.

Results of both investigations indicate the following:

- Native soil beneath the site consists of yellowish-brown sand and silty sand to depths of approximately 180 feet bgs. From 180 feet to 344 feet bgs, soils consisted of silty sand and silt. At least 6.5 feet of olive-brown clay was encountered from 344 to 350.5 feet bgs (maximum depth explored).
- The depth to groundwater is approximately 147.5 to 202.5 feet bgs and groundwater flows easterly.
- Several geophysical anomalies were observed in suspected disposal areas, and these areas were later excavated to identify the potential reason for the anomalies.
- Construction debris (e.g., concrete and asphalt) was detected in trenches at the geophysical anomalies and appears to be the only debris disposed of at Site 20.
- No evidence of the suspected, undocumented USTs associated with the former airfield at the 519th Motor pool was observed.
- HBPHCs and unknown TPHd (identified in the TPHd analysis) were detected in soil samples at concentrations up to 190 mg/kg in the western portion of the troop training area and near one of the former USTs in the 3800 Motor Pool. These concentrations were well below the TPH PRG of 500 mg/kg.

- TRPH was detected in near surface samples at two soil borings near the former grease racks in the 3800 Motor Pool at concentrations of 700 and 3,400 mg/kg, above the TPH PRG of 500 mg/kg.

- Arsenic was detected at concentrations above its PRG; however, those concentrations were within background values. Chromium for which there is no PRG was detected at what are considered background concentrations.

On the basis of these data, near-surface soils near the former grease racks have been recommended for excavation under the IAROD. Details of the investigation are provided in HLA's *Draft Site Characterization Report Site 20 - South Parade Ground, 3800 and 519th Motor Pools, Fort Ord, California*, dated September 13, 1993.

8.2.7 Site 21 - 4400/4500 Block Motor Pool East

Site 21, the 4400/4500 Block Motor Pool East, was used for motor vehicle service, maintenance, and storage and is in the eastern portion of the Main Garrison (Plate 2). Potential areas or chemicals of concern include:

- A 400-gallon gasoline fuel spill near Building 4495 that occurred in 1979

- Six oil/water separators

- A concrete-lined canal and its unpaved discharge area

- Nine wash racks and nine grease racks

- Twenty current and former USTs.

This investigation consisted of the following:

- Collecting 16 soil gas samples at the 400-gallon fuel spill location

- Drilling and sampling eight soil borings (one at each of the six oil/water separators and two at locations where runoff water is likely to have accumulated)

- Collecting 10 surface soil samples at the unpaved canal discharge area and one surface soil sample at the ponded water

- Analyzing 34 soil samples for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicate the following:

- Native soil beneath the site consists of yellowish-brown sand and silty sand to 21.5 feet bgs.

- Unknown TPHd (identified in the TPHd analysis) and TOG were detected in some soil samples near the oil/water separators. However, the maximum detected concentration was 400 mg/kg, below the TPH PRG of 500 mg/kg.

- TRPH, benzene, and toluene were detected in soil gas samples near Building 4495 and appear to be related to a leaking gasoline UST rather than the reported spill.

- Arsenic, lead, antimony, beryllium, cadmium, and chromium were detected at concentrations above PRGs and/or background values in one or more soil samples at the canal discharge area.

On the basis of these data, near-surface soils in the canal discharge area have been recommended for excavation under the IAROD. In addition, work associated with the current and former USTs will be performed under the UST Management Program. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 21 - 4400/4500 Block Motor Pool East, Fort Ord, California*, dated September 20, 1993 and *Draft Data Summary Report, Site 21 - 4400/4500 Motor Pool, East Block, Fort Ord, California*.

8.2.8 Site 22 - 4400/4500 Block Motor Pool West

Site 22, the 4400/4500 Block Motor Pool West, was used for motor vehicle service, maintenance, and parking and is in the eastern portion of the Main Garrison (Plate 2). Potential areas of concern include 16 current and former USTs, a fueling facility, maintenance shops, four grease racks, and three oil/water separators.

A previous investigation (*EA, 1990*) consisted of drilling six soil borings, and installing three monitoring wells; the specific areas investigated were near the stormwater outfall, at the fueling facility, at Grease Rack 4532, and at a former waste oil UST (near Building 4534).

The site characterization investigation consisted of drilling eight soil borings and collecting one surface soil sample at the fueling facility, the former waste oil UST, Grease Rack 4532, which is located over an unpaved area, and the oil/water separators.

Results of the investigations indicate the following:

- Soil contamination was not detected in samples collected near the oil/water separators.
- TRPH, TPHg, and TPHd were detected at concentrations up to 4,400 mg/kg near the fueling facility and the former waste oil UST. These concentrations are above the TPH PRG of 500 mg/kg.
- Unknown hydrocarbons (identified in the TPHd analysis) and TOG were detected at concentrations up to 8,500 mg/kg near the former grease rack.

On the basis of these data, soil near the grease rack have been recommended for remediation by excavation under the IAROD. In addition, current and future work near the fueling facility and the former waste oil UST is being performed under the UST Management Program. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 22 - 4400/4500 Block Motor Pool West, Fort Ord, California*, dated May 23, 1994.

8.2.9 Site 24 - Old DEH Yard

Site 24 is currently a grassy vacant lot (including a 1/4-mile jogging track); however, the site is the location of the former DEH Yard and a former plant nursery within the Main Garrison (Plate 2). Former areas that may be potential sources of contamination include a maintenance facility, a grease rack, drum and asphalt storage areas, aboveground tanks, and the nursery.

A previous investigation (*JMM, 1991c*) included installing three monitoring wells and drilling six soil borings. Pesticides were detected in shallow soils.

The site characterization investigation consisted of the following:

- A surface geophysical survey
- Collecting 24 soil gas samples
- Drilling and sampling 14 soil borings
- Collecting four surface soil samples
- Excavating and sampling nine trenches
- Collecting three groundwater samples from the existing wells
- Analyzing 60 soil samples and 3 groundwater samples for petroleum hydrocarbons, VOCs, pesticides, PCBs, and metals.

Results of the investigations indicate the following:

- Pesticides, TPH, and oil and grease were detected in shallow localized areas at concentrations above the PRGs.
- Two soil gas samples collected near the buried drums contained TCE and PCE at a maximum concentration of 8 μg/l.
- Beryllium concentrations exceeded the PRG and background threshold value in two deep soil samples; arsenic concentrations in 28 samples were below the background threshold value but above the PRG. Other metals detected were at concentrations below PRGs or background values.
- Antimony and nickel were detected in groundwater samples in concentrations

exceeding MCLs; thallium was present in one sample at the MCL.

- Drums were encountered in one trench.
- Waste oil was detected in a liquid sample from one drum; however, no PCBs were detected in this sample.
- Soil samples from the trench with the drums contained TPH, oil and grease, and VOCs.

A Time-Critical Removal Action was conducted at Site 24 from August 22 to August 31, 1994, to remove drums encountered during the site investigation.

Approximately 50 crushed metal drums (ranging in size from 5 to 25 gallons), drum debris, and contaminated soil were removed from the excavation. Most of the drums were empty but the excavation contained pools of viscous, greasy product and contaminated soil. Liquid samples from the drums had detections of the following:

- TPHg at 6 to 22,000 mg/kg
- TPHd at 40,000 to 520,000 mg/kg
- Oil and grease at 91,000 to 440,000 mg/kg
- Lead at 40 to 1,100 mg/kg
- Numerous VOCs and SOCs were also detected
- Pesticides and PCBs were not detected.

Soil samples from the excavations had detections of the following:

- Unknown THPd at 1,600 to 6,900 mg/kg
- Oil and grease at 53,000 to 67,000 mg/kg
- Three VOCs and three SOCs were detected above PRGs
- Metals were detected below PRGs or background.

Four 20-foot-deep soil borings were drilled around the perimeter of the excavation and one 60-foot-deep boring was drilled through the excavation. Four soil samples from each 20-foot boring and seven samples from the 60-foot boring were submitted for chemical analysis (TPHg, VOCs, SOCs, oil and grease, and metals). The soil samples from the borings are presently being analyzed.

Additional information on this Time-Critical Removal Action is presented in the *Action Memorandum, Request for Time Critical Removal Action at Site 24 - The Old DEH Yard*, Fort Ord, California dated July 13, 1994 and the *Removal Action Report, Time Critical Removal Action at Site 24 - The Old DEH Yard, Fort Ord, California* dated October 19, 1994.

Contaminated soils associated with the drums and in shallow localized areas have been recommended for excavation under the IAROD. If Site 24 does not meet the criteria for the IAROD, an RI/FS will be prepared for the site and it will be included in the Basewide Proposed Plan and ROD. Details of the investigation will be provided in HLA's *Draft Site Characterization Report, Site 24 - Old DEH Yard, Fort Ord, California*, currently in preparation.

8.2.10 Site 30 - Driver Training Area

Site 30, the Driver Training Area, is a partially developed parcel in the East Garrison (Plate 2). Former facilities at the site representing potential areas of concern include the following:

- A former grease rack with stained surface soils
- A former gasoline station with two USTs
- An abandoned wash rack.

The investigation focused on these three areas and consisted of drilling and sampling 13 soil borings, drilling one pilot boring, installing and sampling one monitoring well, and collecting one surface soil sample. Thirty-one soil samples and three groundwater samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicate the following:

- Native soil beneath the site consists of yellowish-brown sand and silty sand to a depth of 259.5 feet bgs. Beneath the sand, at least 3 feet of olive-gray clay was encountered from 259.5 to 262.6 feet bgs.

- Unknown TPHd (identified in the TPHd analysis) were detected at a concentration of 3,300 mg/kg, above the TPH PRG of 500 mg/kg, in the stained surface soil sample at the former grease rack.

- Beryllium was detected in soil samples at concentrations above PRGs but these concentrations were considered to represent background conditions.

- No organic chemicals were detected in groundwater. Thallium and chloride were detected above MCLs in groundwater samples from one sampling round.

On the basis of these data, the stained surface soil at the former grease rack has been recommended for excavation under the IAROD. Details of the investigation are provided in HLA's *Draft Site Characterization Report, Site 30 - Driver Training Area Fort Ord, California*, dated September 20, 1993 and *Draft Data Summary Report Supplemental Investigation, Site 30 - Driver Training Area, Fort Ord, California.*

8.2.11 Site 34 - Fritzsche Army Airfield Fueling Facility

Site 34 is the former Fritzsche Army Airfield Fueling Facility and developed areas (Plate 2). Potential areas of concern include: four helicopter wash aprons, one vehicle wash rack (516), and associated oil/water separators at various locations.

Helicopters were cleaned at the wash aprons using solvent solutions, and vehicles were cleaned at the wash rack using soap and water. Each wash apron or wash rack is a relatively large, 12-inch-thick concrete pad where helicopters or vehicles were washed. Each pad either sloped inward toward a central drain or sloped uniformly in the direction of a perimeter drain adjacent to an associated oil/water separator.

Each of the four helicopter wash aprons was investigated by collecting and analyzing six 6-foot-deep soil gas samples (24 total) and by drilling and sampling two 21.5-foot-deep soil borings (8 total). The vehicle wash rack was investigated by drilling and sampling one 21.5-foot-deep soil boring at the inlet to the oil/water separator. Potential contaminants were petroleum hydrocarbons and solvents. Twenty-four soil samples were analyzed for petroleum hydrocarbons, VOCs, and metals.

Results of the investigation indicate the following:

- Native soil beneath and in the immediate vicinity of the five wash aprons/racks consists of brownish-yellow to yellow fine sand, silty sand, and sand with clay.

- VOCs and TPH were detected in soil gas samples from each of the four helicopter wash aprons at maximum concentrations of 1.1. μg/kg and 71.3 μg/kg, respectively. However, similar organic compounds were not detected in confirmation soil borings.

- No organic compounds were detected in soil samples from any of the four helicopter wash aprons.

- At Vehicle Wash Rack 516, elevated xylenes, ethylbenzene, and unknown TPHg (detected in the TPHg analysis at a maximum concentration of 7,900 mg/kg) were detected in the 5.5-foot-deep sample. The concentrations were greatly decreased in the 10.5-foot-deep sample and were not detected in the 20.5-foot-deep sample. Xylene and ethylbenzene concentrations were below the PRGs. There is no PRG for the unknown TPHg detected under the TPHg analysis.

- Arsenic was the only inorganic compound detected above its PRG value; however, the detected concentrations were below background threshold values. Chromium, for which there is no PRG, was detected at concentrations consistent with background conditions.

On the basis of these data, no further work has been recommended at the four helicopter wash aprons. Vehicle Wash Rack 516 has been recommended for excavation under the IAROD. Details of this investigation are provided in HLA's *Draft Final Site Characterization Report, Part 1 - Site 34, Fritzsche Army Airfield Fueling Facility, Fort Ord, California*, dated May 23, 1994.

8.2.12 Site 40 - Fritzsche Army Airfield Helicopter Defueling Area

Site 40, the FAAF Helicopter Defueling Areas, is near Building 533 in the northwest portion of the FAAF (Plate 2). According to interviews with Building 533 employees, four separate potential areas of concern have been identified as locations where helicopters have been defueled or where chemicals associated with helicopter maintenance may have been released. One of these areas was also a suspected landfill site.

Potential contaminants at the four locations include petroleum hydrocarbons, VOCs, and metals.

The investigation to date has included the following activities at three of these areas:

- Collecting and analyzing 67 soil gas samples; at several locations samples were collected at multiple depths
- Drilling and sampling three 105-foot-deep pilot borings and collecting HydroPunch samples at two depths in each pilot boring, drilling and sampling ten 20-foot- to 40-foot-deep soil borings, and installing one monitoring well
- Conducting a geophysical survey at the suspected landfill location
- Excavating six trenches at the suspected landfill location
- Analyzing 24 soil samples and seven groundwater samples for petroleum hydrocarbons, VOCs, SOCs, and metals.

Preliminary results of the investigation indicate the following:

- Native soil consists of brownish-yellow fine sand, silty sand, and sand with clay
- Methane, total petroleum hydrocarbons, and benzene were detected in soil gas at maximum concentrations of 25,600 μg/l, 525 μg/l, and 18.6 μg/l, respectively.
- Unknown TPHd (identified in the TPHd analysis) at a maximum concentration of 950 mg/kg, numerous VOC TICs, and burnt and unburnt natural organic debris were detected in trenches located in the area of the highest soil gas detections.
- Metals were detected at concentrations below PRGs or background values.
- No organics were detected in groundwater samples.
- No inorganics were detected in groundwater above MCLs.

Based on preliminary results, near-surface soils in one of the three areas will likely require soil excavation under the IAROD because of the presence of elevated concentrations of the unknown TPHd. There is no evidence of dumping at the suspected landfill site or of groundwater contamination. This site characterization is ongoing.

8.2.13 Site 41 - Crescent Bluff Fire Drill Area

Site 41 consists of four small fire-fighting training pits that were recently identified during personnel interviews; they are on a bluff approximately 0.75 mile southeast of the East Garrison (Plate 2). The training pits are overgrown and contain ponded water during the wet season. Potential contaminants are flammable liquids (e.g., fuels and solvents).

The investigation consisted of the following:

- Reviewing aerial photographs and interviewing base personnel
- Drilling and sampling seven soil borings, and collecting samples at the surface and at 5-foot intervals. Borings were drilled to 20 feet bgs, where possible
- Collecting two additional surface soil samples outside of the fire-fighting training pits
- Analyzing soil samples for petroleum hydrocarbons, VOCs, SOCs, and metals. Selected soil samples were also analyzed for dioxins and furans.

Preliminary results of the investigation indicate the following:

- Native soil beneath the site consists of yellowish-brown sand, silty sand, clayey sand and gray clay to a depth of 20 feet bgs.
- No TPHd or TPHg were detected. However, in the TPHd analyses, unknown hydrocarbons were detected at several locations at concentrations ranging from 12 to 440 mg/kg, below the TPH PRG of 500 mg/kg.
- Several VOCs, SOCs, and tentatively identified compounds (TICs) were detected; all but bis(2-ethylhexyl)phthalate were below PRGs. Octochlorodibenzo-p-dioxin was detected in two samples, at concentrations below the PRG.
- Several metals were detected above background levels; of these, arsenic and beryllium were detected above their PRG values. Chromium, for which there is no PRG, was detected above background levels at concentrations ranging from 8.1 to 74 mg/kg.

Based on the preliminary results, Site 41 may require excavation under the IAROD program. The site characterization and SRE are ongoing.

The field investigation for Site 41 was on hold until July 1994 because of wetland constraints.

8.2.14 Site 39A - East Garrison Ranges

The East Garrison Ranges are on the west side of the East Garrison (Plate 2). They include three small-bore shooting ranges (EG-1, EG-2, and EG-3), a skeet range, and a target area that appears to have been part of a moving target range that was decommissioned many years ago. Weapons use was limited to pistols (.45 caliber or less) at Ranges EG-1 and EG-2 and to small-bore (.22 caliber) rifles at Range EG-3. Bullets were fired at targets 25 or 50 meters away and became embedded in the hillsides at the back of the range. The skeet range was primarily a recreational shooting range for trap and skeet. Potential contaminants are arsenic, antimony, copper, and lead associated with spent ammunition and PAHs from clay pigeons that contain 32 percent petroleum pitch (asphalt).

The purpose of the investigation was to assess the lateral and vertical distribution of the spent ammunition. As discussed in Volume II, at Site 3 (Beach Trainfire Range), visual mapping was found to be the most reliable method for estimating surface coverage of spent ammunition, and the estimated surface coverage correlated well with lead concentrations in the associated soil samples.

The Site 39A investigation included:

- Visually mapping the distribution of spent ammunition. Due to the small size of the shot present in the skeet range, additional sampling and sieving was performed as part of the mapping task.
- Excavating confirmation pits and estimating the percentage by weight of the spent ammunition in sieved samples. A portion of these pits will be excavated to a depth of approximately 2.5 feet bgs to evaluate the vertical extent of the spent ammunition.
- Visually estimating the distribution of clay pigeon fragments in the skeet range.
- Collecting and analyzing surface soil samples at selected locations and at depths of 0.5 and 2 feet bgs in selected confirmation pits.

Samples will be analyzed for arsenic, antimony, copper, and lead.

- Collecting three soil samples beneath the heaviest accumulations of clay pigeons and analyzing them for PAHs.

Details of this ongoing investigation are presented in the *Draft Work Plan, Site Characterization, Site 39A - East Garrison Ranges, Fort Ord, California*, dated November 3, 1994, and *Draft Data Summary Report, Site Characterization, Site 39A - East Garrison Ranges, Fort Ord, California* dated December 28, 1994. Based on the results of the investigation conducted at Site 3 and the limited areas of concern at Site 39A, it is assumed that Site 39A will meet the criteria for excavation under the IAROD.

8.2.15 Site 39B - Inter-Garrison Training Area

Site 39B is located east of the Main Garrison south of Inter-Garrison Road between Eighth Avenue and Abrams Drive. On April 14, 1994, an unexploded ordnance (UXO) clearance crew found a small container while excavating a site (referred to as Location 1). Two crew members became dizzy and nauseated. The crew also noted metal debris and odors at a second excavation (referred to as Location 2) within 50 feet of the containers. An emergency response action was initiated to treat the UXO crew and secure the site. Other items found in the vicinity of the incident included oil filters, scrap metal, paint cans, engines, and ammunition canisters.

A time-critical removal action was completed in August 1994. Approximately 30 small, rusted containers were removed from Location 1 along with coaxial cables, two coffee cans, and three food ration cans. At Location 2, soil was excavated to a depth of 3 feet bgs; burned railroad ties and scrap metal were found near the surface. Samples from the containers from Location 1 were analyzed for VOCs, SOCs, TPHg, TPHd, oil and grease, pesticides, PCB, priority pollutant metals, and chromium IV and had detections of the following:

- TPHd at 61,000 to 600,000 mg/kg
- Oil and grease at 6,000 to 830,000 mg/kg
- Lead at 910 to 3,100 mg/kg
- Pesticides and PCBs were not detected.

Soil samples from the excavation at Location 1 were analyzed for VOCs, SOCs, TPHg, TPHd, oil and grease, pesticide, PCB, and priority pollutant metals and had detections of the following:

- Unknown THPd at 86 to 820 mg/kg
- Oil and grease at 190 to 1,500 mg/kg
- Pesticides and PCBs were not detected.

Soil samples from the excavation at Location 2 were analyzed for VOCs, SOCs, TPHg, TPHd, oil and grease, pesticide, PCB, and priority pollutant metals and had detections of the following:

- Unknown THPd at 52 to 1,600 mg/kg
- Oil and grease at 52 to 5,800 mg/kg
- Pesticides and PCBs were not detected.

Subsequently, two 20-foot-deep soil borings have been drilled at each of the two locations. Four samples from each boring were submitted for analysis for TPHg, TPHd, VOCs, SOCs, oil and grease, and metals. The soil samples from the borings are presently being analyzed. Results will be presented in a Data Summary Report. Based on the limited amount of contaminated soil remaining at the site, it is assumed that Site 39B will meet the criteria for excavation under the IAROD.

Additional information on the Time-Critical Removal Action is presented in the *Action Memorandum, Request for Time-Critical Removal Action at the Intergarrison Site, Fort Ord, California*, dated July 12, 1994, and the *Removal Action Report, Time-Critical Removal Action at the Intergarrison Site, Fort Ord, California*, dated October 26,1994.

9.0 SUMMARY OF REMEDIAL INVESTIGATIONS, RISK ASSESSMENTS, AND FEASIBILITY STUDIES

This section summarizes the Remedial Investigations (RIs), Baseline Human Health Risk Assessments (BRAs), Baseline Ecological Risk Assessments (ERAs) and Feasibility Studies (FSs) performed for the five RI sites identified at Fort Ord. The RI sites include Sites 2 and 12, Sites 16 and 17, Site 3, Site 31, and Site 39. Detailed information on the RIs for each site is provided in Volume II. The BRAs and ERAs are presented in Volumes III and IV, and the FSs are presented in Volume V. Proposed reuse for individual sites or areas is also summarized; the process by which proposed land use will be defined is discussed in Section 3.0 of this volume.

9.1 Sites 2 and 12

9.1.1 Background

Site 2 is the Main Garrison Sewage Treatment Plant (MGSTP). Site 12 consists of the Lower Meadow (a former disposal site), the Directorate of Logistics (DOL) Automotive Yard, the Cannibalization Yard and surrounding Industrial Area, and a portion of the Southern Pacific Railroad (SPRR) spur (Site 13) between the DOL Automotive Yard and the Cannibalization Yard. Each area is identified on Plate 3. Sites 2 and 12 were combined into one site after the first phase of the RI activities because of the similar groundwater contamination identified both at and between the two sites.

9.1.1.1 Site 2

The MGSTP occupies an unpaved area of approximately 28 acres west of Range Road between Trainfire Range No. 9 and Stilwell Hall. The former treatment facility is fenced and contains a few buildings and two large trickling filters. Outside of the fenced area are three (former) unlined sewage ponding areas and 10 asphalt-lined sludge-drying beds.

The MGSTP was the primary sewage treatment facility for Fort Ord, serving the majority of the housing areas and the main industrial areas from the late 1930s until May 1990 when it was decommissioned. During operation, effluent from the MGSTP was discharged under a National Pollutant Discharge Elimination System (NPDES) permit to a storm drain that emptied onto Indianhead Beach during low tide and discharged to Monterey Bay during high tide. Sewage from Fort Ord now flows via gravity feed to a pumping station in Marina and is then pumped to the Monterey Regional Treatment Plant (MRTP), also in Marina.

Proposed reuse at Site 2 includes outdoor and indoor aquaculture facilities for raising fish and shellfish, and research facilities to support oceanographic studies.

9.1.1.2 Site 12

Potential developments planned for Site 12 include a central business district, light industrial areas, a high-technology business park, a transit center, retail businesses, medium-to-high-density residential areas, and a school. The four major areas of Site 12 are described below.

Lower Meadow

The Lower Meadow is a grassy field of approximately 2 acres east of Highway 1 near the Twelfth Street gate. The site is bounded to the east by the DOL Automotive Yard and to the west by First Avenue. The Lower Meadow is approximately 5 feet lower than the DOL Automotive Yard and receives runoff from it. Several drain pipes (including Outfall 31) are in the southeast corner and the eastern side of the site. It is uncertain if the pipes were designed as drainage lines. No buildings are in the Lower Meadow.

The Lower Meadow was previously used to dispose of waste material such as scrap metal, oil, and batteries generated by the DOL. The area also appears to contain road construction

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The MGSTP occupies an unpaved area of approximately 28 acres west of Range Road between Trainfire Range No. 9 and Stilwell Hall. The former treatment facility is fenced and contains a few buildings and two large trickling filters. Outside of the fenced area are three (former) unlined sewage ponding areas and 10 asphalt-lined sludge-drying beds.

The MGSTP was the primary sewage treatment facility for Fort Ord, serving the majority of the housing areas and the main industrial areas from the late 1930s until May 1990 when it was decommissioned. During operation, effluent from the MGSTP was discharged under a National Pollutant Discharge Elimination System (NPDES) permit to a storm drain that emptied onto Indianhead Beach during low tide and discharged to Monterey Bay during high tide. Sewage from Fort Ord now flows via gravity feed to a pumping station in Marina and is then pumped to the Monterey Regional Treatment Plant (MRTP), also in Marina.

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Potential developments planned for Site 12 include a central business district, light industrial areas, a high-technology business park, a transit center, retail businesses, medium-to-high-density residential areas, and a school. The four major areas of Site 12 are described below.

Lower Meadow

The Lower Meadow is a grassy field of approximately 2 acres east of Highway 1 near the Twelfth Street gate. The site is bounded to the east by the DOL Automotive Yard and to the west by First Avenue. The Lower Meadow is approximately 5 feet lower than the DOL Automotive Yard and receives runoff from it. Several drain pipes (including Outfall 31) are in the southeast corner and the eastern side of the site. It is uncertain if the pipes were designed as drainage lines. No buildings are in the Lower Meadow.

The Lower Meadow was previously used to dispose of waste material such as scrap metal, oil, and batteries generated by the DOL. The area also appears to contain road construction waste. The depth of fill materials is reportedly up to 30 feet.

The DOL Automotive Yard

The DOL Automotive Yard is east of Highway 1 and northeast of the SPRR spur that runs east from First Avenue. The 8.5-acre fenced site is bounded by Twelfth Street to the north and the Lower Meadow to the west. The site includes a paint shop, two wash racks, one temporary hazardous waste container storage area, an oil/water separator, an aboveground storage tank (AST), and several buildings used for automotive repair. The site is paved and slopes gently to the west.

Previous site activities included transmission repair, degreasing, engine testing, steam cleaning and washing vehicles, and petroleum/oil/lubricant (POL) storage. A buried container, which was originally used as a muffler for exhaust from engine testing, may also have been used for liquid waste storage. In addition, before their removal, three USTs were at the site. One AST is still present.

Cannibalization Yard and Industrial Area

The Cannibalization Yard is a small (0.5-acre) paved and fenced area located within the larger (18.5-acre) paved and fenced Industrial Area. The entire 18.5-acre area is bounded by Highway 1 to the west, a baseball field to the east, and Tenth Street to the south. The SPRR spur separates the Industrial Area from the DOL Automotive Yard to the north. The area includes a machine shop, a furniture repair shop, the base laundry, a temporary hazardous waste container storage area, an oil/water separator, and an AST.

The Cannibalization Yard was used (from 1964) to disassemble old equipment, primarily decommissioned military vehicles. Used motor oil was collected and stored onsite in 55-gallon drums. Between January 1988 and August 1988, waste oil was stored in a 450-gallon AST in the hazardous waste storage area at the machine shop adjacent to the yard. Other activities included removing from vehicles gasoline (leaded and unleaded), diesel fuel, brake fluid, asbestos-containing brake shoes and linings, antifreeze/coolants, lead and acid from batteries, lubricating greases, and transmission fluids. Prior to the installation of the oil/water separator at the northeast corner of the yard, runoff from the site flowed down the sloped area northeast of the Cannibalization Yard toward the baseball field. The site is no longer active.

The Southern Pacific Railroad (SPRR) Spur

The SPRR spur (part of Site 13), an area of approximately 0.8 acres, consists of the right-of-way along a portion of the railroad spur that extends northward from the Southern Pacific Railroad track west of Highway 1 and curves east through an industrial complex. The portion of the railroad track discussed in this report extends east from the main track east of Highway 1, across First Avenue, and between the DOL Automotive Yard and the Cannibalization Yard and surrounding Industrial Area. The rest of the railroad spur was investigated during the characterization of Site 13 and is not discussed here. The relatively flat right-of-way is mostly unpaved except in the areas adjacent to loading docks and where the spur crosses First Avenue.

The railroad spur was used to transport materials from the main rail line to storage facilities between the DOL Automotive Yard and the Industrial Area. The SPRR spur is of concern because oil or fuel spirits may have been sprayed in this area for dust control.

9.1.2 Summary of the Remedial Investigation for Sites 2 and 12

The objectives of the RI at Sites 2 and 12 were to determine the source areas of potential contamination and to define the nature and extent of that contamination. A further objective was to collect sufficient data to carry out human health and ecological risk assessments and feasibility studies.

9.1.2.1 Phase 1 Investigation

The Phase 1 investigation at Site 2 included:

- Conducting a soil gas survey

- Drilling and sampling two soil borings
- Drilling four monitoring wells
- Sampling existing and new monitoring wells
- Installing one pilot boring and piezometer nest
- Conducting HydroPunch sampling in the pilot boring
- Measuring water levels in wells and piezometers
- Analyzing 18 soil samples for one or more of the following: VOCs, SOCs, pesticides, priority pollutant metals, fecal coliform, and pH
- Analyzing 21 groundwater samples for VOCs, priority pollutant metals, and fecal coliform.

The Phase 1 field investigation at Site 12 included:

- Conducting a geophysical survey to identify the boundaries of the suspected disposal area at the Lower Meadow
- Excavating trenches to evaluate the extent of landfill materials and characterize fill materials at the Lower Meadow
- Conducting a soil gas survey to evaluate the distribution of organic compounds in the vicinity of the disposal area (Lower Meadow) and the DOL Automotive Yard and to aid in locating potential source areas
- Drilling and sampling 17 soil borings, including 6 along the SPRR spur (conducted as part of the Site 13 investigation)
- Collecting one water sample from the underground muffler
- Installing three new monitoring wells
- Sampling existing and new monitoring wells
- Installing one pilot boring and piezometer nest
- Conducting HydroPunch sampling in the pilot boring
- Measuring water levels in wells and piezometers
- Analyzing 71 soil samples for one or more of the following: VOCs, SOCs, TPHd, TPHg, PCBs, and pesticides
- Analyzing 18 groundwater samples for VOCs and priority pollutant metals.

9.1.2.2 Phase 2 Investigation

The purpose of the Phase 2 investigation was to further characterize Sites 2 and 12 through the investigation of data gaps identified during Phase 1. The investigations of Sites 2 and 12 were combined in Phase 2, and three types of investigations were performed: hydrogeology, source characterization, and groundwater contamination.

The Phase 2 hydrogeology investigation included:

- Drilling four pilot borings and installing three piezometer nests
- Conducting seismic reflection profiling for investigation of subsurface stratigraphy
- Measuring water levels and specific conductance in piezometer nests
- Monitoring tidal influence
- Aquifer testing of two wells.

The Phase 2 source characterization included:

- Excavating and removing the buried muffler in the DOL Automotive Yard
- Conducting a soil gas survey (31 locations) to evaluate the distribution of organic compounds in the vicinity of the DOL Automotive Yard and the Cannibalization Yard

- Drilling and sampling two soil borings at Site 2
- Drilling and sampling 21 soil borings; collecting HydroPunch samples from 9 of the borings
- Collecting two grab groundwater samples from borings
- Collecting five surface soil samples
- Installing one monitoring well
- Analyzing 82 soil samples for one or more of the following: VOCs, SOCs, TPHd, TPHg, priority pollutant metals, and hexavalent chromium.

The Phase 2 groundwater contamination investigation included:

- Conducting HydroPunch sampling at 24 locations. Samples were analyzed for selected VOCs.
- Drilling and installing site monitoring wells
- Analyzing 60 groundwater samples for VOCs and priority pollutant metals. Analyzing selected samples for fecal coliform, SOCs, and TPHd.

Additionally, groundwater and or soil samples were collected from Sites 2 and 12 under three basewide investigations (Hydrogeologic Characterization, Baseline Ecological Risk Assessment, and Surface Water Outfall Investigation).

9.1.2.3 Results and Conclusions of the Remedial Investigation

The results from Phases 1 and 2 were evaluated and are presented below under hydrogeology, source characterization, and groundwater contamination.

Hydrogeology

- Two aquifer units are present at Sites 2 and 12, the Upper 180-foot aquifer and the Lower 180-foot aquifer. Because the SVA is absent at Sites 2 and 12, the A-aquifer, present at much of Fort Ord, is considered part of the Upper 180-foot aquifer. The lithology of both aquifers is primarily sand to silty sand. A sandy silt present at approximately 70 to 80 feet below MSL acts as an aquitard (Intermediate 180-foot aquitard) between the two aquifer units. The Upper 180-foot aquifer is unconfined at both sites, while the Lower 180-foot aquifer is confined.
- Depth to groundwater ranges from about 40 to 60 feet bgs at Site 2 and 70 to 80 feet bgs at Site 12. Groundwater flow in the Upper 180-foot aquifer is to the southwest. Groundwater flow in the Lower 180-foot aquifer is generally from Site 2 inland toward Site 12. Horizontal hydraulic gradients measured in the Upper 180-foot aquifer ranged from a maximum of 6.9×10^{-4} feet/feet in May 1992 to 3.1×10^{-4} feet/feet in March 1992.
- Tidal influence in the Upper 180-foot aquifer occurs in wells close to Monterey Bay, but was not observed inland. Some saltwater intrusion occurs in the Upper 180-foot aquifer. Tidal influence in the Lower 180-foot aquifer is present over 2,000 feet from the bay. Saltwater intrusion occurs in the Lower 180-foot aquifer close to the Bay and as far inland as the sewage treatment plant.
- The geometric average transmissivity and storativity in the Upper 180-foot aquifer at Site 2 are 23,000 square feet per day (ft^2/day) and 0.111 (unitless), respectively. At Site 12, geometric average transmissivity and storativity are 14,900 ft^2/day and 0.42, respectively. The geometric average hydraulic conductivity at Sites 2 and 12 are 300 feet per day (ft/day) and 200 ft/day, respectively.

Source Characterization

Based on site usage, potential sources identified for investigation at Sites 2 and 12 include unlined sewage ponding areas, asphalt-lined sludge drying beds, and three former USTs at the

MGSTP; buried construction debris, discharge pipes, and a stormwater outfall at the Lower Meadow; a paint shop, wash racks, an oil/water separator, an AST, three former USTs, and a former underground muffler at the DOL Automotive Yard; a former furniture shop, machine shop, a laundry, an oil/water separator, an AST, and former and existing USTs for fuel, waste oil, and solvents at the Cannibalization Yard and surrounding industrial area; and possible fuel or solvent spills and oil spraying at the SPRR spur.

Based on the results of the RI, the areas where contamination was confirmed are discussed below.

MGSTP. Priority pollutant metals were detected above maximum background concentrations in surface and near-surface samples collected from the sludge drying beds at the MGSTP. Samples collected from below the drying beds did not contain metals above maximum background concentrations.

Lower Meadow. The sources at the Lower Meadow were found to be buried construction debris and the discharge pipes and a stormwater outfall in the southeast corner. Organic compounds in soil gas samples and metals and organic compounds in soil samples were found within or adjacent to the limits of the debris defined by geophysics, trenching, and soil sampling. The debris was found to extend from approximately 5 to a maximum depth of 15 feet bgs. The vertical extent of the source was defined with borings and soil sampling.

Analytical results of groundwater and HydroPunch sampling indicate that groundwater quality at the Lower Meadow does not appear to be impacted by the buried debris. Above-background metals and several organic compounds including extractable unknown hydrocarbons as diesel were detected in soil at the discharge pipes and stormwater outfall. The source limits (both vertical and horizontal) were defined by soil borings and sampling.

DOL Automotive Yard. No source areas were found at the DOL Automotive Yard. Isolated occurrences of some compounds were detected. However, additional sampling in those areas (i.e., Wash Rack T-2729) determined the extent of those compounds to be limited and not the result of any continuing sources. Concentrations of THCs in soil gas were detected near the former location of Tank 2754. That area continues to undergo investigation under the UST Program.

Cannibalization Yard and Industrial Area. Above-background levels of several metals, including lead and zinc, were detected in the surface sample from the boring adjacent to the oil/water separator at the Cannibalization Yard. Additional surface samples and shallow borings completed near the oil/water separator and along the eastern margin of the Cannibalization Yard contained concentrations of metals exceeding the maximum background concentrations for shallow soils in the 0.35 and 0.50-foot samples at these locations. Several organic compounds were also detected in the samples; at depth, concentrations of these compounds were either not detected or decreased dramatically. The presence of these compounds is probably due to surface water runoff that occurred before installation of the oil/water separator in 1989. THCs in soil gas were detected in the vicinity of Building T-2427; these concentrations are most likely due to a leaking sanitary sewer.

The SPRR Spur. PCE and 1,1,1-TCA were detected in soil gas near the eastern end of the SPRR spur. THCs were also detected in soil gas within a limited area between the railroad spur and Eleventh Street. Additional soil and/or HydroPunch sampling at both locations did not locate sources in either area.

No significant continuing source areas were identified at the MGSTP, Lower Meadow, DOL Automotive Yard, Cannibalization Yard and Industrial Area and the SPRR spur.

Groundwater Contamination

- A TCE plume of approximately 6,000,000 square feet has been laterally assessed to less than 3 μg/l and vertically defined to nondetect at Sites 2 and 12. The extent of the plume was defined with the installation and sampling of monitoring wells and collection of HydroPunch samples. No

VOCs were detected in any of the HydroPunch samples collected from the Lower 180-foot aquifer; therefore, it appears that the Lower 180-foot aquifer has not been impacted by the solvents below Sites 2 and 12.

- Investigation of potential source areas at Site 12 did not indicate any significant continuing sources of solvents to groundwater.

- 1,1,1-TCA was detected in MW-02-10-180 outside of the TCE groundwater plume. The 1,1,1-TCA detected may be related to a storm drain outfall (OF-15) located near the well. The nature and extent of 1,1,1-TCA in groundwater near MW-02-10-180 may require further evaluation.

- Continued monitoring of the Site 2 and 12 wells under the basewide monitoring program is recommended.

9.1.2.4 Contaminant Fate and Transport

Five potential migration pathways for air, surface water, unsaturated zone soil, and groundwater specific to Sites 2 and 12 were identified:

- Volatilization of chemicals into the air from soil and groundwater

- Entrainment of wind-generated dust particles in air

- Transport of chemicals in surface water via storm drains

- Leaching of chemicals into underlying unsaturated zone soil and groundwater

- Migration of dissolved compounds in groundwater.

Based on an evaluation of the analytical results of soil and groundwater samples collected from Sites 2 and 12 and on the mobility and persistence factors of those compounds detected in soil and groundwater, the most significant migration pathways identified for these compounds would be the entrainment of wind-generated dust particles in air at Site 2, the migration of VOCs to groundwater, and the migration of dissolved VOCs in groundwater at Sites 2 and 12.

9.1.3 Summary of the Risk Assessments for Sites 2 and 12

9.1.3.1 Baseline Human Health Risk Assessment

A BRA was conducted for Sites 2 and 12 to estimate potential cancer risks and adverse noncancer health effects from possible exposure to chemicals of potential concern (COPCs). Sites 2 and 12 were evaluated separately for the BRA, which included (1) identifying COPCs, (2) identifying potential receptors, (3) estimating potential exposure to COPCs, (4) identifying EPA- or Cal/EPA-developed toxicity values for COPCs, and (5) evaluating health risks from estimated exposure. The BRA for Sites 2 and 12 is presented in Volume III, Section 3.0.

Chemicals of Potential Concern

Chemicals detected in soil and groundwater were considered for COPC selection at Sites 2 and 12. Sample analyses that are not chemical-specific, such as TPH, were not used in the BRA. The COPCs were selected so that the most prevalent, persistent, and potentially toxic compounds detected were quantitatively evaluated. Criteria for establishing COPCs are described in Volume III, Section 2.1.2. The chemicals selected as COPCs at Sites 2 and 12 are listed below.

- Site 2
    - Soil: Antimony, arsenic, cadmium, copper, mercury, silver, and thallium

- Site 12
    - Soil: Antimony, arsenic, beryllium, cadmium, lead, B(a)P-TE, bis(2-ethylhexyl)phthalate, and total carcinogenic PAHs

- Groundwater: Antimony, copper, 1,1-DCE, 1,2-dichloroethane (1,2-DCA), total 1,2-dichloroethene (1,2-DCE), manganese, mercury, methylene chloride, nickel, nitrate (as N), tetrachloroethane (PCE), and trichloroethane (TCE).

Potential Receptors and Exposure Pathways

Based on the anticipated future use, the following receptors were evaluated at Sites 2 and 12:

- Site 2: Onsite workers
- Site 12: Onsite residents

To estimate potential exposures (i.e., dose) to COPCs, it was assumed that exposure of receptors at both sites to chemicals could occur via incidental ingestion of soil, dermal contact with soil, inhalation of dust, inhalation of VOC vapors diffusing upward from groundwater, and (at Site 12 only) ingestion of groundwater. Exposure assumptions (e.g., ingestion rate, inhalation rate, exposure frequency) were used to estimate dose via each pathway evaluated, as described in Volume III, Section 2.2.4. As recommended by EPA, two separate exposure scenarios were evaluated: (1) a reasonable maximum exposure (RME), and (2) an average exposure.

Methods of Assessing Potential Health Effects of Exposure

Methods used to evaluate potential health effects from estimated exposures are presented in Volume III, Section 2.4. Noncancer health effects were evaluated by comparing exposure estimates with EPA-developed reference doses, resulting in a hazard index (HI). EPA guidance indicates that remedial action may not be warranted for HIs of less than one (1) or for cancer risks of less than one excess cancer death in one million (10^{-6}). Cancer risk estimates falling within the EPA-defined target risk range of 10^{-6} to 10^{-4} may trigger remedial actions at some sites.

Potential cancer risks were estimated by multiplying exposure estimates by EPA- or Cal/EPA-developed slope factors. Because of its unique toxicological properties, potential exposure to lead was evaluated using pharmacokinetic models to estimate blood-lead concentrations, as described in Volume IV, Section 2.2.9. Estimated blood-lead concentrations were then compared to the EPA threshold blood-lead level of 10 micrograms per deciliter (μg/dl). Total multipathway HIs and cancer risk estimates are receptor-specific and include exposure to all COPCs, except lead, via all pathways evaluated.

Results of the Human Health Risk Assessment

Site 2. The results of the BRA indicate that adverse noncancer health effects from exposure to COPCs are not anticipated for any of the receptors evaluated at Site 2. Total multipathway HIs for the onsite worker receptor are 0.01 and 0.1 for the average exposure and RME scenarios, respectively; these HIs are below the EPA's 1.0 threshold level of concern. Total multipathway cancer risk estimates range from 2×10^{-7} (average) to 3×10^{-6} (RME). Background concentrations of arsenic in soil account for two-thirds (67 percent) of the RME cancer risk estimate. If cancer risk estimates at Site 2 are adjusted to account for background levels of arsenic in soil (i.e., if the estimated risks from background levels of arsenic are subtracted from the total multipathway cancer risk estimate), the estimated residual risk is 3×10^{-7} for the RME scenario. In either case, cancer risk estimates for the average or RME scenarios at Site 2 are within or below the EPA threshold risk range of 10^{-6} to 10^{-4}.

Site 12. The highest HIs for the nearby resident receptor at Site 12 are 0.4 and 2 for the average and RME scenarios, respectively. The ingestion of groundwater pathway accounts for approximately 63 percent of the highest multipathway HI of 2 for the RME scenario (the highest HI for the ingestion of groundwater pathway is 1.2; the highest for all soil pathways combined is 0.3). The HIs were highest for the resident receptors assumed to be between 0 and 6 years old. Estimated cancer risks at Site 12 range from 5 x 10^{-6} (average) to 6 x 10^{-5} (RME). The ingestion of groundwater pathway accounts for approximately 69 percent of the average multipathway cancer risk estimate and approximately 57 percent of the RME multipathway cancer risk estimate. When cancer risk estimates are adjusted to account for local background levels of arsenic and beryllium in soil, the residual risk estimates are 3 x 10^{-6} and 4 x 10^{-5} for the average exposure and RME, respectively. In either case, cancer risk estimates for Site 12 are within the EPA threshold risk range of 10^{-6} to 10^{-4}.

Lead exposure evaluation was conducted only for Site 12; lead was not selected as a COPC for Site 2. For the nearby child resident receptor, the blood-lead levels estimated are 3.15 and 7.29 μg/dl for the average and RME scenarios, respectively. Blood-lead levels estimated for the 6 to 9 year old group receptor (average) and the 6 to 18 and adult resident receptor (RME) are 4.46 and 7.64 μg/dl, respectively. These blood-lead levels are below the EPA threshold blood-lead level of 10 μg/dl.

9.1.3.2 Baseline Ecological Risk Assessment

Sites 2 and 12 were evaluated separately for the ERA because their habitats differ. The assessment endpoints for Site 2 are:

- Health of the black legless lizard, an endangered species that lives in the leaf litter layer
- Health of the food base for predators such as foxes and raptors.

The assessment endpoints for Site 12 are:

- Health of the silvery legless lizard, an endangered species that lives in the leaf litter layer
- Health of the food base for predators such as foxes and raptors.

Because both lizards live in the leaf litter layer, soil data were evaluated to assess potential exposure of the litter community. Litter samples were not collected at either site because the relevant areas either were sparsely vegetated and did not contain sufficient litter for analysis (Site 2) or they were paved (Site 12). At Site 2, deer mice, which serve as a food source for predators, were collected and analyzed to assess potential exposure of predators to chemicals in the deer mice. No deer mice were collected at Site 12 due to its developed nature. Exposure assumptions for predators, including home range size and ingestion rates, were used to estimate doses for direct ingestion of soil, dermal contact with soil, and ingestion of food items (e.g., deer mice). A conservative scenario was evaluated as recommended by the U.S. EPA. The assumptions were modified based on biota data (i.e., extrapolated data for leaf litter and plants).

Results of the ERA at Site 2

Lead was the only COPC for soil at Site 2. Results of the ERA at Site 2 are summarized below.

Black Legless Lizard. Because of the highly disturbed nature of Site 2 and the presence of the Hottentot fig, litter was not present in sufficient quantities for collection. Black legless lizards have been observed at Site 3 in areas near Site 2, indicating that they may be present at Site 2. However, the habitats at Site 2 are not the preferred habitat of the black legless lizard. This, combined with the small size of the areas marginally useable by the lizard, limits the value of the habitats at this site. Therefore, lizards are unlikely to frequent Site 2, and no adverse impacts are expected.

Predator Food Base. Most of the potential hazards are due to concentrations of lead in surface soils; results of deer mice sampling at Site 2 indicate that metals are present in rodent tissues consistent with background tissue levels. Therefore, no impacts to rodent populations are expected at Site 2. Because predators feed on rodent populations across the entire site and not only on rodents exposed to maximum concentrations in soil, no adverse effects to predator populations are expected. Even if a rodent spends all of its time in the heavily contaminated areas (which are also the areas of poorest habitat), body burdens are not expected to present a hazard to predators at the site.

Results of the ERA at Site 12

Lead was the only COPC for soil at Site 12. The results of the ERA at Site 12 are summarized below.

Silvery Legless Lizard. Because Site 12 is highly disturbed and mostly paved, no habitat suitable for the silvery legless lizard is present at Site 12. Therefore, no chemical exposures to the lizard are expected.

Predator Food Base. Most of the identified potential hazards are due to concentrations of lead in surface soils. No deer mice were collected at Site 12, but results of deer mice sampling at other sites with similar soil concentrations indicate lead tissue levels are likely to be consistent with background tissue levels. Therefore, no impacts to rodent populations are expected at this site. Additionally, the poor habitat quality is likely to limit the use of the area by small mammals (i.e., rodents). Because predators feed on rodent populations across the entire site, as well as in offsite areas with better habitat quality, and not only on rodents exposed to maximum contaminant concentrations in soil, no adverse effects to predator populations are expected. Even if a rodent spends all of its time in the heavily contaminated areas, which is highly unlikely given the developed nature of the site, body burdens are not expected to present a substantial hazard to predators at the site.

9.1.4 Summary of the Feasibility Study for Sites 2 and 12

The purpose of the FS is to develop and evaluate potential remedial alternatives that meet remedial action objectives (RAOs) and to select a preferred alternative for the mitigation of human health and environmental risks at Sites 2 and 12. This section summarizes the FS; the detailed evaluation is presented in Volume V.

9.1.4.1 Remedial Action Objectives

The RAOs for Sites 2 and 12 are to reduce risks to human health and the environment, and to comply with federal and state laws. A post-remediation risk assessment has shown that human health risks associated with chemicals in groundwater at maximum contaminant levels (MCLs) (aquifer cleanup goals) will not result in adverse human health effects. For soil there are no human health risk-based TCLs because the BRA concluded that chemicals do not present an unacceptable risk. For Site 12, the unknown TPHd will require cleanup to a remedial goal of 500 mg/kg based on To-Be-Considered (TBC) requirements and protection of groundwater. Removal of debris at Site 12 is another RAO because the debris was not disposed to land in accordance with current regulations. In addition, concentrations of contaminants above background levels were detected in soil intermixed with the debris. The contamination cannot be fully defined unless the debris is removed and sampled; therefore, debris is addressed under the soil remediation alternatives for Sites 2 and 12.

9.1.4.2 Description of Remedial Units

One groundwater and three soil remedial units were defined at Sites 2 and 12.

Groundwater Remedial Unit (VOC Plume at Sites 2 and 12)

The groundwater remedial unit is defined as groundwater at Sites 2 and 12 containing the dissolved VOCs TCE, 1,2-DCA, DCE, and PCE that exceed the MCLs. The lateral extent of the affected groundwater is bounded to the west by Monterey Bay. The northern boundary extends east from the ocean passing near the north end of Beach Trainfire Range Number 9 and through the DOL Automotive Yard. The eastern plume boundary passes near the baseball field on Site 12. The southern plume boundary extends south of the Industrial Area of Site 12 to a point about 200 feet north of the Highway 1 overpass and continues west to Monterey Bay at a point near Stilwell Hall. The distribution of TCE, 1,2-DCA, DCE, and PCE is contained within these lateral limits.

The vertical extent of the affected groundwater ranges from the water table to the top of the sandy silt layer that divides the 180-foot aquifer into upper and lower zones. The affected water-bearing zone beneath Sites 2 and 12 is the Upper 180-foot aquifer, which is the uppermost water-bearing zone in the vicinity and has approximately 75 to 80 feet of saturated thickness. Depth to water is approximately 70 to 80 feet bgs at the eastern edge of the plume (Site 12) and approximately 40 feet bgs at the western edge (Site 2). The sandy silt layer dividing the 180-foot aquifer appears to have limited vertical migration of dissolved VOCs, as discussed in the *Draft Final Basewide Hydrogeological Characterization* (*HLA, 1993*) and in Volume II of this RI/FS.

Soil Remedial Unit 1 (Lower Meadow Disposal Area)

The Lower Meadow Disposal Area is an approximately 0.5-acre portion of the Lower Meadow on Site 12. This portion is a grassy field east of Highway 1 near the Twelfth Street Gate and is Soil Remedial Unit 1 (SRU 1). SRU 1 contains concrete rubble and other construction debris intermixed with limited volumes of TPH-affected soil. The limits of the disposal area were laterally defined using a combination of geophysics, trenching, and soil sampling. SRU 1 is approximately 220 feet by 100 feet and extends to approximately 20 feet bgs for a volume of about 16,000 cubic yards.

Soil Remedial Unit 2 (Outfall 31 Area)

Soil Remedial Unit 2 (SRU 2) is the Outfall 31 Area east of SRU 1 and is a grass-covered depression that receives surface runoff and storm drainage flow from Outfall 31 and several other pipes. It has a catch basin area that collects precipitation and rainfall runoff. The catch basin is connected to subsurface piping, which runs to the west from the Outfall 31 Area to Outfall 15. The primary contaminants are unknown TPHd in an area approximately 100 feet by 50 feet with a maximum depth of 15 feet bgs for a volume of approximately 2,800 cubic yards (cy).

Soil Remedial Unit 3 (Cannibalization Yard Area)

Soil Remedial Unit 3 (SRU 3) is the Cannibalization Yard Area. This area is a shallow surface drainage that has been subject to runoff from the DOL Automotive Yard and the Industrial Area to the west and south, respectively. Surface and shallow borings near an oil/water separator and along the eastern margin of the Cannibalization Yard indicate that the shallow soil contains elevated levels (greater than 500 mg/kg) of TPH. No TPH level greater than 500 mg/kg was found below 0.5 feet bgs. The vertical and horizontal limits were defined by soil borings and surface samples. SRU 3 is approximately 170 feet by 80 feet and extends to a maximum depth of 2 feet bgs for a volume of about 1,000 cy. The boundaries of SRU 3 and the TPH data are presented on Plate 2.5.

9.1.4.3 Description of Remedial Alternatives

Remedial Alternative 1

Alternative 1 consists of No Action other than groundwater and surface water outfall monitoring. This no action alternative is provided, as required under CERCLA and the National Contingency Plan (NCP), as a baseline for comparison to the other proposed alternatives. This alternative recognizes that the natural attenuation through contaminant transport, biological degradation, and dispersion can reduce levels over an extended time. This alternative assumes that a monitoring program for the existing groundwater wells and two surface water outfalls will continue for 30 years. No institutional actions such as deed restrictions are included in this alternative.

Remedial Alternative 2

Alternative 2 consists of groundwater extraction and discharge to a Publicly Owned Treatment Works (POTW) for the groundwater remedial unit, capping and surface water controls for SRUs 1 and 2, and excavation and treatment of TPH-affected soil and onsite disposal for SRU 3.

For the groundwater remedial unit, Alternative 2 uses four extraction wells pumping at a total flow rate of 300 gallons per minute (gpm) for groundwater contaminant capture. The extracted water will be collected at a central process and control area. This alternative eliminates the requirement for chemical treatment of the extracted groundwater by proposing disposal at the POTW.

Alternative 2 soil containment includes capping and surface drainage controls for SRUs 1 and 2. This alternative would allow the Lower Meadow Disposal Area debris and elevated-TPH soil (SRU 1) and elevated-TPH soil at the Outfall 31 Area (SRU 2) to remain in place but would prevent potential leaching of chemicals to groundwater. The remedial technologies include capping with asphalt and grading for surface drainage controls.

The shallow soil containing elevated TPH levels at SRU 3 is not practical to cap so it will be excavated (approximately 1,000 cy), treated at the FOSTA, and disposed of at the OU 2 landfill or elsewhere onsite, as needed.

Remedial Alternative 3

Alternative 3 consists of groundwater extraction, treatment, and disposal by NPDES discharge, reuse, reinjection, or reinfiltration of groundwater in the remedial unit; capping of debris and selective excavation, treatment, and onsite disposal of TPH-affected soil for SRU 1; excavation, treatment, and onsite disposal of TPH-affected soil for SRUs 2 and 3.

For the groundwater remedial unit, this alternative uses the same groundwater extraction scenario as Alternative 2. The extracted groundwater requires treatment to meet NPDES, reuse, reinjection, or reinfiltration standards. Two subalternatives are presented to account for two groundwater disposal options.
Alternative 3A consists of disposal of treated water by NPDES discharge or reuse.
Alternative 3B uses four injection wells (separate from the four extraction wells) for groundwater disposal. On the basis of results of the pilot study being performed at Sites 2 and 12, reinfiltration galleries may also be considered in the final design. Groundwater would be treated using granular activated carbon (GAC), and treated effluent will be discharged through the storm drain under an NPDES permit, routed through piping systems for reuse, or placed back in the aquifer through an injection system. Effluent reuses include irrigation or process water. Generally, the treated groundwater will meet discharge standards that are expected to be detection limits using EPA Test Method 502.2 for the chemicals present. Discharge to areas overlying the contaminant plume need only meet the aquifer cleanup levels (MCLs).

Alternative 3 includes capping of SRU 1 after selected areas of TPH-affected soil have been removed; one area of elevated TPH near SB-12-17 has 570 mg/kg unknown TPHd at 10 feet bgs and will be excavated. The estimated volume of soil to be excavated is 10 percent of the total volume of 16,000 cy (i.e., 1,600 cy). The TPHd-affected soil will be treated at the FOSTA and disposed of onsite at the OU 2 landfill or elsewhere, as needed. Capping and surface controls will be implemented similarly to Alternative 2.

The approximately 2,800 cy of elevated-TPH soil from SRU 2 and 1,000 cy of shallow soil at SRU 3 will be excavated, treated at the FOSTA, and disposed of onsite at the OU 2 landfill or elsewhere, as needed.

Remedial Alternative 4

Alternative 4 consists of groundwater extraction, treatment, and disposal by NPDES discharge; reuse (Alternative 4A), reinjection, or reinfiltration of (Alternative 4B) groundwater in the remedial unit; excavation, debris segregation, and treatment of TPH-affected soil and onsite disposal for SRU 1; and excavation, treatment, and onsite disposal of TPH-affected soil for SRUs 2 and 3.

This alternative uses the identical extraction, treatment, and disposal options for the groundwater remedial unit as described in Alternative 3, to develop Alternatives 4A and 4B.

This alternative includes excavation of approximately 16,000 cy of debris and TPH-affected soil from SRU 1. The debris and soil will be segregated, with the debris disposed of in the OU 2 landfill. The TPH-affected soil will be treated at the FOSTA and disposed of onsite in the OU 2 landfill or elsewhere, as needed. Approximately 2,800 cy of elevated TPH-affected soil from SRU 2 and 1,000 cy of shallow TPH-affected soil at SRU 3 will be treated at the FOSTA and disposed of onsite at the OU 2 landfill or elsewhere, as needed.

