Basewide Remedial Investigation/Feasibility Study Fort Ord, California

Volume III - Baseline Human Health Risk Assessment

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

HLA Project No. 23366 041723

Michelle E. Casey
Project Environmental Scientist

Teri Copeland
Principal Environmental Scientist

Rosemary R. Wood
Project Environmental Scientist

Elizabeth T. Hawkins
Principal Environmental Toxicologist
Quality Control Reviewer

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Harding Lawson Associates
Engineering and Environmental Services
105 Digital Drive, P.O. Box 6107
Novato, California 94948 - (415) 883-0112

Basewide Remedial Investigation/Feasibility Study
Fort Ord, California

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Summary of Text Changes

This final version of the Baseline Human Health Risk Assessment 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. Text changes have been made to the following pages in response to agency comments. Replacement pages are indicated with an R.

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ACRONYMS AND ABBREVIATIONS

1,1-DCA	1,1-Dichloroethane
1,1-DCE	1,1-Dichloroethene
1,1,1-TCA	1,1,1-Trichloroethane
1,1,2-TCA	1,1,2-Trichloroethane
1,1,2,2-PCA	1,1,2,2-Tetrachloroethane
1,2-DCA	1,2-Dichloroethane
1,2-DCE	1,2-Dichloroethene (total)
1,2-DCP	1,2-Dichloropropane
1,2,3,4,6,7,8-HpCDF	1,2,3,4,6,7,8-Heptachlorodibenzofuran
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
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1,2,3,7,8-PeCDD	1,2,3,7,8-Pentachlorodibenzo-p-dioxin
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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
1,3,5-TNB	1,3,5-Trinitrobenzene
2-Amino-DNT	2-Amino-dinitrotoluene
2-Methnaphthalene	2-Methylnaphthalene
2-Methylphenol	2-Methylphenol
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
2,4,6-TNT	2,4,6-Trinitrotoluene
4-Amino-DNT	4-Amino-dinitrotoluene
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
BTC	Base Transition Coordinator
BTEX	Benzene, toluene, ethylbenzene, xylenes
BW	Body weight
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
1,3-DNB	1,3-Dinitrobenzene
2,6-DNT	2,6-Dinitrotoluene
2,4-DNT	2,4-Dinitrotoluene
%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
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
Koc	Distribution coefficient divided by soil fraction of organic carbon
Know	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
2-NT	2-Nitrotoluene
3-NT	3-Nitrotoluene
4-NT	4-Nitrotoluene
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
Nitrate	Nitrate as nitrogen
NOAA	U.S. National Oceanic and Atmospheric Administration
NOAEL	No observed adverse effect level
NoFA	No further action
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/ST	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
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
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
TPH-D Unknown	TPH-extractable unknown hydrocarbon
TPH-D	TPH as diesel
TPH-G Unknown	TPH-purgeable unknown hydrocarbon
TPH-G	TPH as gasoline
TPHmo	TPH as motor oil

TPH-Motor Oil	TPH as motor oil
TPHd	Total petroleum hydrocarbons as diesel
TPHg	Total petroleum hydrocarbons as gasoline
TPHh	Total petroleum hydrocarbons of heavy molecular weight (diesel or heavier)
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
Weston	Roy F. Weston, Inc.
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 volume of the Basewide RI/FS presents the Baseline Human Health Risk Assessments (BRAs) for the five RI/FS sites. During the basewide studies conducted for Fort Ord, sites of potential concern were identified and screening risk evaluations (SREs) were carried out for each of these sites. The results of the SREs, together with information on the history of each site, were used to classify each site into one of three categories: (1) sites requiring no further action (NoFA sites), (2) sites requiring some interim action (IA sites), and (3) sites requiring a complete RI/FS evaluation (RI sites