9.1.4.4 Comparison of Remedial Alternatives

Each potential remedial alternative for Sites 2 and 12 was evaluated and compared on the basis of the EPA's nine evaluation criteria and are summarized below.

Alternative 1 does not provide any additional protection to human health or the environment. Alternatives 2, 3, and 4 provide increasing levels of protection with Alternative 4 providing the greatest degree of protection for human health and the environment.

Alternative 1 is not expected to meet the ARARs. Alternatives 2, 3, and 4 will meet chemical-, action-, and location-specific ARARs.

Alternative 1 does not provide any significant long-term effectiveness. Alternative 1 relies on natural processes to degrade the mass of VOCs dissolved in the groundwater and has minimal long-term effectiveness. Alternatives 2, 3, and 4 provide increasing levels of long-term effectiveness, with Alternative 4 providing the most comprehensive long-term effectiveness.

Alternatives 2, 3, and 4 all have about the same short-term risks to the community and workers during implementation, but these are easily mitigated so that adequate protection is provided.

Alternative 1 does not reduce toxicity, mobility, or volume of the contaminants. Alternatives 2, 3, and 4 significantly reduce toxicity, mobility, and volume of contaminants. Alternatives 3 and 4 provide about the same level of reduction, which is greater than that provided by Alternative 2.

All the action alternatives considered for remediation would be designed according to ARARs and are easily implementable provided that appropriate permits and approvals can be obtained.

Total estimated net present value (NPV) costs, using a 5 percent discount rate, vary considerably for the four alternatives.

- Alternative 1: $1,838,500
- Alternative 2: $8,900,200
- Alternative 3: $7,359,000 to $8,656,000 (depending on groundwater disposal option)
- Alternative 4: $7,711,000 to $9,009,000 (depending on groundwater disposal option).

It is expected that the regulatory agencies and the community would accept each of the three action alternatives; however, their acceptance will be assessed in the Proposed Plan.

9.1.4.5 Selection of the Preferred Remedial Alternative

On the basis of comparison of alternatives, Alternative 4 is selected as the preferred alternative because it protects of human health and the environment, complies with ARARs, is effective in both the short and long term, is cost effective, and is readily implementable.

9.2 Sites 16 and 17

9.2.1 Background

Site 16 consists of the DOL Maintenance Yard, Pete's Pond, and Pete's Pond Extension; Site 17 consists of a Disposal Area and Other Areas. Each area is identified on Plate 4. Sites 16 and 17 were combined into one site after the first phase of the RI activities because of the similar contamination identified at both sites.

9.2.1.1 Site 16

For future land use planning, part of Site 16 has been designated to be part of a 40-acre parcel that will contain public agency corporation yards for the city of Marina, the county of Monterey, and the Monterey-Salinas Transit District. The three areas of investigation at Site 16 are described below.

DOL Maintenance Yard

The DOL Maintenance Yard was used as a heavy equipment maintenance facility since the 1950s. The yard consists of an approximately 4.5-acre facility containing five buildings, a steam cleaner shed, a wash rack and associated oil/water separator, and a diesel fuel AST.

The following potential sources of contamination were identified for investigation during the RI:

- A former UST location adjacent to Building 4900
- The oil/water separator and associated wash rack
- The diesel fuel AST
- Potential past spills from vehicles and equipment at the unpaved stained area near Building 4900
- A former paint shop
- Storm drain inlets.

Pete's Pond Extension

Pete's Pond Extension consists of a vacant area of approximately 3.5 acres between the DOL Maintenance Yard, Fifth Avenue, and the Fifth Avenue Cut-Off. Before the RI, trenching performed in this area to repair a stormwater drain encountered stained soils and debris including concrete, rusted ordnance (old bazooka round), a toy wagon, and other scrap metal. Evidence of earthwork and potential dumping was also observed in historical aerial photographs reviewed during Phase 1 of this RI.

Pete's Pond

Pete's Pond consists of an approximately 3.3-acre triangular depression between Fifth Avenue, the Fifth Avenue Cut-Off, and Eighth Street. Six storm drains discharge to Pete's Pond; although the depression is dry most of the year, it occasionally fills with up to 5 feet of water for short periods of time during heavy rainfall.

The following potential sources of contamination were identified for investigation during the RI:

- Past dumping activities: Before the RI, trenching performed to improve drainage at Pete's Pond encountered scrap metal and a drum containing a clear, gel-like substance. Evidence of earthwork was also observed in historical aerial photographs reviewed during this RI.
- Potential chemical spill: A potential chemical spill was identified in 1951 aerial photographs reviewed during Phase 1 of this RI.
- Storm drain outfalls: Discharge of potentially contaminated stormwater to Pete's Pond was suspected.

9.2.1.2 Site 17

Site 17 has been designated as part of an approximately 500-acre parcel that includes Sites 14, 15, part of 16, 17, 18, 23, 24, and 38 of the Basewide Investigation. This area, proposed by the California State University (CSU) as the site for its new Monterey Bay campus, includes mostly developed lands of the former Main Garrison of Fort Ord. Existing structures will be used for faculty and student housing, lecture/laboratory spaces, and university administrative offices. The precise locations of future developments within the CSU parcel (e.g., residence halls, a permanent library building) are unknown. The two areas of investigation at Site 17 are described below.

Disposal Area

The Disposal Area, part of the 1400 Block Motor Pool, consists of an approximately 8-acre area used from 1977 until recently to service, maintain, and store light and heavy trucks and other Army vehicles. The area is paved with asphalt except for a landscaped area along Eighth Street and Fifth Avenue, and contains a storage building and portions of Buildings 1481 and 1483. Information available before Phase 1 of the

RI suggested that waste, including medical debris generated at a former Fort Ord hospital and incinerated at Site 17's Building 1442, had been disposed of at the adjacent baseball field. However, the Phase 1 RI indicated that disposal also occurred at the area now designated as the Site 17 Disposal Area. Therefore, as part of this RI, suspected landfilling activities at the Disposal Area and adjacent baseball field were investigated.

Other Areas

Site 17's Other Areas consist of the entire site excluding the 8-acre Disposal Area described above. The following potential sources of contamination were identified for investigation during the RI:

- A former UST at Building 1426
- An oil/water separator near Building 1490
- Two reported fuel spills of unknown volume into a drainage ditch near the Building 1497 fueling facility
- Leakage from sanitary sewer and storm drain joints.

9.2.2 Summary of the Remedial Investigation for Sites 16 and 17

The objectives of the RI at Sites 16 and 17 were to determine the source areas of potential contamination and to define the nature and extent of that contamination. A further objective was to collect sufficient data to carry out human health and ecological risk assessments and feasibility studies.

9.2.2.1 Phase 1 Investigation

The Phase 1 investigation at Site 16 included:

- Conducting geophysical and soil gas surveys (21 locations) at Pete's Pond
- Excavating six test pits at Pete's Pond to a maximum depth of 10.5 feet bgs
- Drilling and geophysically logging one pilot boring to a maximum depth of 120 feet bgs
- Drilling and sampling 12 shallow borings to a maximum depth of 21.5 feet bgs: 7 at the DOL Maintenance Yard and 5 at Pete's Pond
- Installing and sampling (three rounds) one 117.5-foot-deep monitoring well screened in the A-aquifer
- Analyzing 54 soil samples for selected analytes including VOCs, BTEX, SOCs, TPHd, TPHg, priority pollutant metals, and total oil and grease.

The Phase 1 investigation at Site 17 included:

- Conducting geophysical and soil gas surveys at the baseball field and adjacent motor pool (Disposal Area) and conducting a soil gas survey at the Building 1497 fueling facility
- Excavating six test pits to a maximum depth of 10.5 feet bgs at the Disposal Area
- Drilling and geophysically logging one pilot boring to a maximum depth of 161.5 feet bgs
- Drilling and sampling two shallow soil borings to a maximum depth of 61.5 feet bgs: one at the former UST location at Building 1426 and one adjacent to the oil/water separator at Building 1489
- Installing and sampling (three rounds) two groundwater monitoring wells: one 163.5-foot-deep monitoring well screened in the A-aquifer and one 190-foot-deep monitoring well screened in the 180-foot aquifer
- Analyzing 24 soil samples for selected analytes including VOCs, BTEX, priority pollutant metals, TPHd, and TPHg.

9.2.2.2 Phase 2 Investigation

The purpose of the Phase 2 investigation was to address data gaps identified during the Phase 1 investigation.

The Phase 2 investigation at Site 16 included:

- Conducting a geophysical survey at Pete's Pond Extension
- Excavating 34 test pits to a maximum depth of 14 feet bgs: 12 test pits at the DOL Maintenance Yard and 22 test pits at Pete's Pond Extension
- Drilling and sampling 20 shallow soil borings to a maximum depth of 43 feet bgs: 12 borings at the DOL Maintenance Yard, 3 borings at Pete's Pond, and 5 borings at Pete's Pond Extension
- Analyzing 93 soil samples for selected analytes including VOCs, SOCs, TPHd, TPH as motor oil (TPHmo), priority pollutant metals, PCBs, hexavalent chromium, dioxins and furans, and sulfur mustard.

The Phase 2 investigation at Site 17 included:

- Conducting a geophysical survey at the Disposal Area
- Excavating 14 test pits to a maximum depth of 15.5 feet bgs at the Disposal Area
- Drilling and sampling 10 shallow soil borings to a maximum depth of 41.5 feet bgs at the Disposal Area
- Analyzing 48 soil samples for selected analytes including TPHd, TPHmo, VOCs, SOCs, priority pollutant metals, hexavalent chromium, PCBs, dioxins, and furans.

9.2.2.3 Results and Conclusions of the Remedial Investigation

Soils at DOL Maintenance Yard

- Soil samples from borings adjacent to the former paint shop (Building 4904) and at unpaved stained areas near Building 4900 did not contain organic compounds above detection limits or inorganic compounds above maximum background concentrations, except for chromium. Chromium was detected in one 15-foot sample above the maximum background concentration.
- Near-surface soil samples collected throughout the unpaved areas of the DOL Maintenance Yard generally contained concentrations of chlorinated dibenzodioxins (CDDs) and chlorinated dibenzofurans (CDFs). Concentrations decrease vertically in the upper foot of soil. CDD/CDF concentrations in soil at the DOL Maintenance Yard are lower than mean concentrations reported for an EPA study of soil samples collected from areas within North American that were not believed to be contaminated (*EPA, 1994c*).
- Soil near the oil/water separator, wash pad, steam cleaner shed, and adjacent AST for diesel was stained with petroleum hydrocarbons at depths ranging from 2 to 16 feet bgs. TPHd, unknown TPHd, and associated SOCs were detected in soil samples from 10 locations at concentrations up to 4,300 mg/kg; these samples were generally collected from or adjacent to hydrocarbon-stained soils. TPH has been detected in soil above 500 mg/kg both adjacent to the oil/water separator and adjacent to the steam cleaner shed and AST at depths of approximately 3 to 10 feet bgs; the lateral extent of TPH above 500 mg/kg has been defined, except on the southern boundary of the contaminated area.

Although the source of TPH has not been positively identified, TPH may have originated from one or more of the following:

- Leakage from diesel fuel lines between the AST and steam cleaner shed
- Leakage from the oil/water separator, wash rack, or pipes between the two structures
- Spillage from vehicles and equipment used in this area.

Soils at Pete's Pond Extension

- An elongated electromagnetic (EM) and ground-penetrating radar (GPR) anomaly was identified in the central area of Pete's Pond Extension during the geophysical survey.

- Incinerated and unincinerated debris, generally within a brown sand matrix, were encountered in test pits and borings in an elongated area trending northeast and southwest in the central portion of the area and ranging in depth from the ground surface to 8.5 feet bgs. The debris included broken, whole, and melted glass bottles; metal pieces; engine parts; and other miscellaneous refuse, as well as medical debris and ordnance and ordnance parts (e.g., old bazooka rounds). One 55-gallon drum excavated was the type used to store mustard agent. Debris was found with dates ranging from 1944 to 1955.

- On the basis of the dated material encountered in test pits and review of historical aerial photographs, the debris was probably dumped in the mid-1950s. The incinerated debris and medical debris may have been generated at the old hospital and incinerated at Site 17's Building 1442. The origin of the suspected mustard agent 55-gallon drum and ordnance is not known.

- Organic compounds (including TCE, PCE, pentachlorophenol [PCP], toluene, and TPHd) were detected in soil both inside and outside of the areas with debris. The detections of TCE and unknown TPHd are generally associated with debris-containing sand. Acetone and bis(2-ethylhexyl)phthalate were detected in several samples, but they probably represent laboratory contaminants. CDDs and CDFs were detected only within debris-containing sand. With few exceptions, metals exceeding maximum background concentrations were also in soil samples collected from debris-containing sand. This suggests that the debris is the most likely source of above-background metals concentrations in soil.

Soils at Pete's Pond

- Debris within a dark brown silty sand matrix was encountered in test pits and borings in one 80-by-200-foot area where there was an anomalous EM and GPR response to the geophysical survey; the debris ranges in depth from the ground surface to 7.5 feet bgs. Five other anomalous areas were also identified by the geophysical survey. The debris, predominantly rusted metal, includes metal drums, automotive parts, pieces of ceramics, and crystallized tar-like material.

- Except for a few hydrocarbon detections, VOCs were the only compounds detected in 6-foot-deep soil gas samples at concentrations near or at their detection limits. All but three of the total hydrocarbon detections were within the range of concentrations detected in field blanks during the soil gas survey. Of the detected compounds, only total hydrocarbons were detected consistently. No VOCs were detected in deep soil gas samples (i.e., 37 to 40 feet bgs). The soil gas sampling did not suggest the presence of a VOC source at Pete's Pond.

- TOG and 4,4'-DDT were detected in a few soil samples at Pete's Pond, some of which were collected in areas with subsurface debris. CDDs and CDFs were also detected in three soil samples (the only samples analyzed for these compounds in the Pete's Pond area); two of the samples were collected from areas with subsurface debris. CDD/CDF concentrations in soil at Pete's Pond are lower than mean concentrations reported for an EPA study of soil samples collected from areas within North America that are not believed to be contaminated (*EPA, 1994c*). Suspected laboratory contaminants, including acetone, methylene chloride, and methyl ethyl ketone, have also been detected sporadically in soil samples as well as in sediment samples.

- Metals exceeding maximum background concentrations were also detected in soil samples collected from three areas, but most of these decreased with depth.

- Subsurface debris was encountered discontinuously throughout Pete's Pond at depths of up to 7.5 feet bgs. Discharge of stormwater into Pete's Pond may also have contributed to the presence of organic chemicals and the above-background concentrations of metals in the surface and subsurface samples.

- Xylenes, 4-methyl-2-pentanone (also known as methylisobutylketone [MIBK]), and 4,4'-DDT were detected in two outfall pipe sediment samples. Several metals were also detected above the shallow maximum background concentrations for soil in one sediment sample.

Soils at Site 17 Disposal Area

- A large oval-shaped geophysical anomaly was delineated within the Disposal Area; no geophysical anomalies were discovered at the adjacent baseball field.

- Incinerated and unincinerated debris in a sand matrix were encountered in test pits and borings in an area approximately 350 by 500 feet, approximating the anomaly identified in the geophysical survey. The debris, which ranged in depth from the ground surface (in an unpaved landscaped area) to 16 feet bgs, included scrap metal; melted, unmelted, whole, and broken glass bottles; burnt and unburnt wood; asphalt and concrete chunks; medical debris; and other miscellaneous materials. Dated debris (e.g., bottles, newspapers) ranged from 1935 to 1951, although dates on recovered newspapers ranged only from June 1949 to March 1951.

- VOCs were detected at varying concentrations in soil gas samples in the Disposal Area; no VOCs were detected above reporting limits in samples from the baseball field. Except for total hydrocarbons, most VOCs were detected near or at the reporting limit. Of the detected compounds, only total hydrocarbons were detected consistently. With one exception, total hydrocarbon concentrations were within the range of concentrations detected in field blanks collected during the soil gas survey.

- Unknown TPHd and TPHmo were detected primarily within debris-containing sand, within a few feet below the debris zone, or in sand beneath asphalt paving; concentrations exceeding 500 mg/kg were detected only in samples collected from debris-containing sand. CDDs and CDFs were detected in samples collected from debris-containing sand and from the near surface (0 to 2 feet bgs). CDDs and CDFs were detected at the highest concentrations in samples collected from the debris-containing sand; samples collected from below these debris zones did not contain detectable concentrations. Acetone, methylene chloride, and bis(2-ethylhexyl)phthalate were detected in low concentrations in several samples, but these are considered laboratory contaminants. Several metals including copper, lead, mercury, and zinc were detected above maximum background concentrations; most exceedances were in samples collected within the debris area.

Soils at Site 17 Other Areas

- VOCs were reported at varying concentrations in soil gas samples collected at 40 feet bgs near the fueling facility, but only total hydrocarbons, TCE, and xylenes were detected consistently. These values, however, were within the range of concentrations detected in field blanks during the soil gas survey. The remaining compounds (benzene, toluene, PCE, and 1,1,1-trichloroethane [1,1,1-TCA]) were sporadically detected at several sampling locations at concentrations above their reporting limits. The soil gas sampling did not suggest the presence of a source of contamination near the fueling facility.

- Except for acetone (which is probably a laboratory contaminant) and an unknown TPHd in a surface sample from Boring MW-17-01-A (subsequently converted to a Site 17 monitoring well), no organic chemicals were detected in soil samples collected from the Other Areas. Except for one detection each of copper and silver above the maximum background concentration, metals were not detected above maximum background concentrations in the soil samples from the Other Areas.

Potential Impacts on Groundwater

The analytical results of soil sampling were reviewed to evaluate the potential groundwater impacts from chemicals detected at the site. The potential groundwater impacts of selected organic compounds present in soil were evaluated both qualitatively and quantitatively through modeling using vadose zone leaching (VLEACH) and groundwater mixing models. Potential impacts from metals detected in soil were evaluated qualitatively.

The organic chemicals or groups of chemicals selected for modeling included CDDs/CDFs, TPHd, TCE, PCE, PCP, and 4,4'-DDT. Results of the modeling indicate that CDDs/CDFs, PCP, and 4,4'-DDT would not likely leach to or be detected in groundwater over a 100-year period. Modeling indicates that TCE and PCE might leach to groundwater in 32 and 33 years, respectively; however, the maximum modeled concentrations for both compounds after 100 years were less than 0.2 and 0.002 $\mu g/l$, respectively. TPHd was modeled using three surrogate compounds. Of the three surrogates, dodecane and naphthalene leached to groundwater in 4 and 81 years, respectively; the maximum modeled concentrations in groundwater were less than 2 and 0.002 $\mu g/l$, respectively. When the conservative limitations of the VLEACH and groundwater mixing models are taken into account, these chemicals at their detected concentrations are not considered to be a significant impact to groundwater.

A qualitative analysis of the potential for metals to leach to groundwater indicates that because the concentrations of metals decreased significantly beneath the debris fill, and groundwater is approximately 105 to 155 feet bgs, the potential for impacts to groundwater quality from metals is very low.

Groundwater Quality

Two aquifers were investigated as part of the Site 16 and 17 field investigation: the A-aquifer and the Upper 180-foot aquifer. The A-aquifer is the uppermost aquifer below Site 16 and the eastern portion of Site 17; the depth to groundwater in this area ranges from approximately 100 to 135 feet bgs. In this area, the Fort Ord SVA separates the A-aquifer from the Upper 180-foot aquifer. In the western portion of Site 17, the Fort Ord SVA is not present, and the uppermost aquifer is the Upper 180-foot aquifer. The depth to groundwater in this area is approximately 170 feet.

Three wells at Sites 16 and 17 (MW-16-01-A and MW-17-01-A screened in the A-aquifer and MW-17-02-180 screened in the Upper 180-foot aquifer) were sampled five to six times each between March 30, 1992 and February 25, 1994. No VOCs were detected consistently (i.e., in every round) in any of the wells. However, compounds including PCE, TCE, and carbon tetrachloride have appeared in onsite wells in the last few sampling rounds. These detections appear to be related to the onsite migration of the OU 2 groundwater plume. Of these chemicals, PCE and carbon tetrachloride exceeded the state or federal MCLs in at least one sample from two wells. Except for one detection of antimony, inorganic constituents detected in groundwater samples did not exceed state and federal MCLs.

9.2.2.4 Contaminant Fate and Transport

Eight potential migration pathways for air, surface water, unsaturated zone soil, and ground water specific to Sites 16 and 17 were identified:

- Volatilization of chemicals into the air from soil
- Entrainment of wind-generated dust particles in air
- Potential volatilization from vapors with future water usage from onsite wells
- Transport of chemicals in surface water runoff via surface channels and storm drains

- Infiltration of stormwater runoff
- Leaching of chemicals into underlying unsaturated zone soil and to groundwater
- Migration of dissolved compounds in groundwater
- Volatilization of chemicals from groundwater into unsaturated zone soil.

Compounds detected at Sites 16 and 17 include VOCs, SOCs, TPH, 4,4'-DDT, CDDs/CDFs, and metals. Based on mobility and persistence factors and the distribution of chemicals onsite, the most significant migration pathways identified for the compounds detected at Sites 16 and 17 are:

- Transport of chemicals in surface water runoff via surface channels and storm drains
- Infiltration of stormwater runoff
- Leaching of chemicals into underlying unsaturated zone soil.

Chemicals detected in onsite soils are not expected to significantly impact groundwater; VOCs in groundwater beneath Sites 16 and 17 are believed to be associated with the OU 2 plume.

9.2.3 Summary of Risk Assessments for Sites 16 and 17

9.2.3.1 Baseline Human Health Risk Assessment

A BRA was conducted for Sites 16 and 17 to estimate potential cancer risks and adverse noncancer health effects associated with possible exposure to COPCs. The BRA included (1) identifying COPCs, (2) identifying potential receptors, (3) estimating potential exposure to COPCs, (4) identifying EPA- or Cal/EPA-developed toxicity values for COPCs, and (5) evaluating health risks associated with estimated exposure. The BRA for Sites 16 and 17 is presented in Volume III, Section 4.0.

Chemicals of Potential Concern

COPCs in soil were identified separately for each of the following areas at Sites 16 and 17: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. COPCs in groundwater in the A-aquifer and the Upper 180-foot aquifer beneath Sites 16 and 17 were also identified. Sample analyses that are not chemical-specific, such as TPH, were not used in the BRAs. The COPCs were selected so that the most prevalent, persistent, and potentially toxic compounds detected were quantitatively evaluated. Criteria for establishing COPCs are described in Volume III, Section 2.1.2. Samples results for CDDs and CDFs were converted to 2,3,7,8-tetrachlorodibenzo-p-dioxin equivalents (TCDD-TE) as described in Volume III, Section 2.2.7. The following chemicals were selected as COPCs in soil at Sites 16 and 17:

- DOL Maintenance Yard: arsenic, bis(2-ethylhexyl)phthalate, cadmium, and TCDD-TE
- Pete's Pond: TCDD-TE, chlordane, arsenic, beryllium, and cadmium
- Pete's Pond Extension: 4,4'-DDT, chlordane, TCDD-TE, antimony, arsenic, cadmium, copper, lead, nickel
- Site 17 Disposal Area: TCDD-TE, antimony, arsenic, cadmium, copper, lead, mercury, and nickel.

The following chemicals were selected as COPCs in groundwater at Sites 16 and 17:

- A-aquifer: PCE, TCE, and antimony
- Upper 180-foot aquifer: carbon tetrachloride, PCE, and TCE.

Potential Receptors and Exposure Pathways

The following receptors were used to evaluate possible exposure at Sites 16 and 17:

- Student/faculty artist receptor: Site 17 Disposal Area, with additional exposure at Pete's Pond and Pete's Pond Extension
- Utility worker receptor: Pete's Pond and Pete's Pond Extension
- Construction worker receptor: Site 17 Disposal Area and DOL Maintenance Yard
- Commercial worker receptor: DOL Maintenance Yard

To estimate potential COPC exposures (i.e., dose), it was assumed that exposure to soil could occur via incidental ingestion, dermal contact, and inhalation of dust. The student/faculty artist receptor was assumed to be exposed to groundwater via ingestion. Exposure assumptions (e.g., ingestion rate, inhalation rate, exposure frequency) were used to estimate dose via each pathway evaluated, as described in Volume III, Section 2.2.4. As recommended by EPA, two separate exposure scenarios were evaluated: (1) a reasonable maximum exposure (RME) and (2) an average exposure.

Methods of Assessing Potential Health Effects of Exposures

The methods used to evaluate potential health effects from estimated exposures are presented in Volume III, Section 2.4. Noncancer health effects were evaluated by comparing exposure estimates with EPA-developed reference doses, resulting in a hazard index (HI). EPA guidance indicates that remedial action may not be warranted for HIs below unity (1) or for cancer risks below 10^{-6}. Cancer risk estimates within the EPA-defined target risk range of 10^{-6} to 10^{-4} may trigger remedial actions at some sites. Potential cancer risks were estimated by multiplying exposure estimates by EPA- or Cal/EPA-developed slope factors. Because of its unique toxicological properties, potential exposure to lead was evaluated using pharmacokinetic models to estimate blood-lead concentrations, as described in Volume III, Section 2.2.9. Estimated blood-lead concentrations were then compared with the EPA threshold blood-lead level of 10 μg/dl (micrograms per deciliter). The total multipathway HI and cancer risk estimates are receptor-specific and include exposure to all COPCs, except lead, via all pathways evaluated.

Results of the Human Health Risk Assessment

The results of the BRA indicate that adverse health effects from exposure to COPCs at Sites 16 and 17 are not anticipated for any of the receptors evaluated. None of the multipathway HIs for noncancer health effects exceed the EPA's threshold level of concern. The multipathway HIs range from 0.0001 to 1. The multipathway cancer risk estimates range from: 2×10^{-7} and 5×10^{-6} for the student/faculty artist receptor, 1×10^{-9} and 7×10^{-8} for the utility worker receptor, 2×10^{-9} to 2×10^{-6} for the construction worker receptor, and 7×10^{-7} to 1×10^{-5} for the commercial worker receptor. Subtraction of the contribution of background arsenic levels reduces the maximum (RME) multipathway cancer risk estimate for the construction worker to 1×10^{-6}. All of the risk estimates are in EPA's target risk range of 10^{-4} to 10^{-6}; only the RME cancer risk estimate for the commercial worker receptor (at the DOL Maintenance Yard) and the RME student/faculty artist exceeds 10^{-6}. All exposures to lead evaluated at Sites 16 and 17 are below the EPA threshold blood-lead level of 10 μg/dl.

9.2.3.2 Baseline Ecological Risk Assessment

Chemical data for shallow soil samples collected from Site 16 (Pete's Pond, Pete's Pond Extension, and the DOL Maintenance Yard) were used in the Ecological Risk Assessment (ERA). At the Site 17 Disposal Area, contaminants are beneath paved areas, so this area was not evaluated because of the lack of complete exposure pathways for ecological receptors. Assessment endpoints evaluated at Site 16 are:

- Health of the silvery legless lizard, an endangered species that lives in the leaf litter layer
- Health of the food base for predators such as foxes and raptors
- Health of the central maritime chaparral habitat, a rare and declining habitat.

To evaluate the silvery legless lizard, soil and leaf litter data were evaluated to assess potential exposures to the litter community. To evaluate the food base for predators, an attempt was made to collect and analyze small mammals, which serve as a food source for predators; no small mammals were collected from Site 16. To evaluate the central maritime chaparral habitat, the chemical concentrations in soil, areal extent of contamination, and potential impacts to ecological receptors were considered to provide a weight-of-evidence analysis. Exposure assumptions for the fox, including home range size and ingestion rates, were used to estimate doses for direct ingestion of soil, dermal contact with soil, and ingestion of food items (e.g., deer mice). A conservative scenario was evaluated as recommended by the U.S. EPA. The assumptions were modified based on site-specific biota data (i.e., leaf litter and plants).

COPCs for soil at Site 16 include CDD and CDF congeners and lead. The results of the ERA at Sites 16 and 17 are summarized below.

Silvery Legless Lizard. Analysis of leaf litter organisms indicate that there is a difference in organism abundance relative to reference transects in similar habitats although the functional composition of the communities are similar. In addition, results of chemical analysis of leaf litter from these sites indicate that concentrations of metals are similar to those from reference locations. Therefore, because the difference in species abundance does not appear to impact the functional composition of the community and does not appear to be related to chemical concentrations, no adverse effects to the silvery legless lizard are expected at Site 16.

Predator Food Base. The majority of identified potential hazards at Site 16 are due to concentrations of lead and total CDD/CDFs in surface soils. Site 16 consists of two upland ruderal, developed areas (Pete's Pond and the DOL Maintenance Yard), and a mixture of upland ruderal and central maritime chaparral habitat (in Pete's Pond Extension). Suitable habitat for small mammals was not identified in the two upland ruderal, developed areas. Because of the limited area and its disturbed nature, mammals were not captured at Pete's Pond Extension, which was considered potential small mammal habitat. On the basis of this information, the habitats present at Site 16 do not appear to support small mammals. Therefore, predators are not likely to be present in these areas because no food is available, and exposure of predators to COPCs is not expected.

Central Maritime Chaparral Habitat. The central maritime chaparral is rare and declining in Monterey County; the largest contiguous area of this habitat in the county is at Fort Ord. Because this habitat at Site 16 is restricted to a minute area surrounded by developed land, any impacts at Pete's Pond Extension are not expected to adversely impact the overall habitat value at Fort Ord.

9.2.4 Summary of Feasibility Study for Sites 16 and 17

The purpose of the FS is to develop and evaluate potential remedial alternatives that meet RAOs to select a preferred alternative for the mitigation of human health and environmental risks at Sites 16 and 17.

9.2.4.1 Remedial Action Objectives

The RAOs for Sites 16 and 17 are to reduce risks to human health, and the environment, and to comply with federal and state laws. For soil there are no human health risk-based TCLS because the BRA concluded that chemicals do not pose an unacceptable risk. However, TPH will require cleanup based on a remedial goal of 500 mg/kg based on To-be-Considered (TBC) requirements and protection of groundwater.

Removal of debris at Sites 16 and 17 is another RAO because the debris was not disposed to land in accordance with current regulations. In addition, concentrations of contaminants above background levels were detected in soil intermixed with debris. The contamination cannot be fully defined unless the debris is removed and sampled; therefore, debris is addressed under the soil remedial alternatives for Sites 16 and 17.

Based on the results of the ERA (Volume IV), risks to ecological receptors at Sites 16 and 17 are not significant; however, impacts to the existing habitat should be mitigated where possible through revegetation of remediated areas with native species. Site 17 was not evaluated in the ERA because the site is paved and does not offer a habitat to animal or plant species.

9.2.4.2 Description of Remedial Units

Groundwater

Because the chemical compounds in groundwater at Sites 16 and 17 appear to be associated with the OU 2 plume, the groundwater will be captured and treated as part of the OU 2 groundwater remediation and will not be considered as a separate remedial unit for Sites 16 and 17.

Soil Remedial Unit 1

SRU 1 consists of TPH-impacted soil at the DOL Maintenance Yard and contains approximately 1,100 cy of soil over the TCL of 500 mg/kg for TPH. TPH-impacted soil is estimated to be up to 8 feet bgs and extends over an area of 4,700 square feet.

Soil Remedial Unit 2

SRU 2 consists of medical and miscellaneous debris and associated impacted soil at Pete's Pond, Pete's Pond Extension, and the Site 17 Disposal Area. Approximately 3,600 cy is from Pete's Pond and Pete's Pond Extension and the rest of the debris is at the Site 17 Disposal Area. Debris was identified in test pits up to 20 feet bgs with thickness of up to 15 feet and contains an estimated 67,000 cy of soil distributed over an area of approximately 14 acres.

9.2.4.3 Description of Remedial Alternatives

Remedial Alternative 1

Under Alternative 1, no action is taken at the site, and current site conditions remain unchanged except for the continuation of groundwater monitoring under the basewide program to assess potential impacts to groundwater. CERCLA guidance requires the evaluation of the no action alternative to provide a baseline for comparison. The no action alternative relies on natural degradation and dispersion of contaminants to eventually eliminate risks over many years. This alternative does not meet RAOs.

Remedial Alternative 2

Under Alternative 2, a cap would be constructed over the areas containing debris and TPH-impacted soil to limit contact and prevent surface water infiltration. Currently, asphalt paving covers portions of the Site 17 Disposal Area and the DOL Maintenance Yard. The asphalt pavements would have to be evaluated for quality and thickness to determine whether they provide adequate containment, and they would require ongoing maintenance. It is anticipated that additional asphalt and a seal coat would be needed for these areas.

Installation of the cover system at Pete's Pond and Pete's Pond Extension would involve removing, detonating, and disposing of any near-surface UXO, covering the surface with several layers of soil and impermeable material, installing drainage control systems and irrigation, and restoring and revegetating the surface.

Remedial Alternative 3

Under Alternative 3, debris from Sites 16 and 17 would be consolidated into the Site 17 Disposal Area. This alternative would involve moving Building Structure 1482 (a grease rack) and then removing the existing asphalt pavement and clean soil cover above the debris at the Site 17 Disposal Area. At Pete's Pond and Pete's Pond Extension, UXO would be removed and detonated or disposed of, as appropriate. After placement of debris, a layer of impermeable material would be placed over the debris, and 1 foot of clean soil would be placed over the impermeable material; the asphalt pavement would be restored, and as much of the original asphalt as possible would be recycled.

This alternative also includes excavation of soil containing over 500 mg/kg of TPH and treatment of the soil at the FOSTA. After treatment, this soil could be used in the cap at the OU 2 Landfill or as backfill. The excavation would be backfilled with clean fill, and the asphalt pavement would be patched.

Remedial Alternative 4

Under Alternative 4, debris from Sites 16 and 17 would be removed, treated, and disposed of at OU 2. This alternative would involve moving Building Structure 1482 (a grease rack) and then removing the existing asphalt pavement and clean soil cover above the debris at Site 17 Disposal Area. If UXO is present, it would be removed, detonated, and disposed of, as appropriate. The debris would be screened, treated by sterilization, and incorporated into the Fort Ord Landfill foundation layer. Clean soil would be brought in for backfill and the sites would be restored and revegetated, or repaved.

This alternative includes excavation of soil containing over 500 mg/kg of TPH and treatment of the soil at the FOSTA. After treatment, the soil would be disposed of or reused as fill.

9.2.4.4 Comparison of Remedial Alternatives

Each potential remedial alternative for Sites 16 and 17 was evaluated and compared on the basis of the EPA's nine evaluation criteria, as summarized below.

Alternative 1 would not provide good overall protection of human health and the environment because it would not be expected to meet TCLs for TPH. Alternatives 2, 3, and 4 would significantly increase overall protection of human health and the environment and would meet all chemical-, location-, and/or action-specific ARARs.

In terms of short-term and long-term effectiveness, Alternative 1 would allow potential direct contact with TPH-impacted soil and debris and therefore would not be effective. Alternatives 2 and 3 would provide short- and long-term effectiveness by treatment of the TPH-impacted soil and capping of debris, however, both of these alternatives would also require long-term monitoring, maintenance, and possible deed restrictions to inform potential future users of the site of the presence of TPH in soil and debris. Alternative 4 would provide the greatest short-term and long-term effectiveness at the site because all TPH-impacted soil and debris would be removed and treated.

Alternative 1 would not reduce the toxicity, mobility, or volume of the chemicals in the soil. Alternative 2 would reduce the mobility of chemicals in the TPH-impacted soil and in debris but would not reduce the toxicity or volume. Alternative 3 would reduce the toxicity of the TPH-impacted soil and the mobility of the debris. Alternative 4 reduces the toxicity, volume and mobility of the TPH-impacted soil by treatment prior to disposal; and reduces the volume and toxicity of the debris by screening and sterilizing it.

All of the alternatives considered for remediation are implementable if the appropriate permits and approvals can be obtained. Alternatives 2, 3, and 4 would have to be designed according to ARARs, and each of the action alternatives would require specialized equipment that is readily available.

Total estimated NPV costs using a 5 percent discount rate vary considerably for the four alternatives.

- Alternative 1: $774,000
- Alternative 2: $1,804,000
- Alternative 3: $1,604,000
- Alternative 4: $5,158,000

It is expected that the regulatory agencies and the community would accept each of the three action alternatives; however their acceptance will be assessed in the Proposed Plan.

9.2.4.5 Selection of the Preferred Remedial Alternative

Alternative 4 would be protective of human health, would comply with all ARARs, and would be consistent with projected land use. Therefore, Alternative 4 is selected as the preferred alterative.

9.3 Site 3

9.3.1 Background

Site 3, Beach Trainfire Ranges, extends approximately 3.2 miles along the coastline of Monterey Bay at the western boundary of Fort Ord (Plate 6). It has been used for small arms trainfire since the 1940s. In general, trainees fired from firing lines on the eastern portion of the site toward targets spaced at varying intervals to the west. Spent ammunition accumulated on the east-facing (leeward) sides of the sand dunes that formed the "backstops" for the targets.

Site 3 is proposed for reuse as a state park consisting of hiking trails, campgrounds, and ancillary facilities. Boardwalks through the dunes will connect parking lots on the eastern portion of the site with the beach to the west.

9.3.2 Summary of the Remedial Investigation for Site 3

The objectives of the RI at Site 3 were to determine the source areas of potential contamination and to define the nature and extent of that contamination. A further objective was to collect sufficient data to carry out human health and ecological risk assessments and feasibility studies.

9.3.2.1 Remedial Investigation Program

The three primary tasks conducted during the field investigation were source characterization, soil investigation, and air quality investigation.

Source characterization, included the following:

- Conducting a preliminary visual survey of two areas within the site
- Evaluating the distribution of spent ammunition by:
  - Detailed visual mapping and confirmation sampling in three study areas
  - Geophysical survey concurrent with the visual mapping
  - Sitewide reconnaissance visual mapping, including all blowouts
  - Detailed mapping of five blowouts
  - Visual mapping in five surf zone test pits
  - Evaluation of the chemical characteristics of the spent ammunition.

The soil investigation included the following:

- Excavating 23 test pits in the study areas and collecting 3 soil samples per test pit for metals analysis (69 samples)
- Collecting three additional samples in each of five of the test pits for leachate analysis (15 samples)
- Collecting one separate surface sample in each test pit for particle size analysis (23 samples).

The air quality investigation included collecting and analyzing air samples from one study area.

The need for a groundwater investigation was evaluated on the basis of the results of this investigation. However, groundwater data from two wells installed within Site 3 as part of the RI for Sites 2 and 12 were used to assess potential groundwater impacts.

9.3.2.2 Results and Conclusions of the Remedial Investigation

Lead, tin, zinc, antimony, chromium, copper, and iron are the primary components of spent ammunition at the site. Lead is the main contaminant because its concentrations are among the highest. Where other metals were detected at higher concentrations (e.g., copper and antimony in Test Pit O-9 in Study Area 1 at 0.13 foot), their distribution patterns were similar to that of lead in other test pits. Although iron was generally detected most often and at the highest concentrations, it was not considered to be a contaminant because it was detected in all soil samples (including those collected from the Control Area), it is an essential nutrient, and it has a much lower toxicity than lead.

The highest concentrations of lead were detected where surface concentrations of spent ammunition were greater than 10 percent. In these areas, the lead concentrations in sieved surface soil samples ranged from 457 mg/kg at Test Pit O-9 in Study Area 1 to 46,300 mg/kg at Test Pit I-35 in Study Area 2. An encrusted bullet layer was present beneath the surface (0 to 0.25 feet bgs) and extended to approximately 1 to 2 feet bgs in most areas where the surface concentration was greater than 10 percent and in some areas where surface concentrations were 1 to 10 percent. Lead concentrations in soil samples generally followed the vertical distribution of spent ammunition. Lead concentrations greater than 51.8 mg/kg (maximum background) were generally limited to depths above 2 feet bgs, except where the encrusted bullet layer extended deeper than 2 feet bgs (e.g., Test Pit M-02 in Study Area 1). Concentrations of lead generally decrease by orders of magnitude with depth.

Leachate analyses indicated that the highest concentrations of metals could be leached using rainwater. Leachate concentrations decreased with depth (corresponding to the vertical distribution of spent ammunition) and were less than 1 percent of the total concentration of lead in soil.

Because the results from both study areas were similar (i.e., there was no relation to age or usage of the ranges) and because visual mapping was the most effective way to estimate spent ammunition distribution across the site, the results of the quantitative sampling in the study areas were applied sitewide.

The depth to groundwater ranges from 20 to 100 feet bgs. Priority pollutant metals were not detected above MCLs and lead was not detected in the well installed at Range 11. This well was installed in an accessible area where lead, if present in groundwater, might be detected because (1) the well was within 20 feet of an area where the surface distribution of spent ammunition was heavy (i.e., greater than 10 percent), and (2) the depth to water was shallow (40 feet bgs).

The rapid decrease in lead concentrations in soil with increased depth and the groundwater data from nearby and downgradient wells indicate that there is little potential for contamination of the groundwater by lead.

The results of the air quality investigation indicated that, because of highly variable wind conditions, an assessment of airborne contaminants originating only from Site 3 was not possible. The data collected, therefore, were used only qualitatively in the BRA. Detected metals included lead, antimony, and copper.

9.3.2.3 Contaminant Fate and Transport

The spent ammunition in the dune sands is the potential source of chemicals at Site 3. The possible chemical release and migration mechanisms identified included the following:

- Migration of spent ammunition to the surf zone through erosion
- Leaching of metals from spent ammunition to soil
- Leaching of metals through the soil to groundwater
- Migration of dissolved metals within and between aquifers
- Discharge of groundwater containing metals to Monterey Bay
- Entrainment in air of metals adsorbed to dust particles

9.3.3.2 Baseline Ecological Risk Assessment

Chemical data collected in all three Site 3 study areas were used. Additional surface soil, plant, and small mammal data were collected to address potential risks to ecological receptors. Assessment endpoints evaluated at Site 3 are:

- Health of the Smith's blue butterfly, an endangered species that lives on buckwheat plants
- Health of the black legless lizard, an endangered species that lives in the leaf litter layer
- Health of mourning doves and their young
- Health of the food base for predators such as foxes and raptors.

To evaluate the Smith's blue butterfly, seeds from buckwheat plants and soil were collected and root elongation bioassays were conducted to assess potential impacts to the butterfly's habitat and food source. To evaluate the black legless lizard, soil data were evaluated and leachate tests were conducted on bullets to assess potential bioavailability of chemicals in the near-surface soil layer. To evaluate mourning doves, leachate results were used to assess potential bioavailability of metals in small bullet fragments that may be ingested and incorporated into "crop milk." To evaluate the predator food base, deer mice, which serve as a food source for predators, were collected from each of the three study areas and analyzed to assess potential exposures of predators to chemicals in the deer mice. Exposure assumptions such as home range size and ingestion rates were used to estimate doses for direct ingestion of soil, dermal contact with soil, and ingestion of food items (e.g., deer mice). A conservative scenario was evaluated as recommended by the U.S. EPA. These assumptions were modified based on biota data.

The ERA estimated potential adverse ecological effects associated with exposure to lead concentrations in soil. The results of the ERA at Site 3 are summarized below.

Smith's Blue Butterfly. Soil where the bullet distribution was less than 10 percent (surface area) did not impact the germination or root elongation in buckwheat plants. Where the bullet distribution was greater than 10 percent, the results showed decreased root elongation for some, but not all, buckwheat plants. Buckwheat plants are growing in all study areas of Site 3, including areas where the bullet surface distribution is greater than 10 percent. The buckwheat plants growing in these heavy bullet distribution areas may be stressed based on the root elongation results, leading to effects on growth. Because the Smith's blue butterfly moves from plant to plant during its lifetime, it is unlikely that any impacts to plant growth, seen in some plants, are posing a threat to the continued survival of the species at the site.

Black Legless Lizard. Black legless lizards are also present in all three study areas of Site 3. Results of leachate tests using synthetic rainwater indicate that less than 0.1 percent of the chemicals in bullets are readily leachable, and thus bioavailable to the lizard. Because of this low leachability, the most likely hazard to the legless lizard is the physical presence of an encrusted layer of bullets on the top of the soil, such as is associated with the heavy bullet distribution areas. This would likely restrict the occurrence of the lizard to areas outside of the encrusted layer, because the lizard requires loose soil for movement. Because only 4 percent of the surface of Site 3 is heavily contaminated with spent ammunition (i.e., greater than 10 percent surface coverage), it is not expected that this poses a substantial hazard to the survival of the species at the site.

Mourning Doves. Leachate results indicate that chemicals in bullets are not readily bioavailable and thus are not expected to be incorporated into the "crop milk." Also, because doves are not expected to nest in the area, and any foraging in impacted areas would be minimal, exposure to lead at Site 3 is not considered to be a significant exposure pathway for a dove and its brood.

Predator Food Base. Deer mice were captured in all three study areas. Results of deer mice analyses indicate that lead is present in tissues above background tissue levels. No impacts to rodent populations are expected because the contamination is limited to a small percentage of the site and because predators feed on rodent populations across the entire site, not only on rodents exposed to soil with maximum lead concentrations. Unless a rodent spends all of its time in the heavily contaminated areas, body burdens are not expected to present a substantial hazard.

9.3.4 Summary of the Feasibility Study for Site 3

The purpose of the FS is to develop and evaluate potential remedial alternatives that meet RAOs and to select a preferred alternative to mitigate human health and environmental risks at Site 3.

9.3.4.1 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the protection of human health and the environment at Site 3 are: (1) to reduce the aggregate risks associated with site-related chemicals, (2) to reduce potential adverse health effects for noncarcinogenic site-related chemicals and ammunition in the long-term and short-term by remediation, and (3) to protect sensitive habitats and restore those that are heavily disturbed. These objectives are in accordance with CERCLA guidance and the intended reuse of Site 3 (Section 9.3.1).

9.3.4.2 Description of Remedial Units

Groundwater

As mentioned in Section 9.3.2.2, above-background concentrations of lead are limited to the shallow soil, and lead has not been detected in groundwater from nearby wells. There is therefore little potential for contamination of groundwater by lead, so no groundwater remedial unit was defined for Site 3.

Soil Remedial Unit

A health-based level of concern of 1,860 mg/kg for lead in soil was developed. Concentrations of lead above 1,860 mg/kg occur mainly in areas where greater than 10 percent of the surface is covered by spent ammunition. Although some areas with moderate bullet distribution contain lead above the health-based level of concern, the ERA recommended remediation only in areas of heavy bullet distribution to minimize impacts to the sensitive ecological habitat in other areas. The soil remedial unit is thus defined by those areas of heavy bullet distribution.

The total surface area encompassed by visual observation of heavy bullet distribution made during the RI is approximately 850,000 square feet. The soil remedial unit consists of approximately 63,000 cy of spent ammunition and soil to a depth of 2 feet bgs, of which approximately 55,000 cy is soil and 8,000 cy is spent ammunition. Concentrations of lead detected in soil in RI study areas range from 11 to 46,300 mg/kg.

Storm drain outfalls at Site 3 require no action under CERCLA; however, monitoring of future discharges is required and will be performed under the Basewide Storm Water Outfall Monitoring Program. The Army and future users of the site will determine whether removal of the outfalls or diversion of stormwater will be undertaken.

9.3.4.3 Description of Remedial Alternatives

Remedial Alternative 1

Alternative 1 consists of taking no further action to control or remediate contamination at the site; it is required for consideration under CERCLA guidance, and forms a baseline against which to compare other alternatives.

Remedial Alternative 2

Alternative 2 consists of mechanical and hand excavation of areas with greater than 10 percent coverage of spent ammunition and soil followed by mechanical separation using screens and

- Bioaccumulation of chemicals by organisms, such as plants, and migration to other ecological receptors via the food web.

The data needed to investigate these potential chemical release and migration mechanisms were collected during the RI. The human receptors and exposure pathways are discussed further in the BRA for Site 3 in Volume III of this report. The ecological receptors and exposure pathways are discussed further in the Ecological Risk Assessment in Volume IV of this report.

9.3.3 Summary of the Risk Assessments for Site 3

9.3.3.1 Baseline Human Health Risk Assessment

A baseline human health risk assessment (BRA) was conducted for Site 3 to estimate potential cancer risks and adverse noncancer health effects associated with possible exposure to chemicals of potential concern (COPCs). The BRA included (1) identifying COPCs, (2) identifying potential receptors, (3) estimating potential exposures to COPCs, (4) identifying EPA- or Cal/EPA-developed toxicity values for COPCs, and (5) evaluating health risks associated with estimated exposure. The BRA for Site 3 is in Volume III, Section 5.0.

For the BRA, chemical data collected in Study Areas 1 and 2 were used. It was assumed that the extent and degree of contamination characterized within these two study areas reflect conditions across the entire site. Based on the RI, the following bullet distribution patterns were identified:

Bullet Distribution	Surface Coverage (%)	Fraction of Site 3 Surface Area (%)
Light or None	< 1	91
Moderate	1 to 10	5
Heavy	≥ 10	4

RI chemical data for lead and other potential contaminants are available for each these three categories.

It was assumed that any human receptor at Site 3 would be exposed to contaminants while walking randomly through any portion of the site. For this reason, surface-area-weighted chemical concentrations were estimated to represent sitewide conditions at Site 3. For comparison, health risk estimates were also developed assuming exposure might occur exclusively at areas with soil containing concentrations representing each of the three different bullet distribution levels.

Chemicals of Potential Concern

Chemicals detected in soil were considered for COPC selection at Site 3; based on the RI, groundwater data did not indicate impacts from the spent ammunition. The COPCs were selected so that the most prevalent, persistent, and potentially toxic compounds detected were quantitatively evaluated. Criteria for establishing COPCs are described in Volume III, Section 2.1.2. Antimony, copper, and lead were selected as COPCs in soil at Site 3.

Potential Receptors and Exposure Pathways

A hypothetical nearby resident child receptor, adult nearby resident receptor, and onsite park ranger receptor were evaluated in the BRA. To estimate COPC potential exposures (i.e., dose), it was assumed that exposure to chemicals could occur via incidental ingestion of soil, dermal contact with soil, and inhalation of dust. Exposure assumptions (e.g., ingestion rate, inhalation rate, exposure frequency) were used to estimate the dose via each pathway evaluated, as described in Volume III, Section 2.2.4. As recommended by EPA, two separate exposure scenarios were evaluated: (1) a reasonable maximum exposure (RME) and (2) an average exposure.

Methods of Assessing Potential Health Effects of Exposures

Methods for evaluating potential health effects associated with estimated exposures are presented in Volume III, Section 2.4. Noncancer health effects were evaluated by comparing exposure estimates with EPA-developed reference doses, resulting in a hazard index (HI). An HI greater than unity (1) indicates that there may be a concern for potential noncancer effects. None of the COPCs at Site 3 is considered carcinogenic; therefore, cancer risks could not be estimated. Because of its unique toxicological properties, potential exposure to lead was evaluated using pharmacokinetic models to estimate blood-lead concentrations, as described in Volume III, Section 2.2.9. Estimated blood-lead concentrations were then compared with the EPA's threshold blood-lead level of 10 μg/dl. The total multipathway HIs are receptor-specific and include exposure to all COPCs, except lead, via all pathways evaluated.

Results of the Human Health Risk Assessment

The results of the BRA indicate that no adverse noncancer health effects associated with exposure to COPCs at surface-area-weighted concentrations are anticipated for either the nearby adult or child resident or the onsite park ranger receptors. For the nearby adult or child resident receptor, the multipathway HIs for noncancer health effects range from 0.000007 to 0.7, which are below the EPA's 1.0 threshold level of concern. The multipathway HIs for the onsite park ranger are 0.01 and 0.4 for the average and RME scenarios, respectively. Estimated blood-lead levels range from 2.76 to 7.14 μg/dl for all receptors (both RME and average scenarios); all values are below the EPA's threshold blood-lead level of 10 μg/dl.

For the light or none bullet distribution area, the evaluation of the surface-area-weighted average COPC concentrations indicate that no adverse impacts are anticipated.

Multipathway HIs for the moderate bullet distribution area range from 0.00003 to 2. The multipathway HI of 2 (for the nearby resident child receptor, ages 0-6 years, RME scenario) is the only multipathway HI exceeding 1. The estimated blood-lead concentrations for the moderate bullet distribution area range from 2.77 to 89.36 μg/dl. The exposure scenarios for which the estimated blood-lead concentrations exceed EPA's threshold blood-lead level of concern of 10 μg/dl are: the nearby resident child receptor ages 0-6 years, RME scenario (89.36 μg/dl); the nearby resident adult receptor, RME scenario, (95th percentile = 27.05 μg/dl); and the park ranger receptor, RME scenario (95th percentile = 26.97 μg/dl).

Multipathway HIs for the heavy bullet distribution area range from 0.0004 to 26. The exposure scenarios for which the multipathway HIs exceed 1 are: the nearby adult or child resident receptors, RME scenario (HI = 2 to 26); and the park ranger receptor, RME scenario (HI = 16). The estimated blood-lead concentrations for the heavy bullet distribution area range from 2.79 to 177 μg/dl. The exposure scenarios for which the estimated blood-lead concentrations exceed EPA's threshold blood-lead level of concern of 10 μg/dl are: the nearby resident child receptor, RME scenario (177.42 μg/dl); the nearby resident (6 to 18 year-old child and adult) receptors, RME scenario (95th percentile = 48.14 μg/dl); park ranger receptor, average scenario (95th percentile = 20.50 μg/dl), and RME scenario (95th percentile = 48.14 μg/dl).

A health-based level of concern for lead was developed based on the exposures evaluated and the EPA threshold level of 10 μg/dl for blood-lead. The soil lead cleanup level of 1,860 mg/kg was developed based on possible RME exposure of the resident child receptor. Soil cleanup levels were not developed for other COPCs because the highest concentrations of the other COPCs in soil were collocated with the highest lead concentrations.

gravity-feed separation techniques. In addition, spent ammunition and fragments would be cleaned by a scrap metal dealer and recycled at a refinery. Depending on the residual concentrations of lead after separation, the soil would be treated by one of three methods: stabilization, soil washing, or asphalt batching.

The pre-remedial design study under this alternative would consist of bench-scale and pilot studies that apply sieving and one or more of the above treatment technologies to a limited area of the remedial unit to further define design and operating parameters. A work plan for the pre-remedial design study is currently under preparation for submittal to the regulatory agencies. It is anticipated that sieving and lead analyses of various soil fractions would first be performed to determine the most effective manner of separating the finer fractions of metal fragments from the soil. Based on these results, bench- and pilot-scale studies of the treatment methods would be implemented. The bench- and pilot-scale studies and a Draft Conceptual Plan summarizing the results and recommending full-scale implementation of a chosen treatment method will likely be completed by the summer of 1995.

Remedial Alternative 3

Alternative 3 consists of excavation and separation as described above for Alternative 2. However, instead of recycling and treatment, spent ammunition would be recycled, and soil would be placed in a Corrective Action Management Unit (CAMU) at the OU 2 landfill as foundation layer or disposed of at an appropriate landfill facility. This alternative provides flexibility in planning and management of the large volume of soil to be excavated from Site 3 through consideration of two options. Disposal Option 1, placement of the soil in a CAMU at the OU 2 landfill, would meet the intent and purpose of the CAMU regulations in that it would offer an onsite location for management of the soil in an innovative, cost-effective, and protective manner. Significant cost savings would be realized by placing the soil at OU 2 as a foundation layer because: (1) backfill material would not need to be imported, (2) the soil would stay at Fort Ord instead of being transported to a Class I landfill, and (3) the Army would be managing the waste onsite in a covered landfill that would protect human and environmental receptors from the risks associated with the lead in soil. Disposal Option 2, transportation, pretreatment, and disposal at a Class I landfill, could be used in conjunction with Option 1 for excess soil not needed for the OU 2 foundation layer. As discussed under Alternative 2, a pre-remedial design study would be performed to determine the most effective way to separate the metal fragments from the soil using sieving/screening equipment and to identify the likely disposal facility designation (e.g., Class I or Class II). Based on residual lead concentrations, acceptance of the soil at an appropriate landfill facility would be determined based on comparison of maximum concentrations to total and/or soluble threshold limit concentrations (TTLC/STLC). If lead concentrations exceeded the STLC, pretreatment would be required prior to disposal at a Class I landfill; pretreatment could be performed at the facility. If lead levels did not exceed the STLC, the soil would be disposed at a Class I or II landfill, depending on whether total concentrations exceeded the TTLC.

9.3.4.4 Comparison of Remedial Alternatives

Each potential remedial alternative for Site 3 was evaluated and compared on the basis of EPA's nine evaluation criteria. The evaluations are summarized below.

Alternative 1, no action, would not provide overall protection of human health and the environment or be effective because it would not meet the health-based level of concern for lead. Alternative 2 (excavation, separation, recycling of spent ammunition, and treatment of soil) and Alternative 3 (excavation, separation, and placement in the OU 2 CAMU or disposal at a landfill) would significantly increase overall protection in areas of heavy bullet distribution, eliminating the potential risks of human contact and reducing the surface-area-weighted lead concentration to a level that is below the health-based level of concern.

Alternative 1 would not meet chemical-specific ARARs. Alternatives 2 and 3 would meet all chemical-, action-, and location-specific ARARs.

Alternative 1 would allow direct contact with spent ammunition and lead-containing soil, and, therefore, would not be effective in the long term. Alternatives 2 and 3 would provide short- and long-term effectiveness for the remediation of the spent ammunition and would take 8 to 12 months, and 6 to 8 months, respectively, to effectively remediate the site. Alternatives 2 and 3 would also provide long-term effectiveness at the site because spent ammunition and soil from areas of heavy bullet distribution would be removed from the site, thereby reducing site risks; however, under Alternative 3, the long-term liability associated with the chemical-bearing soil placed at the OU 2 CAMU or disposed of at a landfill would remain with the generator.

Alternative 1 would not reduce toxicity, mobility, or volume of contaminated soil. Alternative 2 would reduce the toxicity, mobility, and volume of contaminated soil, depending on the type of treatment implemented. Alternative 3 would reduce the mobility but would not reduce the toxicity or volume of lead-containing soil. However, the volume of waste would be reduced through recycling and reuse of metals in spent ammunition for Alternatives 2 and 3.

Alternatives 2 and 3 would have to be implemented in accordance with ARARs, and would utilize equipment that is readily available.

Total estimated NPV costs would vary considerably for the three alternatives.

- Alternative 1: There are no costs associated with Alternative 1.
- Alternative 2: $11,482,000 (stabilization); $13,759,000 (soil washing); $16,036,000 (asphalt batching) depending on the method of soil treatment
- Alternative 3: $7,115,000 (OU 2 CAMU); $15,390,000 (Class I Landfill).

It is expected that the regulatory agencies and the community would accept either of the two action alternatives (i.e., 2 or 3); however, the status of their acceptance cannot be determined at this time and will be addressed in the Proposed Plan.

9.3.4.5 Selection of the Preferred Remedial Alternative

Alternative 3 was selected as the preferred alternative because it would protect human health and the environment and would comply with ARARs. It would also provide flexibility in management of the large volume of soil from Site 3, long-term effectiveness, is readily implementable, reduces the mobility and volume of contamination (soil and spent ammunition), and is the most cost-effective remedial alternative if a significant volume of soil is placed at the OU 2 CAMU.

9.4 Site 31

9.4.1 Background

Site 31 is in the southern part of the East Garrison, in and adjacent to a ravine approximately 0.2 mile southeast of the intersection of Watkins Gate Road and Barloy Canyon Road. This dump site is at the boundary of the Leadership Reaction Training Compound (LRTC) on the northern side of the ravine. The visible extent of disposal encompasses an approximately 500-foot-long section of the northern slope of the ravine.

The dump site was reportedly used in the 1940s and 1950s. Apparently, during this time, refuse was wholly or partially incinerated in a 500-ton incinerator, which was adjacent to the ravine.

The site is underlain by fine to medium sand to silty or clayey sand. Undisturbed and slightly cemented sand outcrops in several areas adjacent to and north of the ravine, as well as at the base of the western portion of the ravine.

Site 31 is included as part of a 734-acre parcel that also includes the East Garrison. Two hundred acres of this parcel are slated for the Monterey Agricultural Center and the remainder is to be set aside as open space/habitat. The precise future plans for Site 31 are unknown, although the steepness and natural habitats of Site 31 suggest that part will be set aside as open space.

9.4.2 Summary of Remedial Investigation for Site 31

The objectives of the RI at Site 31 were to determine the source areas of potential contamination and to define the nature and extent of that contamination. A further objective was to collect sufficient data to carry out human health and ecological risk assessments and feasibility studies.

9.4.2.1 Remedial Investigation Program

The field investigation was performed in two phases. The Phase 1 investigation included:

- Conducting preliminary surface debris mapping
- Conducting a geophysical survey
- Conducting a soil gas survey at 18 probe locations
- Drilling 18 soil borings to a maximum depth of 10.5 feet bgs
- Collecting subsurface soil samples for lithologic characterization, chemical analysis, and particle size analysis
- Collecting subsurface soil samples for lithologic characterization, chemical analysis, and particle size analysis. Eighteen soil samples were analyzed for TPHd, VOCs, and priority pollutant metals.

On the basis of results of Phase 1 activities, an additional Phase 2 investigation was performed which included:

- Conducting detailed surface debris mapping
- Collecting 58 surface soil samples for lithologic characterization and chemical analysis
- Drilling 21 soil borings to a maximum depth of 71.5 feet bgs
- Collecting subsurface soil samples for lithologic characterization and chemical and physical analyses
- Analyzing 101 soil samples for selected analytes including priority pollutant metals, hexavalent chromium, SOCs, pesticides, PCBs, and dioxins and furans.

9.4.2.2 Results and Conclusions of the Remedial Investigation

Soils

The history of the site, surface debris mapping, and soil gas and soil sampling indicate that the nature and extent of contamination consist of the following:

- The main potential source of contamination identified at Site 31 is incinerated debris and ash that is probably incinerated refuse. Other potential nonpoint sources of contamination at the site include (1) asphalt pavement operations, (2) stockpiling of coal, and (3) the application of pesticides in the vicinity of Site 31.
- Surface and subsurface incinerated and unincinerated debris at the site is present within a sand matrix; debris consists of whole, broken, and melted glass, melted and unmelted metal fragments, rusted cans, empty, crushed 55-gallon drums, burnt and unburnt wood, coal pieces, concrete and asphalt chunks, brick and clay tile fragments, and ash.
- Concentrations of VOCs were detected in soil gas throughout the site. Because VOCs were not detected in soil samples collected adjacent to soil gas sampling points, and because detected concentrations do not appear to be associated with the presence of

debris, VOCs in soil gas were not investigated further as part of the RI.

- TPHd, PAHs, and dibenzofuran were detected in surface and subsurface soil samples; these chemicals appear to be related to the presence of incinerated and unincinerated debris.

- Pesticides, including 4,4'-DDE, 4,4'-DDT, gamma-BHC, heptachlor, aldrin, dieldrin, and endrin, were detected in surface and subsurface soil samples; these chemicals may be related either to the presence of incinerated and unincinerated debris or to the former application of pesticides along the ravine slope.

- CDDs and chlorinated CDFs were detected throughout the site in surface and subsurface soil samples, both inside and outside areas with debris; concentrations appear to decrease away from the dump site. Although the presence of CDDs and CDFs within the debris zone is likely to be associated with the incineration of the dumped debris, CDDs and CDFs within soils outside the debris area could be from the settling of ash emanating from the chimney of the former onsite incinerator or could represent background conditions.

- Some priority pollutant metals were detected above maximum background concentrations in surface and subsurface soil samples; generally, above-background metal concentrations were associated with the presence of incinerated or unincinerated debris at or above the same sampling location.

- The lateral and vertical extent of several organic and inorganic compounds was not delineated to nondetect or established maximum background concentrations, respectively; however, because concentrations are low and/or are near maximum background conditions, no further investigation was warranted.

Groundwater

Groundwater quality was not investigated at the site because (1) chemicals detected within the soil at the site are relatively immobile, (2) organic and inorganic compound concentrations are either nondetected, detected at low concentrations, or are new background conditions; and (3) groundwater is deep (i.e., approximately 135 feet below the bottom of the ravine). However, to evaluate the potential impact to groundwater from detected organic chemicals, VLEACH modeling was performed for selected organic chemicals or groups of chemicals. Except for the TPHd surrogate dodecane, results of the modeling indicated that these chemicals would not leach to groundwater over a 100-year period if left in place at maximum detected site concentrations. The modeling indicated that dodecane might leach to groundwater in 49 years and estimated a maximum concentration of 0.0008 $\mu g/l$ in 100 years; this estimated concentration is not considered to represent a significant impact to groundwater.

A qualitative analysis of the potential for metals to leach to groundwater indicates that, because the concentration of metals decreases significantly beneath the fill, and groundwater is 135 feet bgs, the potential for impacts to groundwater quality from metals is very low.

9.4.2.3 Contaminant Fate and Transport

There are six potential migration pathways identified for air, surface water, unsaturated zone soil, and groundwater specific to Site 31 contaminants:

- Volatilization of chemicals into the air from soil

- Entrainment of wind-generated dust particles in air

- Leaching of chemicals into underlying unsaturated zone soil and to groundwater

- Transport of chemicals in soil via soil erosion or slope wash

- Transport of chemicals in surface runoff water via surface channels and storm drains
- Infiltration of channeled surface water runoff.

Although these potential pathways were identified, no significant migration pathways in air, surface water, or groundwater currently exist. Chemicals at Site 31 are generally immobile and persistent, as described in Volume II, Site 31, Section 5.2. In addition, an evaluation of analytical results of Site 31 soil samples and the results of modeling indicate that chemicals have not migrated through soil more than a few feet and should not pose a threat to groundwater in the future.

9.4.3 Summary of Risk Assessments for Site 31

9.4.3.1 Baseline Human Health Risk Assessment

A BRA was conducted for Site 31 to estimate potential cancer risks and adverse noncancer health effects associated with possible exposure to chemicals of potential concern (COPCs). The BRA included the following steps: (1) identifying COPCs, (2) identifying potential receptors, (3) estimating potential exposure to COPCs, (4) identifying EPA- or Cal/EPA-developed toxicity values for COPCs, and (5) evaluating health risks associated with estimated exposures. The BRA for Site 31 is in Volume III, Section 6.0.

For the BRA, the site was divided into three areas: the North Slope, the South Slope, and the LRTC Area.

Chemicals of Potential Concern

Only chemicals detected in soil were considered for COPC selection at Site 31; groundwater sampling was not conducted as part of the Site 31 RI. Analytical results that are not chemical-specific, such as TPH, were not used in the BRA. The COPCs were selected so that the most prevalent, persistent, and potentially toxic compounds detected were quantitatively evaluated. Criteria for establishing COPCs are described in Volume III, Section 2.1.2. Results for CDDs and CDFs were converted to TCDD-TE, as described in Volume III, Section 2.2.7. The following chemicals were selected as COPCs at Site 31:

- North Slope: antimony, arsenic, B(a)P-TE, beryllium, cadmium, copper, 4,4'-DDE, 4,4'-DDT, lead, total carcinogenic PAH, and TCDD-TE
- South Slope: TCDD-TE and cadmium
- LRTC Area: TCDD-TE and copper.

Potential Receptors and Exposure Pathways

One receptor, a nearby resident trespasser, was selected for quantitative evaluation. To estimate potential COPC exposures (i.e., dose), it was assumed that exposure to chemicals could occur via incidental ingestion of soil, dermal contact with soil, and inhalation of dust. Exposure assumptions (e.g., ingestion rate, inhalation rate, and exposure frequency) were used to estimate the dose via each pathway evaluated, as described in Volume III, Section 2.2.4. As recommended by EPA, two separate exposure scenarios were evaluated: (1) a reasonable maximum exposure (RME) and (2) an average exposure.

Methods of Assessing Potential Health Effects of Exposures

Noncancer health effects were evaluated by comparing exposure estimates with EPA-developed reference doses, resulting in a hazard index (HI). Potential cancer risks were estimated by multiplying exposure estimates by EPA- or Cal/EPA-developed slope factors. EPA guidance indicates that remedial action may not be warranted for HIs below unity (1), or for cancer risks below 10^{-6}. Cancer risk estimates within the EPA-defined target risk range of 10^{-6} to 10^{-4} may trigger remedial actions at some sites. Because of lead's unique toxicological properties, potential exposure to lead was evaluated using pharmacokinetic models to estimate blood-lead concentrations, as described in Volume III, Section 2.2.9. Estimated blood-lead concentrations were then compared with the EPA threshold blood-lead level of 10 μg/dl. The total multipathway HI and cancer risk estimates are receptor-specific and include exposure to all COPCs, except lead, via all pathways evaluated.

Results of the Human Health Risk Assessment

The results of the BRA indicate that adverse noncancer health effects associated with exposure to COPCs other than lead are not anticipated for the nearby resident trespasser for both the average and RME scenarios. HIs for noncancer health effects range from 0.00004 to 0.02, well below the 1.0 EPA threshold level of concern. Cancer risk estimates range from 8×10^{-11} to 8×10^{-7}; these are below the low end of the EPA threshold risk range of 10^{-6} to 10^{-4}.

Lead exposure was evaluated only for the North Slope because lead was not selected as a COPC for either the South Slope or the LRTC Area. For the nearby resident trespasser at the North Slope, blood-lead levels of 5.24 and 16.1 μg/dl were estimated for the average exposure and RME scenarios, respectively. The blood-lead level for the average exposure scenario is below the EPA threshold blood-lead level of 10 μg/dl. The blood-lead level of 16.1 μg/dl estimated for the RME scenario, however, indicates that adverse health effects from lead exposure may be associated with the RME scenario. Approximately 24 percent of the estimated RME blood-lead concentration results from background exposure to lead. The results of the lead exposure evaluation indicate that remediation based on possible human health effects may be required for Site 31; for this reason, a health-based cleanup level for lead in soil of 1,860 mg/kg was estimated. Exposure of the nearby resident trespasser to lead in soil below this value is not expected to result in blood-lead levels above 10 μg/dl.

9.4.3.2 Baseline Ecological Risk Assessment

Chemical data collected from all areas of Site 31 were used; data were not subdivided by area. Assessment endpoints evaluated at Site 31 are:

- Health of the silvery legless lizard, an endangered species that lives in the leaf litter layer
- Health of the food base for predators such as foxes and raptors.

To evaluate the silvery legless lizard, soil and leaf litter data were analyzed to assess potential litter community exposures. To evaluate the food base for predators, deer mice, which serve as a food source for predators, were collected and analyzed to assess potential exposures of predators to chemicals in the deer mice. Exposure assumptions for predators, including home range size and ingestion rates, were used to estimate doses for direct ingestion of soil, dermal contact with soil, and ingestion of food items (e.g., deer mice). A conservative scenario was evaluated as recommended by the U.S. EPA. These assumptions were modified based on biota data.

COPCs in soil at Site 31 include CDD and CDF congeners and two metals (lead and thallium). The results of the ERA at Site 31 are summarized below.

Silvery Legless Lizard. No differences were found in litter species composition relative to reference transects in similar habitats. Litter organism abundance at Site 31 was lower than at reference location, although the functional composition of the community was similar to the reference location. Concentrations of COPCs other than lead in soil at collocated litter locations are consistent with background; for lead, no decreasing trends in abundance were observed with increasing lead concentrations. Chemical hazards would therefore not be expected to be associated with maximum concentrations of chemicals in surface soils, and no chemical impacts to the silvery legless lizard are anticipated.

Predator Food Base. Most of the potential hazards are due to concentrations of lead in surface soils. Results of deer mice sampling at Site 31 indicate that metals are present in rodent tissues above background tissue levels. No impacts to the rodent populations are expected because the contamination is limited to a small percentage of the site and because predators feed on rodent populations across the entire site, not only on rodents exposed to soil with maximum lead concentrations. Unless a rodent spends all of its time in the heavily contaminated areas, body burdens are not expected to present a substantial hazard. In addition, because soil contamination in vegetated areas onsite is limited to a small percentage of the site and predators feed on rodent populations across the entire site, not only on rodents exposed to maximum soil concentrations, no adverse effects to predators are expected.

9.4.4 Summary of Feasibility Study for Site 31

The purpose of this FS is to develop and evaluate potential remedial alternatives that meet RAOs for the remediation of contaminants and to select an alternative for the mitigation of human health and environmental risks at Site 31.

9.4.4.1 Remedial Action Objectives

The RAOs for the protection of human health and the environment at Site 31 are: (1) to reduce the aggregate risks associated with site-related chemicals, (2) to reduce potential adverse health effects for carcinogenic and noncarcinogenic site-related chemicals in the long term and short term by remediation, and (3) to restore heavily disturbed sensitive habitats. These objectives are in accordance with CERCLA guidance and the intended reuse of Site 31.

Qualitative RAOs are included for protecting Site 31's environment, including its sensitive ecological habitats, which support native coast live oak woodlands and, likely, the silvery legless lizard (an endangered species). No RAOs are necessary for groundwater because groundwater is not threatened by the impacted soil/debris present at Site 31.

Removal of debris at Site 31 is another RAO because the debris was not disposed to land in accordance with current regulations. In addition, concentrations of contaminants above background levels were detected in soil intermixed with the debris. The contamination cannot be fully defined unless the debris is removed and sampled; therefore, debris is addressed under the soil remedial alternatives for Site 31.

9.4.4.2 Description of Remedial Units

Groundwater

As discussed previously, chemicals in soil at Site 31 do not pose a threat to groundwater. No groundwater remedial units were defined for Site 31.

Soil Remedial Unit

On the basis of the health-based level of concern for lead developed in the BRA, a single soil remedial unit was defined on the North Slope. The area is steep (1 foot horizontal per 1 foot vertical) and heavily vegetated. Despite the heavy vegetation, the steep slope and sandy, noncohesive soil make it unstable. The soil remedial unit consists of shallow soil (up to 3 feet bgs) containing a cluster of five sample locations where lead in soil was above 1,860 mg/kg. The maximum lead concentration detected within the unit is 22,100 mg/kg. The soil remedial unit is approximately 3,200 square feet, extends to a depth of 3 feet bgs, and includes an estimated 350 cy of soil and debris.

The remainder of the debris and soil at the site has not been shown to pose a human-health risk, and thus need not be remediated. In addition, debris removal or treatment will not be performed in these other areas of Site 31 because of (1) the steepness and inaccessibility of the ravine and associated biological hazards (e.g., poison oak); (2) sensitive habitat that could be disturbed; (3) overhead power lines traversing the site, which would make equipment difficult to maneuver; and (4) unstable geologic conditions.

9.4.4.3 Description of Remedial Alternatives

Remedial Alternative 1

Alternative 1 consists of taking no further action to treat or control soil or debris at the site. This alternative is required for consideration under CERCLA as a basis for comparison with other alternatives. Institutional actions are not imposed under this alternative.

Remedial Alternative 2

Alternative 2 consists of excavation, soil screening, and disposal. A limited amount of debris and associated soil that contains lead concentrations above the health-based level of concern would be excavated from the soil remedial unit. These soil excavation activities would impact local flora and fauna; therefore, restoration of the original habitat, such as revegetation with native plant species, would be conducted to mitigate these impacts. Because this alternative does not consider unrestricted reuse, deed restrictions would be placed on the site.

The excavated material would be screened to remove debris material. Mechanical separation using screens (sieving equipment) would be used to separate debris from the sandy soil. Separated debris material would be rinsed or steam cleaned for use as foundation material for the OU 2 Landfills. Rinsate could be recycled and dehydrated, with the residual solids incorporated back into the separated sand for treatment.

Screened soil from Site 31 will be used as part of the onsite final remedial action proposed for Site 3. Because of their similarities in soil type (sand) and chemical contamination (lead), the small quantity of material at Site 31 could be easily incorporated into Site 3 remediation activities. If soil from Site 31 cannot be treated at the onsite corrective action management unit (CAMU) for treatment at either Site 3 or OU 2, it will be sent for offsite disposal.

Remedial Alternative 3

Alternative 3 consists of excavation and disposal in an onsite disposal area. A limited amount of debris and associated soil with lead concentrations above the health-based level of concern would be excavated from the soil remedial unit. Excavated material would be placed in a corrective action management unit (CAMU) at Site 3 or OU 2. The CAMU would be capped to limit potential direct human exposure to the waste materials and water infiltration and limit migration of debris and lead-containing soil offsite. A deed restriction would be imposed on the capped portion of the site to limit future development. The CAMU would be on a relatively flat area near the bottom of the ravine or on top of the ravine. The CAMU's final location would depend on engineering design and ecological considerations.

Installation of the CAMU would involve stripping the surface of existing vegetation, placing the consolidated soil and debris, and covering it with several layers of soil and impermeable material, as well as installing the necessary equipment needed for drainage control and irrigation. A concrete retaining wall or earthen berm would be used to direct stormwater runoff and prevent erosion of the cap. Excavation of soil and construction of this cap would impact local flora and fauna, and restoration of the original habitat, through revegetation with native plant species, would be conducted to mitigate these impacts. Site restoration activities would be similar to Alternative 2.

Remedial Alternative 4

Alternative 4 is similar to Alternative 2 and would involve the same excavation, site restoration and deed restriction activities. However, instead of screening the debris and shipping the separated soil to Site 3 for incorporation with pre-design or remedial activities on that site, the excavated soil and debris would be sent directly for offsite disposal at a Class I hazardous waste landfill.

9.4.4.4 Comparison of Remedial Alternatives

Each potential remedial alternative for Site 31 was evaluated and compared on the basis of EPA's nine evaluation criteria, as summarized below.

Alternative 1, no action, would not provide overall protection of human health and the environment and it would not be expected to meet chemical-specific ARARs for soil.

Alternatives 2, 3, and 4 would significantly increase overall protection by removing, containing, or disposing of the chemical-bearing fill, thereby eliminating the potential risks of human contact and are expected to meet applicable ARARs.

Alternative 1 would allow potential direct contact with chemical-bearing soil and would not be effective in the short or long term. Alternatives 2, 3, and 4 would provide short- and long-term effectiveness; however, Alternative 3 would require long-term monitoring and maintenance. Alternative 2 would provide the greatest short-term and long-term effectiveness because the soil would be removed and treated.

Alternative 1 would not reduce toxicity, mobility, or volume of chemicals in soil. Alternative 2 would reduce the toxicity, mobility, and volume by screening and treatment. Alternatives 3 and 4 would reduce the mobility but not the toxicity or volume of chemical-bearing soil.

All of the alternatives considered for remediation are implementable subject to the ability to secure the appropriate approvals. Alternatives 2, 3, and 4 would have to be designed according to ARARs, and each of these action alternatives would require specialized construction or treatment equipment that is readily available.

The estimated NPV cost of the no action alternative for 30 years is zero. As shown below, total estimated NPV costs do not vary considerably for the other three alternatives.

- Alternative 1: The estimated cost of this alternative for 30 years is zero.
- Alternative 2: $315,000 (320,000 with contingency disposal)
- Alternative 3: $445,000
- Alternative 4: $335,000

It is expected that the regulatory agencies and the community would accept each of the three action alternatives; however the status of their acceptance cannot be determined at this time and will be addressed in the Proposed Plan.

9.4.4.5 Selection of the Preferred Remedial Alternative

Of the four alternatives developed, the preferred alternative is Alternative 2 (excavation and treatment of soil and disposal of debris). Alternative 2 is protective of human health and the environment, and it complies with ARARs. Furthermore, it is effective in both the short and long term, is cost effective, and is readily implementable.

9.5 Site 39 (Including Sites 5 and 9)

9.5.1 Background

Site 39 is in the southwestern portion of Fort Ord and includes the Inland Ranges (approximately 8,000 acres) and the 2.36-inch Rocket Range (approximately 50 acres). The Inland Ranges are bounded 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. The 2.36-inch Rocket Range is immediately north of Eucalyptus Road, near the north-central portion of the Inland Ranges.

The Inland Ranges were reportedly used since the early 1900s for ordnance training exercises, including onshore naval gunfire. Over the years, various types of ordnance have been used or found in the Inland Ranges, including hand grenades, mortars, rockets, mines, artillery rounds, and small arms rounds. Some training activities using petroleum hydrocarbons were also conducted. The 2.36-inch Rocket Range was reportedly used for anti-armor (bazooka) training during and shortly after World War II.

The proposed future use of most of the Inland Ranges will be as a natural resource management area (NRMA). This area will be managed by the U.S. Department of the Interior, Bureau of Land Management, and public access will be restricted. Several areas within, but along the periphery of, the Inland Ranges have a proposed future land use other than the NRMA. The Military Operations on Urban Terrain (MOUT)

Area, in the northeastern edge of the Inland Ranges, are proposed for use as a peace officer training area. The areas along the south boundary of the Inland Ranges are proposed for several uses, including city and county parks, a school expansion, and relocation of Highway 68.

9.5.2 Summary of Remedial Investigation for Site 39

The objectives of the RI at Site 39 were to determine the source areas of potential contamination and to define the nature and extent of that contamination. A further objective was to collect sufficient data to carry out human health and ecological risk assessments and feasibility studies.

Site 39 was defined using the results of previous investigations at several ranges within the Inland Ranges and information from research on ordnance-related training areas within and outside the Inland Ranges. Based on that research, the Site 39 RI focused on the following areas:

- Range 36A - Explosive Ordnance Disposal (EOD) Range
- Range 40A - Flame Field Expedient (FFE) Training Range
- Range 33 - Demolition Range
- Explosive ordnance target areas, including the 2.36-inch Rocket Range
- Small arms ranges
- Groundwater sampling
- Occurrence of unexploded ordnance/ordnance and explosive waste (UXO/OEW).

These investigation areas and the results of each investigation are described below.

9.5.2.1 Range 36A - EOD Range

Range 36A is an EOD range and was used for disposal of various types of commercial explosives and military ordnance and ammunition. Disposal occurred by open burning and open detonation (OB/OD). The range was used until October 1992, when Fort Ord's EOD unit was deactivated as part of the closure of Fort Ord. In January 1994, Range 36A was reactivated for disposal of UXO identified from Fort Ord's Time-Critical Removal Action Program for UXO/OEW found outside the Inland Ranges. Potential contaminants present at the range as a result of past activities include explosive compounds and metals.

RI Program

Investigations have been conducted at the direction of the Army at Range 36A by James M. Montgomery Consulting Engineering (JMM) and by HLA. In 1990, JMM performed a PA/SI at Range 36A to evaluate the presence of explosive compounds and metals as a result of past activities at the site. The JMM investigation consisted of drilling two soil borings and installing three wells. Twenty-four soil samples, plus one split sample and one duplicate sample, were collected from the two borings and three monitoring well boreholes; these samples were analyzed for explosive compounds and metals.

In 1992, HLA performed an RI at Range 36A. This investigation included:

- UXO/OEW and biological clearances
- Drilling 23 borings to depths of 15 to 20 feet bgs on an approximate 50-foot grid
- Collecting 69 surface and subsurface soil samples for lithologic characterization, and chemical and physical analysis
- Analysis of soil samples for explosive compounds and priority pollutant metals.

Results

The findings of the field investigations at Range 36A indicate the following:

- The explosive compounds cyclotetramethylenetetranitramine (HMX) and cyclotrimethylenetrinitramine (RDX) are present at low levels (maximum concentrations of 1.35 and 11.88 mg/kg, respectively) and are generally limited to shallow soil.

- With the exception of lead and beryllium in shallow soil, metals in soil at the site above maximum background concentrations do not appear to be related to site activities.

9.5.2.2 Range 40A - FFE Training Range

Range 40A was used for training military personnel in the construction and use of improvised weapons using flammable substances. In the training exercises, a drum containing a gelatinous mixture of gasoline was partially buried so that its top pointed at a selected target. Detonation cord was used to blow the top off the drum while a TNT charge in the drum ejected the burning material. In addition to the FFE training exercises, three shallow trenches, which still exist at the site, were used for fire and smoke demonstrations. The demonstrations were conducted by filling the trenches with a fuel similar to that used for the FFE training, then igniting the fuel and allowing it to burn. The potential contaminants at Range 40A include TPH and related constituents, metals, and explosive compounds.

RI Program

The field investigation at Range 40A was completed in two phases. The Phase 1 investigation, completed in February 1992, included:

- UXO/OEW and biological clearances
- Drilling seven borings to a depth of 5 feet bgs at potential source areas
- Collecting 14 surface and subsurface soil samples for lithologic characterization and chemical analysis, and 7 samples for physical analysis
- Analysis of 14 soil samples for TPHd and TPHg, BTEX, SOCs, and lead.

Based on the results of the Phase 1 activities and on additional information obtained after Phase 1, a Phase 2 investigation was conducted in April 1994 which consisted of the following:

- UXO/OEW and biological clearances
- Drilling 12 borings to a depth of 10 feet bgs and 4 borings to a depth of 5 feet bgs to investigate additional potential source areas
- Collecting 60 surface and subsurface soil samples for lithologic characterization and chemical analysis, and 10 samples for physical analysis
- Analysis of soil samples for TPHd and TPHg, BTEX, SOCs, priority pollutant metals, and explosive compounds.

Results

The Phase 1 and Phase 2 field investigations at Range 40A indicate the following:

- An approximately 8-foot-thick, relatively horizontal clay layer appears to underlie most of the range; this clay layer appears to retard vertical migration of contaminants.
- Unknown TPHd and unknown TPHg were detected, primarily in shallow soil samples, at concentrations up to 1,400 mg/kg; the highest concentrations (i.e., those exceeding 100 mg/kg) are limited to shallow soils within or adjacent to the three trenches used for fire and smoke demonstrations.
- Other organic compounds, including PAHs and TICs, were also detected. These occurred only in surface and near-surface (2.5-foot-bgs) samples, and may be related to petroleum hydrocarbons or occur naturally.
- Arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, and zinc were detected at least once at concentrations above maximum background soil concentrations in surface and/or subsurface soil samples. However, with the exception of cadmium, lead, and zinc in shallow soil samples collected from borings

within or near the trenches or at a small portion of the target area, metals detected above maximum background concentrations do not appear to be related to site activities.

- No explosive compounds were detected in the soil samples.

9.5.2.3 Range 33 - Demolition Range

Range 33 was used as a standard demolition and field expedient demolition training range. Materials used included TNT, C-4 (plastic explosive), and a field expedient explosive, which consisted of a sack of ammonium nitrate soaked with diesel fuel. The potential contaminants include petroleum hydrocarbons and related constituents, metals, and explosive compounds that may have impacted the soil during training activities. Recent ordnance disposal activities have resulted in several recent explosion craters.

RI Program

The field investigation at Range 33 included:

- UXO/OEW and biological clearances
- Drilling 16 borings to a depth of 10 feet bgs
- Collecting 64 surface and subsurface soil samples for lithologic characterization and chemical analysis, and 6 samples for physical analysis
- Analysis of soil samples for TPHg and TPHd, BTEX, SOCs, priority pollutant metals, and explosive compounds

Results

The field investigation at Range 33 indicates the following:

- Unknown TPHd was detected in only one surface soil sample at concentration of 230 mg/kg; this indicates that hydrocarbon contamination related to training activities is likely to be at a low concentration, where present, and limited to surface soil in a small, localized area.
- Other organic compounds, including noncarcinogenic PAHs and TICs, were also detected; these occurred primarily in shallow soil. The TICs appear to be related to the presence of hydrocarbons; however, in areas with no detectable hydrocarbons, the nature of their presence cannot be determined.
- Several explosive compounds, including HMX and RDX, were detected in soil samples from borings adjacent to explosion craters that resulted from recent ordnance disposal activities.
- Beryllium, cadmium, chromium, copper, lead, and zinc were detected above depth- and soil-specific maximum background concentrations. However, with the exception of cadmium, copper, and zinc in localized shallow soil, the other metals do not appear to be related to site activities. Most of these above-background metal concentrations occur in deep soil and do not appear to be related to the source areas identified by the presence of unknown petroleum hydrocarbons and explosive compounds.

9.5.2.4 Explosive Ordnance Target Areas

Portions of the Inland Ranges and the 2.36-inch Rocket Range have been used in the past for training troops in the use of explosive ordnance. Explosive ordnance targets are located in specific ranges within the Inland Ranges and at the 2.36-inch Rocket Range. Potential contaminants at these target areas include explosive compounds and metals.

RI Program

The investigation of the explosive ordnance target areas included:

- UXO/OEW clearance of sampling locations, as well as access/egress routes near target area

- Drilling 120 borings to a depth of 2 to 2.5 feet bgs and 15 borings to a depth of 5 feet bgs at explosive ordnance targets in several ranges, in the High Impact Area within the Inland Ranges, and in the 2.36-inch Rocket Range
- Collecting 285 surface and subsurface soil samples for lithologic characterization and chemical analysis, and 22 samples for physical analysis
- Analysis of soil samples for explosive compounds, priority pollutant metals, and total organic carbon

Results

The results of the investigation at the explosive ordnance target areas indicated the following:

- Several explosive compounds, including HMX; RDX; 1,3,5-trinitrobenzene (1,3,5-TNB); 2,4,6-trinitrotoluene (2,4,6-TNT); 2-Amino-dinitrotoluene (2-Amino-DNT); 4-Amino-dinitrotoluene (4-Amino-DNT); nitroglycerine, tetryl, and pentaerythritoltetranitrate (PETN), are present, predominantly in shallow soil. Except for HMX, which was detected at a maximum concentration of 1,100 mg/kg, the explosive compounds were present at relatively low concentrations (0.14 to 8.1 mg/kg). The concentrations of explosive compounds decreased significantly (one order of magnitude or greater) from the surface to 2.0 or 2.5 feet bgs.
- Soil contamination from explosive compounds appears to be primarily in Ranges 44 and 48; these ranges show evidence of heavy use, such as demolished targets and abundant UXO/OEW at the bases of the targets. Elsewhere, the occurrences of explosive compounds were sporadic and concentrations were usually close to, at, or below reporting limits.
- Antimony, arsenic, beryllium, cadmium, total chromium, copper, lead, mercury, nickel, selenium, silver, and zinc were detected in shallow and/or deep soil samples at concentrations above maximum background concentrations. Copper, lead, cadmium and zinc were the metals most frequently detected at concentrations above maximum background concentrations. In general, above-background metals concentrations in soil corresponded to the presence of explosive compounds in soil at the high use areas. Above-background levels of mercury and selenium in soil do not appear to be related to site activities. In addition, in deep soil, above-background arsenic, beryllium, chromium (total), nickel, and silver do not appear to be related to site activities.

9.5.2.5 Small Arms Ranges

Seventeen small arms ranges are located within the Inland Ranges and were used for pistol, rifle, and machine gun practice. The main potential contaminant in these areas is lead from spent ammunition.

RI Program

The investigations at the small arms ranges were based on the approach used at Site 3, the Beach Trainfire Ranges, and included:

- Identification of the types of spent ammunition present in the small arms ranges
- A visual survey of the distribution of spent ammunition along the lines of fire, at targets, and at backstops or open areas behind the targets
- Visual estimation of the surface distribution and density of spent ammunition at each of the study areas
- Measurements to confirm range boundaries and target locations.

Results

The methodology and results of the Site 3 investigation were used to develop conclusions about the distribution and potential impacts resulting from spent ammunition at the Site 39 small arms ranges. The results indicate the following:

- Spent ammunition consisted primarily of various caliber bullets, and lesser amounts of black powder rifle balls and lead shot.

- The main potential contaminant at the small arms ranges is expected to be lead; this is based on the similar types and compositions of ammunition used at Site 3.

- In general, most of the areas within the small arms ranges contain less than 1 percent surface coverage of spent ammunition.

- A few small, localized areas have a bullet surface coverage of 1 to 10 percent, or greater than 10 percent.

- Based on the soil analyses and groundwater sampling performed for the Site 3 investigation, it appears that there is little potential for contamination of groundwater by lead in the small arms ranges.

9.5.2.6 Groundwater Sampling

Groundwater sampling was performed at available monitoring wells at Site 39 in response to regulatory agency comments regarding groundwater quality at the site.

RI Program

Groundwater investigation at Site 39 consisted of collecting groundwater samples at one well in Range 36A in the eastern portion of the Inland Ranges and six wells in the western portion of the Inland Ranges. The groundwater samples were analyzed for explosive compounds, priority pollutant metals, and nitrate.

Results

The results of the Site 39 groundwater analyses, along with previous groundwater data collected from these wells during basewide sampling events indicate the following:

- No explosive compounds were detected in any of the groundwater samples.

- Antimony was detected in several wells at concentrations ranging from 8.8 to 13.6 $\mu g/l$; these concentrations are above the antimony MCL.

- Other metals detected were present at concentrations below their respective MCLs.

- Nitrate was detected twice in one well at concentrations of 14.8 and 22 mg/l, which are above the MCL.

Groundwater containing nitrate and antimony above their respective MCLs will be further evaluated under the basewide program.

9.5.2.7 Occurrence of UXO/OEW

Because Site 39 was used for ordnance-related training activities, OEW (including UXO) is present at the site. Typically, quantification of UXO/OEW at a contaminated site is performed as part of the remediation of the UXO/OEW (i.e., as UXO/OEW are found, they are removed or detonated).

RI Program

In the Site 39 investigation, several research activities were conducted to provide qualitative information regarding the surface distribution and density of UXO/OEW at the site.

Results

The results of the research activities indicate the following:

- In general, the ordnance used or found at the site is of the conventional type and includes small arms ammunition, grenades, rockets, mortars, artillery rounds, mines, and bombs.

- The distribution and density of UXO/OEW in a given area appear to be influenced by the locations of targets.

- High densities of UXO/OEW at Site 39 appear to be associated with targets in the high explosive/anti-armor ranges in the northwest part of the Inland Ranges and in the 2.36-inch Rocket Range.

- Several small, localized areas containing high densities of UXO/OEW were identified as piles of debris that appear to have either been consolidated during range clearance or dumped during disposal.

- In general, the central portion of the Inland Ranges contains medium densities of UXO/OEW.

- Areas containing low densities of UXO/OEW are predominantly along the perimeter of the Inland Ranges.

- Maximum subsurface penetration of the majority of UXO, based on a variety of conditions (e.g., ordnance type, weight, trajectory, and soil type), may range from less than 1 foot to 10 feet bgs.

- Because of missing or incomplete range activity records, misdirected shots, and poor or undocumented disposal practices, no area in Site 39 can be considered clear of UXO/OEW.

9.5.2.8 Contaminant Fate and Transport

Potential contaminant migration pathways were identified for Site 39 based on the physical characteristics and nature of contamination at the five areas of investigation within the site. These areas include Range 36A, Range 40A, Range 33, the explosive ordnance target areas, and the small arms ranges. In general, the main contaminants consist of TPH, SOCs, explosive compounds, and metals. Based on the results of investigations at these areas, four potential contaminant migration pathways for air, unsaturated soil surface water, and groundwater were identified:

- Volatilization of chemicals into the air from soil

- Entrainment of wind-generated dust particles in air

- Transport of chemicals in surface water via surface water runoff

- Leaching of chemicals into underlying unsaturated zone soil and groundwater.

Although these potential migration pathways were identified for potential contaminants found at Site 39, no significant migration pathways in air, unsaturated zone soil, surface water, or groundwater currently exist. Potential contaminants at Site 39 are generally immobile and persistent. In addition, evaluation of analytical results for Site 39 soil samples indicate that chemicals have not migrated significantly through soil (i.e., greater than a few feet) and should not pose a significant threat to groundwater in the future.

9.5.3 Summary of Risk Assessments for Site 39

9.5.3.1 Baseline Human Health Risk Assessment

A BRA was conducted for Site 39 to estimate potential cancer risks and adverse noncancer health effects associated with possible exposure to COPCs. The BRA included the following steps: (1) identifying COPCs, (2) identifying potential receptors, (3) estimating potential exposure to COPCs, (4) identifying EPA- or Cal/EPA-developed toxicity values for COPCs, and (5) evaluating health risks associated with estimated exposures. The BRA for Site 39 is presented in Volume III, Section 3.0.

Chemicals of Potential Concern

Chemicals detected in soil and groundwater were considered for COPC selection at Site 39. Analytical results that are not chemical-specific, such as TPH, were not used in the BRA. The COPCs were selected so that the most prevalent, persistent, and potentially toxic compounds detected were quantitatively evaluated. Criteria for establishing COPCs are described in the Volume III, Section 2.1.2. The chemicals selected as COPCs at Site 39 are listed below.

- Soil: 2-Amino-DNT, 4-Amino-DNT, antimony, arsenic, beryllium, cadmium, copper, HMX, lead, nickel, RDX, and 2,4,6-TNT.

- Groundwater: Antimony, arsenic, beryllium, mercury, nitrate, and nitrite.

Potential Receptors and Exposure Pathways

Hypothetical receptors representing a habitat management worker and a nearby resident were evaluated in the BRA. To estimate potential exposures (i.e., dose) to COPCs, it was assumed that exposure to chemicals could occur via incidental ingestion of soil, dermal contact with soil, inhalation of dust, and ingestion of groundwater for the habitat management worker receptor, and via inhalation of dust for the nearby resident receptor. Exposure assumptions (e.g., ingestion rate, inhalation rate, exposure frequency) were used to estimate dose via each pathway evaluated, as described in Volume III, Section 2.2.4. As recommended by EPA, two separate exposure scenarios were evaluated: (1) a reasonable maximum exposure (RME), and (2) an average exposure.

Methods for Assessing Potential Health Effects of Exposure

Methods used to evaluate potential health effects from estimated exposures are presented in Volume III, Section 2.4. Noncancer health effects were evaluated by comparing exposure estimates with EPA-developed reference doses, resulting in a hazard index (HI). EPA guidance indicates that remedial action may not be warranted for HIs less than one (1) or for cancer risks of less than one excess cancer death in one million (10^{-6}). Cancer risk estimates falling within the EPA defined target risk range of 10^{-6} to 10^{-4} may trigger remedial actions at some sites. Potential cancer risks were estimated by multiplying exposure estimates by EPA- or Cal/EPA-developed slope factors. Because of its unique toxicological properties, potential exposure to lead was evaluated using pharmacokinetic models to estimate blood-lead concentrations, as described in Volume IV, Section 2.2.9. Estimated blood-lead concentrations were then compared to the EPA threshold blood-lead level of 10 μg/dl. Total multipathway HIs and cancer risk estimates are receptor-specific and include exposure to all COPCs, except lead, via all pathways evaluated.

Results of the Human Health Risk Assessment

The results of the BRA indicate that adverse noncancer health effects from exposure to COPCs are not anticipated. Multipathway HIs are all at or below the EPA's 1.0 threshold level of concern. Multipathway HIs are 0.1 (average scenario) and 1 (RME scenario) for the habitat management worker receptor and 0.0003 (average scenario) and 0.004 (RME scenario) for the nearby resident receptor. The lead exposure evaluation estimated blood-lead levels ranging from 3.06 to 5.13 μg/dl, below the EPA threshold blood-lead level of 10 μg/dl.

Possible multipathway cancer risk estimates are 2×10^{-6} (average scenario) and 8×10^{-5} (RME scenario) for the habitat management worker receptor and 2×10^{-7} (average scenario) and 3×10^{-6} (RME scenario) for the nearby resident receptor. These risk estimates are within the EPA-defined target cancer risk range of 10^{-4} to 10^{-6}.

The RME scenario multipathway cancer risk estimated for the habitat management worker is predominantly due to possible exposure to beryllium in soil (42 percent of the total risk estimate). Although exposure to arsenic and beryllium in the groundwater accounts for approximately 39 percent of the total RME risk estimate, these metals are considered to be naturally occurring in groundwater. Moreover, actual direct exposure (i.e., ingestion) of workers to groundwater is unlikely. Approximately 6.8 percent of the RME risk estimate for the habitat management worker is due to possible exposure to arsenic in soils; adjusting this arsenic risk estimate for exposure to background levels of arsenic in soil reduces the arsenic component of the multipathway to below EPA's threshold levels of concern. The remaining chemical contributing to the RME cancer risk estimate is RDX in soil. The risk estimate for RDX (7×10^{-6}) is at the low end of the EPA's range of concern and was calculated on the basis of RME conditions, which generally overestimate exposures that are likely to actually occur at the site.

The multipathway cancer risks estimated for the nearby resident receptor are below or at the low end of the EPA's threshold levels of concern. Actual risks to nearby residents are likely to be much lower because the risk estimates are based on very conservative exposure assumptions.

9.5.3.2 Baseline Ecological Risk Assessment

Chemical data collected in the areas identified in the Site 39 RI were used. Within each area, sample locations were divided into vegetated and unvegetated locations. The ERA was restricted to an evaluation of potential hazards to ecological receptors associated with chemicals in vegetated locations. Assessment endpoints evaluated at Site 39 are:

- Health of the silvery legless lizard, an endangered species that lives in the leaf litter layer
- Health of the food base for predators such as foxes and raptors
- Health of mourning doves and their young
- Health of the central maritime chaparral habitat, a rare and declining habitat.

To evaluate the silvery legless lizard, soil data were evaluated and leachate tests were conducted on bullets from Site 3 to assess potential exposures to the litter community. To evaluate mourning doves, leachate test results were used to assess potential bioavailability of metals in bullet fragments that may be ingested and incorporated into "crop milk." Deer mice, which serve as a food source for predators, were collected from Site 3 and chemically analyzed to assess exposures to predators. Because Sites 3 and 39 have similar historical land uses and were both used as trainfire ranges, data collected from biota at Site 3 were considered appropriate for evaluating Site 39. To evaluate the central maritime chaparral habitat, the chemical concentrations in soil, areal extent of contamination, and potential impacts to ecological receptors were considered to provide a weight of evidence analysis. Exposure assumptions for the fox, including home range size and ingestion rates, were used to estimate doses for direct ingestion of soil, dermal contact with soil, and ingestion of food items (e.g., deer mice). A conservative scenario was evaluated as recommended by U.S. EPA. The assumptions were modified based on biota data.

COPCs in soil at Site 39 include HMX and lead. The results of the ERA at Site 39 are summarized below.

Silvery Legless Lizard. Silvery legless lizards are likely to be present in all evaluated areas of Site 39. Results of leachate tests using synthetic rainwater indicate that less than 0.1 percent of the chemicals in bullets (e.g., lead) are readily leachable and thus bioavailable to the lizard. Because of this low leachability, the most likely hazard to the legless lizard is the presence of areas containing heavy (i.e., greater than 10 percent) concentrations of bullets. This would likely restrict the occurrence of the lizard to areas outside of heavy bullet distribution areas because the lizard requires loose soil for movement. Because only a small percentage of the 8,000 acres of Site 39 is heavily contaminated with spent ammunition, it is not expected that this poses a substantial hazard to the survival of the species at the site. Chemical hazards other than those present from bullets are likely to be restricted to the one identified hotspot of HMX.

Mourning Doves. Leachate results indicate that chemicals in bullets are not readily bioavailable and thus are not expected to be incorporated into the "crop milk." Also, because doves are not expected to nest in the area, and any foraging in impacted areas would be minimal, exposure to lead at Site 39 is not considered to be a significant exposure pathway for a dove and its brood.

Predator Food Base. Most of the predicted potential hazards are due to concentrations of HMX and lead in surface soils. The hazard posed by HMX was due to concentrations detected at only one location in the explosive ordnance target areas. Results of deer mice sampling at Site 3 also suggest that lead is likely to be present in rodent tissues at Site 39 above background tissue levels.

No impacts to rodent populations are expected because the chemical contamination due to bullets is limited to a small percentage of Site 39 and because predators feed on rodent populations across the entire site and not only on rodents exposed to maximum concentrations in soil. Rodent body burdens are not expected to present a hazard to predators at the site. Potential hazards from exposure to the one hotspot of HMX can be eliminated by removal of this soil.

Central Maritime Chaparral. On the basis of the data collected and evaluated for Site 39, the central maritime chaparral habitat does not appear substantially affected outside of the impact areas and the areas containing heavy bullet distribution (i.e., greater than 10 percent).

9.5.4 Summary of Feasibility Study Summary for Site 39

The purpose of the FS is to develop and evaluate potential remedial alternatives that meet RAOs for the remediation of contaminants and to select a preferred alternative for mitigation of human health and environmental risks at Site 39.

9.5.4.1 Remedial Action Objectives

The RAOs for Site 39 are the protection of human health and the environment, in compliance with federal and state laws. For soil there are health-based cleanup levels developed in the BRA for certain chemicals posing a risk to human health that will be applied at the site.

TPH will also require clean up to a remedial goal of 500 mg/kg based on To-Be-Considered (TBC) requirements and protection of groundwater. Recommendations made in the ERA will also be applied for protection of sensitive species at Site 39.

9.5.4.2 Description of Remedial Units

Groundwater

No groundwater remedial unit was defined for Site 39 because (1) the vertical extent of contamination is limited to the shallow soil (2) the depth to groundwater beneath Site 39 is estimated to range from 60 to 180 bgs, and (3) the presence of potential contaminants (i.e., antimony and nitrates) in groundwater has not been confirmed, and (4) groundwater data from monitoring wells indicated there is little potential for contamination of groundwater as a result of site activities. However, groundwater quality at Site 39 will continue to be evaluated as part of the basewide monitoring program.

Soil Remedial Unit 1

SRU 1 includes soil with detectable concentrations of RDX, beryllium, or TPH at or above the TCLs of 0.5 mg/kg, 2.8 mg/kg, and 500 mg/kg, respectively, from the following areas: Range 36A, Range 40A, Range 33, and the Explosive Ordnance Target Areas.

Based on the chemical data presented in the RI for Site 39, SRU 1 is defined by the distribution of chemicals present in the soil as discussed below.

- Range 40A - One area with concentrations of TPH above the TCL that consists of approximately 175 cy of soil.
- Range 33 - Two locations at isolated target areas where concentrations of RDX are above the TCL. The remedial unit area extends to 2 feet bgs and contains a total of approximately 60 cy of soil.
- Explosive Ordnance Target Areas - Three general areas where concentrations of RDX are above the TCL. The first area is in the vicinity of Ranges 35, 36, and 37 and the 2.36-Inch Rocket Range and contains approximately 30 cy. The second area is in the vicinity of Ranges 43, 45, and 48, and contains approximately 120 cy. The third area is in the vicinity of Ranges 30 and 30A and contains approximately 30 cy. The remedial unit areas extend to about 2 feet bgs and contain a total of approximately 180 cy.

Soil Remedial Unit 2

SRU 2 primarily includes soil containing lead above the health-based level of concern of 1,860 mg/kg from the following areas: explosive ordnance target areas and small arms ranges. For the explosive ordnance target areas, the distribution of lead with concentrations at or above 1,860 mg/kg defines the remedial unit. For the small arms ranges, chemical data for lead in soil are not available and the distribution of lead above 1,860 mg/kg is believed to correspond to the distribution of spent ammunition based on the Site 3 investigation. Because the conditions at the small arms ranges are similar to Site 3, the same model for site characterization was applied to these ranges. SRU 2 consists of the following:

- Explosive Ordnance Target Area - Two areas in the vicinity of Ranges 37 and 48 that extend to 2.5 feet bgs. These two areas consist of approximately 60 cy of soil, and include one detection of beryllium above the TCL of 2.8 mg/kg.
- Small Arms Ranges - Based on visual observations of bullet distribution made during the RI for Site 39, the following areas are included in the remedial unit:
  - Range 19 - The sand backstop and up to 100 feet behind the backstop, consisting of approximately 550 cy of spent ammunition and soil.
  - Range 21 - The backstop and up to 100 feet behind the backstop, consisting of 1,650 cy of spent ammunition and soil.
  - Range 22 - Within 1 meter of targets, this area consists of approximately 25 cy of spent ammunition and soil.
  - Range 23 - The fronts of the bunker and target areas, consisting of approximately 50 cy of spent ammunition and soil.
  - Range 25 - The backstop area, consisting of approximately 900 cy of spent ammunition and soil.
  - Range 26 - The firing lines, consisting of approximately 150 cy of spent ammunition and soil.
  - Range 39 - The backstop and firing lines, consisting of approximately 550 and 225 cy, respectively, of spent ammunition and soil.

9.5.4.3 Description of Remedial Alternatives

Remedial Alternative 1

Alternative 1 would take no further action to treat, contain, or remove impacted soil or spent ammunition. This alternative is required for consideration under CERCLA as a baseline against which to compare other alternatives. The No Action alternative would rely on natural degradation and dispersion over many years to eventually eliminate potential risks. The only activity to continue under no action would be periodic groundwater monitoring, performed as part of the basewide program to detect any threat to human health or the environment. It is likely that deed or access restrictions over much of Site 39 would be necessary to warn potential future users of the site.

Remedial Alternative 2

Alternative 2 would consist of the following institutional controls: (1) construction of a perimeter fence to restrict and completely enclose the remedial units at Site 39, (2) posting of warning placards at appropriate intervals along the fence, and (3) deed and land use restrictions placed on the property for future development. Access restrictions would consist of permanent chainlink fences extending approximately 8,400 linear feet around the boundaries of the remedial units. The fences would be installed using concrete footings and would be 8 feet high mounted with barbed wire as a deterrent to trespassers. In addition, placards would be displayed at intervals of 100 feet, warning of the potential chemical hazards. The integrity of the fence and placards would be checked on a yearly basis by a maintenance crew, and repairs would be made as needed. Deed restrictions would be placed on development of the property (i.e., any future land use would be restricted because the impacted soil would remain in place).

Remedial Alternative 3

Alternative 3 would involve excavation of soil (approximately 4,520 cy) in the remedial units. After excavation, soil with TPH and RDX would be transported for treatment at the FOSTA; soil with lead would be transported for treatment at Site 3. Areas where remediation would be performed would be cleared of UXO prior to excavation. The excavated areas would be backfilled with clean, imported soil, compacted, graded, and revegetated with native species that would enhance the naturally occurring habitat.

Remedial Alternative 4

Alternative 4 would consist of excavation of soil from the remedial units (approximately 4,520 cy), transportation, and offsite disposal at Class I and Class II landfills. Excavated soil containing TPH only (approximately 180 cy) would be treated at the FOSTA. Soil containing RDX (approximately 240 cy) would be manifested and transported to Chemical Waste Management's (CWM's) Kettleman Hills facility, the closest operating Class I landfill facility. Soil containing spent ammunition and lead (approximately 4,100 cy) would be disposed at CWM's Class I landfill.

UXO clearance would be performed as described for Alternative 3, and the different types of contaminated soil would be excavated and stockpiled separately, then transported to the respective landfills. After the soil is removed from the site, the excavated areas would be backfilled with clean, imported soil, graded, compacted, and revegetated as described under Alternative 3.

9.5.4.4 Comparison of Remedial Alternatives

Alternatives 1 and 2 would not provide overall protection of human health and the environment or long-term effectiveness and would not comply with ARARs. Based on the intended future land use, Alternative 2 could be effective in the short term, but would not comply with ARARs. Alternatives 3 and 4 would provide for overall protection of human health and the environment, comply with ARARs, and be effective in the short- and long-term.

Alternatives 1 and 2 would not reduce toxicity, mobility, or volume of the chemicals in soil. Treatment under Alternative 3 would provide reduction of toxicity, mobility, and volume. Disposal under Alternative 4 would reduce the mobility but not the toxicity or volume of contaminants. Although Alternative 4 would reduce mobility, it would continue to have long-term risks associated with the soil remaining at the landfill.

Each of the alternatives are easily implemented, subject to the ability to secure appropriate approvals.

Total estimated NPV costs would vary considerable for the four alternatives:

- Alternative 1: No costs are associated with this alternative
- Alternative 2: $122,000
- Alternative 3: $1,184,000
- Alternative 4: $1,293,000.

Regulatory agency and community acceptance of the alternatives will be determined in the Proposed Plan.

9.5.4.5 Selection of the Preferred Remedial Alternative

Alternative 3 is selected as the preferred alternative because it would comply with ARARs, would be effective in the short and long term, would reduce the toxicity, mobility, and volume, and is the least expensive of the alternatives that comply with ARARs.

10.0 QUALITY ASSURANCE PROGRAM

The overall objective for the quality assurance (QA) program was to develop and implement procedures for obtaining and evaluating quantitative and qualitative data that are precise, accurate, representative, complete, and comparable. Procedures were established so that field measurements, sampling methods, and analytical data provide information that is comparable to and representative of actual field conditions. The procedures that were established are presented in the Quality Assurance Project Plan (QAPP) (*HLA, 1991b*), QAPP Revisions (*HLA, 1992k*), and Part 2 of the *Draft Site Characterization, Site 34 - Fritzsche Army Airfield Fueling Facility, Fort Ord, California*, dated June 12, 1992. Additional field procedures and analytical methods used during the RI/FS and not included in the above documents are discussed in the Introduction to Volume II of this RI/FS.

To meet the overall QA objectives for the RI/FS, field audits were periodically performed to assess the quality of both the field procedures and field documentation. In addition, analytical data except for screening data (soil gas survey data and HydroPunch data analyzed by an onsite mobile laboratory) were validated using procedures outlined in the Introduction to Volume II of this RI/FS. The results of the data validation efforts for each site are provided in the individual site RIs. Data that met the QA objectives and goals were deemed acceptable. Data that did not meet objectives and goals were reviewed on a case-by-case basis to ascertain their usefulness and, when necessary or possible, corrective actions were taken to bring data within the QA acceptability goals.

11.0 COMMUNITY RELATIONS PROGRAM

The Fort Ord Community Relations Program was developed in accordance with CERCLA requirements to establish procedures for (1) disseminating accurate and timely information to the community about the environmental restoration program at Fort Ord, (2) developing ongoing two-way communication with the community, (3) encouraging community involvement, and (4) monitoring and responding to community concerns. The community includes residents of the area, public interest groups, public agencies, and elected officials.

In June 1991, the Army prepared a Community Relations Plan for Fort Ord (*HLA, 1991a*). To develop the plan, the Army conducted interviews with various community members to identify effective ways to communicate with the public. On the basis of the interviews, the program was developed and the plan outlines numerous methods for communicating with the public. The plan also identifies an initial mailing list of people wishing to receive Army literature on the environmental restoration program at Fort Ord. The mailing list is updated regularly as requests to be added to the list are received by the Army.

The Army has conducted numerous community relations activities since publishing the Community Relations Plan. These activities are listed and summarized below:

- "Kick-off" meetings: In late 1991, the Army held a series of kick-off meetings in several local communities, including Monterey, Seaside, Marina, and Salinas. The Superfund process and activities conducted at Fort Ord to date were described at the meetings.

- Media tours: In conjunction with the kick-off meetings, local media representatives were invited to tour Fort Ord and attend a press briefing on the Superfund Program.

- Brochures: A four-page brochure describing the Army's environmental cleanup at Fort Ord was published in September 1991. An additional brochure describing the Fort Ord Soil Treatment System (FOSTA) was published in October 1992. These brochures were mailed to people on the mailing list and have been distributed at public meetings.

- Information papers: Two-page information papers have been published and mailed to people on the mailing list and have been made available at public meetings. The papers included the following:

  - Information Paper #1 - The Underground Storage Tank Management Program at Fort Ord

  - Information Paper #2 - The Groundwater at Fort Ord

  - Information Paper #3 - Fort Ord's Hazardous Waste Management Program

  - Information Paper #4 - Ordnance and Explosive Waste at Fort Ord.

- Quarterly newsletters: The Army has prepared and distributed quarterly newsletters to people on the mailing list. The newsletter, titled *The Advance*, a periodic newsletter, provides updates on the cleanup process and other pertinent information relating to investigation and cleanup. The first *Advance* was published in summer 1992.

- Display boards: Two large display boards illustrating the Army's environmental strategy were prepared and have been exhibited at numerous public meetings and in public buildings (e.g., public libraries and post offices).

- Two information repositories have been established for the public to review documents produced as part of the CERCLA program. The repositories are located at the Fort Ord Post Library and Seaside Branch of the Public Library.

- Additional public meetings: Public meetings are held when milestones in the cleanup process are reached (e.g., after publication of a Proposed Plan) and when other information needs to be disseminated to the public. Notices advertising the meetings are placed in the local newspapers, and the local media are informed that a meeting is to be held. Public meetings held in 1993 included a meeting on the Fort Ord Environmental Restoration on September 21, the OU 2 Proposed Plan public meeting held on October 19, and the Interim Action Proposed Plan public meeting held on November 30.

- Technical Review Committee: A technical review committee (TRC) was developed to include local agencies and a community representative in the Fort Ord environmental restoration program. The TRC reviewed published documents and met quarterly to discuss the cleanup program. The TRC was recently converted into the Restoration Advisory Board (RAB), which is described below.

- Restoration Advisory Board: To better inform the public and encourage more public involvement in the environmental restoration program, Fort Ord has converted the TRC into the RAB. The RAB includes local citizens, in addition to the former members of the TRC. A public meeting to discuss formation of the RAB was held on February 7, 1994. The RAB is a forum for discussion and exchange of information about Fort Ord's environmental restoration program and provides an opportunity for the community to review progress, review published documents, and voice opinions. Workshops to introduce the citizen RAB members to environmental programs at Fort Ord began in May 1994 and are ongoing. To date, workshop topics included NPL field trip, environmental regulations, Fort Ord geology, investigation techniques, risk assessment, and base realignment and closure.

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TABLES

Table 1. Site Summary Table
Volume I - Project Summary, Basewide RI/FS
Fort Ord, California

Number	Site Name	Category
1	Ord Village Sewage Treatment Plant	No Further Action
2	Main Garrison Sewage Treatment Plant	Remedial Investigation
3	Beach Trainfire Ranges	Remedial Investigation
4	Beach Stormwater Outfall	No Further Action
5	Range 36A	Remedial Investigation
6	Range 39 (Abandoned Car Dump)	Interim Action
7	Range 40 and 41 (Fire Demonstration Area)	No Further Action
8	Range 49 (Molotov Cocktail Range)	Interim Action
9	Range 39 FFE Training Area)	Remedial Investigation
10	Burn Pit	Interim Action
11	AAFES Fueling Station	No Further Action
12	Low Meadow, DOL Yard, Cannibalization Yard	Remedial Investigation
13	Railroad Right-of-Way	No Further Action
14	707th Maintenance Facility	Interim Action
15	DEH Yard	Interim Action
16	DOL/Maint. Yard, Pete's Pond	Remedial Investigation
17	1400 Block Motor Pool	Remedial Investigation
18	1600 Block Motor Pool	No Further Action
19	2200 Block Facility	No Further Action
20	South Parade Grounds 3800, 519 Motor Pools	Interim Action
21	4400/4500 Motor Pool, East Block	Interim Action
22	4400/4500 Motor Pool, West Block	Interim Action
23	3700 Motor Pool	No Further Action
24	Old DEH Yard	Interim Action*
25	Former DRMO	No Further Action
26	Sewage Pump Stations	No Further Action
27	Army Reserve Motor Pool	No Further Action
28	Barracks and Main Garrison Area	No Further Action
29	DRMO	No Further Action
30	Driver Training Area	Interim Action
31	Former Dump Site	Remedial Investigation
32	East Garrison Sewage Treatment System	No Further Action
33	Golf Course	No Further Action
34	FAAF Fueling Facility	Interim Action
35	Aircraft Cannibalization Yard	No Further Action
36	FAAF Sewage Treatment Plant	No Further Action
37	Trailer Park Maintenance Shop	No Further Action
38	AAFES Dry Cleaners	No Further Action
39	Impact Area	Remedial Investigation
39A	East Garrison Ranges	Interim Action*
39B	Inter-Garrison Training Area	Interim Action*
40	FAAF Defueling Areas	Interim Action*
41	Crescent Bluff Fire Drill Area	Interim Action*

* Site categories may change as additional information is received from ongoing investigation.

Table 2. Relationship of HLA Sites to Previously Investigated Sites
Volume I - Project Summary, Basewide RI/FS
Fort Ord, California

HLA Site	Previous Investigation
FAAF OU 1	HLA (1987) RI/FS at FAAF Fire Drill Area
Fort Ord Landfill (OU 2)	HLA and Dames and Moore Fort Ord Landfill Investigations
Site 2	JMM (1991) Site 4: Main Garrison Sewage Treatment Plant
Site 5	JMM (1991) Site 2: Range 36-A
Site 10	EA (1990) FTO-10: Fire Drill Burn Pit
Site 11	JMM (1990): AAFES Main Gas Station
Site 12	EA (1990) FTO-008: Cannibalization Area
Site 14	EA (1990) FTO-005: 707th Maintenance Facility
Site 15	EA (1990) FTO-006: 14th Engineering Motor Pool
Site 18	JMM (1991) Site 5: 1600 Area Motor Pool
Site 20	JMM (1991) Site 1: 707th Maintenance Facility JMM (1991) Site 6: 3800 Area Motor Pool Complex
Site 23	JMM (1991) Site 7: 3700 Area Motor Pool
Site 24	JMM (1991) Site 8: Old DEH Yard
Site 25	JMM (1991) Site 9: Old DRMO Site
Site 32	JMM (1991) Site 3: East Garrison Sewage Treatment Plant
Site 34	HLA (1988) Building 511 UST, FAAF

HLA Harding Lawson Associates.
FAAF Fritzsche Army Airfield.
OU Operable Unit.
JMM James M. Montgomery Consulting Engineers.
EA EA Engineering, Science, and Technology.
FTO Fort Ord
AAFES Army and Air Force Exchange Service.
DEH Directorate of Engineering and Housing.
DRMO Defense Reutilization and Marketing Office.
UST Underground storage tank.

Table 3. JMM's Preliminary Assessment/Site Investigation Study Sites
Project Summary - Volume I, Basewide RI/FS
Fort Ord, California

JMM Site Number	Site Name	HLA Site Number
1	519th Motor Pool	20
2	Open Detonation Area, Range 36A	5
3	East Garrison Sewage Treatment Plant	32
4	Main Garrison Sewage Treatment Plant	2
5	1600 Area Motor Pool Complex	18
6	3800 Area Motor Pool Complex	20
7	3700 Area Motor Pool Complex	23
8	Old Directorate of Engineering and Housing (DEH) Yard	24
9	Old Defense Reutilizing and Marketing Office (DRMO)	25
10	Army and Air Force Exchange Service (AAFES) Cleaners	38

JMM James M. Montgomery Consulting Engineers.
HLA Harding Lawson Associates.

Table 4. Description of Areas Requiring Environmental Evaluation (AREE) from Weston's Enhanced Preliminary Assessment Volume I - Project Summary, Basewide RI/FS Fort Ord, California

AREE Number	Description
1	Burn Pit (FAAF Fire Training Pit)
2	Main Garrison Landfill
3	Sanitary Wastewater Treatment (FAAF STP)
4	Maintenance Shop (707th Maint BN)
5	Maintenance Shop (13th ENGR BN)
6	Maintenance Shop (Building 527)
7	Cannibalization Area
8	DRMO Hazardous Waste Storage Area
9	PCB-Containing Waste Area (Building 111)
10	Underground Storage Tank (AAFES)
11	Sanitary Wastewater Treatment (East Garrison STP)
12	Sanitary Wastewater Treatment (Main Garrison STP)
13	Medical Facilities (Autoclave Area, Building 1442)
14	Burn Pit (Fire Training Area)
15	PCB-Containing Waste Storage Area
16	Open Detonation Area
17	TASC Plastics Shop
18	Pesticide Mixing and Storage Areas
19	Drycleaning Shop
20	Incinerator (Building 4385)
21	Medical Facilities (Silver Recovery Unit Building 4385)
22	Former DRMO Storage Area
23	TASC Graphics Shop
24	Maintenance Shops
25	Underground Storage Tanks
26	Aboveground Storage Tanks
27	Battery Repair Shop (Building 2722)

Table 4. Description of Areas Requiring Environmental Evaluation (AREE) from Weston's Enhanced Preliminary Assessment Volume I - Project Summary, Basewide RI/FS Fort Ord, California

AREE Number	Description
28	Photographic Laboratories
29	Boiler Blowdown Areas
30	Wash Racks and Grease Racks
31	Spray Painting Facilities
32	Small Arms Repair Shop (Building 4900)
33	Medical Facilities
34	Laboratory Operations (Buildings 4420 and 2076)
35	Firing Ranges
36	Other Training Sites
37	Other Hazardous Material Storage and Handling Areas
38	Radioactive Waste Storage
39	Sanitary Wastewater Treatment (Ord Village STP)
40	Former Landfill at East Garrison
41	Impact Area
42	Transformers
43	Ammunition Storage
44	Other Hazardous Material Storage and Handling Area (Building 91)
45	Former Landfill (Building 1474 Area)
46	Former Hospital Area
47	Septic Tanks and Tile Fields
48	Former DEH yard
49	Spill Areas
50	Former Incinerator at East Garrison
51	Leaking Underground Storage Tank
52	Leaking Aboveground Storage Tank
53	Fueling Stations
54	Building 3625 Spill Area

Table 4. Description of Areas Requiring Environmental Evaluation (AREE) from Weston's Enhanced Preliminary Assessment Volume I - Project Summary, Basewide RI/FS Fort Ord, California

AREE Number	Description
55	Former Leaking UST Area (Building 511)
56	Water Treatment Plant (Building 4974)
57	Unauthorized Disposal Areas
58	Former UST Areas
59	Shoreline Erosion
60	Asbestos
61	Pesticide Usage

FAAF Fritzsche Army Airfield.
STP Sewage treatment plant.
AAFES Army Air Force Exchange Service.
DEH Directorate of Engineering and Housing.
UST Underground storage tank.
PCB Polychlorinated biphenyls.
DRMO Defense Reutilization and Marketing Office.

Table 5. Summary of EA Zones and HLA/NPL Sites
Volume 1 - Project Summary Basewide RI/FS
Fort Ord, California

HLA NPL Site Number and Name		EA Zone
1.	Ord Village Sewage Treatment Plant	2
2.	Main Garrison Sewage Treatment Plant	2
3.	Beach Trainfire Ranges	2
4.	Beach Stormwater Outfalls	2
5.	Range 36A	3
6.	Range 39 (Abandoned Car Dump)	3
7.	Range 40 & 41 (Fire Demonstration Area)	3
8.	Range 49 (Molotov Cocktail Range)	3
9.	Range 39 (FFE Training Area)	3
10.	Burn Pit	5
11.	AAFES Fueling Station	5
12.	Lower Meadow, DOL Automotive Yard, and Cannibalization Yard	6
13.	Railroad Right-of-Way	6
14.	707th Maintenance Facility	7
15.	DEH Yard	7
16.	DOL Maintenance Yard, Pete's Pond	7
17.	1400 Block Motor Pool	8
18.	1600 Block Motor Pool	8
19.	2200 Block Facility	8
20.	South Parade Grounds 3800 Motor Pool, and 519th Motor Pool	9
21.	4400/4500 Motor Pool, East Block	10
22.	4400/4500 Motor Pool, West Block	10
23.	3700 Motor Pool	11
24.	Old DEH Yard	12
25.	Former DRMO Site	14
26.	Sewage Pump Stations - Bldgs 5871 and 6143	15
27.	Army Reserve Motor Pool	15
28.	Barracks and Main Garrison Area	16

Table 5. Summary of EA Zones and HLA/NPL Sites
Volume 1 · Project Summary Basewide RI/FS
Fort Ord, California

	HLA Site Number and Name	EA Zone
29.	DRMO	17
30.	Driver Training Area	17
31.	Former Dump Site	17
32.	East Garrison Sewage Treatment Plan	17
33.	Golf Course	18
34.	FAAF Fueling Facility	19
35.	Aircraft Cannibalization Yard	19
36.	FAAF Sewage Treatment Plant	19
37.	Trailer Park Maintenance Shop	20
38.	AAFES Dry Cleaners	8
39.	Impact Area	3
40.	FAAF Defueling Area	19
41.	Crescent Bluff Burn Pit	17

AAFES Army and Air Force Exchange Service
DEH Directorate of Engineering and Housing
DOL Directorate of Logistics
DRMO Defense Reutilization and Marketing Office
EA EA Engineering, Science and Technology, Inc.
FAAF Fritzsche Army Airfield
FFE Flame field expedient

TABLE 6. RCRA/CERCLA Integration Chart
Volume I - Executive Summary, Basewide RI/FS
Fort Ord ,California

		SOURCE DOCUMENT					NPL NO.	
SWMU No.	SWMU Name	EA* Lit Review (Zone No.)	Weston** Enhanced PA Report (AREE No.)	ECAS Report (Finding No.)	DHS 1988 NOVs Report (Building No.)	Location	Site No.	Site Description/Comments
FTO-001	FAAF - Abandoned Fire Training Pit	19	1				OU 1	FAAF Fire Drill Area
FTO-002	Fort Ord Sanitary Landfill	1	2				OU 2	Fort Ord Landfill
FTO-003	Fritzsche Army Airfield Sewage Treatment	19	3				36	FAAF Sewage Treatment Plant
FTO-004	707th Maintenance Battalion	7	4,24	FO17-8,9	3898, 3897, 4885, 4886, 4852, 4855	707th Maintenance Motor Pool	14	707th Maintenance Facility
FTO-005	13th Engineer Battalion Motor Pool	10	5		4544	HHC 13th Engineers Motor Pool	22	4400/4500 Motor Pool, West Block
FTO-006	HHC Cavalry Regiment Motor Pool, Bldg. 527	19	6		527	307th Aviation	34	
FTO-007	Cannibalization Area	6	7				12	Lower Meadow - DOL Automotive Yard and Cannibalization Yard
FTO-008	DRMO Hazardous Waste Storage Yard	17	8	FO4-2,3,12 FO4 17	38, T-53A	DRMO	29	Adjacent to Site 29, RCRA Closure Plan
FTO-009	DRMO PCB Storage Bldg. T-111	17	9	FO8-2	111	DRMO	29	DRMO
FTO-010	AAFES Service Station	5	10,53	FO1-1,2	4220	AAFES Gas Station	11	AAFES Fueling Station
FTO-011	East Garrison Sewage Treatment Plant	17	11	FO2-1 FO17-11	4974		32	East Garrison Sewage Treatment Plant
FTO-012	Main Garrison Sewage Treatment Plant	2	12				2	Main Garrison Sewage Treatment Plant
FTO-013	Building 1442 Autoclave	8	13				17	
FTO-014	Fire Training Area	5	14	FO1-6,7			10	Burn Pit
FTO-015	PCB Storage Area	7	15				15	DEH Yard
FTO-016	Open Detonation Area	3	16				5	Range 36A - RCRA Closure Plans
FTO-017	TASC Plastics Shop	8	17		1663		18	1600 Block Motor Pool
FTO-018	Pesticide Mixing Area	7	18	FO9-5,8			15	DEH Yard
FTO-019	AAFES-Economy Cleanser UST For Product Solvent	8	19	FO6-3	1434		38	AAFES Dry Cleaners
FTO-020	Infectious Waste Incinerator - Bldg.4385	12	20	FO5-8	4385	Hays Hospital		
FTO-021	Silver Recovery Unit	12	21,28		4385	Hays Hospital		

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FTO-022	Abandoned DRMO Site	14	22				25	Former DRMO Site
FTO-023	TASC Graphics Shop	8	23,24		1665, 2850	TASC, Graphics / TASC, Photo Lab	18	1600 Block Motor Pool
FTO-024	519th Maintenance Company Motor Pool	9	24		3897, 3898	519th Maintenance Motor Pool	20	South Parade Grounds, 3800 Motor Pool, 519th Motor Pool
FTO-025	14th Engineer Battalion Motor Pool	10	24	FO4-23	4526, 4527, 4531, 4534, 4536, 4537	HHC 14th Engineer	22	4400/4500 Motor Pool, West Block
FTO-026	127th Signal Company Motor Pool	10			4548	127th Signal Battalion Motor Pool	22	4400/4500 Motor Pool, West Block
FTO-027	2/9 Recon Battalion Motor Pool	10	24,31	FO4-6, FO17-6	4495, 510	2nd/9th Motor Pool, Reconnaissance Squadron	21	4400/4500 Motor Pool, East Block
FTO-028	9th Regiment MANCHU Motor Pool	10			4499W	56th Med Motor Pool	21	4400/4500 Motor Pool, East Block
FTO-029	9th Regiment HHC Motor Pool	10			4499E	NCO Motor Pool	21	4400/4500 Motor Pool, East Block
FTO-030	HHC/Air Force Detachment Motor Pool	10			4518E	602 Tactical Air Control Wing	21	4400/4500 Motor Pool, East Block
FTO-031	8th Evacuation Hospital Motor Pool	10		FO4-10,11,24	4522	8th Evac Hospital Motor Pool	21	4400/4500 Motor Pool, East Block
FTO-032	HHC Aviation Brigade Motor Pool	10					21	4400/4500 Motor Pool, East Block
FTO-033	1/23 Aviation Regiment Motor Pool	10					21	4400/4500 Motor Pool, East Block
FTO-034	2nd Brigade Consolidated Motor Pool	10					21	4400/4500 Motor Pool, East Block
FTO-035	3rd Brigade Consolidated Motor Pool	10		FO4-1,4,21	4572E, 4538	HHC 3rd Brigade Motor Pool	22	4400/4500 Motor Pool, West Block
FTO-036	DOL Heavy Equipment Maintenance Motor Pool	7	31,32		4900	DOL Heavy Equipment Maintenance Motor Pool	16 or 15	DOL Maintenance Yard, Pete's Pond

TABLE 6. RCRA/CERCLA Integration Chart
Volume I - Executive Summary, Basewide RI/FS
Fort Ord ,California

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SWMU No.	SWMU Name	EA* Lit Review (Zone No.)	Weston** Enhanced PA Report (AREE No.)	ECAS Report (Finding No.)	DHS 1988 NOVs Report (Building No.)	Location	Site No.	Site Description/Comments
FTO-037	DOL Main Automotive Yard Motor Pool	6	24,27		2722	DOL Vehicle Maintenance (Battery Shop Repair)	12	Lower Meadow, DOL Automotive Yard, and Cannibalization Yard
FTO-038	DOL General Equipment Maintenance Motor Pool	6	27,31	FO2-7, FO4-26	2426, 2719, 2722, 2723, 2724, 2726, 2756, 2784,	DOL General Equipment Area	12	Lower Meadow, DOL Automotive Yard, and Cannibalization Yard
FTO-039	DOL Aircraft Maintenance Motor Pool	19	31		533	DOL Airfield Motor Pool, Hot Refuel Point	34	FAAF Fueling Facility
FTO-040	DOL Temporary Motor Pool	8	24	FO2-5	1672,1663 1665	Organization Maintenance Shop Motor Pool	18	1600 Block Motor Pool
FTO-041	590th SS Company Motor Pool	8	24		1637W,E	301st Trans Co. and 590th s & s Motor Pools	18	1600 Block Motor Pool
FTO-042	HHC Combat Aviation Brigade Motor Pool	19			509	HQ Combat Aviation Brigade Motor Pool	34	Near Site 34 - CAB Motor Pool
FTO-043	1-123rd AVN Regiment Motor Pool	19		FO17-9	527,526		34	
FTO-044	123rd AVN Battalion, E Company Motor Pool	8			1697s		18	4400/4500 Motor Pool, East Block
FTO-045	237th Medical Detachment Motor Pool	19	24		524,527		34	200th AVN and 74th AHC (near Bldg. 507); 307th and DPCA Club
FTO-046	219th Cavalry Reconnaissance Flight Motor Pool	19			510	307th Aviation	34	
FTO-047	3rd Battalion 123rd AVN Brigade Motor Pool	19	24		507		34	
FTO-048	6th/8th Field Artillery Battalion Motor Pool	8			1483E	2nd/8th Field Artillery; 6th/8th Field Artillery	17	1400 Block Motor Pool (UST Data only)
FTO-049	7th/15th Field Artillery Battalion Motor Pool	8		FO17-10,11	1489N, 1478, 1495, 1497	7th/15th Field Artillery Motor Pool 7/7 ADA, Bravo Battery	17	1400 Block Motor Pool (UST Data only)
FTO-050	2nd Battalion, 62nd Air Defense Artillery Motor Pool	8	24			2-62 Air Defense Artillery, Motor Pool	17	1400 Block Motor Pool (UST Data only)

TABLE 6. RCRA/CERCLA Integration Chart
Volume I - Executive Summary, Basewide RI/FS
Fort Ord ,California

		SOURCE DOCUMENT					NPL NO.	
SWMU No.	SWMU Name	EA* Lit Review (Zone No.)	Weston** Enhanced PA Report (AREE No.)	ECAS Report (Finding No.)	DHS 1988 NOVs Report (Building No.)	Location	Site No.	Site Description/Comments
FTO-051	5/15th Field Artillery Battalion Motor Pool	8			1489S	5th/15th Field Artillery	17	1400 Block Motor Pool (UST Data only)
FTO-052	7th Military Police Company Motor Pool	8			1697		18	1600 Block Motor Pool
FTO-053	123 Regiment AVN Regiment, E Company Motor Pool	8					18	1600 Block Motor Pool
FTO-054	107th Medical Battalion Motor Pool	11	24	FO3-6	3773	107th Military Intelligence Motor Pool	23	3700 Motor Pool
FTO-055	U.S. Army Reserve Center Motor Pool	19	24	FO4-22	701	13th Army Reserve D Co. Motor Pool	27	Army Reserve Motor Pool
FTO-056	707th SPT Battalion Organizational Motor Pool	8	24		1640, 1697S	707 Maintenance Battalion Turn In Section 537 TAMC Motor Pool	18	1600 Block Motor Pool
FTO-057	571st MP Company Motor Pool and 536th THMC Motor Pool	8	24		1686, 1688	571st Military Police Motor Pool	18	1600 Block Motor Pool
FTO-058	761st Chemical Company Motor Pool	8	24		1655		18	1600 Block Motor Pool
	Auto Crafts and DPCA	8	28	FO1-3	2242, 2253 2241	Auto Crafts	19	2200 Block Facility - Auto Crafts Bldgs. 2260, 2250, 2250A, 2251, 2251A, 2251B, 2252, 2253, 2290, 2241, and 2242. (DPCA)
	HCC 7th ID Motor Pool	10	31		4518E	HHC 7th ID Motor Pool	21	4400/4500 Motor Pool, East Block
	74th Attack Helicopter, 206th Flight Maintenance	19			507	74th Attack Helicopter, 206th Flight Maintenance	34	FAAF Fueling Facility - UST Removal Report (Jan. 1989)

TABLE 6. RCRA/CERCLA Integration Chart
Volume I - Executive Summary, Basewide RI/FS
Fort Ord ,California

		SOURCE DOCUMENT					NPL NO.	
SWMU No.	SWMU Name	EA* Lit Review (Zone No.)	Weston** Enhanced PA Report (AREE No.)	ECAS Report (Finding No.)	DHS 1988 NOVs Report (Building No.)	Location	Site No.	Site Description/Comments
	DEH Yard	7	31,48	FO1-5; FO2-3,9; FO3-4,5; FO4-14,15,19; FO5-1,3,5,7; FO6-2,4-7,11; FO6-8,9; FO7-1,2; FO8-1,3; FO9-2,3,4,5,8; FO10 1,2,3; FO11-1; FO13-1,3,4; FO14-1; FO15-1 FO16-1,2,3; FO17-1-5,11	4890, 4894 - 4899, 4909 - 4915, 2076E	DEH Yard	15	DEH Yard
	Auto Craft Shop	10	31	FO1-8, FO4-7, FO4-8,13,25, FO17-11	4492, 4541		22	4400/4500 Motor Pool, East Block
	Golf Course	18		FO9-6,7, FO17-7	4110		33	Golf Course
	Wastewater Distribution System	NA	3	FO2-2, FO3-3			Base-wide	Basewide Storm Drain and Sanitary Sewer Investigation
	8th Street Fueling Station , POL and Paint Storage	6	53	FO4-5	T-2037, 2041		13	Railroad Right-of-Way
	Basewide	NA		FO5-4,6, FO12-1, FO2-8			NA	

TABLE 6. RCRA/CERCLA Integration Chart
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Fort Ord ,California

		SOURCE DOCUMENT					NPL NO.	
SWMU No.	SWMU Name	EA* Lit Review (Zone No.)	Weston** Enhanced PA Report (AREE No.)	ECAS Report (Finding No.)	DHS 1988 NOVs Report (Building No.)	Location	Site No.	Site Description/Comments
	Bldg. 1665 - Paint Sump Bldg. 1697 - TAC equip. shop Bldg. 1665 - Electric Maintenance Bldg. 1672 - DMS Vehicle Bldg. 1665 - Plastics Shop	8	24				18	1600 Block Motor Pool
	Beach Range Complex	2	43				3	Beach Trainfire Ranges
	Inland Range Complex	3	41				39	Impact Area
	Indust OP	16			2842, 2850, 2353, 2000		28	Barracks and Main Garrison Area
	East Garrison Range Complex	17						
	All Pro Street	1		FO2-6				
	Transfer Station	1		FO4-9, FO5-2				

SWMU Solid waste management unit.
AEHA Army Environmental Hygiene Agency.
HLA Harding Lawson Associates.
AREE Areas requiring environmental evaluation.

ECAS Environmental Compliance Assessment System.
NOVs Notices of violation.
NPL National Priorities List.
OU Operable unit.
NA Not Applicable
* EA Engineering, Science and Technology (EA), 1991a. Basewide Remedial Investigation/Feasibility Study, Fort Ord, California, Vol. 1. Literature Review and Base Inventory. Draft Final
** Weston, Roy F., Inc., 1990. Task Order II - Enhanced Preliminary Assessment for Fort Ord. Prepared for U.S. Army Toxic and Hazardous Materials Agency. Aberdeen Proving Grounds, Maryland.

Note: Blank indicates that SWMU was not identified in the cited document.

Table 7a RCRA/CERLA Integration, OU 1
Volume I - Project Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	Weston PA AREE No.
OU 1 - Fritzsche Army Airfield Fire Drill Area					
Abandoned fire training pit	No	FTO-001	NA	19	1

EVIDENCE OF RELEASE(S) IDENTIFIED

The Frizsche Army Airfield Fire Drill Area (FDA) was established in 1962 as a training area for the Fort Ord Fire Department. The FDA consisted of a burn pit (SWMU No. FTO-001), a drum unloading area, a gravity-feed storage tank, and underground piping connecting the storage tank to a discharge nozzle in the center of the burn pit. According to the AEHA 1988 and the Weston Report, as part of the training activities, fuel was discharged from the storage tank into the pit, ignited, and exstinguished. Training activities at the FDA were discontinued in 1985, and the associated structures were removed.

PRESENT CONDITION AND STATUS

Remedial investigations were performed after closure of the FDA to document the nature and extent of contamination in the soil and groundwater. Details of these investigations are presented in the RI/FS reports (HLA, 1986, 1987a, 1987b). RI activities began in November of 1985 and continued through January 1987. Soil remediation is complete. Treatment of groundwater is ongoing and is monitored quarterly.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
PA	Preliminary Assessment.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7b RCRA/CERCLA Integration, OU 2
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	Weston PA AREE No.
OU 2 - Fort Ord Landfills					
Fort Ord sanitary landfill	No	FTO-002	NA	1	2

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified in previous investigations at the landfill, in the following reports:
- AEHA, 1988 - Evaluation of Solid Waste Management Units
- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1988 - Preliminary Hydrogeologic Investigation

DISPOSAL METHODS

Waste received at the main landfill facility was placed in trenches approximately 30 feet wide, 10 to 15 feet apart, and 10 to 12 feet below ground surface. Waste generally was placed in the trenches to a height of approximately 10 feet above the trench bottom and covered with about 2 feet of native dune sand deposits excavated during trenching operations; however, thicker refuse sections exist within the landfill.

PRESENT CONDITION AND STATUS

The north landfill was closed in 1966, and the main landfill was operated from 1960 until 1987. A basewide RI/FS is under way to evaluate environmental contamination at Fort Ord. Analysis of soils overlying the landfills and groundwater collected from beneath the landfills detected chemicals associated with the landfills. Chemicals are present in both the upper aquifer and the 180-foot aquifer. The Record of Decision (ROD) which presents the selected remedial action for OU 2 has been approved.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.
NA No finding.

Table 7c RCRA/CERCLA Integration, Site 10
Volume I - Project Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	Weston PA AREE No.
SITE 10 - BURN PIT Fire Training Area - Near fire station Building 4400	No	FTO-014	FO1-6,7	5	14

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified in previous investigations at the burn pit and was documented in the following reports:

- AEHA 1988, Evaluation of Solid Waste Management Units
- Weston 1990, Enhanced Preliminary Assessment
- EA 1991, Literature Review and Base Inventory Report

PRESENT CONDITION AND STATUS

The fire training area is no longer in use. The burn pit was investigated as part of the RI/FS by HLA.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.

Table 7d RCRA/CERCLA Integration, Site 11
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 11 - AAFES Fueling Station						
AAFES service station	BLDG 4220	Yes	FTO-010	FO1-1,2	5	10,53

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified during site investigations conducted at the AAFES service station and was documented in the following reports:

- DHS - Notice of Violations 1987
- AEHA 1988, Evaluation of Solid Waste Management Units
- EA 1991, Literature Review and Base Inventory Report

PRESENT CONDITION AND STATUS

The USTs containing fuel are being assessed under the Fort Ord UST Management Program. Based on a risk evaluation conducted by HLA (HLA,1993-Site 11).

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7e RCRA/CERCLA Integration, Site 12
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 12 - Lower Meadow, DOL Automotive Yard, and Cannibalization Yard						
DOL GENERAL EQUIPMENT MAINTENANCE MOTOR POOL						
- DOL Vehicle Maintenance and Battery Shop	2722	yes	FTO-037		6	24, 27
- DOL Vehicle Maintenance and Paint Shop	2726	yes	FTO-038		6	24
- Wash rack and drum storage area	2723	yes	FTO-038	FO2-7	6	24
- Waste oil storage tank	2724	yes	FTO-038	FO2-7	6	24
- Drum storage of trichloroethane	2756	yes	FTO-038		6	24
- Waste oil storage tank	2784	yes	FTO-038		6	24
- Waste oil stored in 55-gallon drums and underground muffler	2719	yes	FTO-038	FO4-26	6	24
- Machine Shop - drum storage	2426	yes	FTO-038		6	24, 31
- Maintenance Motor Pool	2428	no	FTO-038		6	24
CANNIBALIZATION YARD						
- Cannibalization area	2760	no	FTO-007		6	7
- POL storage	2754	no			6	7

EVIDENCE OF RELEASE(S) IDENTIFIED

The following poor disposal practices have been reported at the DOL Automotive Yard (EA 1991a):

- Battery acid was emptied at the wash rack, and the acid was washed into the drain or nearby sanitary sewer.
- An underground muffler at Building 2719 may have been used to store hazardous waste. The muffler was removed, and contaminated soil was excavated during HLA's site investigation.
- Waste solvent and paints from Building 2726 were previously discharged to the ground.
- Waste storage drums were reportedly allowed to overflow.

Building 2760: EA Report - Zone 6; Weston Report - AREE No. 7
Building 2722: DHS-NOVs
Building 2726: DHS-NOVs (corrected in 1987); EA Report - Zone 6
Buildings 2723, 2724, 2756: EA Report - Zone 6
Building 2784: DHS-NOVs (corrected in 1987)
Building 2719: DHS/NOVs; EA Report - Zone 6

PRESENT CONDITIONS AND STATUS

The waste storage areas (FTO-007 ,037, 038) are no longer in use. Waste has been transported to the DRMO facility for storage and disposal. The DOL Automotive Yard and Cannibalization Yard were investigated as part of the RI/FS by HLA.

Table 7f RCRA/CERCLA Integration, Site 13
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 13 - Railroad Right-of-Way					
8th Street fueling station - Building 2037	No	NA	FO4-5	11	53
Paint Storage - Building 2062	No	NA		11	53
POL Storage Site - Building 2036	No	NA		11	53

EVIDENCE OF RELEASE(S) IDENTIFIED

There has been no evidence of releases cited for the above-mentioned areas in the reports reviewed.

PRESENT CONDITION AND STATUS

The 8th Street fueling station is being investigated under the UST Management Program.
It is not known whether the two storage sites are still active. However, waste was transported to the DRMO facility for storage and disposal.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
ECAS	Environmental Compliance Assessment System.
SWMU	Solid waste management unit.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
POL	Petroleum/oil/lubricant.
NA	No finding.

Table 7g RCRA/CERCLA Integration, Site 14
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 14 - 707th Maintenance Facility						
707th Maintenance Facility					7	4,24
- HMSC Motor Pool	4885	Yes	FTO-004			
- Hazardous waste storage area	4852	Yes				
- A,B, and C Company Motor Pools (former waste oil UST)	4855	Yes				
- Storage area for hazardous waste next to building	4886	Yes				
- Motor Pool	4860	No	FTO-004		7	4
- Motor Pool	4857	No		FO17-8,9		4

EVIDENCE OF RELEASE(S) IDENTIFIED:
- HMSC Motor Pool (Bldg. 4885): DHS-NOVs; EA Report - Zone 7; Weston Report - AREE No. 4; AEHA (FTO-004)
- A, B, C Motor Pools (Bldg. 4855): DHS-NOVs; EA Report - Zone 4; Weston Report - AREE No. 4

PRESENT CONDITION AND STATUS

The waste storage units are no longer in use. Waste has been transported to the DRMO facility for storage and disposal. The 707 Maintenance Facility, including the above-mentioned storage units, was investigated as part of the RI/FS by HLA.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.

Table 7h RCRA/CERCLA Integration, Site 15
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 15 - DEH Yard						
DEH Yard						
- Pesticide Storage Site	4912	No	FTO-015		7	15
- PCB Storage Area	4913	No	FTO-015		7	15
- Pesticide Mixing Facility	4897	No	FTO-018	FO9-5,8	7	18
- Maintenance Facility	2076E	No		FO9-3,5,8	7	15
Administrative Buildings and Facilities						
	4890	No			7	48,31
	4894	No			7	48,31
	4895	No			7	48,31
	4896	Yes			7	48,31
	4898	Yes			7	48,31
	4899	No		See note below	7	48,31
	4909	No			7	48,31
	4910	No			7	48,31
	4911	No			7	48,31
	4914	No			7	48,31
	4915	No			7	48,31

Note: ECAS Findings for Bldg. 4899: FO1-5; FO2-3,9: FO3-4,5; FO4-14,15,19; FO5-1,3,5,7; FO6-2,4-9,11; FO7-1,2; FO8-1,3; FO9-2,3,4,5,8; FO10-1,2,3; FO11-1; FO13-1,3,4;FO14-1; FO15-1; FO16-1,2,3; FO17-1-5,11.

EVIDENCE OF RELEASE(S) IDENTIFIED

Buildings 4896 and 4898 were cited for evidence of release in the DHS-NOV Report. The violations were corrected and recorded during the 1987 DHS inspection. The EA Report and the Weston Report indicated no evidence of contamination; however, it was suspected at SWMUs FTO-015 and FTO-018. The remaining reports which were reviewed identified no evidence of release at the above-listed locations.

PRESENT CONDITION AND STATUS

The storage units (FTO-015 and FTO-018) are no longer in use. Waste has been transfered to the DRMO facility for storage and disposal. A Site Characterization was performed by HLA (HLA, 1993-Site 15) during the RI/FS. The pesticides detected were in the shallow soils around Building 4913.

Table 7i RCRA/CERCLA Integration, Site 16
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 16 - DOL Maintenance Yard and Pete's Pond						
DOL Heavy Equipment Motor Pool	4900	Yes	FTO-036	NA	7	32
Pete's Pond	NA	No	NA	NA	7	57
Former Paint Shop	4904	No	NA	NA	7	31
Aboveground Diesel Tank	4901	No	NA	NA	7	52
Sewage Pumping Station	4906	No	NA	NA	7	NA

EVIDENCE OF RELEASE(S) IDENTIFIED

No known evidence of release(s) was identified in the reports reviewed. However, suspected contamination was reported at the DOL Yard in the EA Report.

PRESENT CONDITION AND STATUS

A site characterization was conducted at the DOL Maintenance Yard and Pete's Pond (HLA, 1993-Site 16) to assess environmental conditions associated with potential sources of contamination. An SWMU (FTO-036) is within Site 16.
There is no record that the storage unit was closed; however, waste was transported to the DRMO facility for storage and disposal.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7j RCRA/CERCLA Integration, Site 17
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 17 - 1400 Block Motor Pool						
Autoclave	1442	No	FTO-013		8	13
6th/8th Field Artillery Battalion Motor Pool	1483E	Yes	FTO-048		8	30
2nd/8th Field Artillery Motor Pool	1483W	Yes	FTO-048		8	30
7th/15th Field Artillery	1478,1489N	Yes	FTO-049	FO17-10,11	8	
5th/15th Field Artillery	1489S	Yes	FTO-051		8	
HHB/7th Air Defense Artillery	1495	Yes		FO17-10	8	
2nd/62nd Air Defense Artillery Motor Pool			FTO-050		8	24
Motor Pool	1481	No		FO17-11	8	
Power House	1497	No			8	49
Former Storage Site	1431	No			8	
Former Storage Site (AAFES Dry Cleaners)	1435	No			8	19
Disposal Area	1474	No			8	45

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of releases was identified during the DHS 1985 and 1987 inspections and documented in the NOV Report. Violations for Buildings 1483E, 1483W, and 1495 were corrected in 1987 and documented in the NOV Report. Additionally, the EA Report indicated no known releases but stated there was reason to suspect contamination. There are 16 USTs in the 1400 Block Motor Pool; 8 are waste oil storage tanks, 6 are diesel tanks, and 2 are unleaded gasoline tanks. Investigations will be conducted under the UST Management Program.

AREAS OF CONCERN

In addition to the SWMUs, the following potential sources of contamination were identified at the site and investigated as part of the RI/FS:

- Oil/water separator at Building 1489
- Former USTs at Building 1426
- Fuel facility at Building 1497
- Suspected disposal area near the baseball field and motor pool

Site Description	DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.

PRESENT CONDITION AND STATUS

The storage units (FTO-048,049,050,051) are no longer in use. Waste has been transported to the DRMO facility for storage and disposal. A site characterization was performed by HLA as part of the RI/FS (HLA, 1993-Site 17). Additionally, in 1990, JMM (1990a) drilled soil borings adjacent to the AAFES dry cleaners. No concentrations were detected in any of the soil samples which were collected at depths of 0, 10, and 20 feet bgs.

Table 7k RCRA/CERCLA Integration, Site 18
Volume I - Executive Summary, Basewide RI/FA
Fort Ord, California

Site Description		DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 18 - 1600 Motor Pool						
TASC Plastic Shop	1663	No	FTO-017		8	17
TASC Graphics hop	1665	Yes	FTO-023		8	23,24
- Paint Sump						
- Electric Maintenance						
DOL Main Automotive Yard	1672	Yes	FTO-040	FO2-5		30
- DOL Temporary Motor Pool			FTO-040		8	24
590th SS Company Motor Pool	1637E	Yes	FTO-041		8	24
- 301st Trans Co. Motor Pool	1637W	Yes				
2nd Battalion, 62nd Air Defense Artillery Motor Pool	1641	Yes	FTO-050		8	24
707th SPT Battalion Organizational Motor Pool	1640	Yes	FTO-056		8	24
536th THMC Motor Pool	1697S	Yes	FTO-044		8	24
7th Medical Maintenance Battalion Motor Pool	1697N	Yes	FTO-044		8	24
571st MP Company Motor Pool	1686, 1688	Yes	FTO-057		8	24
761st Chemical Company Motor Pool			FTO-058		8	24
DOL Busworks	1669	No			8	24
7th S & T Battalion Motor Pool	1679	Yes			8	24

EVIDENCE OF RELEASE(S)

Evidence of release was identified in the DHS-NOV report for Buildings 1672 and 1679 only. The violation for Building 1672 was corrected in 1987 and documented in the DHS-NOV Report. Additionally, the 1988 (AEHA) and the Weston Report indicated that a release had occurred at Building 1637E, where waste motor oil was spilled. The spill was remediated using absorbant material, which was disposed offsite by the DRMO.

AREAS OF CONCERN

In addition to the SWMUs, the following sources of contamination were identified at Site 18 during the RI/FS:

- Stained soil near Building T-1669
- Grease racks at Buildings 1636, 1680, and 1689
- Sump and dry well used in the waterfall system at the TASC Graphics Shop, Building 1665

Site Description	DHS NOVs	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.

PRESENT CONDITION AND STATUS

Waste previously stored at the Graphics Shop (FTO-023) is now stored at the TASC Plastics Shop (FTO-017).
The SWMUs at each above-mentioned motor pool are no longer in use. Waste has been transported to the DRMO facility for storage and disposal.

A site characterization was performed on the 1600 Motor Pool by HLA during the RI/FS. Additionally, investigations were performed by EA and JMM in 1989 and 1990, respectively.
- No further investigation is required at Site 18, based on the data obtained during HLA's investigation.
- The locations of the three former diesel USTs adjacent to Building 1685 and any remaining USTs in place will be identified and investigated as part of the UST Management Program.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7I RCRA/CERCLA Integration, Site 20
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 20 - 3800 Motor Pool/519th Motor Pool						
519th Motor Pool						
- Automotive repair facility	3897	No	FTO-024	NA	9	24
- Vehicle maintenance shop	3898	No	FTO-024	NA	9	24
- HHB 2/62 Motor Pool	3867	Yes	NA	NA	9	24, 30

EVIDENCE OF RELEASE(S)

The 1988 IFR, Weston, and AEHA reports stated that very minor spillage occurred at SWMU FTO-024. Previous investigations were performed at the two motor pools by JMM (1990a and 1991) which indicated evidence of release(s). Hydrocarbon contamination was detected in surface soils and groundwater samples collected at the 519th Motor Pool, and minimal levels of contamination were detected in the soil and groundwater samples collected at the 3800 Motor Pool.

PRESENT CONDITION AND STATUS

The waste storage units are no longer in use. Waste has been transported to the DRMO facility for storage and disposal. The 3800 Motor Pool and the 519th Motor Pool were investigated by HLA as part of the RI/FS (HLA, 1993-Site 20).

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7m RCRA/CERCLA Integration, Site 21
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 21 - 4400/4500 Motor Pool, East Block						
2nd Squadron 9th Division Motor Pool	4495	Yes	FTO-027	FO4-6, FO17-6	10	24, 31
67th Maintenance Motor Pool						
9th Regiment MANCHU Motor Pool			FTO-028		10	24, 30
- 56th Medical Motor Pool	4499W	Yes				
- NCO Motor Pool	4499E	Yes	FTO-029		10	24, 30
HHC Motor Pool			FTO-030		10	24, 30
- 7th ID Motor Pool	4518E	Yes			10	24, 30
- 602nd TAC Wing Motor Pool	4518W	Yes				
8th Evacuation Hospital Motor Pool	4522	Yes	FTO-031	FO4-10,11,24	10	24, 30
HHC Aviation Brigade Motor Pool				FO17-9		
- 307th Attack Helicopter Motor Pool	4506	Yes	FTO-032	FO17-9	10	24, 30
- 1/23rd AVN Battalion Motor Pool			FTO-033		10	24, 30
2nd Brigade Consolidated Motor Pool						
- 3rd Brigade Consolidated Motor Pool	4512E	Yes	FTO-034		10	24, 30

EVIDENCE OF RELEASE(S) IDENTIFIED

The DHS-NOV report cited that evidence of release(s) had occurred at Buildings 4495 and 4518W. The EA report indicated that stained soils were observed along the fence line around the 1/23rd, 2nd Brigade, and 2nd Squadron 9th Division Motor Pools.
The impacted area in the 1/23rd Motor Pool was immediately excavated, and the removed soils were disposed of at the DRMO facility.

AREAS OF CONCERN

In addition to the SWMUs, the following potential sources of contamination were identified at the site:
- Oil/water separators
- Reported gasoline spill in the decommisioned fuel facility
- Stained soil in the canal discharge area

PRESENT CONDITION AND STATUS

The storage sites at each motor pool are no longer in use. Waste has been transported to the DRMO facility for storage and disposal.
A site characterization was performed by HLA as part of the RI/FS (HLA, 1993-Site 21). Additionally, 14 USTs were identified (HLA, 1990a) and are being investigated under the UST Management Program.

Table 7n RCRA/CERCLA Integration, Site 22
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 22 - 4400/4500 Motor Pool, West Block					
14th Engineer Batallion Motor Pool					
- Fueling Staion	4526	FTO-025		10	24
- Equipment Shop	4527	FTO-025		10	24
- Equipment Shop	4531	FTO-025		10	24
- Equipment Shop	4534	FTO-025	FO4-23	10	24
- Equipment Shop	4536	FTO-025		10	24
- Equipment Shop	4537	FTO-025		10	24
- Wash Rack	4529	FTO-025		10	24, 30
13th Engineer Motor Pool					
- TAC Equipment Shop	4544	FTO-005		10	5
- TAC Equipment Shop	4538	FTO-035	FO4-1,4,21	10	24
- Autocraft Shop	4541			10	24
127th Signal Company Motor Pool	4548	FTO-026		10	24, 30

EVIDENCE OF RELEASE(S) IDENTIFIED

Buildings 4544, 4538, 4534, and 4526 were cited for evidence of release in the DHS-NOV report. The violations for Buildings 4544 and 4538 were corrected and documented during the 1987 DHS inspection. The Verification of SWMUs Report (HLA, 1993) states that no evidence of releases was observed at SWMUs FTO-025, 026, and 035 during HLA's site inspection in March 1993. Additionally, the Weston and EA reports indicated evidence of releases at the 14th Engineers Motor Pool (Main Building 4534).

AREAS OF CONCERN

In addtion to the SWMUs, the following sources of contamination were identified during the RI/FS Work Plan:
- Soil contamination associated with the USTs removed from the area near Buildings 4534 and 4526.
- Oil/water separators and grease racks at Buildings 4536,4534,4538,and 4526.

PRESENT CONDITION AND STATUS

The storage units at each of the motor pools are no longer in use. Waste has been transported to the DRMO facility for storage and disposal. A site characterization was performed by HLA as part of the RI/FS (HLA, Site 22)

Table 7o RCRA/CERCLA Integration, Site 23
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 23 - 3700 Motor Pool Complex						
107th Medical Battalion Motor Pool	3773	Yes	FTO-054	FO3-6	11	24, 30

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified based on previous investigations at the 3700 Motor Pool, which was described in the following reports:

- EA, 1991 - Literature Review and Base Inventory Report - Zone 16
- HLA, 1992 - Preliminary Draft Site Characterization Report - Site 23

PRESENT CONDITION AND STATUS

The 3700 Motor Pool Complex is being investigated by HLA as part of the RI/FS (HLA, Site 23). The above-mentioned area was included in the investigation.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7p RCRA/CERCLA Integration, Site 25
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 25 - Former DRMO					
Former DRMO storage area	No	FTO-022	NA	14	22

EVIDENCE OF RELEASE(S) IDENTIFIED

As stated in the Weston report 1990, information was not avaliable to determine if spills had occurred at the site; however, during a site inspection it was observed that the potential exists for spills relating to the storage of transformers. All other reports reviewed indicated no evidence of release(s) was observed.

PRESENT CONDITION AND STATUS

The site is now an unpaved, open field, which has been used periodically since 1972 for military training exercises and heavy vehicle/equipment parking. All buildings and structures have been removed. A Risk Assessment was performed by HLA at Site 25 (HLA, Site 25).

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7q RCRA/CERCLA Integration, Site 27
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 27 - Army Reserve Motor Pool						
13th Army Reserve D Co. Motor Pool	701	No	FTO-055	FO4-22	19	24, 30

EVIDENCE OF RELEASES(S) IDENTIFIED

As stated in the EA Report (1991a), a 300-gallon diesel spill was reported at the repair shop at the motor pool in 1987. The entire spill discharged into the sanitary sewer system. The Verification of SWMUs Report (HLA, 1993) stated that no evidence of release was observed at SWMU FTO-055 during HLA's site inspection in March 1993. All other reports reviewed indicated no evidence of release(s) was observed.

In addition to the storage unit, the following potential area of contamination was identified:

- Oil/water separator and wash rack west of Building 701. The oil/water separator and wash racks were investigated by HLA as part of the Basewide Oil/Water Separator Investigation.

PRESENT CONDITION AND STATUS

Based on the Site Characterization Report (HLA, 1993-Site 27), no further investigation is recommended. The facility is active; however, all waste is transported to the DRMO facility for storage and disposal. The impact of the diesel spill was investigated as part of the Basewide Storm Drain and Sanitary Sewer Investigation.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.

Table 7r RCRA/CERCLA Integration, Site 28
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 28 - Barracks and Main Garrison Area						
Visual Information Center	2842	No	NA	NA	16	NA
OPTM Photo Developing	2850	Yes	NA	NA	16	28
Print Shop	2353	No	NA	NA	16	NA

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified based on previous investigations at the Barracks and Main Garrison area and was documented in the following reports:

- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Site Characterization Report - Site 28

PRESENT CONDITION AND STATUS

The Barracks and Main Garrison area was investigated by HLA as part of the RI/FS (HLA, Site 28). The above-mentioned areas were included in this investigation. Based on the on the results, no additional work is recommended.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7s RCRA/CERCLA Integration, Site 29
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 29 - Defense Reutilization and Marketing Office (DRMO)						
DRMO						
- DRMO hazardous waste storage yard	38, T-53A	Yes	FTO-008	NA	17	8
- DRMO PCB storage	111	Yes	FTO-009	NA	17	8, 9

EVIDENCE OF RELEASE(S) IDENTIFIED

The following reports reviewed identified areas of release occurring in the two storage areas:
- AEHA, 1988 Evaluation of Solid Waste Management Units
- DHS-Notice of Violation Report (October 1987)
- Weston, 1990 - Enhanced Preliminary Assessment

RECOMMENDATIONS FROM THE 1988
- Close storm drains in the DRMO lot and divert surface runoff into a closed area for collection
- Construct spill containment berms around each hazardous waste area
- Label hazardous waste segregation areas

PRESENT CONDITION AND STATUS

The areas in which evidence of releases was identified were addressed in the site characterization conducted by HLA as part of the RI/FS (HLA, Site 29). The DRMO PCB storage area is no longer in use. However, the hazardous waste storage yard is still in operation. Overall, the facility is in good condition and is properly maintained.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7t RCRA/CERCLA Integration, Site 3
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 3 - Beach Trainfire Ranges					
Beach Range Complex	No	NA	NA	2	43, 35

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified on the basis of visual inspection made during the following investigations:

- EA, 1991 - Literature Review and Base Inventory Report
- Weston, 1990 - Enhanced Preliminary Assessment
- HLA site inspection on October 13, 1992

PRESENT CONDITION AND STATUS

The Beach Trainfire Ranges are being investigated by HLA as part of the RI/FS.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.
NA No finding.

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 32 - East Garrison Sewage Treatment Plant (EGSTP)					
Sewage treatment plant	No	FTO-011	FO2-1, FO17-11	17	11

EVIDENCE OF RELEASE(S) IDENTIFIED

No releases or evidence of releases have been identified at the treatment plant. However, as stated in Weston's report, it is suspected that potential contaminants could have occured due to effluent discharging into unlined percolation ponds.

PRESENT CONDITION AND STATUS

The EGSTP is no longer in operation. Based on the results of the site characterization (HLA, 1993-Site 32), HLA recommends no further investigation at the site.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7v RCRA/CERCLA Integration, Site 34
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description		DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 34 - Fritzche Army Airfield Fueling Station						
HCC Cavalry Regiment Motor Pool	527	No	FTO-006		19	6
HCC Combat Aviation Brigade Motor Pool	509	Yes	FTO-042		19	24
1/123rd AVN Regiment Motor Pool	527,526	Yes	FTO-043	FO17-9	19	24
237th Medical Detachment Motor Pool	524,527	Yes	FTO-045		19	24
219th Cavalry Reconnaissance Flight Motor Pool	527	No	FTO-046		19	6
3rd/123rd AVN Brigade Motor Pool	507	No	FTO-047		19	24
206th AVN and 74th AHC Motor Pool	507	Yes	FTO-045		19	24
2nd/9th Reconnaissance Squadron	510	Yes			19	24
Hot Refuel Point		Yes	FTO-039			

EVIDENCE OF RELEASE(S) IDENTIFIED

Buildings 509, 524, and 507 were cited for evidence of release in the DHS-NOV report. The violations for Building 524 were corrected and documented during the 1987 DHS inspection. In 1987, a previous investigation was conducted by HLA when a loss of approximately 3,200 gallons of gasoline occurred at Building 511 (HLA, 1988b). Soil and groundwater contamination were detected, which prompted the installation of a soil gas extraction/thermal incineration project. The remaining reports which were reviewed indicated no evidence that release(s) had occurred.

PRESENT CONDITION AND STATUS

As stated in the Verification of SWMU Report (HLA, 1993), storage units FTO-006, FTO-045, and FTO-046 no longer exist and all waste has been transported to the DRMO facility for storage and disposal. Storage units FTO-042, -043, and -047 have also been closed since approximately 1992. All waste has been transported to the DRMO for storage and disposal. In January 1992, HLA conducted a site characterization at the Fritzche Army Airfield (HLA, 1994 - Site 34) to assess environmental conditions associated with potential sources of contamination. The SWMUs located in Site 34 are no longer in use and all waste has been transported to the DRMO facility for storage and disposal.

Table 7v RCRA/CERCLA Integration, Site 34
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.

Table 7w RCRA/CERCLA Integration, Site 36
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 36 - FAAF Sewage Treatment Plant (FAAFSTP)					
Sewage treatment plant	No	FTO-003	NA	19	3

EVIDENCE OF RELEASE(S) IDENTIFIED

Potential impacts to groundwater were investigated by HLA through a limited investigation in 1986 under RWQCB Order 85-20. Areas of potential negative impacts on soil and groundwater were documented in the EA Literature Review and Base Inventory Report (March, 1991). All other reports reviewed indicated no evidence of releases having occurred.

PRESENT CONDITION AND STATUS

As stated in HLA's Site Characterization Report, (HLA 1992, Site 36) the FAAF sewage treatment plant is no longer in operation. A new sewage lift station now transports the FAAFSTP flow to the Monterey Regional Treatment Plant in Marina. The facility is being investigated as part of the RI/FS process by HLA.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment Compliance.
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.

Table 7x RCRA/CERCLA Integration, Site 39
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 39 - Inland Ranges					
Inland Range Complex	No	NA	NA	3	41, 35

EVIDENCE OF RELEASE(S) IDENTIFIED
Evidence of release was identified based on previous investigations at the Inland Range Complex, in the following reports:
- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Summary and Work Plan Site 39 - Inland Ranges

PRESENT CONDITION AND STATUS
The inland range area is being investigated by HLA as part of the RI/FS at Fort Ord.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.
NA No finding.

Table 7y RCRA/CERCLA Integration, Site 40
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 40 - DOL Aircraft Maintenance Motor Pool					
DOL Aircraft Maintnance Motor Pool	533	FTO-039	NA	19	31

EVIDENCE OF RELEASE(S) IDENTIFIED

As stated in the DHS-NOV report, Building 533 was cited for violation for the possibility of release during a site inspection in 1985. However, the violation was corrected and documented during the DHS inspection in 1987. All other reports reviewed indicated that no evidence of releases was observed.

PRESENT CONDITION AND STATUS

During a visit by HLA in March 1993, the area was observed to be free of spills. Additionally, all waste that is accumulated at the unit is transfered to the DRMO facility for storage and disposal.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7z RCRA/CERCLA Integration, Site 2
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 2 - Main Garrison Sewage Treatment Plant					
MGSTP	No	FTO-012	NA	2	12

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified based on previous investigations at the Main Garrison Sewage Treatment Plant in the following reports:

- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Final Sites 2 and 12 Data Evaluation and Recommendation Report, Fort Ord, California

PRESENT CONDITION AND STATUS

The Main Garrison Sewage Treatment Plant is being investigated by HLA as part of the RI/FS at Fort Ord.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7aa RCRA/CERCLA Integration, Site 1
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 1 - Ord Village Sewage Treatment Plant (OVSTP)					
Sewage treatment plant	No	NA	NA	2	39

EVIDENCE OF RELEASE(S) IDENTIFIED

No releases or evidence of releases have been identified at the treatment plant. However, as stated in Weston's report, it is suspected that potential contaminants could have occured due to unlined evaporation ponds and sludge beds.

PRESENT CONDITION AND STATUS

The OVSTP is no longer in operation. Based on the results of the site characterization (HLA, 1994-Site 1), HLA recommends no further investigation at the site.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 7bb RCRA/CERCLA Integration, Site 5
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 5 - Range 36A					
Open Detonation Area	No	NA	NA	3	16

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified based on previous investigations at the Open Detonation Range, in the following reports:

- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Site Characterization Report, Site 5 - Ranges 36A, Fort Ord, California

PRESENT CONDITION AND STATUS

Site 5 is being investigated as part of the RI/FS at Fort Ord.

DHS California Department of Health Services.
NOV Notice of violation.
AEHA Army Environmental Hygiene Agency.
SWMU Solid waste management unit.
ECAS Environmental Compliance Assessment System
EA EA Engineering, Science, and Technology.
AREE Areas requiring environmental evaluation.
OU Operable unit.
NA No finding.

Table 7cc RCRA/CERCLA Integration, Site 31
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
SITE 31 - Former Dump Site					
Former Landfill at East Garrison	No	NA	NA	17	40

EVIDENCE OF RELEASES(S) IDENTIFIED
Evidence of release was identified based on previous investigations in the following reports:
- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Final Site Characterization, Site 31 - Former Dump Site, Fort Ord, California

PRESENT CONDITION AND STATUS
Site 31 is being investigated as part of the RI/FS at Fort Ord

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System.
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.

Table 7dd RCRA/CERCLA Integration, Site 39A
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Description	DHS NOV	AEHA Report SWMU No.	ECAS Report Finding No.	EA Zone	AREE No.
Site 39A - East Garrison Range					
East Garrison Range Complex	No	NA	NA	17	35

EVIDENCE OF RELEASE(S) IDENTIFIED

Evidence of release was identified based on the following reports:

- Weston, 1990 - Enhanced Preliminary Assessment
- EA, 1991 - Literature Review and Base Inventory Report
- HLA, 1994 - Draft Work Plan, Site Characterization, Site 39A - East Garrison Ranges, Fort Ord, California

PRESENT CONDITION AND STATUS

Site 39A is being investigated as part of the RI/FS at Fort Ord.

DHS	California Department of Health Services.
NOV	Notice of violation.
AEHA	Army Environmental Hygiene Agency.
SWMU	Solid waste management unit.
ECAS	Environmental Compliance Assessment System
EA	EA Engineering, Science, and Technology.
AREE	Areas requiring environmental evaluation.
OU	Operable unit.
NA	No finding.

Table 8. OU 1 Chemicals of Concern in Groundwater and Proposed Aquifer Cleanup Goals

Chemicals of Concern	Federal MCL (ppb)	State MCL (ppb)	Maximum Concentration Detected (ppb)	Maximum Concentration Detected (1994) (ppb)	Aquifer Cleanup Goals (ppb)	Discharge Limits for Treated Water[4] (ppb)
Benzene	5	1	76	ND (<0.5)	1	0.5
Chloroform	100	--	3.2	0.57	2.0[3]	0.5
1,1-Dichloroethane	--	5	40	1.4	5	0.5
1,2-Dichloroethane	5	0.5	1.2	ND (<1.0)	0.5	0.5
1,1-Dichloroethene	7	6	19	3.2	6	0.5
Total 1,2-dichloroethene	--	--	170	8	6[1]	0.5
Methyl Ethyl Ketone	--	--	1,700	400	1,900[2]	0.5
Tetrachloroethane	5	5	8	8	5	0.5
1,1,1-Trichloroethane	200	200	110	8.2	200	0.5
Trichloroethene	5	5	650	20	5	0.5

(1) Cleanup goal based on the lowest MCL for isomers.
(2) Based on Preliminary Remediation Goal (EPA, 1994) from Region 1X Preliminary Remediation Goals Second Half 1994. August 1, 1994
(3) Aquifer cleanup goal lower than federal or state MCL selected based on risk calculations. The combined, or additive effect of exposure to all chemicals at the levels listed was found to range from 2×10^{-6} to 3.0×10^{-5}. This cumulative risk is within the acceptable risk range, and is health protective.
(4) Discharge to areas overlying contaminated groundwater plume need only meet aquifer cleanup goals.
ND Chemical not detected during 1994 sampling events.
ppb Parts per billion.
MCL Maximum Contaminant Level.

Table 9. Summary of PHA1 Findings /a/
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Number	Site Name
10	Burn Pit
13	Railroad Right-of-Way
14	707th Maintenance Facility
18	1600 Block Motor Pool
19	2200 Block Motor Pool
20	South Parade Grounds, Motor Pool
23	37th Motor Pool
27	Army Reserve Motor Pool
28	Barracks and Main Garrison Area
30	Driver Training Area
34	FAAF Fueling Facility
36	FAAF Sewage Treatment Plant
37	Trailer Park Maintenance Shop

Outfall Number	Outfall Location and Primary Source Area
OF-08	Site 11, drains Site 11
OF-11	Site 22, drains Site 22
OF-13	Site 21, drains Site 21
OF-19	Site 34, drains site 34
OF-20	Site 34, drains Sites 34 and 40 and FAAF runway
OF-24	Site 30, drains Sites 30 and 32
OF-25	Site 30, drains Sites 29 and 30
OF-27	Site 27, drains Site 27
OF-32	Site 14, drains Site 14 and 15

/a/ Potential source area sites and outfalls for which no ecological effects are expected due to the absence of complete exposure pathways.

Table 10. Summary of Quantitative Screening Assessment Findings /a/
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Number	Site Name	Decision Basis
1	Ord Village Sewage Treatment Plant	/b/
17	1400 Block Motor Pool / Disposal Area	/b/
40	FAAF Defueling Areas	/b/

Outfall Number	Outfall Location and Primary Source Areas	Decision Basis
OF-01N	Site 37, drains Site 37 and residential streets	No ecosystem-level effects expected
OF-01S	Site 37, drains Site 37 and residential streets	No ecosystem-level effects expected
OF-21	FAAF, drains Site 34 and 40 and FAAF runway	No ecosystem-level effects expected
OF-22	FAAF, drains Site 34 and FAAF runway	No ecosystem-level effects expected

/a/ Sites and outfalls eliminated from further consideration in the Ecological Risk Assessment.
/b/ Possible ecological effects are not expected at these sites because the hazard indices computed for the gray fox, the deer mouse, and plants were less than 1.

Table 11. Summary of Quantitative Risk Assessment Findings /a/
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Number	Site Name	Species Evaluated
2	Main Garrison Sewage Treatment Plant	Plants, deer mouse, gray fox
11	AAFES Fueling Station	Plants, deer mouse, gray fox
12	Lower Meadow, DOL Yard, Cannibalization Yard	Plants, deer mouse, gray fox
15	DEH Yard	Plants, deer mouse, gray fox
16	DOL Maintenance Yard, Pete's Pond	Plants, deer mouse, gray fox, litter
21	4400/3500 Motor Pool, East Block	Plants, deer mouse, gray fox, litter
22	4400/3500 Motor Pool, West Block	Plants, deer mouse, gray fox
24	Old DEH Yard	Plants, deer mouse, gray fox, litter
25	Former DRMO	Plants, deer mouse, gray fox, litter
29	DRMO	Plants, deer mouse, gray fox, litter
31	Former Dump Area	Plants, deer mouse, gray fox, litter
32	East Garrison Sewage Treatment Plant	Plants, deer mouse, gray fox
33	Golf Course	Plants, deer mouse, gray fox
35	Aircraft Cannibalization Yard	Plants, deer mouse, gray fox
41	Crescent Bluff Fire Drill Area	Plants, deer mouse, gray fox

Outfall Number	Outfall Location and Primary Source Areas	Decision Basis
OF-01-MH	Site 2, drains Sites 2, 18, 19, and 28	Dilution
OF-02	Site 3, drains Site 13	Dilution
OF-03	Site 3, drains Sites 20 and 24	Dilution
OF-04	Site 3, drains Sites 20 and 24	Dilution
OF-05	Site 3, drains Sites 13 and 14	No ecosystem level effects expected
OF-07	Site 20, drains Site 20	Dilution
OF-12	Site 22, drains Site 22	No complete exposure pathways
OF-14	Site 21, drains Site 21	No ecosystem level effects expected
OF-15	Site 12, drains Site 12	No ecosystem level effects expected
OF-16	Site 16, drains Sites 15, 16, 17, and 23	No ecosystem level effects expected
OF-23	Site 36, drains Sites 34 and 36 and FAAF runway	Effluent not toxic in bioassay, and no ecosystem level effects expected
OF-31	Site 12, drains Site 12	No ecosystem level effects expected
OF-34	Site 34, drains FAAF near Buildings 533 & 535	No ecosystem level effects expected
OF-35	Site 34, drains FAAF near Building 533	No complete exposure pathways

/a/ Sites and outfalls eliminated from further consideration in the Ecological Risk Assessment.

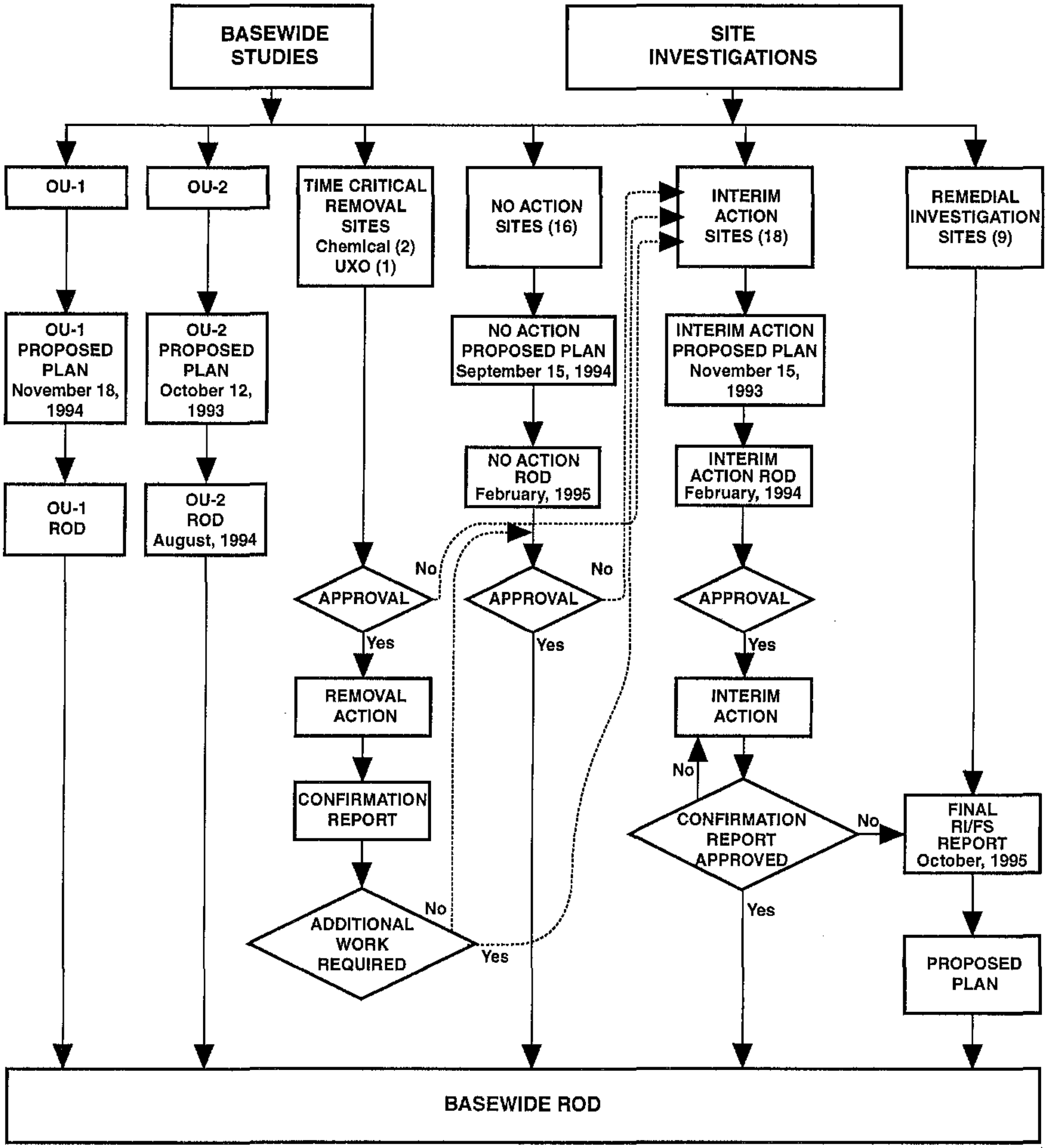
Table 12. Summary of Risk Description Findings
Volume I - Executive Summary, Basewide RI/FS
Fort Ord, California

Site Number	Site Name	Species Evaluated	Findings
3	Beach Trainfire Ranges	Buckwheat, Smith's Blue butterfly, deer mouse, gray fox, dove	Possible ecosystem impacts
39	Inland Ranges and 2.36-inch Rocket Range	Plants, deer mouse, gray fox	Possible ecosystem impacts

Outfall Number	Outfall Location and Primary Source Areas	Decision Basis	Findings
OF-26	Site 29, drains Site 29	COPCs at background concentrations	No ecosystem impacts expected

PLATES

FORT ORD SUPERFUND PROCESS



Note: See Table 1 for a list of Interim Action, No Action, and Remedial Investigation Sites.

101795DJP

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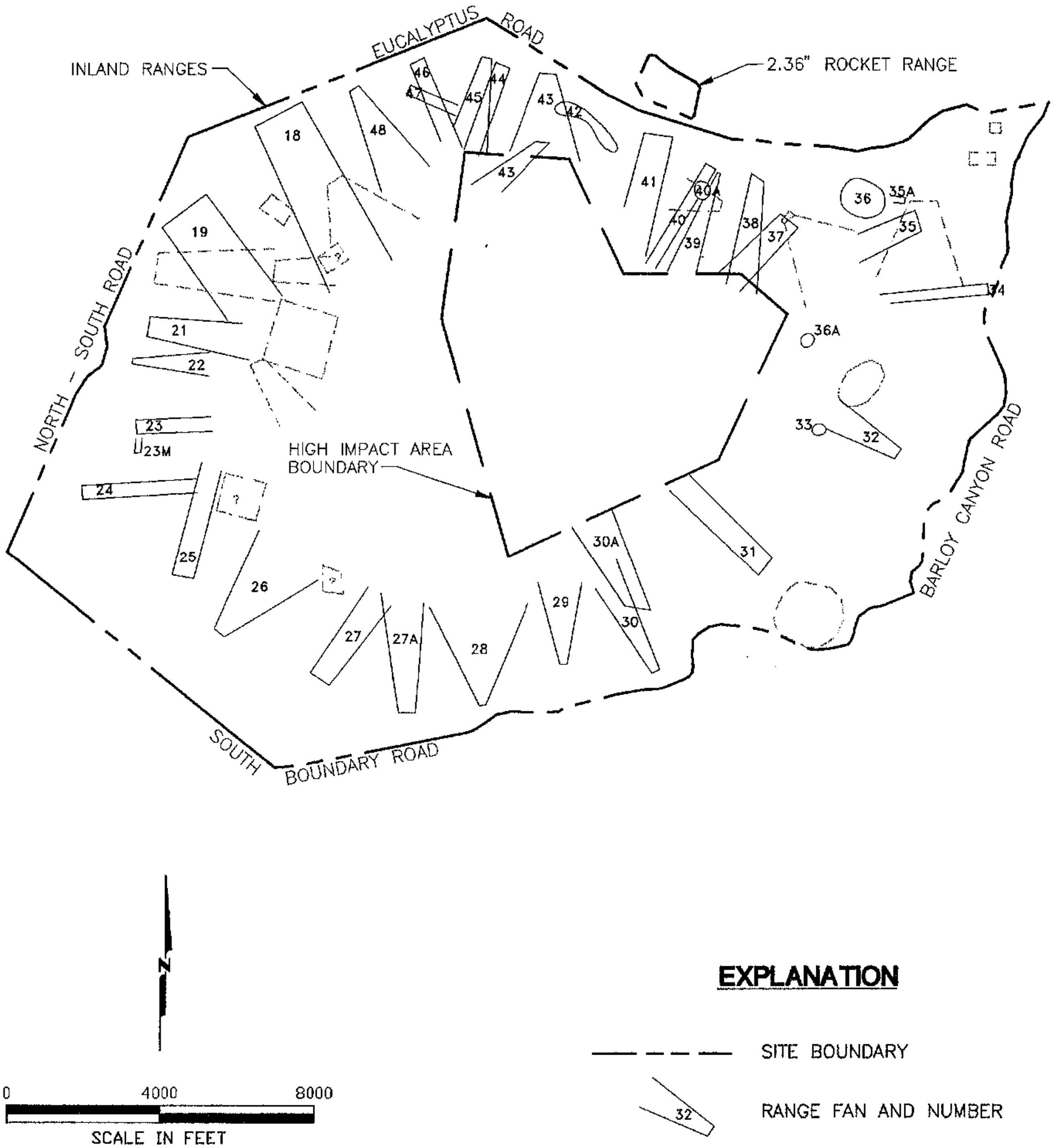
Engineering and Environmental Services

Fort Ord Superfund Process
Volume I, Background and Executive Summary
Basewide RI/FS
Fort Ord, California

PLATE **1A**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
LFDc	23366 041736	EJT	12/94	



23366495 4000.0
19951002.1524

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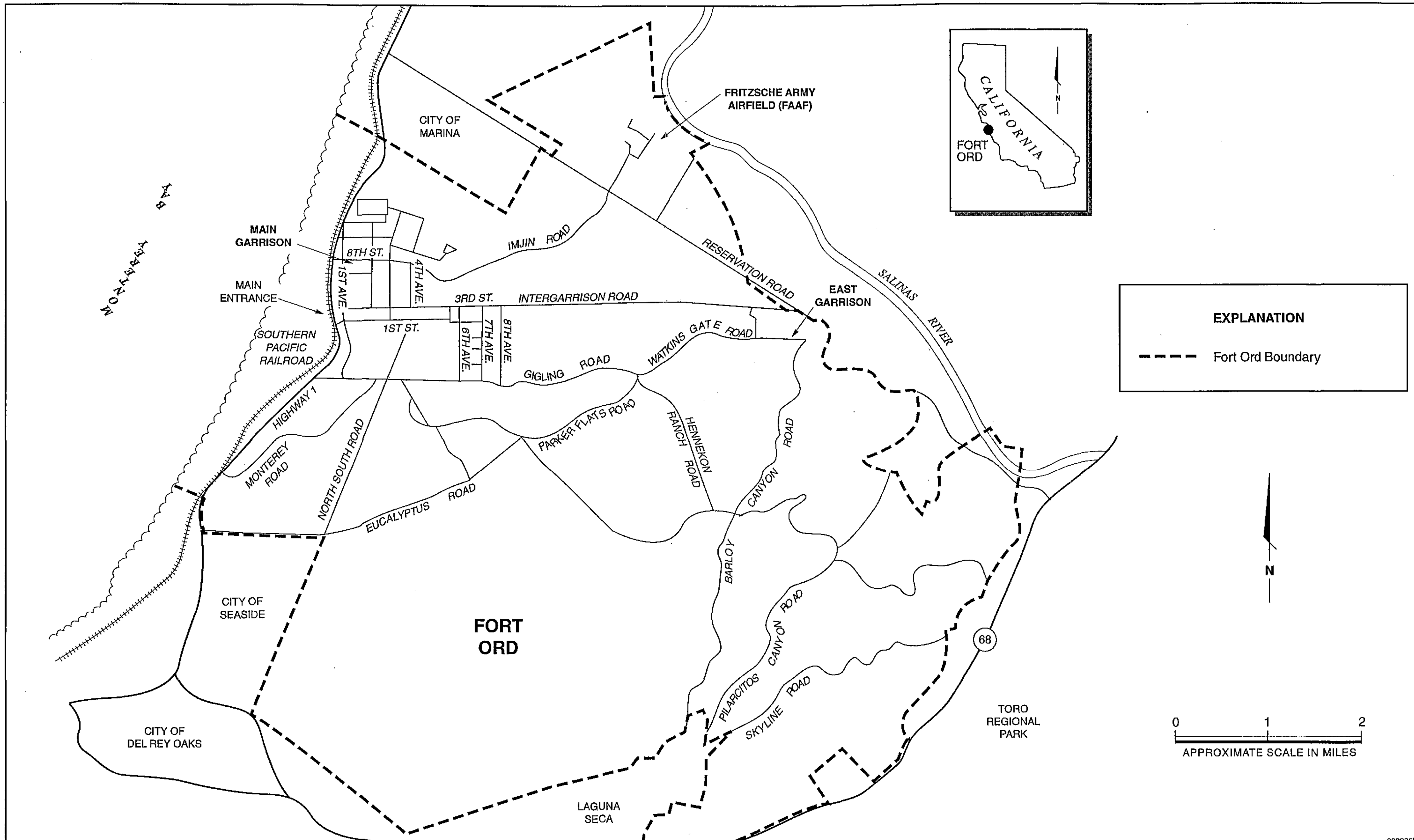
Site Map, Site 39
Volume 1 – Background and Executive Summary
Basewide RI/FS
Fort Ord, California

PLATE
7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
KF	23366 041726	EJ	12/94	10/95



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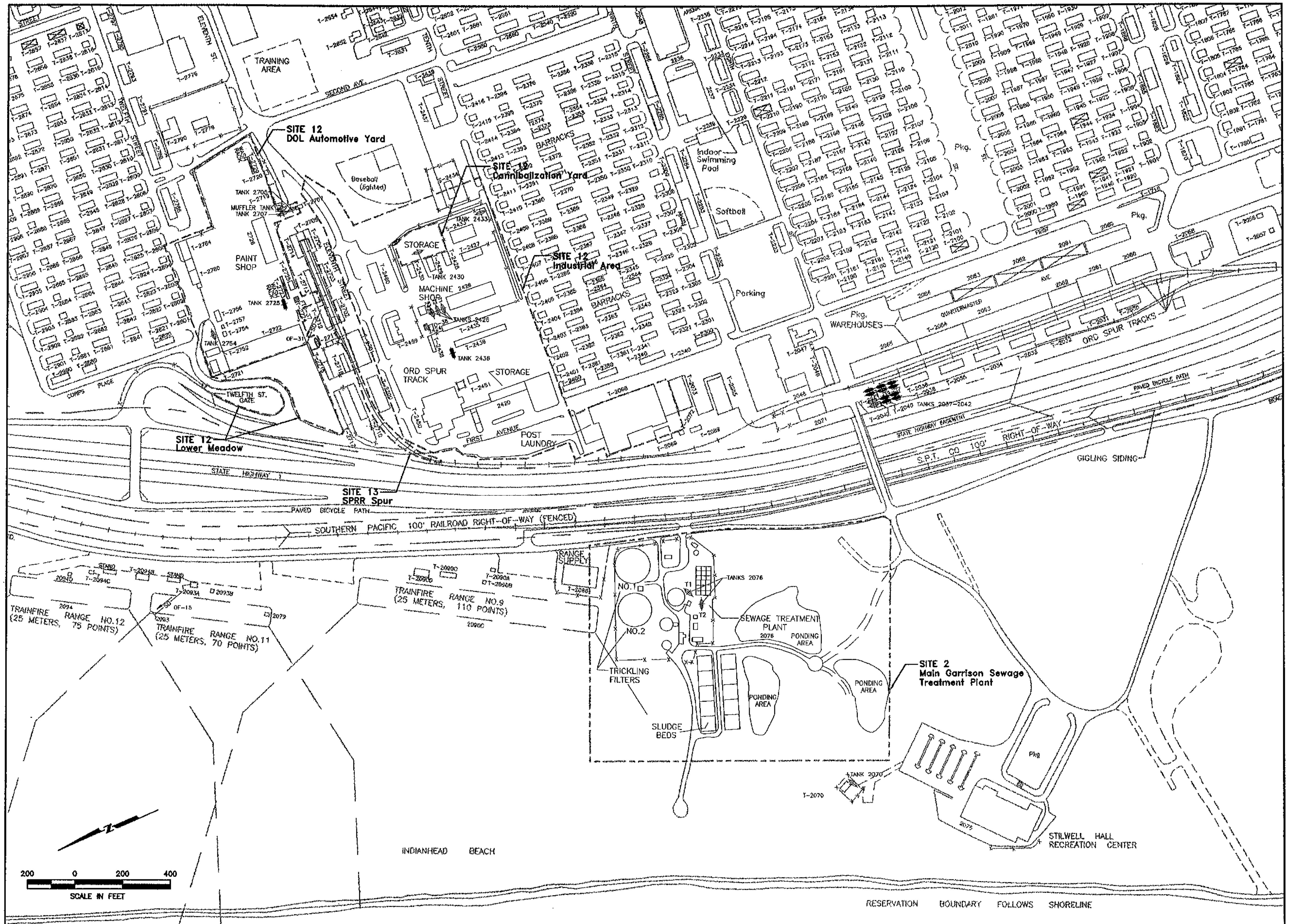
Fort Ord Location Map
Volume I, Background and Executive Summary
Basewide RI/FS
Fort Ord, California

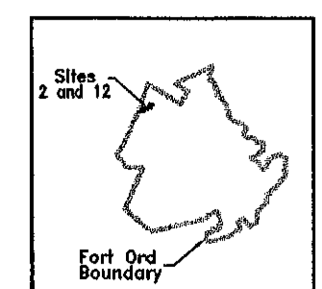
PLATE
1

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
RHCc	10776 675		10/92	10/95



EXPLANATION

- EXISTING UNDERGROUND STORAGE TANK
- FORMER UNDERGROUND STORAGE TANK
- EXISTING ABOVEGROUND STORAGE TANK
- UNDERGROUND MUFFLER
- WASH RACK
- OIL/WATER SEPARATOR
- CURRENT HAZARDOUS WASTE STORAGE AREA
- SITE BOUNDARY
- AREA BOUNDARY
- BUILDING
- FENCE
- STORM DRAIN OUTFALL PIPE



KEY MAP

NO.	DATE	REVISIONS	HLA FILE NO.	PROJECT NO.	APPROVED	APPROVAL DATE	DRAWN BY
1	7/94	DRAFT	23366490	23366 041716			KF
2	12/94	DRAFT FINAL	23366490	23366 041726			KF
3	10/95	FINAL	23366490	23366 041726		10/17/95	KF

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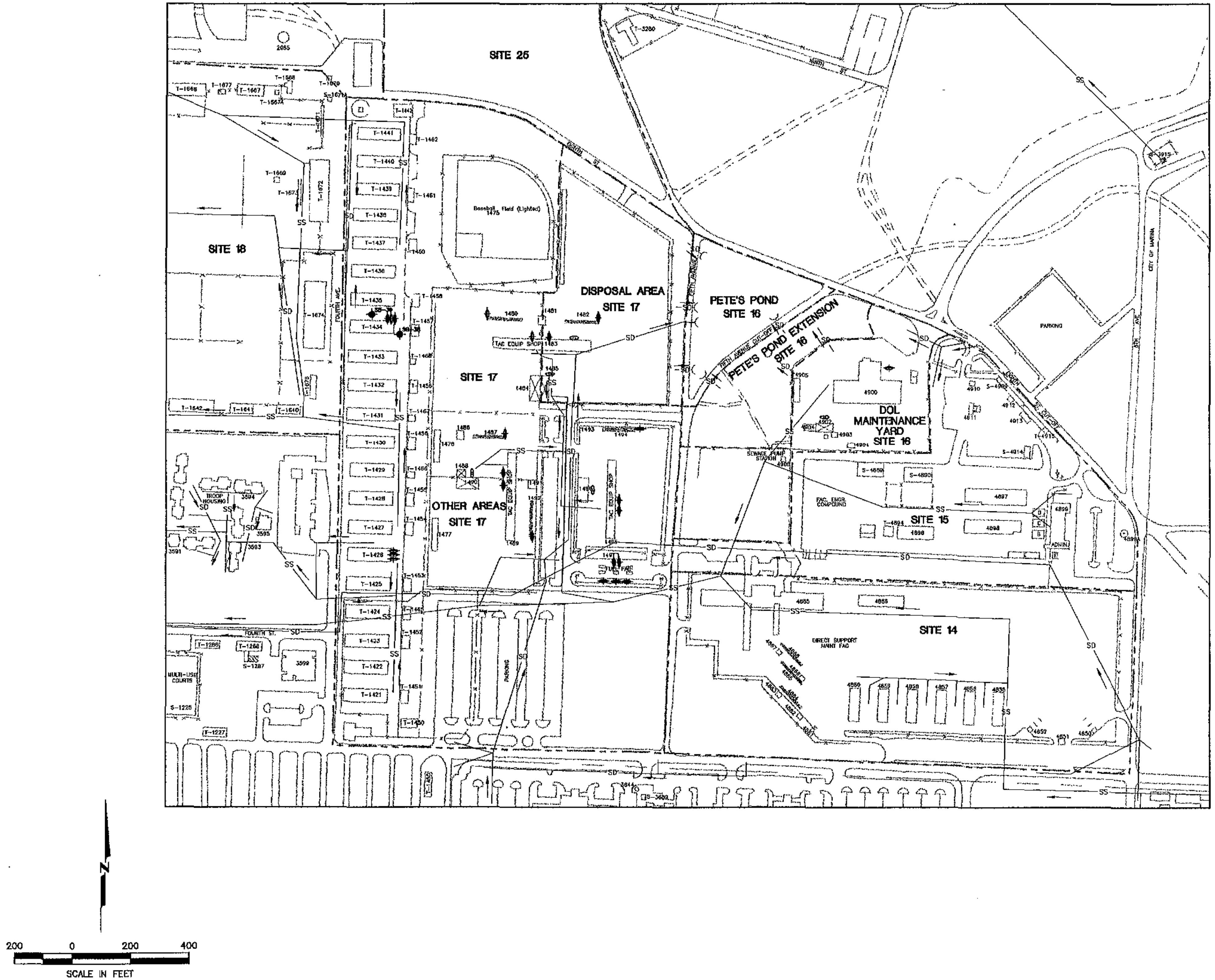
Volume I - Background and Executive Summary
Basewide RI/FS
Fort Ord, California

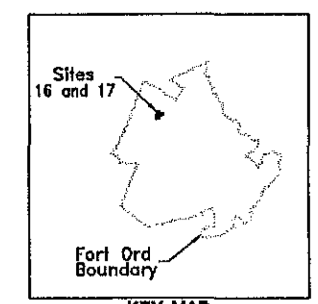
Site Map
Sites 2 and 12

PLATE: 3



EXPLANATION

- SOIL BORING (BY OTHERS)
- EXISTING UNDERGROUND STORAGE TANK
- FORMER UNDERGROUND STORAGE TANK
- WASH RACK
- GREASE RACK
- OIL/WATER SEPARATOR
- SITE BOUNDARY
- AREA BOUNDARY
- BUILDING
- STORM DRAIN OUTFALL PIPE
- FENCE
- STORM DRAIN LINE
- SANITARY SEWER LINE



KEY MAP

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2	12/94	DRAFT FINAL	23366491	23366 041726			PH
3	10/95	FINAL	23366491	23366 041726	[illegible]	11/17/95	PH

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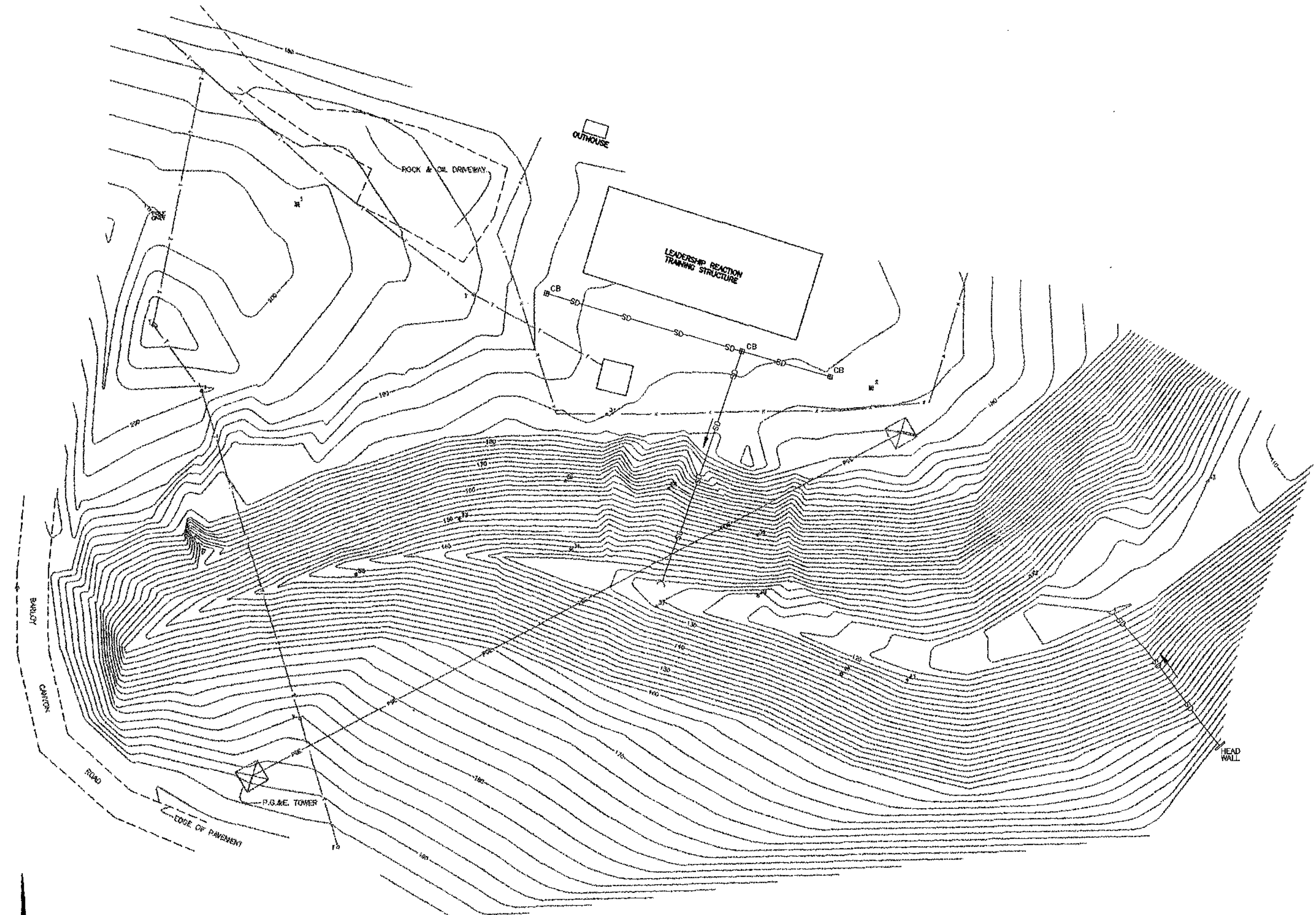
Volume I - Background and Executive Summary
Basewide RI/FS
Fort Ord, California

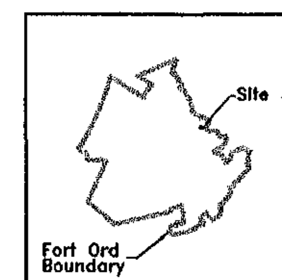
Site Map
Sites 16 and 17

PLATE:
4



EXPLANATION

- GROUND SURFACE CONTOUR (FEET ABOVE MEAN SEA LEVEL, CONTOUR INTERVAL 2 FEET)
- BUILDING
- STORM DRAIN OUTFALL PIPE
- FENCE
- GLOBAL POSITIONING SYSTEM (GPS) POINT
- WATER CATCH BASIN
- FENCE POST REFERENCE POINT
- TELEPHONE POLE
- TELEPHONE LINE
- PACIFIC GAS & ELECTRIC POWER LINE
- STORM DRAIN LINE



KEY MAP

NO.	DATE	REVISIONS	HLA FILE NO.	PROJECT NO.	APPROVED	APPROVAL DATE	DRAWN BY
1	7/94	DRAFT	23366492	23366 041716			KF
2	12/94	DRAFT FINAL	23366492	23366 041726			KF
3	10/95	FINAL	23366492	23366 041726		10/11/95	KF

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Volume I – Background and Executive Summary
Basewide RI/FS
Fort Ord, California

Site Map
Site 31

PLATE: 5

APPENDIX A

INTERIM ACTION RECORD OF DECISION

Interim Action Record of Decision
Contaminated Surface Soil Remediation
Fort Ord, California

February 23, 1994

United States Department of the Army
Sacramento Corps of Engineers
February 1994

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APPENDIX

Interim Action Record of Decision
Contaminated Surface Soil Remediation
Fort Ord, California

February 23, 1994

HLA Project No. 23366 00773

This document was prepared by Harding Lawson Associates at the direction of the U.S. Army Corps of Engineers (COE) for the sole use of the COE and the signatories of the Federal Facilities Agreement, including the Army, the U.S. Environmental Protection Agency, the California Environmental Protection Agency, including the Department of Toxic Substances Control (formerly, the Toxic Substances Control Program of the Department of Health Services), and the Regional Water Quality Control Board, Central Coast Region, the only intended beneficiaries of this work. No other party should rely on the information contained herein without prior written consent of the COE and Army. This report and the interpretation, conclusions, and recommendations contained within are based on information presented in other documents that are cited in the text and listed in the references. Therefore, this document is subject to the limitations and qualifications presented in the referenced documents.

1.0 DECLARATION

Site Name and Location

Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base comprises 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 Southern Pacific Railroad and Highway 1 pass through the western portion of Fort Ord, separating the beach front from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively. Land use east of Fort Ord is primarily agricultural.

Basis and Purpose

This decision document presents the chosen Interim Action (IA) for soil remediation of selected areas at 41 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites on Fort Ord, California (see Plate 1). This IA was selected in accordance with CERCLA, as amended by the Superfund Amendment and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for Fort Ord.

The United States Environmental Protection Agency (USEPA) and the state of California concur with the selected remedy.

Site Assessment

Actual or threatened releases of hazardous substances from Fort Ord, if not addressed by implementing the response action selected in this Interim Action Record of Decision (IAROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

Description of the Remedy

The selected remedial alternative for the Interim Action described in this IAROD addresses immediate, imminent, and/or significant risks to human health and the environment posed by limited areas of shallow contaminated surface soil at Fort Ord, California. IA at Fort Ord will likely be implemented before final remedial alternatives or cleanup levels for given chemicals have been established, but a conservative approach will be used in developing soil cleanup levels for these IA areas to reduce the likelihood of further remedial actions at an IA area. The selected Interim Action remedy will involve the following activities:

- Biological and ecological assessment of each IA area
- Use of site eligibility criteria for screening potential IA areas
- A regulatory approval process for implementing IAs
- Excavation of limited quantities of shallow contaminated surface soil, followed by confirmation sampling and backfilling with clean fill
- Soil treatment, recycling and/or disposal. Whenever possible, the contaminated soil will be treated or recycled, with landfill disposal used only as a last resort. Soil treatment/recycling will be performed at the Fort Ord Soil Treatment Area (FOSTA) using biotreatment and/or soil vapor extraction. Whenever feasible, treated soil will be reused on Fort Ord.
- Preparation of confirmation reports of site remedial Interim Action activities

Statutory Determination

This Interim Action is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements, with the exception of one waiver, for this limited-scope action, and is cost-effective. However, this Interim Action is not intended to address fully the statutory mandate for permanence and treatment to the maximum extent practicable. This Interim Action utilizes soil treatment whenever feasible and appropriate. The statutory preference for remedies that employ treatment that reduce toxicity, mobility, or volume as a principal element, although partially addressed in this remedy, will be fully addressed the final basewide Record of Decision (ROD). The necessity of subsequent actions to address fully the threats posed by the conditions at these Interim Action areas will be evaluated in subsequent decision documents and the final basewide ROD. If hazardous substances remain on site above health-based levels, a review will be conducted at 5 year intervals after remedial action is commenced to ensure that the remedy continues to provide adequate protection of human health and the environment. Because this is an Interim Action ROD, review of this remedy will be ongoing as final remedial alternatives for Fort Ord are developed.

Thomas F. Ellzey 11 Mar 94

Thomas F. Ellzey, Jr.
Colonel, U.S. Army
Commanding
Fort Ord

Joseph A. Cochran 11 Mar 94

Joseph A. Cochran
BRAC Environmental Coordinator
Fort Ord

John Wise 3.15.94

John C. Wise
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Anthony J. Landis

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Chief of Operations, Office of Military Facilities
California Environmental Protection Agency
Department of Toxic Substances Control

Roger W. Briggs

for William R. Leonard
Executive Officer
California Environmental Protection Agency
Central Coast Regional Water Quality Control Board

2.0 DECISION SUMMARY

2.1 Site Description

Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base comprises 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 Southern Pacific Railroad and Highway 1 pass through the western portion of Fort Ord, separating the beach front from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively. Land use east of Fort Ord is primarily agricultural.

2.2 Site History

Since its opening in 1917, Fort Ord has primarily served as a training and staging facility for infantry troops. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed. From 1947 to 1975, Fort Ord was a basic training center. After 1975, the 7th Infantry Division (Light) occupied Fort Ord. Light infantry troops are those that perform their duties without heavy tanks, armor, or artillery. Fort Ord was selected for closure in 1991. The majority of the soldiers were reassigned to other Army posts in 1993. Although Army personnel still operate the base, no active army division is currently stationed at Fort Ord.

The three major developed areas within Fort Ord are the Main Garrison, the East Garrison, and Fritzsche Army Airfield (FAAF). The remaining undeveloped property (approximately 20,000 acres) was used for training activities. The Main Garrison contains commercial, residential, and light industrial facilities. It was constructed between 1940 and the 1960s, starting in the northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, there was a small airfield in the central portion of the Main Garrison. This airfield was decommissioned when FAAF was completed, and the airfield facilities were redeveloped as motor pools or for other operations. FAAF, which serves as the general airfield for Fort Ord, is in the northern portion of the base, adjacent to the city of Marina. FAAF was incorporated into Fort Ord in 1960 and expanded in 1961. The East Garrison occupies 350 acres on the northeastern edge of the base and consists of military and industrial support areas, recreational facilities, and recreational open space.

Generally, chemicals present in soil at Interim Action sites are the result of former routine maintenance and support activities on Fort Ord. Such activities include: maintenance of military vehicles at wash racks, tank storage of chemicals such as waste oil, the use of oil/water separators in drainage areas, and pesticide use and storage.

2.3 Enforcement and Regulatory History

Environmental investigations began at Fort Ord in 1984 at FAAF under RWQCB cleanup or abatement orders 84-92, 86-86, and 86-315. Investigations indicated the presence of residual organic compounds from fire drill burning practices at the Fire Drill Burn Pit (Operable Unit 1 or OU-1). The subsequent Remedial Investigation/Feasibility Study (RI/FS) for OU-1 was completed in 1988, and cleanup of soil and groundwater began. In 1986, under RWQCB cleanup or abatement orders 86-87, 86-317, and 88-139, further investigations began of the landfill areas (Operable Unit 2 or OU-2), and the preliminary site characterization was completed in 1988. In 1990, Fort Ord was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL) primarily because of volatile organic compounds found in groundwater beneath OU-2, and a Federal Facility Agreement (FFA) under CERCLA Section 120 was signed by the Army, USEPA, DTSC, and RWQCB. The FFA establishes schedules for commencing remedial investigations and feasibility studies, and requires completion of remedial actions as expeditiously as possible. The basewide RI/FS began in 1991, and Fort Ord was placed on the Base Realignment and Closure List (BRAC). The final Feasibility Study for OU-2 was completed October 1, 1993.

2.4 Highlights of Community Participation

On November 15, 1993, the United States Department of the Army (Army) presented the Proposed Plan for this basewide Interim Action at Fort Ord to the public for review and comment. The Proposed Plan summarizes information in the Interim Action Feasibility Study (IAFS) and other documents in the Administrative Record for the base. These documents are available to the public at the following locations: Fort Ord Post Library, Building 4275 North-South Road, Fort Ord, California; and Seaside Branch Library, 550 Harcourt Avenue, Seaside, California. The entire administration record is available at 1143 Echo Avenue, Suite F, Seaside, California.

Comments on the Proposed Plan were accepted during a 30-day public review and comment period that began on November 15 and ended on December 15, 1993. A public meeting was held on November 30, 1993, at the Doubletree Hotel, Portola Plaza, in Monterey, California. At that time, the public had the opportunity to ask the Army questions and express its concerns about the plan. In addition, written comments were accepted during the public comment period. Responses to comments received during the public comment period are included in the Responsiveness Summary (Section 3.0), which is part of this Interim Action Record of Decision (IAROD).

2.5 Scope and Role of Interim Action

The scope of this IA is to address areas of limited surficial soil contamination on Fort Ord through excavation of contaminated soil. Excavated contaminated soil from these IA areas will be treated, recycled, or disposed of as described in Section 2.12.5. Plate 1 identifies 41 CERCLA sites on Fort Ord where these IA excavations may be implemented.

In 1991, Congress mandated a three-year completion schedule for RI/FS documents for closing BRAC sites such as Fort Ord (Public Law 102-190). Furthermore, acceleration measures suggested by the USEPA's draft Superfund Acceleration Cleanup Model (SACM) Guidance Manual recommend allocating and expanding resources to clean up areas that pose the greatest risk to human health and the environment while expending resources on sites that can (1) be cleaned up quickly in keeping with reuse goals and objectives and (2) be verified as clean and turned over to government agencies or sold to private entities for use and further development.

The economic impact of Fort Ord's closure is another impetus to accelerate the implementation of remedial actions. Closure of Fort Ord will have significant repercussions on the local economy, and timely conversion of Fort Ord property to civilian uses is a high priority to the local community as well as the Army. By conducting this IA, a large portion of Fort Ord property contaminated by chemicals could be cleaned up and made ready for civilian reuse years earlier than if remedial measures for these areas were implemented after the final basewide ROD, which is anticipated to be completed in 1995. Consequently, remedial investigations and actions at Fort Ord must be accelerated.

IA at Fort Ord will be implemented before final remedial alternatives or cleanup levels for given chemicals or combinations of chemicals have been established. Further remedial actions may be required at IA areas after final cleanup levels are established in the approved basewide ROD for Fort Ord. A conservative approach will be used in developing soil cleanup levels for these IA areas to reduce the likelihood of further remedial actions at an IA area. (The development of these cleanup levels is detailed in Section 2.7 below). Therefore, the IA is consistent with the anticipated final remedy for these areas.

2.6 Characteristics of a Typical Interim Action Site

Fort Ord covers approximately 44 square miles. The majority of soil at Fort Ord consists of sand deposits. The average depth to water beneath Fort Ord is typically 60 to 150 feet, and, in many places, the first major clay barrier between aquifers is located 600 to 700 feet below ground surface.

The Salinas Basin and the Seaside Basin are the two main hydrogeologic structures underlying Fort Ord. The Salinas Basin underlies the northern part of Fort Ord; the Seaside Basin underlies the southern part (approximately two-thirds of the base). The location and characteristics of the boundary are uncertain between these two basins. Further information on Fort Ord geology and hydrogeology is presented in the IAFS and other documents in the Administrative Record for Fort Ord.

Information gathered to date during ongoing site characterization activities at Fort Ord has identified areas within 41 sites that may be potentially suitable for IAs; of these, nine have been initially recommended for IAs (Plate 1). Potential IA areas are located throughout Fort Ord and are not limited to any single portion of the base. For the purpose of screening, developing, and selecting an appropriate remedial action at these IA areas, a "typical" IA remedial unit is described below. If additional sites (beyond the 41 sites) are identified for which the processes developed in this document are applicable, then an Explanation of Significant Differences (ESD) will be prepared, or this IAROD will be amended to include these additional sites and issued for public comment.

The following physical characteristics are applicable to all the preliminarily identified IA areas:

- Contaminated soil, like most surface soil at Fort Ord, consists of sand and/or silty sand of fine to medium grain size.
- Groundwater is relatively deep, typically more than 60 feet below the ground surface.
- Contaminated soil is of limited extent, often less than 500 cubic yards (cy), and no more than 5,500 cy of contaminated soil.
- Contaminated soil to be excavated is not more than 25 feet below the ground surface.
- Generally, the chemicals present in contaminated soil at these potential IA areas are the result of routine Fort Ord activities. Typically this soil is located near maintenance or service facilities, such as wash racks, oil/water separators, drainage areas, or former storage tanks.
- Chemicals in contaminated soil that are likely to be the object of an IA are: petroleum hydrocarbons, solvents, oils, metals and pesticides.

2.7 Remedial Action Objectives and Summary of Site Risks

The primary rationale for the development of Interim Remedial Action Objectives (RAOs) is the reduction of immediate risks to human health and protection of groundwater at an IA area. RAOs for the protection of human health from exposure to chemicals in contaminated soil at an IA area consider the following exposure routes: ingestion or dermal contact with the contaminated soil, ingestion of contaminated soil or groundwater affected by chemicals leaching from contaminated soil, and the inhalation of dust created from contaminated soil.

Achievement of the RAOs for the reduction in long-term human exposure to the contaminated soil through the above pathways requires the establishment of allowable chemical concentrations in surface soils. Soil having such allowable chemical concentrations, if left in place, will not pose unacceptable risks to future residents or users of the area. Similarly, achievement of the RAOs for the protection of groundwater quality, as well as for the prevention of ingestion of contaminated groundwater, requires the establishment of allowable chemical concentrations in the soil that will not adversely impact groundwater, if present. The methodology used to establish these allowable concentrations is presented below.

Risks to the ecosystem from the contaminated soil and proposed remedial action will be qualitatively assessed at each IA area. If such a qualitative analysis indicates that a quantitative analysis is necessary to assess the ecological risks posed either by contaminated soil or by potential remedial activities at an area, the appropriateness of conducting an IA will be re-evaluated. As mentioned previously, further remedial actions at IA areas may be specified in the final basewide ROD for Fort Ord; however, a conservative approach will be used to minimize the likelihood of future remedial actions.

2.7.1 Human Health Considerations

The RAO for the IA areas is the achievement of an acceptable aggregate human health risk estimate of: (1) 10^{-6} excess cancer risk (one-in-one million probability of an exposed individual developing cancer) or lower in accordance with USEPA methods (see Table 1) and (2) a hazard index of 1 or less, to address possible noncancer health risks. Achievement of the RAO will be evaluated separately for each of the IA areas and will apply to soil treated at the Fort Ord Soil Treatment Area, as described in Section 2.10. Site Characterization Reports for proposed IA areas will contain Screening Risk Evaluations (SREs), which identify Preliminary Remediation Goals (PRGs), also listed in Table 1 of this document, for individual soil chemical concentrations at each proposed IA area. The SREs performed for each site using chemical-specific PRGs and environmental concentration data will be used to evaluate contributions of site chemicals to cumulative area-related health risk estimates. Chemical-specific PRGs will then be revised as necessary to develop Target Cleanup Concentrations (TCCs) that address possible cumulative effects of exposure to multiple site-related chemicals and meet the overall interim RAOs. Interim RAOs and potential remediation requirements were also listed in the IAFS. These RAOs are in accordance with the National Contingency Plan (NCP), and CERCLA guidance. The development of PRGs is described in detail in the *Draft Technical Memorandum, Preliminary Remediation Goals*, dated June 14, 1993; these PRGs were also presented in the IAFS and are presented in Table 1. If necessary, additional PRGs will be developed using the same methodology.

2.7.2 Protection of Groundwater

Chemicals in contaminated soil at each IA area will be evaluated for their potential impact to groundwater. As discussed in the *Technical Memorandum: Approach to Evaluating Potential Groundwater Quality Impacts*, dated July 29, 1993, organic compounds in the contaminated soil within the unsaturated zone will be evaluated using an USEPA-developed partitioning mass transport model (VLEACH). This model will use groundwater depth and soil characteristics specific to an IA area to estimate potential maximum groundwater chemical concentrations for given chemical soil concentrations. TCCs for organic chemicals based on human health exposures discussed above will be evaluated using this model to ensure that state and federal primary maximum contaminant levels (MCLs) in groundwater will not be exceeded. If state or federal primary MCLs are predicted to be exceeded in groundwater, the TCCs for organic chemicals will be reduced accordingly until this standard of protection is obtained. Pesticide- and metal-contaminated soil will be assessed qualitatively to determine potential impacts to groundwater quality.

2.8 Description of Alternatives

Two alternatives were developed in the IAFS for detailed analysis: Alternative 1, No Action (as required by CERCLA guidance); and Alternative 2, Excavation with Soil Treatment, Recycling, and/or Disposal. Each of these remedial alternatives were evaluated in the IAFS in accordance with nine screening criteria as described in the NCP . These criteria are:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs
- Long-Term Effectiveness
- Reduction of Toxicity, Mobility, and Volume Through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State Acceptance
- Community Acceptance.

Table 2 presents a summary of these evaluations.

2.9 Alternative 1 - No Action

Alternative 1, the No Action alternative, provides a baseline from which to evaluate other alternatives and is required to be considered under CERCLA guidance. Some minimal actions were assumed to be necessary for this alternative, such as securing the area from public access with fencing, installing monitoring wells, and placing deed restrictions on the property. Annual water quality monitoring reports and site assessments were also assumed to be necessary.

The No Action alternative could be easily implemented at an IA area; however, gaining community and regulatory acceptance of this alternative would be difficult. The estimated cost, primarily O&M, to implement the No Action alternative when all 41 potential sites are considered, would be approximately $19 million. This cost is based on the net present value of annual O&M costs of approximately $1 million per year, primarily for groundwater monitoring, over 30 years using a 5 percent interest rate.

2.10 Alternative 2 - Excavation with Soil Treatment, Recycling, and/or Disposal

Alternative 2 involves excavating contaminated soil from the IA area and backfilling the excavation with clean material. Soil will be removed using a backhoe and either placed in stockpiles (nonhazardous) or containers (hazardous) at the IA area while waiting for laboratory analytical results or hauled immediately for storage, treatment, or disposal.

Excavation is a simple, readily implementable, remedial alternative for IA areas that will be protective of the community and site workers. The services and materials required for treatment of soil will also be readily available.

Excavation at an IA area could be completed within a week, because soil to be excavated is shallow and does not cover a large area. Field screening analyses and laboratory confirmation samples will be required to establish that contaminated soil had been removed before backfilling began. Analytical results may require up to two weeks to obtain. One destination for excavated soil will be the Fort Ord Soil Treatment Area (FOSTA) located at the 519th Motor Pool. The FOSTA will serve several purposes: (1) as an area to store excavated IA soil pending waste classification as well as for storage of soil until sufficient quantities are obtained for treatment or recycling; and (2) as a treatment area for nonhazardous soil containing petroleum hydrocarbons and solvents.

Some excavated soil will be stored in containers at FOSTA pending results of laboratory analysis. If the soil is characterized as hazardous, and cannot be treated at FOSTA, it will be sent offsite for treatment, recycling, and/or disposal.

Soil treatment using bioremediation and soil vapor extraction (SVE) treatment technologies are considered "presumptive" remedies because their effectiveness has already been established by previous successful implementation at Fort Ord. The effectiveness of bioremediation was demonstrated at the Operable Unit 1 Fire Drill Area at Fritzsche Army Airfield. Soil vapor extraction was demonstrated as an effective technology in a pilot study at a non-NPL petroleum hydrocarbon cleanup also at Fritzsche Army Airfield. These technologies are presumed to work successfully for excavated IA soil at the FOSTA because the contaminated soil types, as well as the chemicals, are similar to those in areas where these technologies have been successfully implemented previously. Application of these technologies at FOSTA is described below.

- <u>Bioremediation</u>: Contaminated soil will be segregated depending on the soil type and the type of petroleum hydrocarbons present. Treatment may consist of irrigating, aerating, and mixing the soil to provide soil conditions conducive to increased microbial activity. Inorganic nutrients (i.e., bulk agricultural fertilizers or ammonia, nitrate, and phosphate of industrial or food-grade quality) will be dissolved in water and periodically applied to the soil. The amount and rate of application will be based on data collected from field operations and pretreatment laboratory studies, if necessary. To maintain proper soil moisture conditions, the soil will be irrigated with water as needed. The application of water will be controlled to minimize the production of leachate. The amended and irrigated soil will be mixed periodically or aerated using perforated plastic pipes within the pile. Air emissions are not anticipated to present any significant health risks as a result of bioremediation activities. This treatment is intended for use on soils contaminated with heavy, nonvolatile petroleum hydrocarbons such as jet or diesel fuels, and/or pesticides.

- Soil Vapor Extraction: Vacuum extraction pipes consisting of plastic perforated pipes will be installed beneath or within each pile. Each soil pile will be covered with polyethylene sheeting. Concrete blocks or sand bags will be used all around and on top of each pile to hold down the plastic cover. An electric blower will draw air through the soil to remove volatile organic compounds (VOCs) from the soil. Air leaving the piles will be treated with vapor phase carbon or prefabricated abatement units as required. Soil amenable for this treatment will generally contain volatile petroleum hydrocarbons or solvents.

Prior to treatment of excavated soil, the FOSTA will be modified in the following manner:

- A liner system (permeability less than 10^{-6} cm/sec) will be constructed beneath the treatment unit(s) areas that minimizes leachate migration from the units.

- Perimeter berming will be constructed around the treatment unit(s) that prevents precipitation runoff from the unit(s) and prevents runon from outside the unit(s).

The Army will prepare a groundwater monitoring plan to perform groundwater monitoring during the FOSTA's operation, closure, and if necessary, post closure period. If groundwater monitoring is technically warranted, existing monitoring wells around the FOSTA will be used. The location of monitoring wells and frequency of sampling will be established during the Remedial Design phase.

At the conclusion of soil treatment, the FOSTA will be closed. Closure will include decontamination of treatment components, and removal and proper disposal of contaminated components and associated soil at an appropriate waste management facility.

Future IA areas may require treatment technologies in addition to those described above. An Explanation of Significant Differences or IAROD Amendment will be used to address these new IA areas and any new necessary soil treatment technologies. These technologies may include: low temperature thermal desorption, soil stabilization/ solidification, or soil aeration.

Recycling or treatment of excavated soil sent offsite will be performed at an approved facility whenever this option is feasible. When appropriate, treated or untreated soil below health-based standards and classified as "inert" under Title 23 CCR, Chapter 15, Article 2, "Waste Classification and Management" may be used on Fort Ord as part of the OU 2 landfill cap, as roadbase material, or as clean fill. Soil that can not be treated at the FOSTA will be transported off Fort Ord using, where appropriate, a licensed hazardous waste hauler. Such soil will be sent to a licensed treatment, storage, or disposal (TSD) facility designed and approved to accept such wastes.

The cost of Alternative 2, Excavation with Soil Treatment, Recycling, and/or Disposal, is comparable to the No Action alternative. The cost, including capital and O&M, for implementing this alternative at the nine preliminarily identified IA areas is approximately $1 million. A total of 6,600 cubic yards (cy) is anticipated to be excavated for all of these nine areas. Extrapolating these costs to all 41 sites results in a total cost of approximately $24 million. A quantity of 2,750 cy of excavated soil from each of the other 32 sites with potential IA areas assumed in this extrapolated cost estimate. This quantity of excavated soil is a conservative maximum. This cost assumes that the soil from the other 32 areas will be treated at FOSTA, recycled, or disposed in the same ratio as the nine preliminary identified sites (79 percent for the FOSTA, 19 percent for offsite disposal, and 2 percent for recycling.). Furthermore, costs for the construction of FOSTA, two years of groundwater monitoring, excavation and backfill, mobilizing, and regulatory interaction are also included in this estimate.

2.10.1 Screening Process for Recommended IA Areas

An IA area must meet given site conditions with respect to the nature and extent of the contaminated soil and IA location constraints, as described below. These criteria are included in the IA area eligibility checklist presented in the IAFS.

- Maximum Depth of Chemicals: IA excavations will be made with standard construction equipment to a maximum depth of 25 feet below grade. This depth limitation is based on the maximum reach of an extended backhoe. Furthermore, the bottom of IA excavations will be no deeper than 5 feet above the groundwater table, including the capillary fringe, at that area.

  The maximum depth of chemicals detected above their respective TCCs will be estimated from data presented in the site characterization report. This estimated depth will be compared with the depth limitation discussed above. Any site with contaminated soil that requires excavation below those depth limitations will not be recommended for an IA as defined in this document and will be addressed in the basewide RI/FS.

- Maximum Volume of Excavated Soil: The maximum volume of contaminated soil to be removed from a recommended IA area will be estimated from available data collected during site characterization activities and presented in the Approval Memorandum. The maximum quantity of contaminated soil to be excavated at any single area considered for IA will be not more than 5,500 cy. This maximum volume is based on a preliminary review of potential IA site data from available SCRs and is not a technical or regulatory restriction. Because an IA is intended to be limited in scope, this maximum quantity requirement is presented as a reasonable limit. Many IA areas will have much smaller quantities of soil. Agency approval will be required to exceed quantity limitation of 5,500 cy.

- Location Restrictions for IA Areas: Excavation activities will be restricted in certain locations. Each recommended IA area will meet the following criteria:

  - No IA will divert, modify, or impact an existing stream, watercourse, or wetland

  - No property listed in the National Register of Historic places will be impacted by IA excavations

  - IA excavations will not impact oak trees greater than 6 inches in diameter and more than 2 feet tall

  - IA areas in the coastal zone will require a consistency determination that the proposed remedial actions are in conformance with California's Coastal Zone Management Plan.

- Biological and Cultural Resource Screening: Because endangered or threatened plants and animals are present at some locations at Fort Ord, a Biological Area Clearance (BAC) will be completed for each IA area. These species are generally found at undeveloped regions of the base. Because preliminarily identified IA areas are located in developed areas, these species are not anticipated to be impacted by the proposed IAs. Documentation of the BAC will be included with the approval memorandum.

  Similarly, a Cultural Resources Clearance (CRC) will be completed for each IA, either as part of current site characterization activities or prior to IA. Documentation of the CRC will also be included in the Approval Memorandum.

- Ecological Assessment: A qualitative Ecological Assessment (EA) of each IA area will be performed to determine if a quantitative risk assessment is required for an IA area. A summary of this qualitative ecological risk assessment will be included with the Approval Memorandum. If a quantitative risk assessment is recommended, the appropriateness of an IA at each area will be re-evaluated.

- Materials Restricted from Interim Action: IAs are intended only to address shallow contaminated soil that may contain pesticides, metals, solvents, and petroleum hydrocarbons. The remediation of other wastes, such as radioactive materials, medical wastes, liquids, and sludges, are not addressed in this document. Agency approval, such as an Explanation of Significant Differences (ESD) or ROD amendment, will be required to perform an IA excavation on such materials.

Flowcharts on Plates 2 and 3 summarize the methodology used to evaluate and recommend areas for an IA, and the implementation process for these recommended IA areas. These flowcharts as well as a checklist for site eligibility criteria that will be used to screen a proposed IA area were presented in the IAFS; this checklist will be completed and included in the Approval Memorandum as described below in Section 2.10.3.

2.10.2 Approval Process for Interim Actions

Prior to performing an IA, an Approval Memorandum will be prepared for each recommended IA area. This memorandum will demonstrate that the proposed IA area meets the requirements and site conditions for an IA as described in the IAFS. This memorandum will reference completed SCRs and will include, at a minimum:

- A description of the IA area and its geologic conditions
- A completed site eligibility checklist for the area
- Results of a biological area clearance for endangered species that will be impacted by excavation activities, as well as other potential ecological impacts
- Results of a cultural resources clearance
- A table of expected chemicals, with their respective PRGs and TCCs
- A map showing the estimated areal extent of contaminated soil, and an estimate of the cubic yards of contaminated soil to be removed
- The anticipated soil waste classification, treatment, and final disposition of the excavated soil for excavated soil
- A summary of the qualitative ecological risk assessment for the IA area.

Each Approval Memorandum will be submitted by the Army to the USEPA, DTSC, and RWQCB. A verbal notification of submittal will be performed by the Army. Before beginning excavations at an IA area, approval of this memorandum will be obtained from agency representatives. Agency review of the Approval Memorandum will be completed within 10 working days of its submittal. Any agency approvals for the authorization of the Approval Memorandum or modifications of IA area eligibility requirements will be confirmed in subsequent written correspondence from the USEPA, DTSC, and RWQCB. In the event of an agency failure to respond to the Army regarding the Approval Memorandum within the specified review period, the Army will assume concurrence and commence with IA activities. If a dispute that cannot be settled informally arises regarding the Approval Memorandum, dispute resolution under the FFA could be invoked. A dispute regarding any particular IA area(s), however, will not prevent activities at other approved IA areas.

Generally, modifications to the Approval Memorandum are not anticipated because of the restrictive nature of IA area eligibility criteria. Some modifications of the Approval Memorandum may be required, however, by the uncertain nature of field activities and extent of chemicals present at an IA area. If a dispute that cannot be settled informally arises over any modification to the Approval Memorandum, dispute resolution under the FFA could be invoked. Such a modification will be required:

- To exceed the expected volume estimate of contaminated soil to be removed at the proposed IA area presented in the Approval Memorandum.
- To remove soil containing unanticipated hazardous materials or chemicals encountered in an IA excavation. In such an event, field work will be postponed until an evaluation is made of the applicability of an IA. If an IA is not applicable to chemicals or materials, the site will be recommended for the RI/FS process and IA activities will cease.
- If excavated soil requires a different treatment or class of landfill than proposed in the Approval Memorandum.

Agency approval (verbal or written) will be required for any of these modifications by the USEPA, DTSC, and RWQCB. Written confirmation of such changes will be sent to the agencies within 10 working days.

2.10.3 Public Notice

Advance notice of an IA will be placed in a major local newspaper at least two weeks before excavation activities. Prior, ongoing, or planned future IA activities will also be described in the quarterly newsletter, the *Advance*, prepared by the Army for local residents. Notification of these proposed IA activities will also be distributed to other local county agencies, such as the Monterey County Health Department and Monterey County Unified Air Pollution Control District, although site remedial activities at IA areas are not expected to fall within the direct jurisdiction of these agencies.

2.10.4 Suitability for Onsite Treatment

Available data for soil at each IA area will be evaluated to determine its preliminary waste classification. This waste classification will be used to determine the anticipated treatment and final disposition of the contaminated soil. These preliminary determinations, as well as the estimated quantity of excavated soil, will be presented in the Approval Memorandum. If soil from an IA area is not suitable for treatment on Fort Ord, the Army will document the rationale for this decision. Cumulative quantity totals will be recorded for all soil sent off Fort Ord for disposal and will be available for agency review. Soil may be stored in rolloff bins pending confirmation of the waste classification.

Excavated soil taken to the FOSTA as part of these IA activities will be classified according to Chapter 11 of Title 22 CCR, "Identification and Listing of Hazardous Waste." Excavated soil will be assessed for the presence of pesticides, metals, solvents, and total petroleum hydrocarbons (TPH). Soil expected to be characterized as hazardous waste will be containerized for further characterization and/or storage. As described in Plates 4 and 5, excavated soil will be treated and classified at the FOSTA, as appropriate.

Soil containing only petroleum hydrocarbons, without metal concentrations above background levels or detectable pesticide concentrations, will be treated to 500 mg/kg. This level was developed based on conservative site-specific data for Fort Ord, and applies to the placement or removal of TPH-containing soil throughout all of Fort Ord. This cleanup level is demonstrated to be protective both of human health and groundwater quality and is consistent with the inert waste as defined in Title 23 CCR, Chapter 15, Article 2 for Fort Ord. A 10^{-6} excess cancer risk and hazard index of less than one was used in the Fort Ord *Draft Technical Memorandum: Preliminary Remediation Goals*, dated June 14, 1993 to evaluate health-related risks of TPH in surface soil. To evaluate potential groundwater impacts of these PRGs, VLEACH, a USEPA-developed groundwater modeling program, was run using conservative assumptions. The specific modeling techniques used in assessing groundwater impacts are outlined in the Fort Ord *Technical Memorandum: Approach to Evaluating Potential Groundwater Quality Impacts*, dated July 29, 1993.

Soil containing metals, solvents, and/or pesticides will be containerized and characterized to determine if offsite disposal or onsite treatment and/or onsite disposal in the OU-2 landfill is applicable for this waste (see Plate 5). The characterization data will be qualitatively evaluated to determine if the soil has the potential to impact groundwater quality (exceed their respective MCLs). If the data indicates that no potential for exceeding MCLs in groundwater exists, then the soil would be classified as inert waste as defined in 23 CCR Chapter 15 Article 2. Soil that contains a listed RCRA hazardous waste will be sent off Fort Ord for disposal.

Soil containing chemicals other than metals, pesticides, solvents, and TPH will be evaluated on a case-by-case basis for continued storage, treatment, recycling, and/or disposal. Agency approval will be required for onsite treatment and/or recycling.

2.10.5 Confirmation Reports

A summary of IA field activities for each will be presented in a Confirmation Report for each area. The report will include, at a minimum:

- Copies of waste manifests for the excavated soil, if applicable
- A site map showing the limits of the excavation and location of confirmation samples
- A brief documentation of field activities, including a discussion of any agency-approved deviations or modifications to the Approval Memorandum
- Records of backfill compaction and density tests
- Chain of custody forms and laboratory analytical results for soil samples taken from the IA area
- A map showing the vertical and horizontal extent of excavated soil, and remaining chemical concentrations in any impacted soil left in place after the IA
- A determination of whether RAOs have been achieved at the IA area. This determination may be used as the basis for subsequent decision documents that indicate that all necessary remedial actions have been taken at the area, in accordance with CERCLA 120 (h) (3), and thus is suitable for transfer by deed
- Planned future remediation or characterization activities, if any, that are apparent at the time of the preparation of the confirmation report.

Each Confirmation Report will evaluate the risks of residual IA chemical concentrations at IA areas and document that further remedial actions are or are not required. Each confirmation report will be sent to the EPA, DTSC, and RWQCB. These confirmation reports will support subsequent decision documents that may allow for the transfer of property, and that may be prepared prior to the basewide ROD.

2.11 The Selected Remedy

The selected IA alternative must meet the first two of the nine CERCLA screening criteria described in Section 2.8 above: protection of human health and the environment as well as compliance with ARARs. The next five criteria are primarily balancing criteria used for comparing alternatives. The final two criteria, state and community acceptance, are used to address the concerns of state agencies and surrounding communities. Table 2 presents a summary of the alternative screening evaluation. Based on the assessment in the IAFS, Alternative 2 is the selected remedial alternative for the following reasons:

- Alternative 1: No Action is not protective of human health and the environment. In addition, this alternative will not be timely because it will delay or prohibit transfer of property from the Army to civilian use. Thus, Alternative 1 is not a feasible alternative for IA at Fort Ord.
- Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal will allow timely transfer of Army property to

civilian use, will be protective of human health and the environment through the achievement of interim RAOs, and will comply with ARARs for IAs at Fort Ord, except for the waiver as noted below.

The selected remedy, alternative 2, will meet Interim RAOs. These RAOs are based on the reduction of immediate risks to human health and the environment. The development of these RAOs is discussed in Section 2.7.

2.12 Statutory Determinations

The selected remedy meets the requirements of Section 121 of CERCLA to:

- Be protective of human health and the environment
- Comply with ARARs, (except for one waiver as described in Section 2.12.2 below)
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practical
- Satisfy the preference for treatment as a principal alternative.

2.12.1 Protection of Human Health and the Environment

The selected remedy for Interim Actions at Fort Ord is protective of human health and the environment through the removal of contaminated soil from the IA areas. Excavated soil will be classified according to its waste characteristics and handled appropriately. This excavated soil will be treated to reduce toxicity mobility and/or the volume of chemicals in the contaminated soil, whenever feasible.

2.12.2 Compliance With ARARs

ARARs include "applicable" or "relevant and appropriate" requirements. The categories of ARARS are: Action-specific, chemical-specific, and location specific. Action-, chemical-, and location-specific ARARs for the selected remedy, excavation with soil treatment, recycling, and/or disposal, are presented in Table 3.

The selected remedy complies with ARARs, except that a waiver from the 90-day storage limitation for hazardous wastes (Title 22 CCR, Chapter 12, Article 3, Section 66262.34) is invoked. Such storage requirement under Title 22 would otherwise function to limit the Army's ability to store both RCRA hazardous waste and non-RCRA hazardous waste (as defined in Title 22, Chapter 11, Article 5) at the FOSTA beyond 90 days. However, Section 121[d][4] of CERCLA legislation allows selected ARAR(s) to be waived for a remedial action under certain circumstances. One such circumstance is a remedial action that is only part of a total remedial action, such as an IA, which will attain or meet such standards when completed. Upon completion of the final remedy for Fort Ord, the standard or level of control of Title 22, Chapter 11, Article 3, Section 66262.34 shall have been met.

The waiver will apply as outlined in Table 4, Application of Waiver. The purpose of the waiver is twofold. One, for RCRA hazardous waste, the waiver is invoked to allow storage until sufficient amounts of material are accumulated to make offsite treatment or disposal practical. Currently, the FOSTA is not designed to treat RCRA hazardous waste, and the selected remedy in the ROD is limited to treatment of designated and inert waste as classified by CCR Title 23, Chapter 15. Thus, as stated above, an extended storage period is required to accumulate the materials to be shipped offsite. Two, for non-RCRA hazardous waste, the waiver is similarly invoked to allow storage until sufficient amounts are accumulated to make offsite treatment or disposal practical. Additionally, because the Army may decide to treat non-RCRA hazardous waste, given the statutory preference for treatment, the waiver is also required to allow time to decide whether the ROD should be amended or an explanation of significant difference obtained in order to allow such treatment.

Although the waiver will be applied as described above, in order to be protective of the environment, the Army will comply with the FOSTA Operation, Maintenance, Monitoring and Closure Plan, a primary document under the FFA, which will specify soil treatment, monitoring and closure, including hazardous waste inventory, storage and tracking procedures. For the interim excavation activities proposed in this document, no other waivers of ARARs are necessary.

The parties (Army, USEPA, and State of California) have agreed that, Title 23 CCR, Division 3, Chapter 15 (Chapter 15), Article 2 applies to the discharge of treated soil. The parties have not agreed as to whether Chapter 15 is an ARAR for construction and operation of the FOSTA soil treatment area. However, the State has agreed not to dispute the IAROD because the Army has agreed to design the FOSTA treatment area as described in Section 2.10 of the IAROD.

Related guidance that was identified as To-be-considered (TBCs) in the IAFS included "public nuisance" regulations of the Monterey Bay Unified Air Pollution Control District (MBUAPCD), as well as the Monterey County Oak Tree Preservation Ordinance. The MBUAPCD has not established requirements regarding dust emissions from excavation activities. The closest regulation is the Public Nuisance regulation, which can be invoked in the interest of protecting public health. In consideration of the oak tree ordinance, mitigation measures will be taken as necessary to preserve oak trees that are larger than 6 inches in diameter and greater than 2 feet tall and that may be detrimentally contaminated by IA excavations. The Army need not comply with TBCs. These TBCs were considered as screening criteria, but are not ARARs or performance standards.

2.12.2.1 ARAR Development Rationale

The purpose of the proposed IA is to address limited volumes of contaminated soil. Because groundwater will not be treated or contaminated by the proposed IA activities, requirements regarding groundwater quality, protection, and treatment are not ARARs for these IAs. Therefore, groundwater requirements, such as Maximum Contaminant Levels (MCLs), are not presented in this review of ARARs. Requirements pertaining to groundwater will be addressed in the basewide RI/FS and will be established in the final basewide ROD.

No chemical-specific cleanup levels have been established by federal or state agencies for chemicals in soil. TCCs for each IA area will be used to define the minimum limits of excavation. Final cleanup levels for chemicals in soil will be presented in the basewide ROD. Because these TCCs will be established prior to the completion of the basewide ROD, further remedial actions may be required if final cleanup levels in the basewide ROD are more stringent than the chemical concentrations remaining in the soil at the IA area. A conservative approach, however, will be used in the development of TCCs to minimize the necessity of future remedial actions.

IA will only be performed on selected areas at Fort Ord. Proposed IA areas must pass site eligibility criteria which set definitive bounds for any recommended IA areas. Any areas that do not meet these criteria will not be the subject of an IA described in this document. Thus, location-specific ARARs are based on a specific recommended IA area that meets these site screening criteria, and not on location requirements for the entire Fort Ord site.

2.12.3 Cost Effectiveness

The selected alternative is a cost-effective solution for reducing risks to human health and the environment for the IA areas, and will also allow for the timely transfer of property to the public. The estimated net present value for the No Action alternative is approximately $19 million. The maximum cost of the selected alternative is approximately $24 million, and is comparable to the No Action alternative. This estimate for the selected alternative includes costs for soil excavated from all 41 sites. Actual costs for the selected alternative are likely to be significantly lower because IAs will most likely not be implemented at all of the 41 sites.

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies

An IA is a remedial action that can be implemented quickly and that, although not necessarily intended as a final site remedial measure, significantly reduces potential immediate, imminent, and/or significant risks to human health or the environment. IAs at Fort Ord will likely be implemented before final remedial alternatives or cleanup levels for given chemicals or combinations of chemicals have been firmly established. Further remedial actions may be required at IA areas after final cleanup levels are established in the approved basewide ROD for Fort Ord, but a conservative approach will be used in developing Target Cleanup Concentrations for these IA areas to reduce the likelihood of further remedial actions at an IA area. The preference for resource recovery (recycling) and treatment of excavated soil is illustrated in Plate 4.

2.12.5 Preference for Treatment as a Principal Element

The selected remedy satisfies the statutory preference for treatment as a principal element in addressing the human health and environmental threats posed by contaminated soil at the IA areas. Plate 4 is a flowchart showing soil treatment options, and which illustrates the selected alternative's preference for soil treatment.

2.13 Documentation of Significant Changes

As described in the Responsiveness Summary (Section 3.0), the Interim Action Proposed Plan for the Interim Action Feasibility Study (IAFS) was released for public comment on November 15, 1993, and a public meeting was held on November 30, 1993. This Proposed Plan identified Excavation with Soil Treatment, Recycling, and/or Disposal as the selected remedial response action. Comments collected over the 30-day public review period between November 15 and December 15, 1993 did not necessitate any significant changes to the conclusions or procedures outlined in the IAFS and Proposed Plan. In addition, no new IA sites or FOSTA soil treatment technologies beyond those described in the IAFS and Proposed Plan have been identified at this time.

3.0 RESPONSIVENESS SUMMARY

3.1 Overview

This Responsiveness Summary provides a summary of the public comments and concerns regarding the Proposed Plan and Interim Action Feasibility Study (IAFS) at Fort Ord, California. At the time of the public review period, the Army had selected a remedy for conducting Interim Actions for limited areas of shallow surficial soil contamination at Fort Ord, California.

On the basis of the written and verbal comments received, the Army's Proposed Plan for Interim Action was generally accepted by the public. However, some citizens expressed concerns regarding the level of public involvement in the selection of remedial alternatives at Fort Ord, the location of the FOSTA, and soil cleanup levels.

3.2 Background on Community Involvement

The Army has implemented a progressive public relations and involvement program for environmental activities at Fort Ord. The *Advance*, published by the Army, is a quarterly newsletter, sent to the public, that highlights the status of ongoing and planned remedial activities at Fort Ord. The Army also conducts a quarterly Technical Review Committee to involve the public in decisions made regarding remedial actions. In addition, two toll-free 800 numbers are available for concerned citizens to comment and receive answers regarding the environmental restoration and transfer of Fort Ord property. A synopsis of community relations activities conducted by the Army is presented in Appendix A.

The Army held a public comment period on these actions from November 15, 1993, through December 15, 1993. Over 600 copies of the Proposed Plan were mailed for public review and comment to interested parties and were placed in the Fort Ord Post Library, Building 4275 North-South Road, Fort Ord, California, and Seaside Branch Library, 550 Harcourt Avenue, Seaside, California. This Proposed Plan also invited readers to a public meeting to voice their concerns.

This public meeting was held to discuss the selected remedy and final IAFS with the public. This meeting was held on November 30, at 7:00 in the Doubletree Hotel in Monterey, California.

No comments were received from the public regarding the proposed Interim Action prior to the publication of the Proposed Plan and the start of the public comment period. Comments received during this period are addressed below.

3.3 Summary of Comments Received during the Public Comment Period and Department of the Army Responses

The public comment period on the final IAFS and Proposed Plan was held from November 15 to December 15, 1993. A five day extension of this comment period, to December 20, 1993, was granted to the California Environmental Protection Agency (Cal/EPA) at their request. Concerns from the general public on the proposed IA were raised at the Public Meeting (held on November 30, 1993) regarding the location of the FOSTA, soil cleanup levels, as well as the start of, and local contractor involvement in, IA activities. Addition comments not related to the proposed IA were raised regarding the Fort Ord OU2 landfills and the level of public involvement in the development and selection of remedial activities (through the Restoration Advisory Board). These questions and comments were addressed during the public meeting.

No written comments were received from the general public during the public comment period. Two written letters from regulatory agencies regarding specific technical and legal questions were received during the public comment period; one from the Monterey Bay Unified Air Pollution Control District, and the second from the Cal/EPA, including the DTSC, and the RWQCB. The letter from the MBUAPCD concerned air emissions from the FOSTA, and the letter from the state concerned details on the FOSTA and TPH soil cleanup levels for Fort Ord.

Comments from the local community that were not sufficiently addressed during the public meeting are summarized and addressed according to their topics in the following sections of this document. Response to the specific technical and legal issues raised by regulatory agencies is also presented.

3.3.1 Summary and Response to Local Community Concerns

Comments from the local community were voiced at the Public Meeting, and are summarized and addressed below. No written comments were received from the local community during the public comment period.

3.3.1.1 Public Comments Regarding Community Relations

Comment: The public meetings aren't adequately advertised to the general public.

Army Response: The Public Meeting was advertised in the Proposed Plan and the Herald two weeks before of the scheduled meeting date. In addition, a reminder regarding the scheduled time of the public meeting was announced on local television programs on the day of the meeting.

3.3.2 Summary and Response to Written Specific Legal and Technical Questions

Two written comments were received during the Public Comment period, both from regulatory agencies: the first from the Monterey Bay Unified Air Pollution Control District (MBUAPCD) regarding air emissions from soil treatment activities at the FOSTA; and the second from the Cal/EPA regarding details of the FOSTA construction.

3.3.2.1 Summary of, and Army Response to, the Letter Received from the MBUAPCD

The MBUAPCD had three main concerns regarding the Proposed Plan and IAFS:

(1) MBUAPCD's Regulation X, Rule 1000, requires that facilities emitting carcinogenic toxic air contaminants not cause an excess cancer risk of greater than one-in-one million. Furthermore, toxic air contaminants (carcinogenic and noncarcinogenic) must not result in an exposure of greater than PEL/420 (where the PEL is the Permissive Exposure Limit).

(2) Soil vapor extraction, which emits carcinogenic toxic air contaminants, must have Best Available Control Technology.

(3) Benzene was not identified in the table of Preliminary Remediation Goals but is commonly found in gasoline-contaminated soil.

Army Response to MBUAPCD Letter

Activities performed as part of this Interim Action will conform to the health-based standards recommended by the MBUAPCD (the PEL/420 or one-in-one million excess cancer risk). No toxic air contaminants are expected to be generated from the bioremediation of soil, which will be the primary remedial treatment technology for soil brought to the FOSTA.

Some soil may be treated by soil vapor extraction (SVE). Any soil treated by SVE will be covered, and air emissions will be "cleaned" using vapor phase carbon drums before discharge to the atmosphere. Air pollution abatement using this carbon treatment will meet the Best Available Control Technology requirements.

No benzene is expected to be present in soil collected as part of these Interim Actions because gasoline-contaminated soil (where benzene is normally found) will not be excavated for these Interim Actions. Thus, benzene is not expected to be present in any significant quantities for soil collected as part of these Interim Actions.

3.3.2.2 Reprint of, and Army Response to, the Letter Received from the California Environmental Protection Agency (Including the DTSC and RWQCB)

Generally, the State agrees with the Army's planned Interim Actions; however, the Plan is incomplete in describing the specific site modifications, treatment system operation, and site closure of the Fort Ord Soil Treatment Area (FOSTA). Specific Plan deficiencies include: a) FOSTA location, b) modifications to the existing concrete slab to insure containment, c) groundwater monitoring during FOSTA operations, closure, and post closure periods, d) soil treatment and storage areas clean closure, e) decontamination area modifications to contain wash water and subsequent wash water disposal. The Plan must specify that:

a) The location of the FOSTA will be the 519th Motor Pool Area at North-South Roads and Light Fighter Drive. Non-hazardous soil storage and treatment will occur on the existing concrete slab between Buildings S-3897 and S-3898.

b) The concrete slab between Buildings S-3897 and S-3898 used for soil treatment and storage will be modified with the application of a concrete sealing product. A concrete sealing product will be selected based on the anticipated soil contaminants and will provide containment of any leachate during the active life of the unit. The slab area will be modified to include concrete curbs around the perimeter. Curbs will be designed to insure that wastes are contained within the treatment area and on the modified slab. Curbs will be designed to prevent precipitation runoff from the treatment unit and prevent runon from outside the unit.

c) The Army will conduct groundwater monitoring during the FOSTA's operation, closure, and, if necessary, post closure periods. Groundwater monitoring will be conducted using existing groundwater monitoring wells around the FOSTA. Specified wells will be monitored quarterly as part of the basewide monitoring program. Monitoring wells will be selected during the Remedial design phase and may be modified during FOSTA operation.

d) The Army intends to "clean close" the FOSTA at the conclusion of treatment operations. Clean closure will include removing and properly disposing all remaining contaminated soils, washing the concrete surface to remove all remaining contamination. Where contamination cannot be removed from the treatment components, the Army will properly discharge (dispose) contaminated components at an appropriate waste management facility.

e) The existing wash area for military vehicles will be modified to collect and store wash water generated during equipment decontamination in a properly designed storage system. The Army will insure that collect water is properly disposed.

The State agrees with and supports the Army's Plan to expedite remedial activities, particularly sites with limited soil contamination. However, the State maintains that the California Code of Regulations, Title 23, Division 3, Chapter 15 (Chapter 15) requirements apply to the Fort Ord Soil Treatment Area (FOSTA). Chapter 15 contains specific requirements established to regulate construction, monitoring, and closure of soil storage, treatment, and disposal areas. Chapter 15 requirements have been developed to ensure protection of the environment, specifically water quality.

The Army believes the remedial alternatives proposed are exempt from Chapter 15 pursuant to Section 2511 (d) and (i). As the State has stated previously, the Army's belief is not entirely accurate. The Army appears to be interpreting Section 2511 (d) as a full exemption from Chapter 15. Section 2511 (d) is a limited exemption and states that "wastes, . . . removed from the immediate place of release shall be discharged according to Article 2 . . ." The Army's Plan proposes to excavate contaminated soil from specific sites ("the immediate place of release") and transport the excavated soil to a waste management unit for treatment. Thus, a

Section 2511 (d) exemption requires compliance with Article 2 at the treatment unit. According to Article 2, the contaminated soil must be classified and then discharged only to waste management units that comply with other applicable Chapter 15 provisions. In other words, the waste management unit proposed for treating the soils must comply with the siting criteria (Article 3), the construction standards (Article 4), and the monitoring standards (Article 5). When the unit is closed, it must close according to Article 8.

Chapter 15, Section 2510 (b) and (c), provides the Regional Board latitude to consider "specific engineered alternatives" to Chapter 15's construction and prescriptive standards. The Army can comply with the applicable Chapter 15 provisions by constructing a "specific engineered alternative" as specified in Section 2510 (b).

Section 2511 (d) requires that, after treatment, the treated soils must be discharged according to Article 2. Applicable discharge requirements will depend on the level of treatment attained.

Chapter 15, Section 2511 (i) provides an exemption where waste treatment is in fully enclosed facilities. The Statement of Reasons clarifies the intent to apply this section to specific types of facilities. An open concrete slab for contaminated soil treatment does not fit within the Section 2511 (i) exemptions.

The Plan and the Interim Action Feasibility Study (IAFS) state the Army intends to modify the proposed FOSTA location (519th Motor Pool) to store and treat contaminated soils. At recent Remedial Project Manager meetings, the Army and its consultant have described plans to modify the concrete slab at the FOSTA before treating contaminated soils. The proposed modifications include sealing the concrete and providing perimeter curbing to prevent runoff and runon. The Army has stated it would monitor existing groundwater wells and "clean close" the FOSTA when remediation is complete. The specific site modifications, treatment system operation, and site closure described by the Army for the FOSTA appear to comply with Chapter 15 "specific engineered alternatives." However, specific details discussed have not been included in either the IAFS or the Plan.

The State contends that all design, operation, and closure details which qualify as "specific engineered alternatives" need to be specified in the Plan. Furthermore, the specific details must also be incorporated into the Record of Decision. The Plan must be changed to reflect the specific site modifications, FOSTA treatment system operations, and site closure as provided in Attachment 1.

The proposed Plan includes a soil cleanup and soil treatment level of 500 mg/kg for Total Petroleum Hydrocarbons (TPH). Although the Regional Board typically imposes a 100 mg/kg soil cleanup level at petroleum-contaminated sites, it concurs with the proposed 500 mg/kg TPH level for the Interim Action cleanups, based on the following factors:

a. Petroleum contamination at Fort Ord consists primarily of weathered petroleum product that contains hydrocarbon chains consisting of 14 or more carbon atoms ($>$-C_{14});

b. The depth to groundwater ranges from 60 to 150 feet below ground surface;

c. A soil partitioning computer model will be used at each site to determine if groundwater could be impacted by contaminants remaining in soil at the 500 mg/kg concentration. Soil cleanup level will be reduced if groundwater could be impacted. If groundwater is impacted the IA process will not apply; and

d. The cleanup level seems protective of both human health and groundwater quality, based on conservative site-specific data provided.

Army Response to Comments from the California Environmental Protection Agency

The Army is pleased that the State concurs and supports the IA Proposed Plan for sites with limited soil contamination. As the Army has stated previously, we believe that Section 2511(d) of Chapter 15 provides an exemption for "actions taken by or at the direction of public agencies to cleanup or abate conditions of pollution or nuisance resulting from unintentional or unauthorized releases of waste...". The Army believes that the excavation of limited amounts of contaminated soil and treatment of such soil at the FOSTA falls squarely within this exemption.

The Army agrees with the State that Section 2511(d) is not a complete exemption. To the extent that the exemption further provides that waste "removed from the immediate place of release shall be discharged according to Article 2" of Chapter 15, the Army intends to fully comply with Article 2. Article 2 classifies waste and based upon such classification, determines where waste may be discharged.

The Army does not agree that soil treatment at the FOSTA itself constitutes a classified waste management unit that would be regulated by Chapter 15. Therefore, provisions dealing with siting criteria (Article 3), construction standards (Article 4), monitoring standards (Article 5), closure standards (Article 8), are not triggered. As stated above, the Army believes that the excavation and treatment of soil is exempt under Section 2511(d) as a governmental action to cleanup or abate waste. The Army is no longer pursuing exemption 2511(i) in regard to the FOSTA as mentioned in previous discussions with the State.

The Army has stated in the Proposed Plan and IAFS that design criteria, soil acceptance requirements, operational and maintenance procedures, target cleanup concentrations, and closure procedures for the FOSTA will be provided in a FOSTA Design Operation, Maintenance, Monitoring, and Closure Plan.

The Proposed Plan already stated that nonhazardous soil will be stockpiled at the FOSTA and that hazardous soil will be stored in containers. Figure 5B in the Proposed Plan clearly shows that soil will be placed in a lined facility, and describes the storage of containers of hazardous waste inside buildings. Furthermore, the location of the FOSTA was identified as the 519th Motorpool area in the Proposed Plan and is clearly shown in the Fort Ord Site Plan (Figure 2 in the Proposed Plan). The 519th Motorpool area has historically experienced heavy vehicle traffic and is expected to have the strength to handle traffic associated with the placement and treatment of these materials. The FOSTA will be designed with the intent of facilitating soil remedial activities and protecting human health and the environment, including groundwater.

The specific details requested by the State to be included in this Record of Decision (ROD), while important to the operation of the FOSTA, are not germane in light of the overall CERCLA process and IAFS. Feasibility Studies and their associated Proposed Plans are intended to recommend a selected remedy for a given remedial problem that can attain established cleanup levels and comply with applicable or relevant and appropriate requirements (ARARs).

Then, during the Remedial Design (RD) phase, engineering specifications will be drafted to implement the selected remedy as directed by the ROD. In addition to the ARARs listed in the ROD which guide remedial design, the CERCLA process also provides for currently accepted construction practices and techniques to be used to ensure the protection of human health and the environment, including groundwater.

Specific details regarding curb specifications or building numbers had no bearing on the selection of Alternative 2, Soil Excavation with Treatment and/or Disposal, as the selected remedy for Interim Action for areas on Fort Ord.

The Army again emphasizes that this information will most likely be similar to information that would be required under Chapter 15. To that end, the Army is pleased that the State believes that construction, operation and closure designs may satisfy the "engineered alternative" provided by Chapter 15. The Army believes that these actions would not be driven by Chapter 15 as an ARAR. In other words, the Army plans to perform these activities as part of the CERCLA process, not as an attempt to satisfy any engineered alternative allowed by Chapter 15. As part of the CERCLA process, the details for these activities will be delineated during the upcoming RD stage. The State, of course, will have the opportunity at that time to comment on the RD.

The Army agrees that a cleanup level of 500 ppm of total petroleum hydrocarbons in soil is an acceptable standard for Fort Ord.

TABLES

Table 1. Preliminary Remediation Goals (PRGs)*
Interim Action Record of Decision
Fort Ord, California

Chemical	Lowest PRG	Based on Noncancer Health Effects: Child Resident	Adult Resident	Construction Worker	Based on Carcinogenesis: Adult Resident	Construction Worker
Acenaphthene	960	960	4,600	31,000	NA	NA
Acetone	220	220	900	8,200	NA	NA
Antimony	27	27	290	57	NA	NA
Arsenic	0.87	20	220	44	0.87	60
Barium	1,000	1,000	4,700	4,100	NA	NA
Beryllium	0.39	340	3,700	730	0.39	28
Bis(2-ethylhexyl)phthalate	13	320	1,500	1,000	13	3,200
Cadmium	8.1	34	370	73	8.1	380
Carbon disulfide	0.96	0.96	3.9	3.7	NA	NA
Carbon tetrachloride	0.025	29	190	750	0.025	8.6
Chlordane	0.14	0.97	4.6	3.2	0.14	34
Chromium VI	0.23	7.2	30	38	0.23	11
Copper	2,500	2,500	27,000	5,300	NA	NA
4,4'-DDT	0.53	8.0	38	26	0.53	130
Dieldrin	0.011	0.80	3.8	2.6	0.011	2.8
Ethylbenzene	830	830	3,700	3,900	NA	NA
Fluorene	640	640	3,100	21,000	NA	NA
Lead (a)	240	240	3,900	460	NA	NA
Mercury	20	20	210	41	NA	NA
Methyl ethyl ketone	620	620	2,900	3,300	NA	NA
2-Methylnapthalene	640	640	3,100	2,100	NA	NA
Petroleum Hydrocarbons (b)	500	(c)	(c)	(c)	500	120,000
Napthalene	640	640	3,100	2,100	NA	NA
Nickel	130	1,400	15,000	2,900	130	6,300
Phenanthrene	640	640	3,100	2,100	NA	NA
Pyrene	480	480	2,300	16,000	NA	NA
Selenium	340	340	3,600	710	NA	NA
Silver	340	340	3,600	710	NA	NA
Tetrachloroethylene	0.16	410	2,700	11,000	0.16	54
Thallium (as Thallic oxide)	4.7	4.7	50	100	NA	NA
Toluene	190	190	770	3,700	NA	NA
1,2,4-Trichlorobenzene	49	49	210	710	NA	NA
Vanadium	470	470	5,000	1,000	NA	NA
Xylenes	130	130	520	500	NA	NA
Zinc	20,000	20,000	210,000	42,000	NA	NA

* All PRGs are in milligrams per kilogram, and are taken from the:
Draft Technical Memorandum, Preliminary Remediation Goals, Fort Ord, California. Dated June 14, 1993.
Prepared by HLA for the Sacramento COE.
These PRGs were developed according to procedures described in:
Risk Assessment Guidelines for Superfund, Volumes 1 and 2.
Prepared by the Office of Emergency and Remedial Response, EPA documents EPA/540/I-89/006 and EPA/540/I-89/001

(a) *Draft Final Basewide Background Soils Investigation.* Dated March 15, 1993
Prepared by HLA for the Sacramento COE.
(b) This PRG is based on maximum concentrations of individual carcinogenic and non-carcinogenic constituents in used motor oil.
(c) Calculated value exceeds 100% of soil, indicating noncancer health effects would not be expected at any soil concentration.
NA = Not available

Table 2. Summary of Interim Action Alternative Screening Evaluation
Interim Action Record of Decision
Fort Ord, California

Selection Criteria	Alternative 1: No Action	Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal
Protection of human health and the environment	Not protective	Protective
Compliance with ARARs	May not trigger ARARs if soil left in place	In compliance, except a waiver is invoked as noted in Section 2.12.2
Long-term effectiveness and permanence	Not effective in the long-term	Likely to be effective in the long-term considering the use of conservative Target Cleanup Concentrations
Reduction of waste toxicity, mobility, and volume through treatment	No reduction of toxicity, mobility, or volume	Reduction of toxicity and mobility of chemicals in soil. May reduce volume of contaminated soil through treatment
Short-term effectiveness, including timeliness	Not effective or timely	Effective and timely
Implementability	Implementable	Implementable
Cost (Estimated maximum net present value)	$19,000,000[(1)]	$24,000,000[(2)]
State acceptance	Not acceptable	Acceptable
Community acceptance	Not acceptable	Acceptable

Notes:

(1) Based on a 5 percent interest rate over 30 years.

(2) Estimated maximum cost based on excavating soil at all 41 sites. Actual costs are likely to be significantly lower.

Table 3. Applicable or Relevant and Appropriate Requirements
Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal
Interim Action Record of Decision
Fort Ord, California

Source	Regulation, Standard, or Level of Control	Description	Applicable or Relevant and Appropriate	Comments
Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities	Title 22 CCR, Chapter 14, Use and Management of Containers; Article 9, Sections 66264.171-178	Establishes requirements for the use of containers to store hazardous waste.	Applicable Action-Specific Requirement	Excavated soil or decontamination water subsequently characterized as hazardous may be stored in containers at an IA area or at the FOSTA.
	_______, Section 66171; Condition of Containers	Containers for hazardous waste must be maintained in good condition.	Applicable Action-Specific Requirement	See above
	_______, Section 66172; Compatability of Waste in Containers	Containers for hazardous waste must be compatible with the wastes stored in them.	Applicable Action-Specific Requirement	See above
	_______, Section 66173; Management of Containers	Containers holding hazardous waste must be closed during storage except when necessary to add or remove waste.	Applicable Action-Specific Requirement	See above
	_______, Section 66174; Inspections	Containers and container storage areas must be inspected weekly for leaks or deterioration.	Applicable Action-Specific Requirement	See above
	_______, Section 66175; Containment	Container storage areas must be designed according to the requirements of this section.	Applicable Action-Specific Requirement	See above
	_______, Section 66176; Special Requirements for Ignitable or Reactive Waste	Container of ignitable or reactive wastes must be stored at least 15 meters from a facility's property line.	Applicable Action-Specific Requirement	See above
	_______, Section 66177; Special Requirements for Incompatible Waste	Incompatible wastes must not be placed in the same container, or in unwashed containers which previously held incompatible wastes.	Applicable Action-Specific Requirement	See above
	_______, Section 66178; Closure	At closure, all hazardous waste and waste residues must be removed and remaining containment structures decontaminated.	Applicable Action-Specific Requirement	See above

Table 3. Applicable or Relevant and Appropriate Requirements
Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal
Interim Action Record of Decision
Fort Ord, California

Source	Regulation, Standard, or Level of Control	Description	Applicable or Relevant and Appropriate	Comments
Standards Applicable to Generators of Hazardous Waste	Title 22 CCR, Chapter 12, Article 3, Section 66262.34, Accumulation Time	A generator may accumulate hazardous waste for 90 days or less.	Applicable Action-Specific Requirement	A waiver of this requirement will be invoked to allow storage for excavated hazardous soil until sufficient volumes are obtained for treatment, recycling, or disposal.
Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities	Title 22 CCR, Chapter 14, Article 2, Section 66264.14	Owners and operators of hazardous waste treatment, storage, or disposal (TSD) facilities must prevent the unknowing entry of persons or livestock onto the active portions of the facility; in addition, warning signs must be posted.	Applicable Action-Specific Requirement	IA areas will be restricted from public access.
Standards for owners and operators of hazardous waste treatment, storage,	Title 22 CCR, Chapter 14, Article 7, Section 66264.119; Post Closure Notices	Under this requirement, a restriction is placed on the deed which constrains future uses of the property.	Applicable Action-Specific Requirement	No unacceptable concentrations of chemicals are expected to remain at the FOSTA site after closure. Further remedial actions, as well as possible deed restrictions, may be required as part of the final basewide ROD for an IA area.
Standards for owners and operators of hazardous waste treatment, storage, and disposal facilities	Title 22 CCR, Chapter 14, Article 16, Section 66264.601	These regulations apply to facilities that treat, store, or dispose of hazardous waste in miscellaneous units. Owners and operators of TSDs at which hazardous waste is stored in miscellaneous units must locate, design, construct, operate, maintain, and close those units in a manner that is protective of human health and the environment.	Applicable Action-Specific Requirement	Carbon drums may be used as part of the FOSTA treatment activities. These carbon drums may be considered miscellaneous treatment units.

Table 3. Applicable or Relevant and Appropriate Requirements
Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal
Interim Action Record of Decision
Fort Ord, California

Source	Regulation, Standard, or Level of Control	Description	Applicable or Relevant and Appropriate	Comments
Land Disposal Restrictions	Title 22 CCR, Chapter 18, Article 1, Section 66268.7	Requires laboratory analysis of wastes intended for landfill disposal to establish that the waste is not restricted from landfill disposal.	Applicable Action-Specific Requirement	Soil excavated from IA areas may subsequently be found to be hazardous or designated waste. Treated and untreated hazardous or designated soil that cannot be recycled will be shipped for disposal off Fort Ord.
Monterey Bay Unified Air Pollution Control District (MBUAPCD)	Regulation II (New Sources) and Regulation X (Toxic Air Contaminants)	Establishes requirements for new stationary sources of air pollution, and the appropriate level of abatement control technology for toxic air contaminants.	Relevant and Appropriate Chemical-Specific Requirement	The FOSTA would need to meet the substantive requirements of these MBUAPCD regulations because soil treatment, such as SVE or biodegradation, may generate toxic air emissions. Levels of these emissions are anticipated to be minimal to none.
National Primary and Secondary Ambient Air Quality Standards (NAAQS)	40 CFR Part 50	Establishes NAAQS for criteria pollutants: particulate matter (PM10), sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead.	Applicable* Chemical-Specific Requirement	Although none of these pollutants are present at the preliminarily identified IA areas, they may be encountered or generated during IA excavation activities.
Standards for the Management of Hazardous Waste	Title 23 CCR, Chapter 15, Article 2; Waste Classification and Management	This regulation establishes and defines procedures and criteria for identification and listing of designated and hazardous wastes.	Applicable Chemical-Specific Requirement	This provision applies to the discharge of soil leaving the FOSTA.
Federal Endangered Species Act	50 CFR Parts 200 and 202	These regulations provide for the protection of endangered or threatened species through an evaluation of affected habitats in the IA area, as well as consultation with the appropriate government agencies.	Applicable* Location-Specific Requirement	Fort Ord does contain endangered species of plants and animals. Each IA area will be screened for potential environmental impacts to such species and results will be included as part of the IA area Approval Memorandum that will recommend measures, as necessary, to ensure compliance with this ARAR.
National Archaeological and Historic Preservation Act	36 CFR Part 65	These regulations provide for the protection of any historically significant artifacts that may be unearthed during excavation activities.	Applicable Location-Specific Requirement	No historically significant artifacts have been uncovered during previous investigation activities at Fort Ord, and none are expected to be unearthed at the IA areas. Appropriate actions will be taken, however, should any such artifacts be unearthed.

Table 3. Applicable or Relevant and Appropriate Requirements
Alternative 2: Excavation with Soil Treatment, Recycling, and/or Disposal
Interim Action Record of Decision
Fort Ord, California

Source	Regulation, Standard, or Level of Control	Description	Applicable or Relevant and Appropriate	Comments
Coastal Zone Management Act	16 USC 1451	These regulations require activities conducted in the coastal zone (the area west of Highway 101) to be completed in a manner that is consistent with the state's coastal zone management program.	Applicable* Location-Specific Requirement	The coastal zone at Ford Ord lies between U.S. Highway 1 and the ocean. None of the nine preliminary identified IA areas lie within this coastal zone; but three of the 41 CERCLA sites are within the coastal zone.
Toxic Substances Control Act	40 CFR 761(D)	This regulation covers the handling and disposal of PCB-containing materials.	Applicable* Chemical-Specific Requirement	Although PCBs have not been detected in soil samples from any of the preliminarily identified IA areas, several of these areas contained heavy oils. If PCBs are present in these oils, these requirements would be considered applicable.

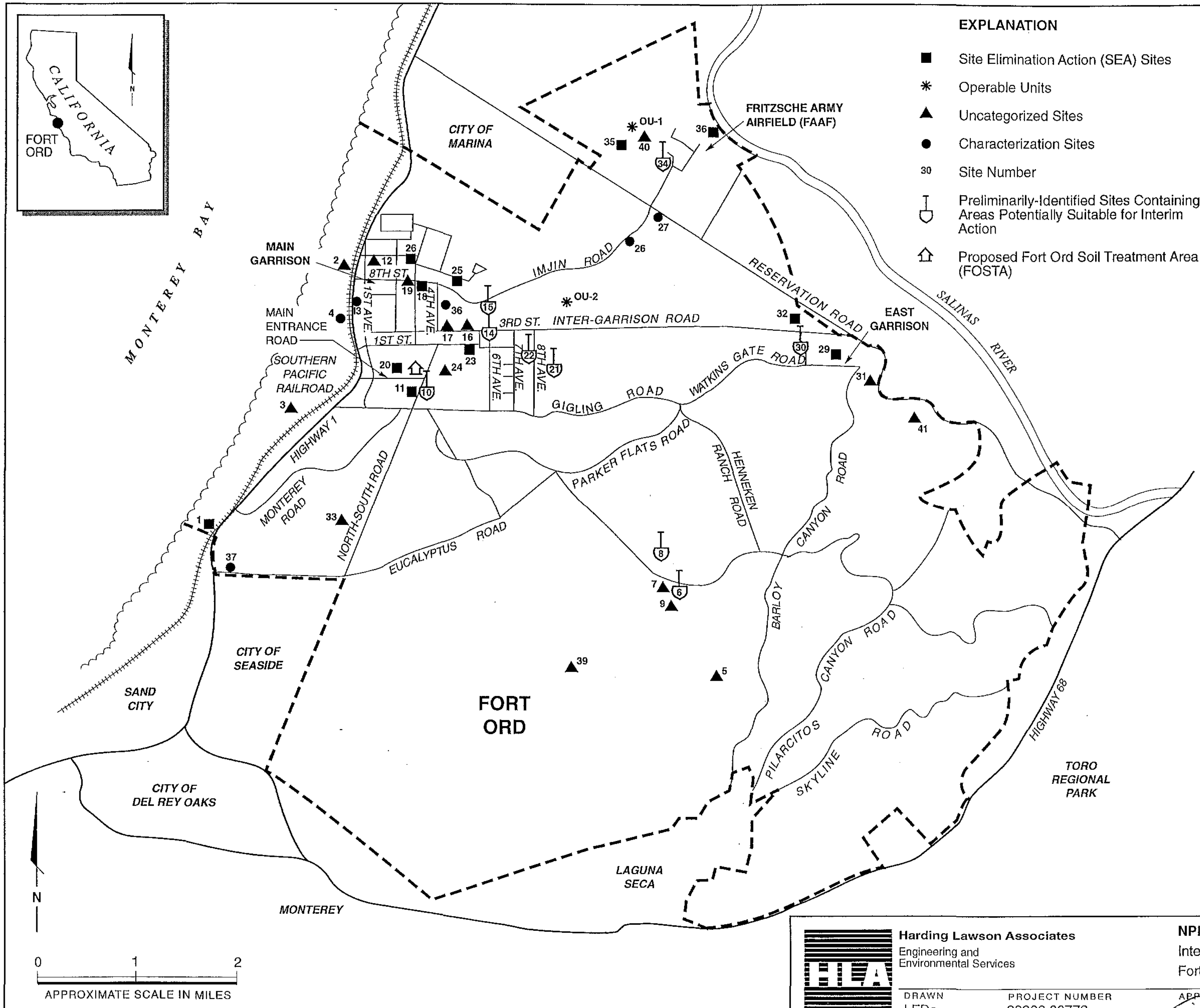
* Site characterizations for all of the proposed IA sites are currently being completed.
Thus, several requirements listed here as ARARs may be found to be not applicable once these reviews are completed for all the IA areas.

Table 4. Application of Waiver
Interim Action Record of Decision
Fort Ord, California

Soil Type	Title 22 CCR, Chapter 12, Article 3 Section 66262.34 Accumulation Time	Comments
RCRA hazardous	ARAR waived*	Allows time to accumulate material to make offsite treatment or disposal practical
Non-RCRA hazardous (CA hazardous)	ARAR waived*	Allows time to accumulate material for offsite treatment or disposal and, when practical, for onsite treatment. Onsite treatment would require a ROD amendment or explanation of significant differences
CA designated	N/A	Onsite treatment with soil vapor extraction (SVE) or bioremediation
CA inert	N/A	

* Although the waiver will be applied, in order to be protective of the environment, the Army will comply with the FOSTA Operation, Maintenance, Monitoring and Closure Plan which will specify soil treatment, monitoring and closure, including waste-inventory, storage, and tracking procedures.

PLATES



SITE NO.	SITE DESCRIPTION
OU-1	FORMER FIRE DRILL AREA
OU-2	FORT ORD LANDFILLS
1	ORD VILLAGE SEWAGE TREATMENT PLANT
2	MAIN GARRISON SEWAGE TREATMENT PLANT
3	BEACH FIRING RANGE
4	BEACH STORMWATER OUTFALLS INCORPORATED INTO BASEWIDE SEWER PROGRAM
5	RANGE 36A (EXPLOSIVE ORDNANCE DISPOSAL)
6	RANGE 39 (ABANDONED CAR DUMP)
7	RANGES 40 & 41 (FIRE DEMO AREA)
8	RANGE 49 (MOLOTOV COCKTAIL RANGE)
9	RANGE 39 (FLAMED FUEL EXHIBITION)
10	FIRE DRILL BURN PIT
11	AAFES FUELING STATION
12	DOL AUTOMOTIVE YARD, CANNIBALIZATION YARD, LOWER MEADOW AREA
13	RAILROAD RIGHT-OF-WAY
14	707TH MAINTENANCE FACILITY
15	DIRECTORATE OF ENGINEERING AND HOUSING (DEH) YARD
16	DOL MAINTENANCE YARD, PETE'S POND AREA
17	1400 BLOCK MOTORPOOL
18	1600 BLOCK MOTORPOOL
19	2200 BLOCK FACILITY
20	SOUTH PARADE GROUND, 3800 BLOCK MOTORPOOL, 519TH MOTORPOOL
21	4400/4500 BLOCKS MOTORPOOL (EAST)
22	4400/4500 BLOCKS MOTORPOOL (WEST)
23	3700 BLOCK MOTORPOOL
24	OLD DEH YARD
25	FORMER DRMO SITE
26	SEWAGE PUMP STATIONS-BLDGS 5871/6143
27	ARMY RESERVE MOTORPOOL
28	BARRACKS AND MAIN GARRISON AREA
29	DRMO
30	DRIVER TRAINING AREA
31	FORMER DUMP SITE
32	EAST GARRISON SEWAGE TREATMENT PLANT
33	GOLF COURSE
34	FRITZSCHE AAF FUELING FACILITY
35	AIRCRAFT CANNIBALIZATION YARD
36	FRITZSCHE AAF SEWAGE TREATMENT PLANT
37	TRAILER PARK MAINTENANCE SHOP
38	AAFES DRY CLEANERS
39	INLAND RANGES/IMPACT AREA
40	FRITZSCHE AAF DEFUELING AREAS
41	CRESCENT BLUFF BURN PITS

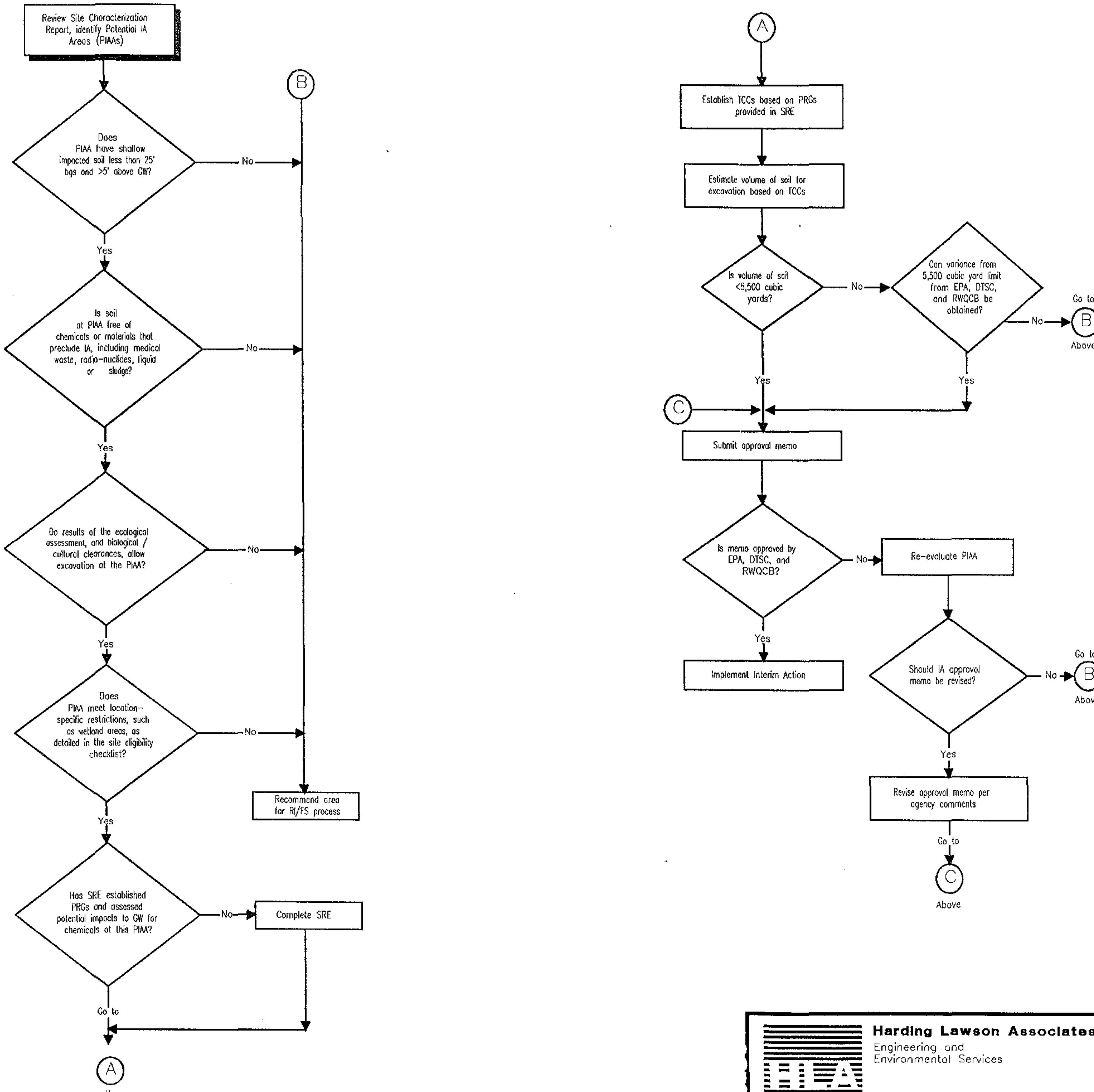
HLA **Harding Lawson Associates**
Engineering and Environmental Services

NPL Site Location
Interim Action Record of Decision
Fort Ord, California

PLATE **1**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
LFDc	23366 00773		11/93	

36697



ABBREVIATIONS

bgs	Below ground surface
IA	Interim Action
IAROD	Interim Action Record of Decision
DTSC	Department of Toxic Substance Control of the California Environmental Protection Agency
EPA	Federal Environmental Protection Agency
GW	Groundwater
SCR	Site Characterization Report
SRE	Screening Risk Evaluation
PRGs	Preliminary Remediation Goals
RWQCB	Regional Water Quality Control Board of the California Environmental Protection Agency
TCCs	Target Cleanup Concentrations

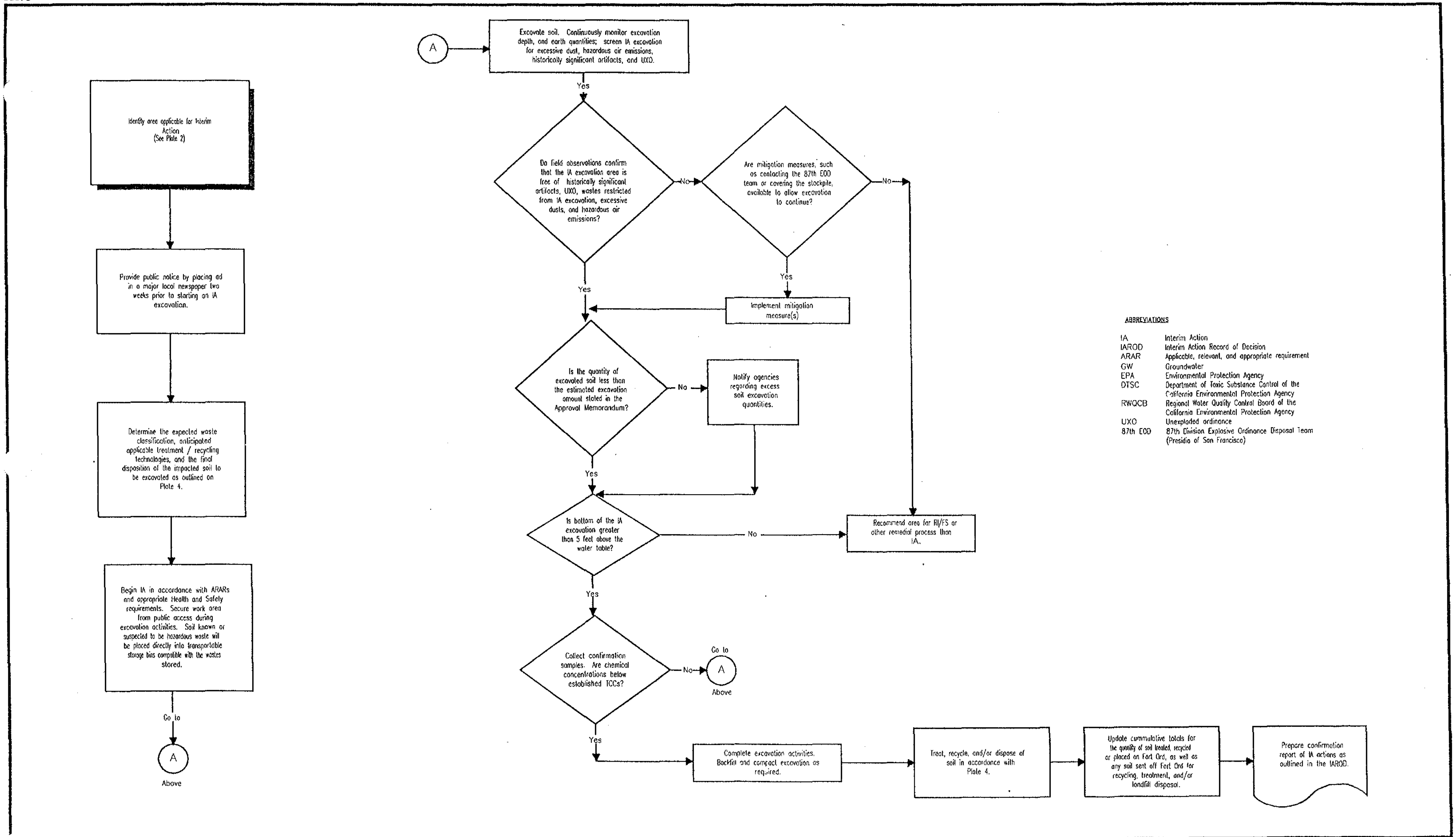
Harding Lawson Associates
Engineering and Environmental Services

Site Eligibility Flowchart
Interim Action Record of Decision
Fort Ord, California

PLATE
2

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
JEB	23366 00773	NDG	11/93	

36698



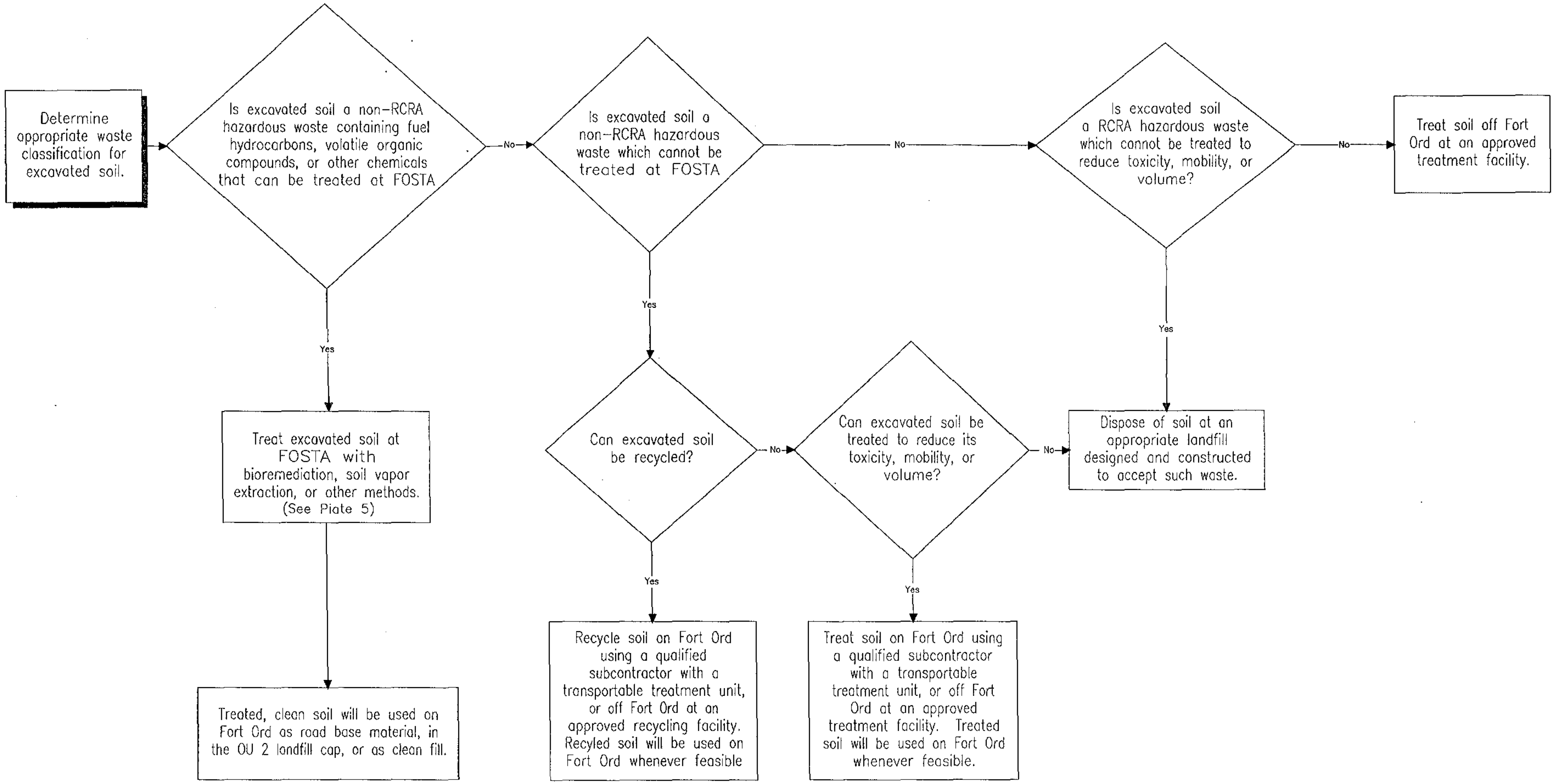
Harding Lawson Associates
Engineering and Environmental Services

Implementation Process Flowchart
Interim Action Record of Decision
Fort Ord, California

PLATE **3**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
DEK	23366 00773	MG	11/93	

36699



ABBREVIATIONS

FOSTA	Fort Ord Soil Treatment Area
RCRA	Resource Conservation and Recovery Act
OU	Operable Unit

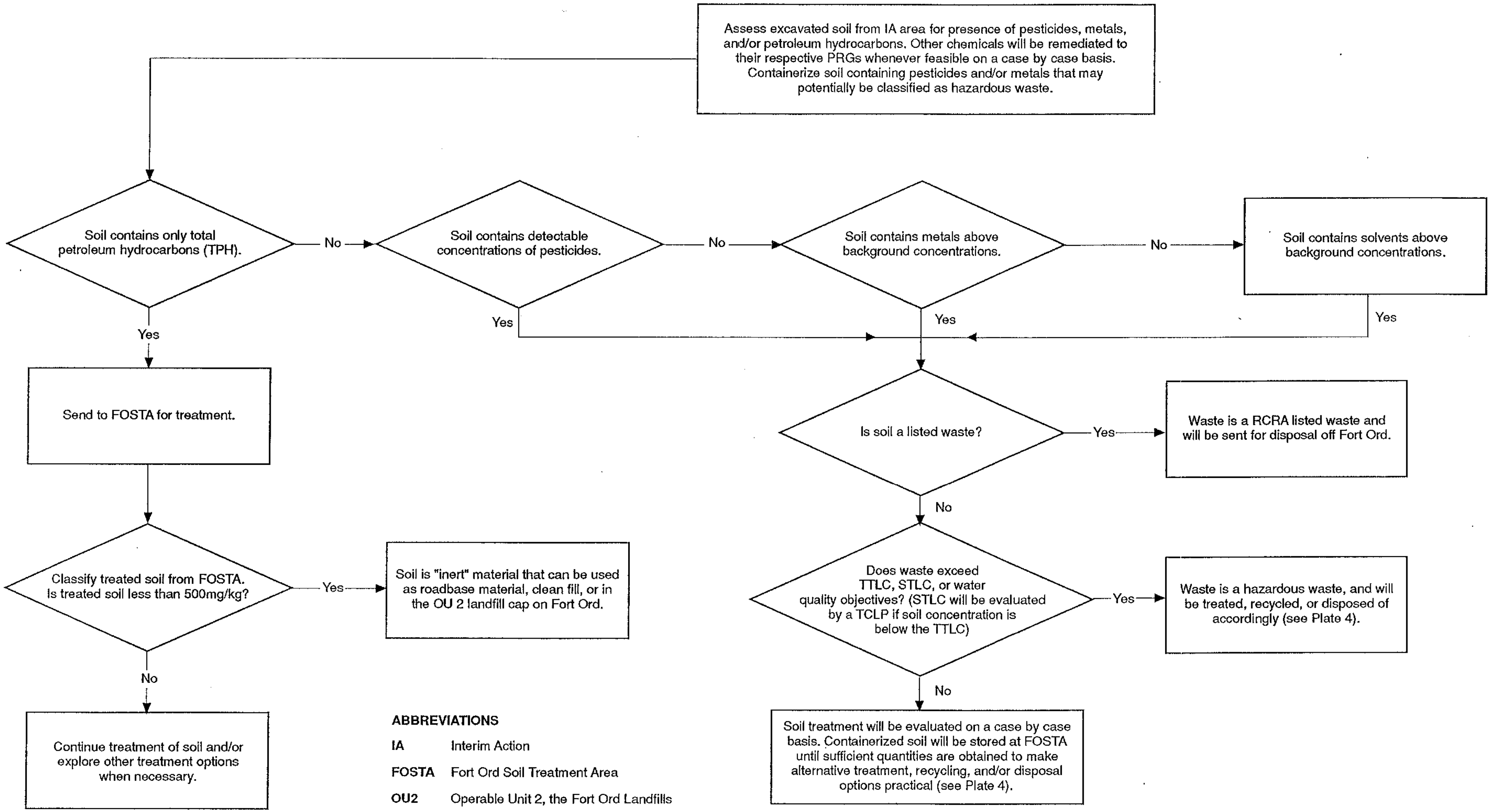
Harding Lawson Associates
Engineering and
Environmental Services

Soil Treatment Options Flowchart
Interim Action Record of Decision
Fort Ord, California

PLATE **4**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
DEK	23366 00773	MJG	11/93	

42054



ABBREVIATIONS

IA	Interim Action
FOSTA	Fort Ord Soil Treatment Area
OU2	Operable Unit 2, the Fort Ord Landfills
PRG	Preliminary Remediation Goals
RCRA	Resource Conservation and Recovery Act
STLC	Soluble Threshold Limit Concentration
TCLP	Toxicity Characteristic Leachate Procedure
TPH	Total Petroleum Hydrocarbons
TTLC	Total Threshold Limit Concentration
mg/kg	Milligrams of Chemical per Kilogram of Soil

031494pg

HLA **Harding Lawson Associates**
Engineering and Environmental Services

Soil Treatment Options Flowchart for the Fort Ord Soil Treatment Area
Interim Action Record of Decision
Fort Ord, California

PLATE **5**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
SMOc	23366 00773	MJG	1/94	

APPENDIX B

NO ACTION RECORD OF DECISION

No Action Plug-In Record of Decision Fort Ord, California

February 1995

United States Department of the Army
Sacramento Corps of Engineers

CONTENTS

TABLE

PLATES

No Action Plug-In Record of Decision
Fort Ord, California

HLA Project No. 23366 04771

This document was prepared by Harding Lawson Associates at the direction of the U.S. Army Corps of Engineers (COE) for the sole use of the COE and the signatories of the Federal Facilities Agreement, including the Army, the U.S. Environmental Protection Agency, the California Environmental Protection Agency, including the Department of Toxic Substances Control (formerly, the Toxic Substances Control Program of the Department of Health Services), and the Regional Water Quality Control Board, Central Coast Region, the only intended beneficiaries of this work. No other party should rely on the information contained herein without prior written consent of the COE and Army. This report and the interpretation, conclusions, and recommendations contained within are based on information presented in other documents that are cited in the text and listed in the references. Therefore, this document is subject to the limitations and qualifications presented in the referenced documents.

1.0 DECLARATION

1.1 Site Name and Location

Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base comprises 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 Southern Pacific Railroad and Highway 1 pass through the western portion of Fort Ord, separating the beach front from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively. Land use east of Fort Ord is primarily agricultural.

1.2 Basis and Purpose

This decision document presents the No Action Plug-In Record of Decision (ROD) for selected areas at Fort Ord, California (see Plate 1). The plug-in ROD describes the process for identifying a No Action site. Site specific documentation justifying that the no action criteria has been met will be provided subsequent to this ROD through an Approval Process. This process is referred to as the "plug-in" process, because the Approval Memoranda plug into the ROD. This plug-in ROD was prepared in accordance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for Fort Ord.

The United States Environmental Protection Agency (USEPA) and the State of California concur with the No Action site criteria.

1.3 Description of the Selected Remedy

A No Action site is a site where remedial action is not necessary to protect human health and the environment. No action (i.e., no treatment, engineering controls, or institutional controls) would be warranted under the following general sets of circumstances applicable to sites at Fort Ord:

- Where the baseline risk assessment or screening risk evaluation concluded that conditions at the site pose no unacceptable risks to human health and the environment
- Where a release involved only substances exempt from remedial action under CERCLA Section 101 (investigation and/or remediation may be undertaken pursuant to other state or federal authority)
- Where a previous response action (e.g., interim remedial action or removal action) eliminated existing and potential risks to human health and the environment such that no further action is necessary.

Although the No Action sites at Fort Ord do not require treatment or controls, groundwater monitoring may be performed as part of basewide monitoring activities.

1.4 Declaration Statement

Because CERCLA hazardous substances will not remain onsite above health-based levels, the 5-year review will not apply to sites that receive no action approval.

United States Department of the Army

Lewis D. Walker 3/21/95
Lewis D. Walker — Date
Deputy Assistant Secretary of the Army (Environment, Safety and Occupational Health)

Ila Mettee-McCutchon 7 Mar 95
Ila Mettee-McCutchon — Date
Colonel, U.S. Army
Garrison Commander
Presidio of Monterey

Gail Youngblood 6 Mar 95
Gail Youngblood — Date
Acting BRAC Environmental Coordinator
Presidio of Monterey

California Environmental Protection Agency

Anthony J. Landis 4-5-95
Anthony J. Landis, P.E. — Date
Chief of Operations, Office of Military Facilities
California Environmental Protection Agency
Department of Toxic Substances Control

Roger Briggs 4-11-95
Roger W. Briggs — Date
Executive Officer
California Environmental Protection Agency
Central Coast Regional Water Quality Control Board

U.S. Environmental Protection Agency

Julie Anderson 4/13/95
Julie Anderson — Date
Director, Federal Facilities Cleanup Office
U.S. Environmental Protection Agency, Region IX

2.0 DECISION SUMMARY

2.1 Site Description

Fort Ord is located near Monterey Bay in northwestern Monterey County, California, approximately 80 miles south of San Francisco. The base comprises 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 Southern Pacific Railroad and Highway 1 pass through the western portion of Fort Ord, separating the beach front from the rest of the base. Laguna Seca Recreation Area and Toro Regional Park border Fort Ord to the south and southeast, respectively. Land use east of Fort Ord is primarily agricultural.

2.2 Site History

Since its opening in 1917, Fort Ord has primarily served as a training and staging facility for infantry troops. No permanent improvements were made until the late 1930s, when administrative buildings, barracks, mess halls, tent pads, and a sewage treatment plant were constructed. From 1947 to 1975, Fort Ord was a basic training center. After 1975, the 7th Infantry Division (Light) occupied Fort Ord. Light infantry troops are those that perform their duties without heavy tanks, armor, or artillery. Fort Ord was selected for closure in 1991. The majority of the soldiers were reassigned to other Army posts in 1993. Although Army personnel still operate the base, no active army division is currently stationed at Fort Ord.

The three major developed areas within Fort Ord are the Main Garrison, the East Garrison, and Fritzsche Army Airfield (FAAF). The remaining undeveloped property (approximately 20,000 acres) was used for training activities. The Main Garrison contains commercial, residential, and light industrial facilities. It was constructed between 1940 and the 1960s, starting in the northwest corner of the base and expanding southward and eastward. During the 1940s and 1950s, there was a small airfield in the central portion of the Main Garrison. This airfield was decommissioned when FAAF was completed, and the airfield facilities were redeveloped as motor pools or for other operations. FAAF, which serves as the general airfield for Fort Ord, is in the northern portion of the base, adjacent to the city of Marina. FAAF was incorporated into Fort Ord in 1960 and expanded in 1961. The East Garrison occupies 350 acres on the northeastern edge of the base and consists of military and industrial support areas, recreational facilities, and recreational open space.

Generally, any chemicals present in soil at potential No Action sites are the result of former routine maintenance and support activities on Fort Ord. Such activities include: maintenance of military vehicles at wash racks, tank storage of chemicals such as waste oil, the use of oil/water separators in drainage areas, and pesticide use and storage.

2.3 Enforcement and Regulatory History

Environmental investigations began at Fort Ord in 1984 at FAAF under Regional Water Quality Control Board (RWQCB) cleanup or abatement orders 84-92, 86-86, and 86-315. Investigations indicated the presence of residual organic compounds from fire drill burning practices at the Fire Drill Burn Pit (Operable Unit 1 or OU-1). The subsequent Remedial Investigation/ Feasibility Study (RI/FS) for OU-1 was completed in 1988, and cleanup of soil and groundwater began. A plan describing the cleanup process was presented to the public in June 1987. In 1986, under RWQCB cleanup or abatement orders 86-87, 86-317, and 88-139, further investigations began of the landfill areas (Operable Unit 2 or OU-2), and the preliminary site characterization was completed in 1988. In 1990, Fort Ord was placed on the U.S. Environmental Protection Agency's (USEPA) National Priorities List (NPL) primarily because of volatile organic compounds found in groundwater beneath OU-2, and a Federal Facility Agreement (FFA) under CERCLA Section 120 was signed by the Army, USEPA, DTSC, and RWQCB. The FFA establishes schedules for commencing remedial investigations and feasibility studies, and requires completion of remedial actions as expeditiously as possible. The basewide RI/FS began in 1991, and Fort Ord was placed on the Base Realignment and Closure List (BRAC). The final Feasibility Study for OU-2 was completed October 1, 1993 and the ROD was signed in August 1994. An Interim Action Plug-In ROD was signed in March 1994 which allows for excavation and treatment of shallow contaminated soils. The Draft and Draft Final versions of the Basewide RI/FS were completed on August 1, 1994 and December 5, 1994, respectively.

2.4 Highlights of Community Participation

On September 15, 1994, the United States Department of the Army (Army) presented the Proposed Plan for No Action at Fort Ord to the public for review and comment. The Proposed Plan summarizes information on the No Action process and other documents in the Administrative Record for the base. These documents are available to the public at the following locations: Chamberlain Library, Building 4275 North-South Road, Presidio of Monterey Annex, California; and Seaside Branch Library, 550 Harcourt Avenue, Seaside, California. The entire administration record is available at 1143 Echo Avenue, Suite F, Seaside, California.

Comments on the Proposed Plan were accepted during a 66-day public review and comment period that began on September 15, 1994 and ended on November 21, 1994. A public meeting was held on September 22, 1994, at the Sherwood Hall, Santa Lucia, in Salinas, California. At that time, the public had the opportunity to ask representatives from the Army, U.S. EPA, and Cal EPA questions and express its concerns about the plan. In addition, written comments were accepted during the public comment period. Responses to comments received during the public comment period are included in the Responsiveness Summary (Section 3.0), which is part of this No Action Plug-In ROD.

2.5 Scope and Role of No Action

The No Action ROD will document that any necessary remedial actions under CERCLA have been taken at sites or that remedial action is not necessary for the two No Action categories described below. Additionally, a No Action ROD would provide a basis for deletion of the property from the NPL. The scope of the No Action process is to address categories of sites where remedial action is not necessary to protect human health and the environment, or CERCLA does not provide the appropriate authority to take any remedial action at the site. Plate 1 identifies 41 areas on Fort Ord where No Action may be implemented.

In 1991, Congress mandated a 3-year completion schedule for RI/FS documents for closing BRAC sites such as Fort Ord (Public Law 102-190). The impact of Fort Ord's closure on the local economy is one reason to undertake a No Action process in order to facilitate release of property at Fort Ord for redevelopment. Conversion of Fort Ord property to civilian uses is a high priority for the local community, the agencies involved, and the Army. To meet Fort Ord's mission of transferring real property as soon as possible, site identification, remedial investigations, and cleanup at Fort Ord are being accelerated. By completing and implementing the No Action ROD and eliminating these sites from the basewide RI/FS, the properties would become available for reuse much earlier than the previously scheduled date.

2.6 Characteristics of a Typical No Action Site

This section describes the characteristics of a no action site but does not identify specific sites. Site-specific no action decisions will be made through the approval process described in Section 2.8.

No Action sites at Fort Ord fall under two categories:

Category 1 Sites

Category 1 sites are already in a protective state and pose no current or potential threat to human health or the environment. Fort Ord contains areas where storage and/or release or disposal of hazardous substances has occurred and some level of contamination may be present; however, in order to be included as a Category 1 site, the level of contamination that exists at a site must be below the levels required for protection of human health and the environment. Examples of Category 1 sites could include sites where a previous response action mitigated the threat; sites where concentrations are below basewide background levels, or risk-based cleanup levels (e.g., Preliminary Remedial Goals [PRGs] [Table 1]); and sites at which the threat no longer exists because of natural environmental processes.

Category 2 Sites

Category 2 sites are sites where CERCLA does not provide the appropriate authority to take any remedial action except to the extent that the FFA provides for corrective action under the Resource Conservation and Recovery Act (RCRA). These sites would include two types (Plate 2):

- Sites that had storage and/or release of contaminants that are excluded from the CERCLA process. Investigation and/or remediation may be undertaken pursuant to other state or federal authority. For example, leaking underground petroleum hydrocarbon storage tanks would fall under the present underground storage tank (UST) program at Fort Ord and would be regulated under state and local agencies (DTSC, RWQCB, County of Monterey).

- Sites where no release to the environment has occurred. An example of this type of site would include sites where compounds, such as asbestos in buildings, has not been released to the environment (outdoors). Such sites would be handled on a site-by-site basis in accordance with the intended reuse scenario, and/or under other state or federal authorities.

If a site contains both CERCLA and non-CERCLA regulated contaminants' it could not be included as a Category 2 site, but may be a Category 1 site if it satisfies those requirements.

2.7 Summary of Site Risks

The primary rationale for the designation of Category 1 sites is that they do not contain concentrations of chemicals above PRGs and are therefore protective of human health. In addition, an ecological assessment is conducted to ensure protection of the environment. For Category 2 sites, no releases have occurred under CERCLA authority and they are either protective of human health and the environment or risks associated with any non-CERCLA substances would be addressed under separate authority.

2.7.1 Human Health Considerations

The overall screening criterion for a No Action Site is an acceptable level of protection for human health and the environment. This acceptable level of protection requires that the reasonable maximum risk of exposure for a person to site-related chemicals results in an estimated additional risk of developing cancer of less than one-in-one million, and is without appreciable risk of deleterious noncancer health effects. This is in accordance with the National Contingency Plan (NCP) and CERCLA guidance. Category 1 sites would require documentation that concentrations of contaminants at the site are below PRGs (Table 1), as set and agreed to by the State and Federal regulatory agencies. Because the screening criteria for Category 2 sites are: no release occurred, or contaminants found are excluded from CERCLA jurisdiction, these sites would automatically qualify for No Action without further analysis (e.g., comparison to PRGs).

PRGs were developed in accordance with the procedures described in the *Draft Final Technical Memorandum, Preliminary Remediation Goals, Fort Ord, California* dated June 24, 1994. In general, separate PRGs were developed for chemicals based on possible cancer and noncancer health effects. PRGs based on cancer risk represent chemical concentrations in soil that might result in estimated human daily intakes (doses) associated with an estimated one-in-one million probability that an exposed individual would develop cancer.

PRGs based on noncancer health effects represent chemical concentrations considered to result in estimated human daily doses expected to be without appreciable risk of adverse noncarcinogenic effects (hazard quotient of 1 or less). The lowest PRG for a chemical will be used to evaluate the need for further action or investigation at sites containing that chemical in soil; i.e., if concentrations of chemicals at a site are below PRGs, no action would need to be taken to protect human health and the environment. Chemical specific PRGs and environmental concentration data for each site will be used to evaluate that contributions of site chemicals to cumulative area-related health risks are acceptable.

The methods used to calculate PRGs generally employed conservative assumptions consistent with EPA and Cal/EPA risk-management policies for sites with future unrestricted use. Conservative EPA-developed models and EPA default assumptions were used where site-specific information was unavailable, and agency-established toxicity values (reference doses and slope factors) were used. The PRGs were designed so that uncertainties would tend to cause overestimation of actual exposures and toxicity, and thus provide PRGs protective of human health.

2.7.2 Protection of Groundwater

In addition, No Action sites will be evaluated for potential impact to groundwater. The PRGs for chemicals based on human health discussed above will be evaluated to determine that State and Federal Maximum Contaminant Levels in groundwater will not be exceeded.

As discussed in the *Technical Memorandum: Approach to Evaluating Potential Groundwater Quality Impacts*, dated July 29, 1993, organic compounds in the soil within the unsaturated zone will be evaluated using an USEPA-developed partitioning mass transport model (VLEACH). This model will use groundwater depth and soil characteristics specific to a preliminarily identified No Action site to estimate potential maximum groundwater chemical concentrations for given chemical soil concentrations. PRGs for organic chemicals based on human health exposures discussed above will be evaluated using this model to ensure that state and federal primary maximum contaminant levels (MCLs) in groundwater will not be exceeded. Pesticide- and metal-contaminated soil will be assessed qualitatively to determine potential impacts to groundwater quality.

Concentrations of chemicals below PRGs, such as those found at Category 1 sites, are not expected to have an impact on groundwater quality.

2.7.3 Ecological Considerations

Preliminary Hazard Assessments for ecological risk indicate that the majority of the preliminarily identified No Action sites do not pose ecological risks because the areas are already disturbed (paved). The results of the ecological risk assessment will be included in the Approval Memorandum for each site (Plate 2) to verify that these sites do not pose a risk to the environment.

2.8 Approval Process for No Action

Following this ROD, an Approval Memorandum will be prepared for each proposed No Action site to demonstrate that the area meets appropriate requirements and conditions of Category 1 or 2. Each Approval Memorandum will be made available by the Army to the public, local and county agencies, the Restoration Advisory Board, U.S. EPA, and the California Environmental Protection Agency, including DTSC and RWQCB for review.

For Category 1 sites, the Approval Memorandum will include:

1) A description of the site and its geologic conditions with reference to appropriate completed site characterization, interim action confirmation, and removal action reports.

2) A map of the site detailing location and any posted chemical or other pertinent available data (e.g., groundwater chemistry).

3) A table of site-related chemical concentrations and their respective PRGs.

4) An evaluation of potential impacts to groundwater.

5) Results of the ecological risk assessment.

For Category 2 sites, the Approval Memorandum will include:

1) A description of site conditions

2) Data related to investigation and/or remedial actions, if applicable (e.g., asbestos surveys, UST removal records).

The Approval Memorandum will serve as a decision document for the transfer of property, and will be prepared prior to the Base Wide Record of Decision. Following a 30-day public review and comment period, the Army will forward the Approval Memorandum, public comments, and response to comments to the agencies for final review and approval. Agency review of the Approval Memorandum will be completed within 10 working days of its submittal unless extended pursuant to the FFA. Agency approvals will be confirmed in subsequent written correspondence from the agencies. Agency denial of a No Action Approval Memorandum may be disputed pursuant to Section 12 (Dispute Resolution) of the FFA.

When the Army receives approval of a No Action site determination, a notice will be placed in a major local newspaper. Completed and planned No Action site activities will also be described in newsletters, prepared for local residents by the Presidio of Monterey.

2.9 Documentation of Significant Changes

As described in the Responsiveness Summary, the No Action Proposed Plan was released for public comment on September 15, 1994, and a public meeting was held on September 22, 1994. This Proposed Plan identified No Action as the selected remedy for two categories of sites at Fort Ord. At the request of the public, the comment period was extended to November 21, 1994. Comments collected over the 66-day public review period between September 15, 1994 and November 21, 1994 resulted in a modification to the Approval Memorandum procedures outlined in the Proposed Plan. The approval process was amended to allow for a 30-day public review and comment period on each Approval Memorandum. No new category of sites beyond those described in the ROD and Proposed Plan have been identified at this time.

3.0 RESPONSIVENESS SUMMARY

3.1 Overview

This Responsiveness Summary provides a summary of the public comments and concerns regarding the No Action Proposed Plan at Fort Ord, California.

On the basis of the verbal and written comments received, the Army's Proposed Plan for No Action was generally accepted by the public. However, some citizens and/or organizations expressed concern regarding the level of public involvement in the review and approval process for the No Action sites.

3.2 Background on Community Involvement

The Army has implemented a progressive public relations and involvement program for environmental activities at Fort Ord. The *Advance*, published by the Army, is a newsletter, sent to the public, that highlights the status of ongoing and planned remedial activities at Fort Ord. The Army also conducts monthly Restoration Advisory Board meetings to involve the public in decisions made regarding remedial actions. In addition, a toll-free 800 number is available for concerned citizens to comment and receive answers regarding the environmental restoration and transfer of Fort Ord property.

The Army held a public comment period on the No Action Proposed Plan from September 15, 1994 through November 21, 1994. Over 700 copies of the Proposed Plan were mailed for public review and comment to interested parties and were placed in the Chamberlain Library, Building 4275, North-South Road, Presidio of Monterey Annex, California and Seaside Branch Library, 550 Harcourt Avenue, Seaside, California. This Proposed Plan also invited readers to a public meeting to voice their concerns.

The September 22, 1994 public meeting was held to discuss the screening and approval process for the No Action sites.

No comments were received from the public regarding the proposed No Action process prior to the publication of the Proposed Plan and the start of the comment period. Comments received during the comment period are addressed below.

3.3 Summary of Comments Received during the Public Comment Period and Department of the Army Responses

The public comment period on the No Action Proposed Plan was held from September 15, 1994 to October 15, 1994. A thirty-six day extension of this comment period, to November 21, 1994, was granted to the public at their request. Concerns from the general public on the proposed No Action process were raised at the Public Meeting (held on September 22, 1994) regarding the level of public involvement in the development and approval of the No Action sites. These questions and comments were addressed during the public meeting.

Four written letters were received from the general public during the public comment period. One written letter from California Coastal Commission (CCC) regarding specific technical questions was received during the public comment period. The letter from the CCC expressed concern with the identification of No Action sites in the coastal zone, the criteria for identifying No Action sites and the review and comment period for a No Action Approval memorandum.

Comments from the local community that were not sufficiently addressed during the public meeting are summarized and addressed according to their topics in the following sections of this document. Response to the specific technical issues raised by the state agencies is also presented.

3.3.1 Summary and Response to Local Community Concerns

Comments from the local community were voiced at the Public Meeting, and are summarized and addressed below. Four written comments were received from the local community during the public comment period.

3.3.1.1 Public Comments Regarding Community Relations

Comment: The public meetings aren't adequately advertised to the general public.

Army Response: The public meeting was advertised in the Proposed Plan and in the Monterey Herald on September 16, 17, and 18th before the scheduled meeting date. In addition, the public meeting was advertised in the Californian on September 16, 17, and 19th.

Comment: The meetings should be held closer to Fort Ord instead of in Salinas.

Response: In the past, public meetings related to the cleanup at Fort Ord have been held in Monterey. At the request of the Restoration Advisory Board and the regulatory agencies to involve all potential areas that have an interest in the cleanup at Fort Ord, the No Action public meeting was held in Salinas, which is the county seat for Monterey County.

3.3.2 Summary and Response to Written Specific Technical Questions

One written comment letter was received during the Public Comment period from the California Coastal Commission concerning the identification of No Action sites in the coastal zone, the criteria for identifying No Action sites and the review and comment period for a No Action Approval memorandum.

3.3.2.1 Reprint of, and Army Response to, the Letter Received from the California Coastal Commission

Staff of the California Coastal Commission has reviewed the Superfund Proposed Plan for preliminarily identified No Action (NOFA) sites, and offers the following comments.

NOFA Sites in the Coastal Zone

As expressed in previous comment letters dated May 13, 1994, July 7, 1994, and October 28, 1994, Commission staff has many concerns regarding the Army's evaluation of hazardous waste sites in the coastal zone and their impacts on coastal resources. We are alarmed at the proposed plan's preliminary identification of the Beach Stormwater Outfalls (Site 4) and the Ord Village Sewage Treatment Plant (Site 1) as sites which require no further action.

At the September 22, 1994 public hearing regarding the NOFA proposed plan, Commission staff expressed concerns regarding the preliminary identification of the storm drains (Site 4) as a NOFA site. In response, the Army clarified that Site 4 was no longer being considered as a NOFA site, and that remedial action would be undertaken. Written clarification of the current status of Site 4 should be provided.

Commission staff remain concerned that inadequate investigations have been undertaken at Site 1 in order to quantify and evaluate contamination which may adversely impact human health and environmental resources (please refer to our comments on the draft Remedial Investigation/Feasibility Study dated October 28, 1994). More thorough investigations and analyses should be provided prior to classifying this coastal zone site as requiring No Further Action.

NOFA Criteria

The NOFA Proposed Plan describes NOFA sites as sites where remedial action is not necessary to protect human health or the environment (Category 1), or where CERCLA does not provide the appropriate authority to take remedial action (Category 2). In order to qualify as a Category 1 site, the proposed plan states: "the level of contamination that exists at a site must be below the level required for protection of human health (e.g., Preliminary Remediation Goals [PRGs]) and the environment" (page 2).

Commission staff is concerned that the criteria for qualifying as a Category 1 NOFA site has not been adequately identified. The PRGs listed in Figure 3 of the Proposed Plan may not be adequate to identify potential threats to human health, due to the fact that a PRG has not been identified for contaminants such as fecal coliform bacteria, total chromium, total polycyclic aromatic hydrocarbons (PAHs), 4,4'-DDD, e,e'-DDE, and polychlorinated biphenyls (PCBs). The NOFA process should include remediation goals for all chemicals of potential concern detected at each site and provide comparisons of detected levels with remediation goals which are protective of environmental resources as well as human health. As indicated in our comment letter of October 28, 1994, many of the PRGs exceed the Probable Effects Levels (PELs) for sediment impacts on coastal and marine resources (in some cases by 2 orders of magnitude), and therefore do not provide an acceptable basis for evaluating potential sediment impacts on coastal and marine resources.

NOFA Process

The proposed plan states: "An Approval Memorandum will be prepared for each proposed No Action site to demonstrate that the area meets appropriate requirements and conditions. Each Approval Memorandum will be submitted by the Army to the U.S. EPA, and the California Environmental Protection Agency, including DTSC and RWQCB for review and approval . . . Agency review will be completed within 10 working days of its submittal" (page 6).

Commission staff is concerned that the proposed process does not incorporate an acceptable level of public participation. In addition to the governmental agencies involved in the disposal and reuse of Fort Ord, members of the public and their representatives at the Restoration Advisory Board (RAB) should have the opportunity to review and comment on a draft Approval Memorandum for each NOFA site. The Army should formally respond to submitted comments in a final Approval Memorandum for each NOFA site. The proposed review period of 10 days is much too short to allow for thorough public review, and a minimum 30 day comment period should be provided.

In addition, the proposed plan states: "When the Army receives approval of a No Action site determination, a notice will be placed in a major local newspaper" (page 6). In order to allow for public input into the decision making process, notice that a site is being considered for No Further Action should be paced in more than one major local newspaper prior to the final decision.

In summary, Commission staff has concerns regarding the preliminary identification of coastal zone Site 1 as requiring No Further Action, and request written clarification regarding the status of Site 4. Commission staff is also concerned that the criteria for qualifying as a Category 1 NOFA site identified by the proposed plan does not adequately protect human health and the environment, as Preliminary Remediation Goals are incomplete and do not adequately protect coastal zone resources. Furthermore, Commission staff believe that the NOFA proposed plan should be revised in a manner which will maximize public participation and ensure that public concerns are adequately addressed.

Army Response to Comments from the California Coastal Commission

The Army has responded to each of the CCC comment letters with additional information and clarification regarding the site characterization of areas within the Coastal zone. The Army would like to reiterate that each site considered for No Action under CERCLA will be evaluated during the approval memorandum process. If a site is approved for no action under CERCLA, it does not preclude the implementation of other actions that may be required under federal, state, and local regulations.

At the public meeting on September 22, 1994, the Army indicated that the evaluation of Site 4 (beach stormwater outfalls) is being performed under the basewide stormwater assessment. The results of the basewide evaluation will determine if any remedial action at the outfalls will be required. However, it does not indicate that remedial action will be undertaken as stated by CCC.

The Army has stated in the Proposed Plan that the overall screening criterion for a No Action site is an acceptable level of protection for human health and the environment. The preliminary remediation goals (PRGs) were developed on a chemical specific basis for cancer and non-cancer health effects. All chemicals detected at a site will be screened against a chemical specific PRG. The Proposed Plan states in the footnote to Figure 2 that PRGs not listed will be established according to the approved procedures as described in the PRG Technical Memorandum dated June 15, 1993. The CCC comment letter of October 28, 1994 was providing comment on the Draft Basewide RI/FS report and not the No Action Proposed Plan. However, the Army again emphasizes that an ecological risk evaluation will use appropriate screening criteria (such as Probable Effects Levels) where applicable, and be performed for each No Action site.

The Army has encouraged public involvement and implemented several progressive public relations programs for environmental activities at Fort Ord. To that end, the Army will modify the approval memorandum process for No Action sites to provide the public with an opportunity for review and comment on the each Approval Memorandum.

The modified memorandum process will consist of the following:

For each No Action site, the Army will submit an Approval Memorandum for a 30 day public review and comment period. Following public review and comment, the final Approval Memorandum, public comments, if any, and response to public comments will be submitted to the USEPA and the California Environmental Protection Agency, including DTSC and RWQCB. Agency review of the Approval Memorandum will be completed within 10 working days of submittal unless extended pursuant to the FFA. Agency approvals will be confirmed in subsequent written correspondence from the agencies. Notice of a No Action site determination will be placed in a major local newspaper.

TABLE

Table 1. Preliminary Remediation Goals
No Action Record of Decision
Fort Ord, California

Chemical	Lowest PRG*	Based on Noncancer Health Effects: Child Resident	Adult Resident	Construction Worker	Based on Carcinogenesis: Adult Resident	Construction Worker
Acenaphthene	960	960	4,600	31,000	NA	NA
Acetone	220	220	900	8,200	NA	NA
Aldrin	0.011	0.48	2.3	1.6	0.011	2.6
Anthracene	3300	3300	15000	110000	NA	NA
Antimony	27	27	290	57	NA	NA
Arsenic	0.87	20	220	44	0.87	60
Barium	1000	1,000	4,700	4,100	NA	NA
Benzo(a)anthracene	0.15	NA	NA	NA	0.15	37
Benzo(a)pyrene	0.015	NA	NA	NA	0.015	3.7
Benzo(b)fluoranthene	0.15	NA	NA	NA	0.15	37
Benzo(k)fluoranthene	1.5	NA	NA	NA	1.5	370
Benzo(ghi)perylene	640	640	3100	2100	NA	NA
Beryllium	0.39	340	3,700	730	0.39	28
Bis(2-ethylhexyl)phthalate	13	320	1,500	1,000	13	3,200
Bromoform	7.6	63	260	2400	7.6	2,300
Butylbenzylphthalate	3200	3200	15000	100000	NA	NA
Cadmium	8.1	34	370	73	8.1	380
Carbon disulfide	0.96	0.96	3.9	3.7	NA	NA
Carbon tetrachloride	0.025	29	190	750	0.025	8.6
Chlordane	0.14	0.97	4.6	3.2	0.14	34
Chlorobenzene	12	12	50	470	NA	NA
Chloromethane	0.12	NA	NA	NA	0.12	40
Chromium III	67000	67000	720000	/a/	NA	NA
Chromium VI	0.23	7.2	30	38	0.23	11
Chrysene	15	NA	NA	NA	15	3700
Cobalt	2000	3700	20000	2000	NA	NA
Copper	2,500	2,500	27,000	5,300	NA	NA
4,4′-DDD	0.74	NA	NA	NA	0.74	190
4,4′-DDE	0.53	NA	NA	NA	0.53	130
4,4′-DDT	0.53	8.0	38	26	0.53	130
Dibromochloromethane	0.13	22	90	840	0.13	43
Di-n-butylphthalate	1600	1600	7700	52000	NA	NA
1,3-Dichlorobenzene	330	330	1800	1200	NA	NA
1,2-Dichloroethane	0.074	NA	NA	NA	0.074	26
Dieldrin	0.011	0.80	3.8	2.6	0.011	2.8
Diethylphthalate	13000	13000	61000	420000	NA	NA
Endosulfan II (beta)	96	96	460	310	NA	NA
Endosulfan sulfate	96	96	460	310	NA	NA
Ethylbenzene	830	830	3,700	3,900	NA	NA
Fluoranthene	640	640	3100	21000	NA	NA
Fluorene	640	640	3,100	21,000	NA	NA
gamma-BHC (Lindane)	0.14	4.8	23	160	0.14	34
Heptachlor	0.031	8.0	38	26	0.031	7.8
Heptachlor epoxide	0.014	0.21	1.0	0.68	0.014	3.4
Indeno(1,2,3-cd)pyrene	0.15	NA	NA	NA	0.15	37
Lead (a)	240	240	3,900	460	NA	NA
Mercury	20	20	210	41	NA	NA
Methylene chloride	0.90	260	1100	950	0.90	310
Methyl ethyl ketone	620	620	2,900	3,300	NA	NA
2-Methylnapthalene	640	640	3,100	2,100	NA	NA
4-Methyl-2-pentanone (MIBK)	74	74	400	2800	NA	NA

Table 1. Preliminary Remediation Goals
No Action Record of Decision
Fort Ord, California

		Based on Noncancer Health Effects			Based on Carcinogenesis	
Chemical	Lowest PRG*	Child Resident	Adult Resident	Construction Worker	Adult Resident	Construction Worker
Naphthalene	640	640	3,100	2,100	NA	NA
Nickel	130	1,400	15,000	2,900	130	6,300
PCBs	0.02	NA	NA	NA	0.02	5.8
Pentachlorophenol	1.5	480	2300	1600	1.5	370
Petroleum Hydrocarbons (b)	500	(c)	(c)	(c)	500	120,000
Phenanthrene	640	640	3,100	2,100	NA	NA
Pyrene	480	480	2,300	16,000	NA	NA
Selenium	340	340	3,600	710	NA	NA
Silver	340	340	3,600	710	NA	NA
2,3,7,8-TCDD	1.20E-06	NA	NA	NA	1.20E-06	3.00E-04
1,1,2,2-Tetrachloroethane	0.28	NA	NA	NA	0.28	68
Tetrachloroethylene	0.16	410	2,700	11,000	0.16	54
Thallium (as Thallic oxide)	4.7	4.7	50	100	NA	NA
Toluene	190	190	770	3,700	NA	NA
1,2,4-Trichlorobenzene	49	49	210	710	NA	NA
1,1,1-Trichloroethane	200	200	1100	7600	NA	NA
Trichloroethene	1.1	NA	NA	NA	1.1	270
Vanadium	470	470	5,000	1,000	NA	NA
Xylenes	130	130	520	500	NA	NA
Zinc	20,000	20,000	210,000	42,000	NA	NA

* All PRGs are in milligrams per kilogram, and are taken from the: *Draft Final Technical Memorandum, Preliminary Remediation Goals, Fort Ord, California.* Dated June 24, 1994. Prepared by HLA for the Sacramento COE. These PRGs were developed according to procedures described in: *Risk Assessment Guidelines for Superfund, Volumes 1 and 2.* Prepared by the Office of Emergency and Remedial Response, EPA documents EPA/540/1-89/006 and EPA/540/1-89/001

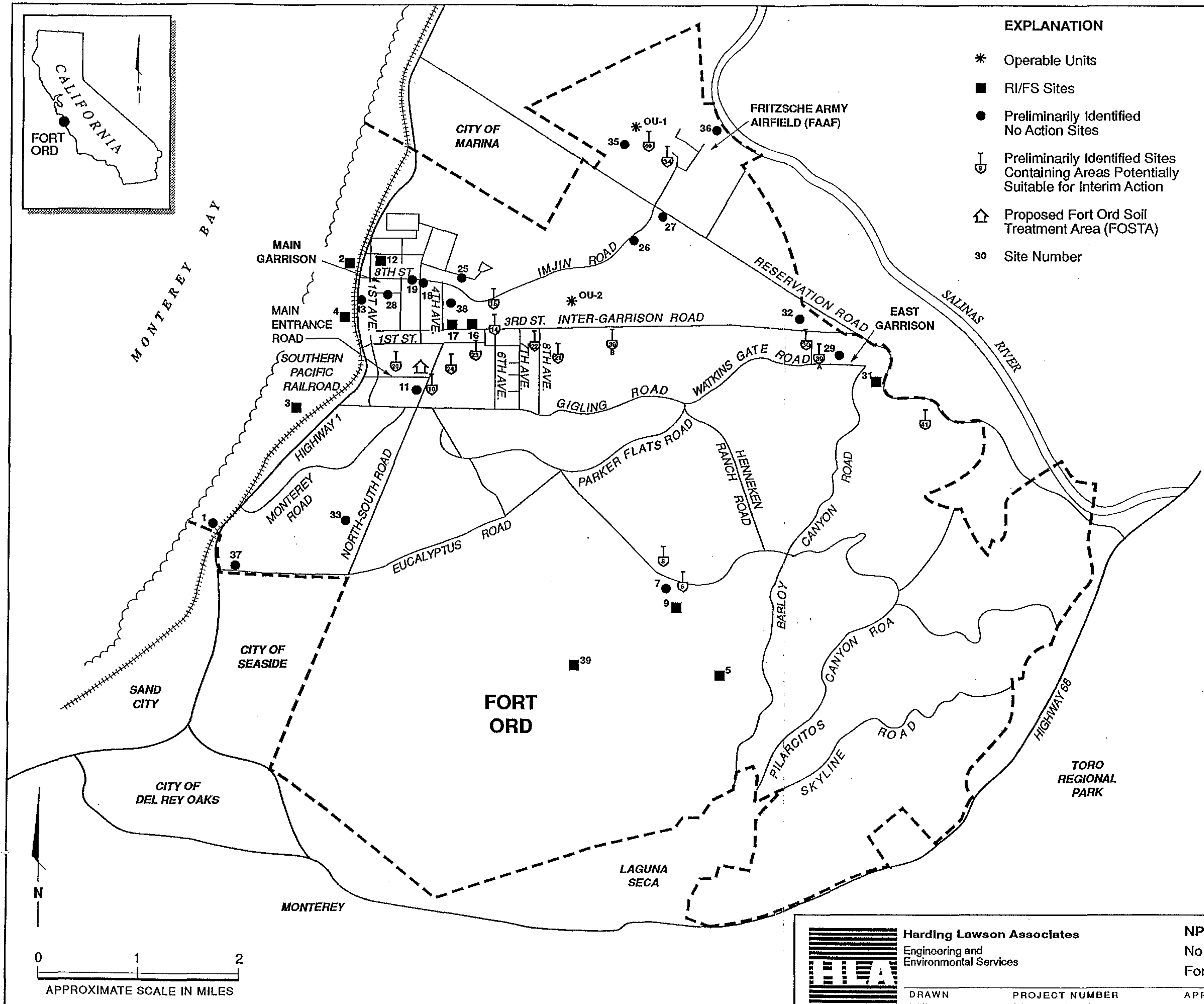
(a) *Draft Final Basewide Background Soils Investigation.* Dated March 15, 1993
Prepared by HLA for the Sacramento COE.

(b) This PRG is based on maximum concentrations of individual carcinogenic and non-carcinogenic constituents in used motor oil and was developed for use at petroleum hydrocarbon sites where SOC analyses were not available.

(c) Calculated value exceeds 100 percent of soil, indicating noncancer health effects would not be expected at any soil concentration.

PRG = Preliminary Remediation Goal.
mg/kg = Milligrams per kilogram
NA = Not available.

PLATES



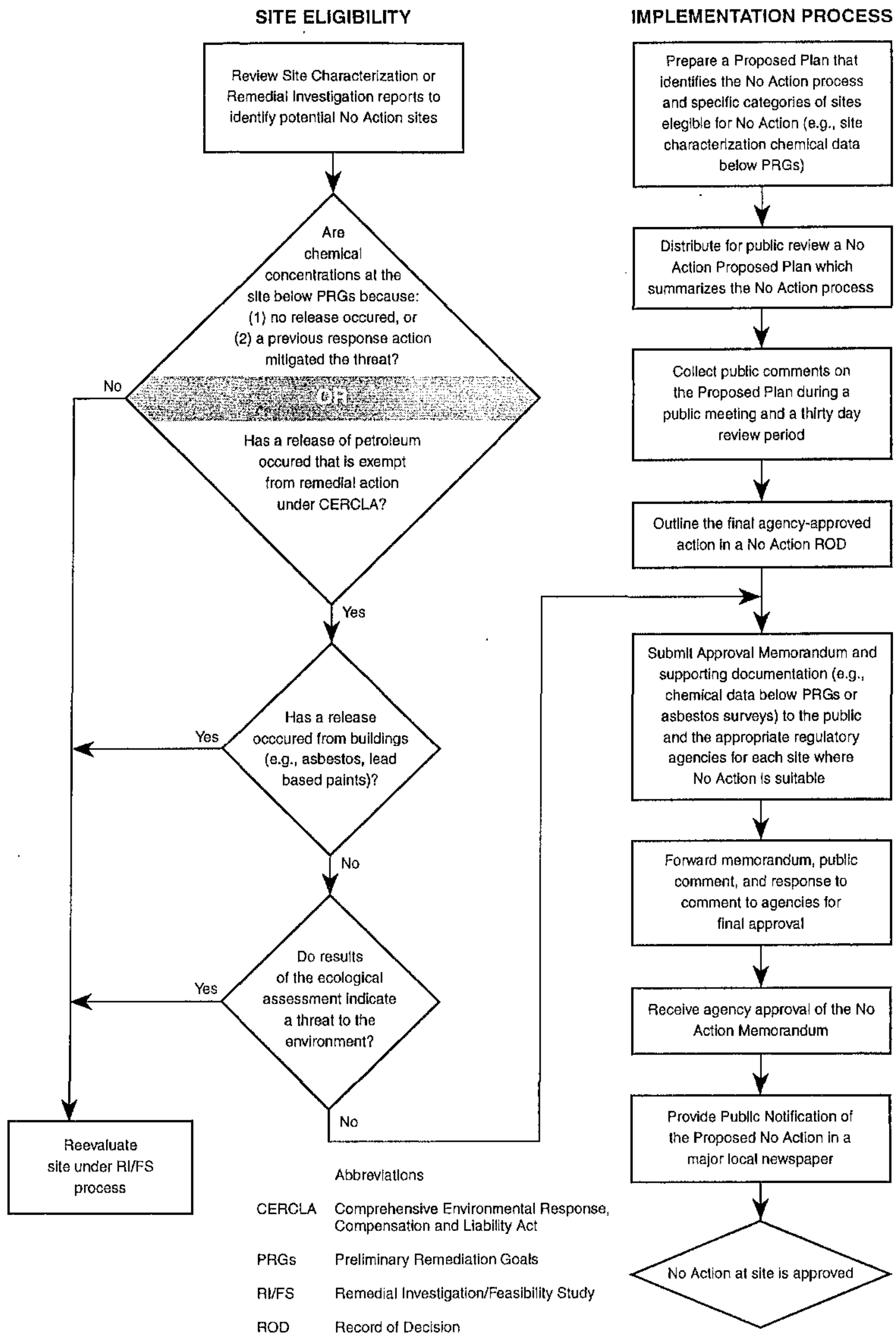
SITE NO.	SITE DESCRIPTION
OU-1	FORMER FIRE DRILL AREA
OU-2	FORT ORD LANDFILLS
1	ORD VILLAGE SEWAGE TREATMENT PLANT
2	MAIN GARRISON SEWAGE TREATMENT PLANT
3	BEACH FIRING RANGE
4	BEACH STORMWATER OUTFALLS INCORPORATED INTO BASEWIDE SEWER PROGRAM
5	RANGE 36A (EXPLOSIVE ORDNANCE DISPOSAL)
6	RANGE 39 (ABANDONED CAR DUMP)
7	RANGES 40 & 41 (FIRE DEMO AREA)
8	RANGE 49 (MOLOTOV COCKTAIL RANGE)
9	RANGE 39 (FLAMED FUEL EXHIBITION)
10	FIRE DRILL BURN PIT
11	AAFES FUELING STATION
12	DOL AUTOMOTIVE YARD, CANNIBALIZATION YARD, LOWER MEADOW AREA
13	RAILROAD RIGHT-OF-WAY
14	707TH MAINTENANCE FACILITY
15	DIRECTORATE OF ENGINEERING AND HOUSING (DEH) YARD
16	DOL MAINTENANCE YARD, PETE'S POND AREA
17	1400 BLOCK MOTORPOOL
18	1600 BLOCK MOTORPOOL
19	2200 BLOCK FACILITY
20	SOUTH PARADE GROUND, 3800 BLOCK MOTORPOOL, 519TH MOTORPOOL
21	4400/4500 BLOCKS MOTORPOOL (EAST)
22	4400/4500 BLOCKS MOTORPOOL (WEST)
23	3700 BLOCK MOTORPOOL
24	OLD DEH YARD
25	FORMER DRMO SITE
26	SEWAGE PUMP STATIONS-BLDGS 5871/6143
27	ARMY RESERVE MOTORPOOL
28	BARRACKS AND MAIN GARRISON AREA
29	DRMO
30	DRIVER TRAINING AREA
31	FORMER DUMP SITE
32	EAST GARRISON SEWAGE TREATMENT PLANT
33	GOLF COURSE
34	FRITZSCHE AAF FUELING FACILITY
35	AIRCRAFT CANNIBALIZATION YARD
36	FRITZSCHE AAF SEWAGE TREATMENT PLANT
37	TRAILER PARK MAINTENANCE SHOP
38	AAFES DRY CLEANERS
39	INLAND RANGES/IMPACT AREA
39 A	EAST GARRISON RANGES
39 B	INTER-GARRISON TRAINING AREA
40	FRITZSCHE AAF DEFUELING AREAS
41	CRESCENT BLUFF BURN PITS

Harding Lawson Associates
Engineering and Environmental Services

NPL Sites
No Action Record of Decision
Fort Ord, California

PLATE **1**

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
LFDc	23366 04771	DRS	10/93	12/94



Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
PRGs	Preliminary Remediation Goals
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision

021395LFD

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Site Eligibility and Implementation Process Flow Chart
No Record of Decision
Fort Ord, California

FIGURE **2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
LFDc	23366 04771	DRS	1/95	

APPENDIX C

RESPONSE TO AGENCY COMMENTS ON THE DRAFT REPORT

Response to Agency Comments
Draft Basewide Remedial Investigation/Feasibility Study
Volume I - Background and Executive Summary
Fort Ord, California

The following are the Army's responses to the comments of the regulatory agencies on the Draft Basewide Remedial Investigation/Feasibility Study. All comments and the associated responses pertaining to this volume of the Basewide Remedial Investigation/Feasibility Study are provided below.

I. U.S. Environmental Protection Agency General Review Comments

General Comments

Comment 1: **Fort Ord and its contractor, Harding Lawson Associates, should be commended for their efforts to expedite remedial investigation/feasibility study (RI/FS) activities and to produce such a well written and organized report. Fort Ord's efforts to streamline the RI/FS with such things as the Hydropunch to rapidly delineate the extent of the Sites 2 and 12 plume, the Remedial Technology Screening Report to jump-start the identification of remedial technologies, your unique methods of interacting with the regulatory agencies in the areas of information exchange and on-board reviews, and the so-called "rolling RI", just to name a few, have been remarkable examples of Superfund innovation and should be held up as an example to others.**

Response: Comment acknowledged. The Army also extends its appreciation to the regulatory agencies that have been involved in the RI/FS process; their cooperation and efforts in expediting the process, especially in participating in meetings to work through differences in understanding, have contributed to the Army's ability to maintain the aggressive schedule.

Comment 2: **However, despite such areas of tremendous success, EPA's review of the RI/FS Report has identified a number of serious shortcomings, briefly listed below and further discussed in specific comments. These were expressed to and in some cases tentatively resolved with the Army over the course of our review period. Nevertheless, these issues must be addressed before EPA can approve the report as final. EPA recognizes that Fort Ord may have difficulty responding to some of these comments, as well as those raised by the State and other members of the RAB, and producing a draft final document in the ninety days (sixty days plus automatic 30 day extension) allowed for under the FFA, so would be willing, assuming State concurrence, to consider allowing Fort Ord additional time to complete this task.**

a. As the Basewide RI/FS, EPA recommends that this report incorporate the conclusions of other studies or actions (OUs, Interim Actions, No actions, removal actions, etc) into the final basewide RI and FS determinations such that they can be evaluated with and against the proposed remedies for consistency in cleanup standards, approach, etc. How does the Army plan on addressing this issue with respect to each component of Fort Ord Superfund work? Please explain in detail. A flow chart describing how this all fits together would be useful.

For instance, 1) if Interim Actions are not complete, then it is not known whether additional RI work is needed at an IA site or whether an FS for a final remedy is necessary; 2) the results of removal actions need to be presented and

incorporated into the basewide study. The Site 24 removal action was completed but further investigatory work is still underway. The depths to which UXO were located and cleared in the UXO removal action need to be evaluated relative to future land uses and the need for the FS to develop alternatives which may include additional clearances, institutional controls and/or contingencies for UXO clearance activities in the future; 3) regarding OU 2 Landfill, it would be appropriate to analyze the feasibility of consolidating (with possible treatment) some of the contaminated soil/debris at Sites 16/17 and 31 at the landfill for use as base material for the cover; and 4) final cleanup levels for the 180ft aquifer at OU2 should be addressed in this document, taking basewide 180ft aquifer issues into account. A basewide holistic approach to addressing this aquifer needs to be discussed in greater detail, possibly in a separate section for groundwater.

b. Unexploded Ordnance (UXO) - Alternatives for addressing UXO at Fort Ord are not addressed in the RI/FS Report. In general, EPA considers UXO at Fort Ord to be a CERCLA hazardous substance and requests that it be evaluated and included in the Draft Final RI/FS. We may dispute the document if UXO is not addressed.

c. Ecological Risk Assessment - The ecological risk assessment, including that of the marine environment, is incomplete. While the Army has anticipated the sites that are likely to be impacted by the assessment and included some provisions for addressing these impacts in the FS, EPA cannot approve the RI/FS until this analysis is complete and it is clear that the alternatives are protective. While EPA recognizes that the Army has had some data analysis delays arise which were beyond your control, the ecological assessment is an essential component of an RI/FS and we must not proceed further until this activity is complete.

d. Fate and transport - Most of the RI Reports lack a discussion of the fate and transport of contaminants. This is an essential component of an RI Report, as it feeds into the risk assessment.

e. Proposed future land uses - EPA is concerned with the certainty of the proposed future land uses. There is a concern that where reuse plans are subject to change, the risk assessment may not account for all possible receptors and pathways. The residential reuse scenario should be used as a default wherever reuse plans have not been finalized.

f. Predesign study at Site 3 - EPA requests that the Predesign study at Site 3 be conducted as soon as possible, particularly since the results of this study also impact the remedial alternatives at Sites 31 and 39. Please provide us with more information on the timing of this study relative to the Basewide Proposed Plan and Record of Decision. If the timing is not acceptable to EPA, a study of reduced scale should be considered in order to expedite the cleanup decision. Most likely, a smaller study would achieve the same objectives as the one currently proposed. While contingencies in a ROD are acceptable, EPA is hesitant to base three site cleanup decisions on cleanup technologies whose effectiveness are uncertain.

Response: a. The discussion regarding the interaction of the various programs has been revised to provide clarification. In addition, a flow chart has been added as Plate 1A. The specific examples are addressed as follows:

(1) The description of the IA process has been expanded in Section 1.2.3.

(2) Section 8.2.10 has been expanded to include the available results of the removal action. Companion documents have been prepared for areas outside the Inland Ranges containing UXO; one example is the Time-Critical Removal Action memo for UXO. In addition, a Land Disposal Site Plan (LDSP) for the areas outside the Inland Ranges has been prepared and submitted to the agencies. UXO clearance activities were considered for the intrusive activities associated with each alternative in the FSs.

(3) The feasibility of consolidating contaminated soil and debris at OU 2 has been considered and the FSs revised, where needed.

(4) The final cleanup levels and final remedy for the 180-foot aquifer at OU 2 will be addressed in an Explanation of Significant Differences to the OU 2 ROD.

b. In accordance with the NCP, DOD (the Army) is the removal response authority with respect to remediation involving DOD military weapons and munitions. The Army is preparing, as companion documents to the Basewide RI/FS, a Hazard Assessment and an Explosive Safety Submission for the Inland Ranges. These documents present the Army's strategies for removal and remediation of UXO/OEW at Fort Ord. In addition, the relationship of UXO/OEW to the CERCLA process is under consideration by the Army.

c. The Draft Final RI/FS includes a complete Ecological Risk Assessment in Volume IV, a summary of which is provided in Section 7.6 and various subsections of Section 9.0 of Volume I (9.1.3.2, 9.2.3.2, 9.3.3.2, 9.4.3.2 and 9.5.3.2).

d. Discussion of fate and transport was presented in the BRA (Volume III) in the Draft RI/FS. A general discussion of contaminant fate and transport has been added to the Introduction to Volume II, Section 3.0. A conceptual site model and a site-specific discussion of contaminant fate and transport have been added to each RI site report.

e. Cleanup and the final remedy for each site at Fort Ord are consistent with the NCP, CERCLA, and the President's 5-Point Plan and are based on the reuse as provided by the Fort Ord Reuse Authority (FORA) in the *Fort Ord Base Reuse Plan* dated October 14,1994. Although the risk assessment scenarios are based on site-specific reuse, these scenarios and exposure assumptions are very conservative and would likely be protective of human health and the environment in the event that reuse is different from what is currently planned. In areas where reuse is undefined, a residential scenario was used.

f. Work plans for bench-scale and pilot study treatment of soil at Site 3 are currently under preparation for submission to the regulatory agencies. The Army intends to conduct these studies, after approval of the work plans, from March through July of 1995. A Conceptual Plan for implementation of full-scale remediation of Site 3 based on the results of the studies will be submitted in August of 1995, prior to submission of the Basewide Proposed Plan and ROD.

Comment 3: **For subsequent reports, particularly those of this magnitude, please consider saving a few trees and print the reports double-sided!!**

Response: An effort has been made to print double-sided as much of the Draft Final RI/FS as possible.

Specific Comments

Comment 4: Attached please find Attachment A, which includes additional EPA Technical Review Comments on the RI/FS Report, dated September 6 and September 8, 1994. EPA has kept these separate from the comments found below since they were submitted to the Army in the middle of September, and we believe it would be easier for the Army to respond to them if they are not integrated with those found here. The Technical Review Comments were prepared for EPA by Bechtel Environmental, Inc., EPA's technical consultant for the Fort Ord project.

Response: Comment acknowledged.

Vol I - Executive Summary

Comment 5: Section 1 Introduction. This section should also discuss removal actions and Operable Units.

Response: A more detailed description of the Basewide ROD process, including the IA and No Action RODs, Operable Units, and Time-Critical Removal Actions for chemical contaminants, has been added to Section 1.2.

Comment 6: Section 3.3 Local Community Reuse Planning, second paragraph. Was FORA created by the passage of a U.S. or State Senate bill?

Response: FORA was formed under State Senate Bill SB-899. The text has been revised as suggested.

Comment 7: Section 4 Previous Investigations and UST Program. This section should be expanded to cover other environmental investigations, discussing the scope of the effort, their relevance to the CERCLA process, and results and/or next steps. Examples of these are radiological decommissioning, lead-based paint surveys, asbestos surveys, and chemical agent identification set (CAIS) investigations.

Response: Section 4.0 has been expanded to include a summary of Non-CERCLA programs.

Comment 8: Section 4.3 UST Program. Have all USTs containing CERCLA hazardous substances been evaluated (ie., passed leak test, or if failed test, successfully removed)?

Response: USTs containing CERCLA hazardous substances have been evaluated. With the exception of USTs 4495 and 4512, which could not be tested, all identified USTs have been removed or have passed leak tests. USTs 4495 and 4512 have been scheduled for removal in 1995.

Comment 9: Section 5.4.2 RCRA Part B Permit, last sentence. Range 36A is being used for disposal of UXO/OEW removed from areas outside the Inland Ranges as part of the time-critical removal action. As discussed in a general comment on the RI/FS, since the results of this removal action should be incorporated into this RI/FS report, so should corrective action plans for Range 36A. How and when will this occur?

Response: The Army intends to continue using Range 36A as a disposal area for UXO/OEW. At the time Range 36A is closed, closure plans will be prepared in accordance with applicable regulations. The results of the site investigation show that even with heavy and relatively recent use, disposal activities have not resulted in a risk to human health or groundwater. No text changes have been made.

Comment 10: Section 6.1 OU 1. Conclude this section with a statement discussing the extent to which OU1 relates to other basewide sites. For instance, are the remedies proposed for groundwater at OU 2 and Sites 2/12 expected to impact the OU1 groundwater system? Were the OU1 groundwater and soils risk assessments done in a manner consistent with the basewide risk assessment?

Response: Section 6.1 has been revised as suggested.

Comment 11: Section 6.2 OU 2. Similar to the previous comment, conclude this section with a statement discussing the extent to which the actions proposed for OU 2 relate to those proposed at other sites. For instance, what is the relationship between the groundwater plumes at OU1, Sites 2/12, and OU 2.

The 180ft Aquifer at OU2 was only addressed through an interim action due to area-wide concerns about contamination in that aquifer. The final analysis, pursuant to Title 23 CCR Chapter 15, to determine final groundwater cleanup goals needs to be accomplished and should be presented along with the proposed cleanup alternatives for the Site 2 and 12 plume. Will this be included in the Draft Final FS.

Given that alternatives for some sites in the FS discuss the potential for disposing of soils/debris at OU 2 as base material for the cap, it would be appropriate to recognize this in this section and discuss, based on ARARs identified in the OU2 ROD, what type of soils/debris would be acceptable.

Response: The groundwater plumes at OU 1, OU 2, and Sites 2 and 12 are considered to be three separate plumes. Section 6.2 has been revised to state that the risk assessment and proposed remedies are consistent with the final basewide remedy. The final cleanup levels and final remedy for the 180-foot aquifer at OU 2 will be addressed in an Explanation of Significant Differences to the OU 2 ROD; no text changes were made. The discussions concerning disposal of soil and debris at OU 2 are included in the appropriate Feasibility Studies.

Comment 12: Section 8.1 No Action Sites and Section 8.2 Interim Action Sites. Please make a statement in the introductory portions of these sections regarding how the cleanup goals and approach for these sites are very conservative and are consistent with those presented in the RI/FS and OU sites. Also note how this consistency with basewide remedies will be evaluated further in the basewide Proposed Plan and ROD.

Response: Sections 8.1 and 8.2 have been revised as suggested.

Comment 13: Section 8.2.10 Site 24. Update this section to discuss the Site 24 removal action and the ongoing investigation. If this site is not found suitable for plug-in into the Interim Action and requires a full RI/FS, explain in the text how the Army would complete the RI/FS and integrate it into this report and/or the basewide Proposed Plan.

Response: Section 8.2.10 has been updated to include the removal action and the ongoing investigation. Section 1.2 discusses how Site 24, or other proposed IA sites, would be handled if they do not meet the IA criteria.

II. U.S. Environmental Protection Agency Technical Review Comments

Analysis of Conclusions and Recommendations/Major Deficiencies

Comment 1: **Review of the Executive Summary of the RI for each site makes clear the fact that the individual RI reports do not include a section on "Fate and Transport" nor do the summary sections of the RI reports include a section incorporating "Recommendations for Future Work" or a section on "Recommended Remedial Action Objectives." All of these sections are part of the "Suggested RI Report Format" provided in the EPA document Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October, 1988).**

Response: A discussion of fate and transport was included in the Baseline Human Health Risk Assessment, Volume III of the Draft RI/FS. For the Draft Final, a general discussion of contaminant fate and transport has been added to the Introduction to Volume II, Section 3.0. Site-specific discussions of a conceptual site model and contaminant fate and transport have been added to each RI site report. Recommendations for future work have been added where applicable.

Remedial Action Objectives (RAOs) were included in the individual Feasibility Study (FS) sections, Volume V, of the Draft RI/FS. Because these FSs were submitted concurrently and in the same RI/FS as the discussions of the individual RIs, it is more appropriate to include the discussion of the RAOs in the FS sections. A summary of the RAOs has been added to each FS section of this volume (Sections 9.1.4.1, 9.2.4.1, 9.3.4.1, 9.4.4.1, and 9.5.4.1).

Comment 2: **At worst, lack of a fate-and-transport analysis should make the preparation of an adequate Risk Assessment impossible and lack of remedial action objectives should make preparation of a Feasibility Study impossible. At best, lack of these sections in the RI report handicaps the reader in understanding how the results of the RI were incorporated into the Risk Assessment and the Feasibility Study.**

Response: See the response to EPA Technical Review Comment 1 above.

Comment 3: **The recommendation for no further action at sites 1, 7, 26 and 36 may be premature. See Specific Comments 15, 17, 19, and 21 below.**

Response: See the responses to EPA Technical Review, Specific Comments 15, 17, 19, and 21.

General Comments

Comment 1: **Due to the complexity of most RI/FS documents and the Fort Ord RI/FS in particular, the Executive Summary is often a lengthy document in itself, i.e., the Executive Summary for this RI/FS comprises 92 pages of text, 24 pages of references, seven tables, seven plates, and an appendix. To provide a truly brief overview, an abstract should be prepared and incorporated into the RI/FS document in front of the Executive Summary. The scope and most significant conclusions of the RI/FS should be summarized in one or two pages, or up to a maximum of ten pages (approximately 10 percent of the volume of the Executive Summary).**

Response: Based on the size of the installation, the number of site investigations, and the scope of the RI/FS, it is not feasible to condense the information into ten pages.

Comment 2: The list of references is not complete. Some published documents cited in the text are not included in the Reference section. Not all of the unpublished references are included in the Reference section.

Response: The reference list has been updated to include additional published documents. Information for unpublished documents is cited in the text but is not included in the reference list.

Comment 3: When referring readers to other volumes for specific issues, the section and page numbers should be included.

Response: References to other volumes include section numbers, where feasible. Due to production logistics associated with such a large document, it is not feasible to include page numbers when referring to other sections.

Comment 4: Section 8 and 9. All RI/FS sites should be discussed with more specific details. For example, when the report says that contamination presents acceptably low risks, it should give a number or range; when the report says that low concentrations of chemicals were found, it should give values for them. Also, the ecological risk of each site should also be discussed. The reader should be given enough information to feel comfortable with the report's conclusions.

Response: The purpose of Volume I is to provide an overview of the NPL Program at Fort Ord. It is not the intent of this volume to provide detailed information on each of the sites. More extensive descriptions of the sites covered in Section 8 are presented in the individual site reports that are referenced. Details for the RI sites included in Section 9 are discussed in the appropriate section of Volume II. Where appropriate, values for chemical concentrations have been added to the text. The term "low" has been retained when discussing risks to human health because of the complexity of the detail required to further explain the term. Those details are included in individual site characterization reports.

Specific Comments

Comment 1: Table of Contents and Section 9.5: To avoid confusion concerning the handling of Site 5 and Site 9, the title of Section 9.5 should be revised to read "Site 39 (plus former Site 5 and Site 9)". Other than Table 1, the Executive Summary does not appear to address Site 5 and Site 9.

Response: The title of Section 9.5 has been revised.

Comment 2: Section 1.2, Page 3, Paragraph 6: What happens to NOA sites where CERCLA does not provide authority for R.A.? This information should be added to the report.

Response: The description of these sites has been expanded.

Comment 3: Section 2.2.2.3, Page 6, second paragraph and Section 7.1.2.1, Page 26: In describing the Fort Ord water-supply wells the phrase "...eastward to their current locations..." does not clearly explain the history of these wells. Should it state that a progression of wells were installed, each further to the east until the current locations were

reached or simply that the current wells are located to the east of the initial water-supply wells?

Response: Sections 2.2.2.3 and 7.1.2.1 have been revised.

Comment 4: Section 2.4, Page 7, second paragraph, last sentence: The phrase "...fully developed by ecological standards..." could be read to mean that the ecology has reached a climax community. If the intent of this sentence is to describe land which has been developed for human use, the term "developed land" would be more appropriate.

Response: Section 2.4 has been revised.

Comment 5: Section 2.6.1, Page 8, last sentence: This sentence implies that the geology of Fort Ord is summarized in Section 7.1 of the Executive Summary, which is incorrect. It is the report entitled Basewide Hydrogeologic Characterization that is summarized in Section 7.1. Changing the word "and" to "which" in this sentence would eliminate the confusion.

Response: In the Draft RI/FS, Section 7.1 of the Executive Summary, Volume I, presented a summary of the geology and hydrogeology, based on the results of the Basewide Hydrogeologic Characterization Study, which includes Phase 1 work presented in the Draft Final Basewide Hydrogeologic Characterization Report as well as subsequent Phase 2 work. No changes to the text have been made in response to this comment.

Comment 6: Section 3.4, Page 11, last paragraph: This paragraph refers to information that "...has not been formally published..." Is this information available to a reader of this document in order to assess Harding Lawson's (HLA) identification of future land uses?

Response: Future land use information was provided in the Fort Ord Base Reuse Plan issued at the Fort Ord Reuse Authority (FORA) on October 14, 1994. Additional information was provided by the COE from unpublished sources.

Comment 7: Section 4.0, Pages 13 and 14: A number of the documents to which reference is made in this section are discussed in subsequent subsections (e.g., 4.1.1, 4.1.2, 4.2.1, 5.2.2). To alert the reader to this fact, these subsections should be noted. As an example of a comparable aid to the reader, subsections 5.3.1 and 5.3.2 alert the reader to the location of further information on cited reports.

Response: Section 4.0 has been revised as suggested.

Comment 8: Section 4.1.2, Page 15, last paragraph: There is no explanation as to why or how elevated lead concentrations could be associated with the surface water drains.

Response: An explanation has been added to Section 4.1.2.

Comment 9: Section 4.2.2, Page 15: The summary of the Enhanced Preliminary Assessment does not provide a clear explanation of the nature of the 61 "areas" (AREEs) identified. Review of Table 4 clearly shows that AREEs consist not only of specific buildings and geographic locations (e.g., FAAF Burn Pit, Building 527 Maintenance Shop) but also generic operations and facilities (e.g., underground storage tanks, fueling stations), plus activities and conditions (e.g., pesticide usage, shoreline erosion, asbestos). Therefore, the reader is unable to ascertain how the 61 AREEs are or are not

incorporated into HLA's sites. Examination of Table 6 shows that only 30 of the 61 AREEs are referenced and examination of Table 7 shows that only 26 of the 61 are referenced.

Response: Table 7 has been expanded to account for additional AREEs investigated during the RI/FS. Although the Enhanced Preliminary Assessment identified 61 AREEs, not all were covered under CERCLA. Areas such as shoreline erosion, asbestos, and various petroleum storage tanks were not included in the RI/FS. Table 6 was not revised.

Comment 10: Section 6.1, Page 22, third paragraph: The "uppermost aquifer" at Operable Unit 1 is not identified. In the same manner as used in the describing aquifers in Section 6.2 on the following page, the name of the aquifer which is uppermost at OU1 should be clearly presented.

Response: Section 6.1 has been revised as suggested.

Comment 11: Section 7.1, Page 25, second paragraph, last sentence: The statement that "...contamination occurs mainly in the Salinas basin..." implies that there is some contamination in the Seaside basin. Clearer phrasing or more explanation is needed to assure the reader that exclusion of the Seaside basin from the discussion of hydrogeology in the RI/FS did not result in an inadequate assessment of the physical characteristics and nature and extent of contamination at Fort Ord.

Response: Section 7.1 has been revised as suggested. A detailed description of the Seaside basin is provided in the Draft Final Basewide Hydrogeologic Characterization Report (*HLA, 1994f*).

Comment 12: Section 7.1.2, Page 25: Maps, or reference to maps in other volumes, would help when discussing geology, hydrogeology, site plans, site contamination and salt water intrusion issues.

Response: The intent of the Executive Summary is to summarize the contents of the other volumes. Reference in the Executive Summary to plates, tables, etc., contained in other volumes is not appropriate. Detailed information is contained in the appropriate volumes.

Comment 13: Section 8.1, Page 32, first paragraph: This paragraph cites the No Action Proposed Plan and refers to Appendix A. However, the Appendix A attached to the Executive Summary is the Interim Action Record of Decision. This citation of Appendix A should be corrected or clarified.

Response: The No Action Proposed Plan has been added as Appendix B.

Comment 14: Section 8.1.1, Page 32: What were the results of the tidal influence study? As a general rule, if the bullets say that something was done, there should be a corresponding bullet for the results.

Response: Results of the tidal influence study have been added to Section 8.1.1.

Comment 15: Section 8.1.1, Page 32, last paragraph: This paragraph should state that the report of the results of the Site Characterization has not yet been reviewed by the agencies. Therefore, the recommendation for no further action at Site 1 has not been approved by the agencies.

Response: A sentence has been added to the end of Section 8.1 to reflect the need for regulatory agency approval of site categorization.

Comment 16: **Section 8.1.3, Page 33: What was the time frame of the reported activity? If trenching was discontinued some years ago, there might well be no visual evidence of trenches. The burned plastic found at the site supports the testimony that burning took place at this location. Without more information, such as a geophysical survey, the exclusion of this site from further action may be premature.**

Response: Section 8.1.3 has been revised to more clearly explain the results of the Site 7 investigation.

Comment 17: **Section 8.1.3, Page 33, last paragraph: Although no further action is recommended for Site 7, it should be noted in this paragraph that this site is encompassed within the boundaries of Site 39 - Inland Ranges which is undergoing further action under the RI/FS program. Therefore, potential groundwater contamination related to former trenches at Site 7 could be addressed as part of the RI for Site 39.**

Response: Section 8.1.3 has been revised to describe the inclusion of Site 7 in Site 39.

Comment 18: **Section 8.1.6, Page 34: It is unlikely that the nickel found in groundwater at concentrations above MCLs is a result of the stainless steel well screen. Unless there are unusual groundwater conditions, stainless steel well screens are generally highly reliable when used in environmental monitoring wells. No specific evidence of unusual groundwater condition (e.g, pH, Eh, salinity) has been presented. Although this section referenced the Basewide Hydrogeological Characterization, all that is contained in that document (Section 4.4.3, Page 28) is a statement that wells with stainless steel screens were not used.**

Response: An explanation of the nickel contamination associated with stainless steel casings is presented in the *Draft Final Basewide Hydrogeologic Characterization (HLA, 1994f)*. This reference has been added to Section 8.1.6.

Comment 19: **Section 8.1.9, Page 36: Even though there have been eight documented spills, the text states that contamination is not expected. Without a more thorough explanation, this conclusion is inappropriate.**

Response: As described in the RI/FS Work Plan (*HLA, 1991c*) and Sampling and Analysis Plan (*HLA, 1991b*), no investigation was proposed at this site based on the nature of the spills and site conditions. This approach was agreed upon at meetings with the regulatory agencies during the planning stages of this project.

Comment 20: **Section 8.1.13, Page 39, first bullet: More information should be provided on contaminants found in groundwater. Were the elevated concentrations of nitrate and fecal coliform found in the same well, during the same sampling event? Was this well upgradient or downgradient of potential sources of these contaminants? Was the orthophosphate found in the same well(s) as the other contaminants? Was nitrate at concentrations below 10 mg/l present during other sampling rounds at the same well? How many rounds of sampling were conducted and were any trends noted?**

Response: Additional information has been added to Section 8.1.13. Detailed information is available in *Draft Data Evaluation and Recommendation Report, Site 32 - East Garrison Sewage Treatment Plant, Fort Ord, California*, dated August 6, 1993.

Comment 21: **Section 8.1.16, Page 40: This section has several inconsistencies or shortcomings.**

(a) In the first paragraph, nitrogen is listed as a contaminant of concern. Should this be nitrate?

(b) In the third paragraph, no analysis of groundwater for "nitrogen" or nitrate is listed.

(c) The last paragraph should state that the report of the results of the Site Characterization has not yet been reviewed by the agencies; therefore, the recommendation for no further action at Site 36 has not been approved by the agencies.

Response: (a) and (b) Section 8.1.16 has been revised as suggested to include Kjeldahl nitrogen in the analysis of groundwater.

(c) A sentence has been added to the end of Section 8.1 to reflect the need for regulatory agency approval of site categorization.

Comment 22: **Section 8.2.1, Page 42, last paragraph: Although no further action is recommended for Site 6 beyond the interim action for soil adjacent to the fog oil drum, it should be noted in this paragraph that this site is encompassed within the boundaries of Site 39 - Inland Ranges which is undergoing further action under the RI/FS program.**

Response: Section 8.2.1 has been revised to describe the inclusion of Site 6 in Site 39.

Comment 23: **Section 8.2.3, Page 43, bullets: The bulleted results do not provide a complete summary of the results of analysis of soil and groundwater samples.**

(a) The results of analyses of soil samples for the by-products of burning (specifically dioxins) are not addressed.

b) The results of analyses of groundwater samples for the by-products of burning (specifically polynuclear aromatics [PNAs] such as benzo(a)pyrene, an SOC) are not addressed.

c) The sixth bullet reports low concentrations of SOCs in soil samples, but the description of HLA's analyses for soil does not list SOC analysis. Were these SOC results obtained by EA (1990)? Which SOCs were detected? PNAs, which are SOCs, represent a health risk at very low concentrations.

Response: (a) Section 8.2.3 has been revised as suggested.

(b) Groundwater samples were analyzed for SOCs (EPA Method 8270), but none were detected. Groundwater samples were not analyzed for dioxins. Section 8.2.3 has been revised to provide clarification.

(c) Section 8.2.3 has been revised as suggested.

Comment 24: **Section 8.2.4, Page 43, fourth paragraph: The list of HLA's analytical parameters for soil and groundwater samples at Site 14 includes "petroleum hydrocarbons." Does this mean Total Petroleum Hydrocarbon-gasoline (TPHg) and Total Petroleum Hydrocarbon-diesel (TPHd) only or does it include Total Recoverable Petroleum**

Hydrocarbons (TRPH) and Total Oil and Grease (TOG) as well? Without this information it is not clear whether the TRPH/TOG results presented in the bullet on the following page are from the HLA investigation or from the earlier EA investigation.

Response: TRPH/TOG results are from the HLA investigation. Details are provided in the *Draft Site Characterization, Site 14 - 707th Maintenance Facility, Fort Ord California*, dated October 29, 1993. The text has been revised to provide clarification in the TPH diesel analysis (EPA 8015D).

Comment 25: Section 8.2.4, Page 44, second bullet: This bullet presents the analytical results in a confusing manner. Without an understanding of the analytical procedure, this bullet seems to present contradicting information: First, nothing was detected by the TPHd analysis and, second, concentrations of up to 1,400 mg/kg were detected by the TPHd analysis. Presumably, the information being presented is that the TPHd gas chromatograph (GC) results were not consistent with the presence of diesel and, therefore, TPHd was not detected. However, the GC results indicated the presence of hydrocarbons, which did not correspond to diesel, at concentrations of 1,000 to 1,400 mg/kg.

Response: TPHd was not detected. However, in the TPHd analysis (EPA 8015D), an unknown hydrocarbon was detected at concentrations of 1,000 to 1,400 mg/kg.

Comment 26: Section 8.2.5, Page 44, third paragraph: The scope of HLA's investigation should be clarified. The third bullet indicates that 25 soil samples were collected, but the fourth bullet states that 52 soils samples were analyzed.

Response: Section 8.2.5 has been revised.

Comment 27: Section 8.2.5, Page 44, fourth paragraph: The results of the investigation presented here do not include the results of analyses for petroleum hydrocarbons, metals, and VOCs. Also, the results of investigation near the storm drain and the former USTs are not presented.

Response: Section 8.2.5 has been revised.

Comment 28: Section 8.2.8, Page 47, second and third paragraphs: It is not clear whether the investigations "...near grease racks..." by EA and HLA are for the same grease rack area or different grease rack areas.

Response: Section 8.2.8 has been revised.

Comment 29: Section 8.2.8, Page 47, fourth paragraph: The results of investigations near the oil/water separators are not presented. Also, there appear to have been no investigations associated with the maintenance shops.

Response: Section 8.2.8 has been corrected. There was no field investigation associated with the Maintenance Shop because there was no evidence of a contaminant release at the shop.

Comment 30: Section 8.2.9, Page 47, fourth paragraph: The results of investigations near the oil/sand interceptors and oil/sand separator are not presented. The results of analysis

for VOCs and metals are not presented. There are no results presented for the five other USTs.

Response: Section 8.2.9 has been revised as suggested.

Comment 31: Section 8.2.10, Page 48, fourth paragraph: The results of investigations are not fully summarized. Missing information includes the results of soil gas sampling, the results of metals analysis, the results of groundwater sampling, and the relationship between contaminant concentrations in shallow soil and the applicable PRGs.

Response: Section 8.2.10 has been corrected.

Comment 32: Section 8.2.10, Page 48, last paragraph: As the report of results of the Site Characterization has not yet been reviewed by the agencies, the recommended actions should be qualified as not yet approved by the agencies.

Response: A sentence has been added to the end of Section 8.1 to reflect the need for regulatory agency approval of site categorization.

Comment 33: Section 8.2.11, Page 48, third paragraph: The results of groundwater sampling are not addressed.

Response: Groundwater results were added to Section 8.2.11.

Comment 34: Section 8.2.13, Page 49 and Section 8.2.14, Page 50: There is no explanation as to why Site 40 and Site 41 are included as Interim Action sites. Including sites 40 and 41 in Section 8 is premature. These sites should remain in Section 9 until the investigation is complete, or, alternatively, an additional section could be added for sites still under investigation.

Response: Data collected since the Draft RI/FS was submitted have been added to Sections 8.2.13 and 8.2.14. Based on these data, these two sites are considered Interim Action sites.

Comment 35: Section 9.1.2.3, Page 55: The term "unknown TPH as diesel" is used. Is this the same kind of compound as the "unknown hydrocarbons" detected by TPHd as described for several Interim Action sites in Section 8.2? If so, the terminology should be made consistent between sections of the RI/FS.

Response: The terms "unknown TPH as diesel" and "unknown hydrocarbons" both represent unknown hydrocarbons detected under the TPH diesel analysis (EPA Method 8015D) and will be referred to as "unknown TPHd." This has been clarified in the text.

Comment 36: Section 9.1.3.1, Page 56; Section 9.3.3.1, Page 72; Section 9.4.3.1, Page 77: The terminology seems to be confused concerning chemicals of potential concern (COPCs) versus chemicals of concern (COCs). COPCs should be a larger list of contaminant chemicals found at the site during the RI. The "most prevalent, persistent, and potentially toxic compounds detected" should then be a smaller list of COCs. The COCs, as determined by Fate and Transport analysis and Risk Assessment, are then the driving force for Remedial Action Objectives. The use of the term COPC in this section makes it unclear whether the list of chemicals presented on Page 56 represents COPCs or COCs.

Response: The use of the term "chemicals of potential concern" (COPC) in the Baseline Human Health Risk Assessment is consistent with EPA guidelines (*Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), 1989*). EPA defines "chemicals of potential concern" as those chemicals included in the quantitative risk assessment. Chemicals of potential concern are further defined as a subset of all potentially site-related chemicals that are selected based on a number of criteria such as essential nutrient information, frequency of detection, and a concentration-toxicity screen. Therefore, for the purpose of this BRA "chemicals of potential concern" refers to a subset of potentially site-related chemicals included in the quantitative risk assessment. The term "chemical of concern" (COC) is not used in the BRA.

Comment 37: **Sections 9.1.3.1, Page 56, first paragraph and Section 9.1.3.2: These paragraphs seem to imply that a Fate and Transport analysis was conducted to identify the persistence of contaminant chemicals found during the RI (9.1.3.1) and to identify the pathways by which contaminant chemicals found during the RI will migrate through the environment (9.1.3.2). However, no Fate and Transport analysis was provided in the RI report.**

Response: A fate and transport analysis was conducted to identify potential migration pathways in environmental media associated with chemicals detected at the RI sites. This fate and transport analysis has been incorporated into Section 3.0 of the Introduction to Volume II and in all the RI sections of the Draft Final RI/FS.

Comment 38: **Section 9.1.4, Page 57; Section 9.2.4, Page 68; Section 9.3.4, Page 73; Section 9.4.4, Page 78; Section 9.5.4, Page 86: The introductory paragraph to these sections refer to "remedial action objectives;" however, the RI reports did not provide any remedial action objectives for Sites 2 and 12, Sites 16 and 17, Site 3. Additionally, remedial action objectives are not addressed in the portion of the Executive Summary covering the FS.**

Response: A summary of the Remedial Action Objectives (RAOs) has been added to each FS section of this volume. Sections 9.1.4.1, 9.2.4.1, 9.3.4.1, 9.4.4.1, and 9.5.4.1 discuss the RAOs.

Comment 39: **Section 9.1.4.1, Pages 57 and 58: For each of the four remedial units, the summary does not include a clear description of contaminants of concern, nor does it provide a summary of remedial action objectives for each unit.**

a) No explanation is given as to why the Groundwater Remedial Unit is limited to a VOC plume of four compounds when a much more extensive list of "COPCs" was provided in the summary of the Risk Assessment.

b) No chemical concentrations are provided and no remedial action clean-up level goals are provided to characterize the groundwater remedial unit.

c) The contaminants of concern for Soil Remedial Unit 1 are not clearly summarized and the remedial action objectives are not stated. It is not clear from this summary just what requires remediation.

d) For Soil Remedial Unit 2, "unknown TPHd" is described as the "primary contaminant," but it is not clear whether this is a COC and whether there are other COCs. As the levels and risks associated with the unknown TPHd are not

stated in terms of remedial action objectives, it is not clear what requires remediation.

e) Remedial action objectives for Soil Remedial Unit 3 are not clear.

Response: (a) Only four VOCs (TCE, 1,2-DCA, DCE, and PCE) had detected concentrations above the associated MCLs.

(b) The remedial action cleanup levels are included in the RAO description that has been added to Section 9.1.4.1. Groundwater contamination levels are discussed in Volume II, Sites 2 and 12 RI, Sections 4.4.1 and 4.4.2.

(c) Contaminants detected in Soil Remedial Unit 1 (Lower Meadow) are discussed in Section 9.1.2.3 (Nature and Extent of Contamination, Source Characterization), Lower Meadow. RAOs have been added to Section 9.1.4.1.

(d) The unknown TPHd has been included in the RAO description in Section 9.1.4.1.

Comment 40: Section 9.1.4.2, Pages 58 through 59: The summaries of the remedial alternatives do not explain whether or how each alternative meets remedial action objectives.

a) There is no indication as to whether the No Action alternative (Remedial Alternative 1) meets any remedial action objectives. For instance the reduction of contaminant levels over an extended time period could be the most cost effective solution if there is also no threat to human health or the environment during that time period. However, if the No Action alternative does not meet remedial action objectives (which have not been described in this Executive Summary), then this section should state that No Action does not meet those objectives.

b) Which, if any, of the remedial action objectives do Remedial Alternatives 2, 3, and 4 satisfy?

Response: (a) The Remedial Action Objectives include the reduction of risks to human health and the environment and compliance with ARARs. A summary of the evaluation of each alternative with respect to these RAOs was provided in Section 9.1.4.3 of the Draft RI/FS, and the detailed analyses and comparisons were provided in Volume V, Sections 2.5 and 2.6.

(b) Please see response to EPA Technical Review Specific Comment 40a above.

Comment 41: Section 9.2.3.1, Page 67, first paragraph: See Comment on Section 9.1.3.1 concerning use of the term "COPC."

Response: See response to EPA Technical Review Specific Comment 36.

Comment 42: Section 9.2.3.1, Page 67, first paragraph: This paragraph seems to imply that a Fate and Transport analysis was conducted to identify the persistence of contaminant chemicals found during the RI. However, no specific section discussing Fate and Transport analysis was provided in the RI report and transport analysis appears to be limited to use of VLEACH and groundwater mixing models.

Response: See response to U.S. EPA Technical Review Specific Comment 37.

Comment 43: **Section 9.2.4, Page 68: The statement that the purpose of the FS is to develop alternatives to mitigate human health risks does not seem appropriate. In Section 9.2.3.4, the summary of the Baseline Risk Assessment indicates that no adverse health effects are anticipated for Sites 16 and 17.**

Response: Although the health risks related to chemical contamination are acceptably low at Sites 16 and 17, the site remediation will be based on ARARs.

Comment 44: **Section 9.2.4.1, Page 68: Soil Remedial Unit 1, the DOL Maintenance Yard, has no COPCs as determined by the Risk Assessment (summarized in Section 9.2.3.1 of the Executive Summary). Therefore, without a statement of the remedial action objectives for this unit, there is no clear explanation for remediation of this area.**

Response: A discussion of RAOs has been added as Section 9.2.4.1. The DOL Yard remediation is based on the TPH cleanup goal of 500 mg/kg in soil, which is protective of groundwater. Reduction of the potential risk to groundwater is stated as an RAO in Section 9.2.4.1.

Comment 45: **Section 9.2.4.1, Page 68: The summary for Soil Remedial Unit 2 does not identify the contaminants of concern, nor does it provide remedial action objectives for this unit.**

Response: A discussion of RAOs has been added as Section 9.2.4.1. Although the health risks related to chemical contamination are acceptably low at Sites 16 and 17, there are health risks associated with physical hazards from UXO/OEW and medical waste.

Comment 46: **Section 9.2.4.2, Pages 68 and 69: The summaries of the remedial alternatives do not explain whether or how each alternative meets remedial action objectives.**

a) There is no indication as to whether the No Action alternative (Remedial Alternative 1) meets any remedial action objectives. For instance, the reduction of contaminant levels over an extended time period could be the most cost effective solution if there is also no threat to human health or the environment during that time period. However, if the No Action alternative does not meet remedial action objectives (which have not been described in this Executive Summary, but which appear to be limited to ARARs), then this section should state that No Action does not meet those objectives.

b) Which, if any, of the remedial action objectives do Remedial Alternatives 2, 3, and 4 satisfy?

Response: (a) and (b) These evaluations are provided in Section 9.2.4.4 of the Draft Final RI/FS (Section 9.2.4.3 in the Draft RI/FS).

Comment 47: **Section 9.2.4.3, Page 69: Statements to the effect that Alternative 1 "...would not provide good overall protection of human health..." and "...would not reduce the toxicity, mobility, or volume of the chemicals in soil..." are not in keeping with the statement in Section 9.2.3.4 that there are no adverse health effects anticipated from exposure to COPCs at Sites 16 and 17. A statement of remedial action objectives might clarify why No Action is not a desirable alternative. Alternatively, a statement concerning health aspects/toxicity of TPH, which was not addressed by the Risk Assessment, might improve the logic of this summary of the comparison of remedial alternatives.**

Response: A discussion of RAOs has been added as Section 9.2.4.1.

Comment 48: Section 9.3.2.3, Page 71, first paragraph: It is not clear in what way iron concentrations were "elevated" if concentrations were similar in all soil samples including those from a "Control Area." Were iron concentrations comparable to basewide background iron concentrations? What was the purpose of the control area? This summary should either be clarified or reference to "elevated concentrations" should be eliminated.

Response: This section of the Draft RI/FS has been revised to remove the reference to elevated concentrations. In the Draft Final RI/FS, the section is renumbered 9.3.2.2.

Comment 49: Section 9.3.2.3, Page 72, first paragraph; Section 9.3.4.1, Page 73; Section 9.5.2.6, Page 84, last bullet: The statement that "...there is little potential for contamination of the groundwater by lead..." is not supported by the information provided in this Executive Summary. On the previous page, the results of leachate analysis are reported to indicate that metals could be leached by rainwater. There is no information provided that would indicate that rainwater infiltrating through high lead concentrations at the surface will not recharge groundwater. This summary should be clarified to support the conclusions concerning potential for groundwater contamination, or the conclusions should be revised.

Response: Additional data on the depth to groundwater and analytical results of the groundwater samples at Site 3 have been added to this section of the Draft RI/FS. In the Draft Final RI/FS, the section is renumbered 9.3.2.2.

Comment 50: Section 9.4.2.1, Page 75, second paragraph, fourth bullet: Why were dioxins not investigated at Site 31? If there are chlorinated organics present at a site where burning occurred, sampling and analysis should be conducted for dioxins.

Response: Sampling and analysis for dioxins was not conducted during the Phase 1 investigation because ash and burnt debris were not anticipated to be present at the site. Samples collected during the Phase 2 investigation were analyzed for dioxins, as shown in the last paragraph of Section 9.4.2.1.

Comment 51: Section 9.4.2.2, Page 76: The summary of the results of the RI do not include a description of the subsurface lithology. Therefore, the reader has no information as to the possible permeability of the subsurface materials. No support is provided for the conclusions that the chemicals detected are relatively immobile and that a depth of 135 feet to groundwater is sufficient to be protective of groundwater quality.

Response: A brief description of the site lithology has been added to Section 9.4.1. A more extensive description of site geology and fate and transport are provided in the Site 31 RI, Volume II.

Comment 52: Section 9.4.3.4, Page 78, second paragraph: Why is lead exposure evaluated only for the North Slope?

Response: Based on the COPC selection criteria described in Section 2.1.2 of Volume III, Baseline Human Health Risk Assessment, lead was selected as a COPC only at the North Slope area. Lead was not selected as a COPC at the South Slope or LRTC area because maximum detected concentrations of lead in these areas were below the concentration-toxicity screening criteria used in the selection of COPCs (refer to response to EPA Technical Review Specific Comment 36). Quantitative evaluation of lead was therefore conducted only for the North Slope.

Comment 53: **Section 9.5.4.1, Page 86, first paragraph: The statement that "...there is little potential for contamination of groundwater..." at Site 39 does not address the presence of antimony and nitrate found at elevated concentrations in the wells sampled as part of the RI.**

a) Elevated levels of potentially site-related chemicals were found in an extremely limited groundwater sampling program (seven wells for an area of more than 8,000 acres). This suggests that there may be a significant data gap for Site 39. Elimination of potential groundwater contamination from consideration seems to be premature.

b) The most obvious source of antimony would seem to be the Small Arms Ranges by comparison with the nature of contaminants found at Site 3. However, no sampling and analysis was conducted in this area to characterize the distribution of metals in soils as compared to Site 3. This represents a data gap in terms of investigation of a potential source for elevated antimony concentrations in groundwater.

Response: (a) Wells sampled during the Site 39 RI will continue to be sampled as part of Basewide Quarterly Sampling Program to assess the presence of nitrate and antimony in groundwater. The results will be reviewed after four quarters of sampling to determine if additional sampling is necessary.

(b) See above response.

Comment 54: **References, Page 110: Only one reference is listed for the U.S. Army Environmental Hygiene Agency (AEHA); however, in the text of the Executive Summary at least three titles are referenced as follows:**

- **On Page 13, Interim Final Report, Hazardous Waste Consultation No. 37-26-0176-89 (December 1988),**
- **On Page 13, Hazardous Waste Management Survey (June 1988); and**
- **On Page 19, Evaluation of Solid Waste Management Units, Fort Ord, California, September 18-22, 1988.**

Response: The reference list has been revised as suggested.

Comment 55: **Table 5: The careful explanation of acronyms provided in Tables 1 through 4 and Tables 6 and 7 is not carried through for this table. The reader must do some backtracking to determine that EA is a consultant rather than a zone descriptive such as the acronym AREE.**

Response: An acronym list has been added to Table 5.

Comment 56: **Table 6: Two reports listed as "Source Documents," the ECAS Report and the DHS 1988 NOVs Report, are not included in the list of references.**

Response: The ECAS Report is a compilation of findings from the Army Environmental Compliance Assessment System and is not a formal document. A reference for the DHS NOVs has been added to the reference list.

III. Department of Toxic Substances Control Comments

General Comments

Comment 1: In providing comments, we would like to acknowledge the efforts the Army has taken to accelerate the investigation and remediation of Fort Ord. The RI/FS contains a significant amount of information and is evidence of the Army's commitment to provide for re-use as soon as possible.

Response: Comment acknowledged. The Army also extends its appreciation to the regulatory agencies that have been involved in the RI/FS process; their cooperation and efforts in expediting the process, especially in participating in meetings to work through differences in understanding, have contributed to the Army's ability to maintain the aggressive schedule.

Comment 2: However, as expressed during our meetings and telephone conference calls, we consider the document incomplete. One of our primary concerns is the absence of discussion on how unexploded ordnance (UXO) will be addressed. The document fails to discuss options not only to remediate UXO from Site 39 (impact range), but also fails to provide information on how time critical removal actions currently underway (for UXO sites outside the impact range) will be integrated into the basewide cleanup process.

Response: In accordance with the NCP, DOD (the Army) is the removal response authority with respect to remediation involving DOD military weapons and munitions. The Army is preparing, as companion documents to the Basewide RI/FS, a Hazard Assessment and an Explosive Safety Submission for the Inland Ranges. These documents present the Army's strategies for removal and remediation of UXO/OEW at Fort Ord. In addition, the relationship of UXO/OEW to the CERCLA process is under consideration by the Army.

Comment 3: As you know, the National Contingency Plan (NCP) requires removal actions to be consistent with the final remedy. It is our position that the RI/FS should include a thorough discussion of how removal actions and interim actions will be integrated into the Basewide RI/FS process and verified as actions consistent with the final remedy. The report should also discuss how activities assocaited with the Fort Ord Soil Treatment Area (FOSTA) will be consistent with the final remedial action.

Response: A more detailed description of the Basewide ROD process, including plug-in RODs, Operable Units, and Time-Critical Removal Actions for chemical contaminants has been added to Section 1.2.

The use of the Fort Ord Soil Treatment Area (FOSTA) as part of the selected remedy for the IAROD process meets the requirements of Section 121 of CERCLA to satisfy the preference for treatment as a principal alternative and will be consistent with the Basewide ROD final remedy. A description of the activities associated with the FOSTA is provided in the IAROD dated February 23, 1994, and included as Appendix A of this volume.

Specific Comments:

Comment 1: **Radiological issues: It is our understanding the Army has conducted a radiological survey at Fort Ord, however, neither the study nor conclusions were presented in the report.**

Response: Section 4.0 of this volume has been expanded to include a brief discussion of the radiological survey as well as other surveys not related to the CERCLA process (i.e., lead-based paint and asbestos surveys).

Comment 2: **Land use cleanup: The report is deficient in its presentation regarding proposed land uses and development of clean up levels. A thorough discussion needs to be included which details the assumptions made and how the assumptions will affect future land use. A large scale map showing re-use options used in establishing clean up levels should be included as well.**

Response: Cleanup and the final remedy for each site at Fort Ord are consistent with the NCP, CERCLA, and the President's 5-Point Plan and are based on the reuse as provided by the Fort Ord Reuse Authority (FORA) in the *Fort Ord Base Reuse Plan*, dated October 14, 1994. Although the risk assessment scenarios are based on site-specific reuse, these scenarios and exposure assumptions are very conservative and would likely be protective of human health and the environment in the event that reuse is different from what is currently planned. In areas where reuse is undefined, a residential scenario was used.

Comment 3: **Open Burn/Open Detonation (OB/OD): We are very concerned about the report's lack of information regarding how the use of the OB/OD area for removal actions will be integrated into the CERCLA process. Technical issues such as emission estaimtes adn dispersion modeling must also be addressed.**

Response: The Army intends to continue using Range 36A as a disposal area for UXO/OEW. At the time that Range 36A is closed, closure plans will be prepared in accordance with applicable regulations. The results of the site investigation show that even with heavy and relatively recent use, disposal activities have not resulted in a risk to human health or groundwater.

Comment 4: **Ecological Risk Assessment: Due to the incomplete information provided in the RI/FS regarding the ecological risk assessment, the Department is unable at this time to provide detailed comments regarding this issue. It is our understanding an enhance preliminary assessment of potential impacts to marine habitat is scheduled for delivery very soon, possibly by October 28, 1994. The Department will provide comments regarding ecological issues subsequent to receipt of all documentation.**

Response: During the preparation of the Draft RI/FS, it was recognized and agreed to by all FFA parties that the Ecological Risk Assessment (ERA) would not be complete and that the Draft RI/FS would contain the conceptual model. Since the Draft was submitted, three ERA data packages have been submitted and reviewed by the regulatory agencies. Additionally, four meetings have been held to discuss the data and address comments. The complete Ecological Risk Assessment is included in the Draft Final RI/FS.

The Enhanced Preliminary Assessment of Monterey Bay was prepared as a separate document and is not part of the RI/FS.

IV. Regional Water Quality Control Board Comments

We provide specific and general comments on many of the individual sections of the complete Draft Basewide Remedial Investigation/Feasibility Study, Fort Ord, California (RI/FS Report). The following comments are our general comments regarding the RI/FS Report as a whole.

General Comments

Comment 1: **Overall, we believe Fort Ord, USACE Sacramento District, and Harding Lawson Associates have taken an aggressive approach in completing the necessary site characterization studies and feasibility studies to develop the RI/FS Report in the limited time frame provided, by federal legislation. While we do not always agree with the conclusions and recommendations provided they are usually supported.**

Response: Comment acknowledged. The Army also extends its appreciation to the regulatory agencies that have been involved in the RI/FS process; their cooperation and efforts in expediting the process, especially in participating in meetings to work through differences in understanding, have contributed to the Army's ability to maintain the aggressive schedule.

Comment 2: **The remedial investigation conducted and identified in the RI/FS Report with regard to defining the geology and hydrogeology is sufficient to support the proposed alternative remedial alternatives. While all information regarding site characterization (including aquifer parameters), effects of ground water extraction (including salt water intrusion), and the number and location of remedial extraction wells has not been defined, these data gaps will be addressed in the remedial design and do not change the proposed alternatives.**

Response: Comment acknowledged.

Comment 3: **Regional Water Board review has identified data gaps in the RI/FS Report. A specific section should be included in each volume of the RI/FS identifying data gaps and how they will be addressed.**

Response: The Summary and Conclusions section of each RI site discusses data gaps where appropriate.

Comment 4: **We encourage the Army to select remedial alternatives that remove all contaminated debris and soils from sites throughout Fort Ord and dispose of this material to the extent feasible and appropriate as part of the Operable Unit 2 (OU2) landfill closure. We believe the public is better served when wastes and contaminated soils such as those found on Fort Ord are placed in one central repository for long term internment. Containing all wastes and contaminated soils in one location will provide for water quality and landfill closure monitoring at one location as well as protect future users when new development is undertaken. Furthermore, the availability of the OU 2 landfill at this time provides the Army with a cost efficient site for contaminated soils and debris disposal generated during remedial activities.**

Response: The disposal of contaminated debris and soil at OU 2 will be considered in the Feasibility Studies.

Comment 5: **The RI/FS Report should provide specific information and details regarding conclusions and recommendations. In particular, conclusions frequently state "low or**

very low concentrations where detected at the site", without providing a numerical value. The report text should provide sufficient information (i.e., numerical values), for the reader to arrive at a similar conclusion without reviewing every data set in the appendices. Furthermore, the persistent use of subjective wording such as "low or very low" gives a bias to the report which is not needed.

Response: The text has been revised as suggested.

Comment 6: We are enclosing two tables identifying Regional Water Board applicable or relevant and appropriate requirements (ARARs). These two tables entitled "RWQCB ARARs for Soil Remediation" and "RWQCB ARARs for Ground Water Remediation" are both dated October 3, 1994. These tables accurately and concisely present appropriate general ARARs for remedial actions proposed.

Response: Comment acknowledged. These ARARs will be incorporated where appropriate.

EXECUTIVE SUMMARY COMMENTS

General Comments

Comment 1: The Executive Summary (ES) is too long and cumbersome. We suggest the present ES be renamed "Report [or Investigation] Overview" (RO) and a six to ten page Executive Summary be prepared.

Response: Based on the size of this document, it is not feasible to condense the information into ten pages.

Comment 2: The ES or RO should provide the only chosen remedy and supporting information used to select the specific alternative. The detailed information concerning the range of alternatives is not necessary in the ES and should be eliminated.

Response: Because Volume I may be the only volume read by the public and some reviewers, it is important to include the range of alternatives that were evaluated, as well as the chosen remedy. This will help prepare the public for the proposed plans for each site.

Comment 3: The RI/FS and other studies conducted at Fort Ord were conducted by the Army and not Harding Lawson Associates or James M. Montgomery. References to private contractors completing work at Fort Ord should be eliminated and replaced by "the Army" or "Fort Ord completed studies or investigations."

Response: The text has been revised as suggested. However, to avoid confusion in areas were multiple investigations have been conducted, terms such as "JMM data" or "HLA data" are used for clarification.

Comment 4: References to other volumes in the RI/FS Report or other supporting documents in the Administrative Record should include specific section and page.

Response: References to other volumes will include section numbers. Due to production logistics associated with such a large document, it is not feasible to include page numbers when referring to other sections.

Comment 5: **The RI/FS Report should refrain from use of the subjective wording that minimizes the extent or concentration of contaminants in soil and ground water. Specifically, the use of the wording "low" or "very low concentration," without stating the associated concentration of range of concentrations is misleading to the reader. Where the text states "low" or "very low" the actual range of concentrations should be stated.**

Response: The text has been revised as suggested.

Specific Comments

Comment 1: **Section 1.2, Page 8: The two No Action sites categories identified need to be modified to reflect the present language used in the No Action Proposed Plan.**

Response: The text has been revised as suggested.

Comment 2: **Section 2.2.3.3, Page 6: A map should be included showing the identified well locations and ownership.**

We were not aware that the East Garrison sewage treatment plant is closed and that sewage is now discharged to the Monterey Regional Treatment Plant. When was the pipeline placed from East Garrison to the Main Garrison area and tied into the sewers lines? If this is not accurate, where and how is sewage handled at East Garrison?

Response: This comment refers to Section 2.2.2.3, not 2.2.3.3. A map of well locations and ownership is provided on Plate 4 of the Basewide Hydrogeologic section of Volume II. Marina wells shown are owned by the Marina County Water District.

The text has been corrected to state that the East Garrison Sewage Treatment Plant is still operating.

Comment 3: **Section 4.1, Page 15: Is the elevated lead identified at the service station organic or inorganic lead and what is the source of the lead?**

Response: Lead concentrations are total lead detected under EPA Method 7421. The source appears to be the stormwater outfall that drains runoff from the service station. Section 4.1 has been revised to include this information.

Comment 4: **Section 6.1, Page 22: This section should provide additional information regarding the ground water cleanup status. In particular, this section should include information on contaminant concentrations and how long the treatment system is anticipated to operate. Too much specific information on the soil treatment has been included and not enough information on the continuing ground water extraction and treatment system.**

The identification of Cleanup or Abatement Orders (CAOs) issued by the Regional Water Board is in error. The Regional Water Board has issued CAOs No. 84-92, 86-86, and 86-315 for investigations and remedial activities at Operable Unit 1 (OU1). The Regional Water Board also issued Waste Discharge Requirements (WDR) No. 87-189 for operation of the ground water and soil treatment system and discharge of treated waters.

The statement regarding the review of the Draft Final Remediation Confirmation Study should be updated to state that Agencies have reviewed and approved the report.

Response: Section 6.1 has been revised as suggested, and Table 8, which presents groundwater quality data and aquifer cleanup goals, has been added. The groundwater treatment system will operate until aquifer cleanup goals are met or until levels are met that are protective of human health and the environment.

Comment 5: **<u>Section 6.2, Page 23</u>: The dates of landfill use and closure for the main landfill and the north landfill are conflicting. The text should be corrected or the reason for the conflict explained.**

The Regional Water Board issued CAO Nos. 86-317 and 88-139 for the investigation and cleanup of ground water contamination caused by the landfill. In addition, the Regional Water Board issued WDR No. 87-153 requiring landfill closure by 1989. These Orders should be identified with the report.

Alternative 3 does not include surface water infiltration but recharge to the subsurface, which is different. Correct the text to state the actual method of recharge.

Response: Section 6.2 has been revised as suggested.

Comment 6: **<u>Section 7.1.2.3, Page 27</u>: A complete listing for all organic contaminants and the maximum concentration should be provided for each aquifer unit.**

Response: The intent of the Basewide Hydrogeologic Characterization is to characterize the aquifers on a regional basis and provide more detailed information for the site-specific remedial investigations. Trichloroethene is considered to be a representative chemical for characterizing the distribution of the organic contaminant plumes at Fort Ord. Information on other organic chemicals associated with the plumes can be found in individual site remedial investigation sections in Volume II.

Comment 7: **<u>Section 8.1, Page 32</u>: Appendix A does not include the No Action Proposed Plan but the Interim Action Proposed Plan. Correct this error.**

Response: The No Action Proposed Plan has been added as Appendix B.

Comment 8: **<u>Section 8.1.1, Page 32</u>: If the data indicates that no further action is needed at this site, why is quarterly ground water monitoring continuing? What is the purpose of the monitoring and how long will monitoring continue? What method or criteria will be used to determine that ground water monitoring can be discontinued?**

Response: Section 8.1.1 has been modified to show that thallium, antimony, cadmium, chloride, nitrate, and dissolved solids have been detected in at least one groundwater sample. Therefore, quarterly monitoring is planned for four more quarters to enable an assessment of potential site impacts. After the last 1995 sampling event, quarterly sampling results will be reviewed to determine if additional sampling is necessary.

Comment 9: **<u>Section 8.1.13, Page 38</u>: The Army reported earlier that fecal coliform levels where above Maximum Contaminant Levels (MCLs) and asked the agencies what could be done. It was decided that the Army would disinfect the well and obtain additional**

EXPLANATION

FORT ORD SITE BOUNDARY

NPL SITE OR OPERABLE UNIT BOUNDARY

SWMU BOUNDARY

SWMU LOCATION FTO-014

NPL SITE

OPERABLE UNIT

NO.	DATE	REVISIONS	HLA FILE NO.	PROJECT NO.	APPROVED	APPROVAL DATE	DRAWN BY
1	7/94	DRAFT	23366496	23366 041716			KF
2	12/94	DRAFT FINAL	23366496	23366 041726			KF
3	10/95	FINAL	23366496	23366 041726	EXJ	16/17/95	KF

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Volume I – Background and Executive Summary
Basewide RI/FS
Fort Ord, California

Fort Ord NPL Sites, SWMUs,
and Operable Units

PLATE: 2

NO.	DATE	REVISIONS	HLA FILE NO.	PROJECT NO.	APPROVED	APPROVAL DATE	DRAWN BY
1	7/94	DRAFT	23366493	23366 041716			AED
2	12/94	DRAFT FINAL	23366483	23366 041726			JCE
3	10/95	FINAL	23366493	23366 041726		10/18/95	CSN

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Site Plan–Site 3

PLATE: 6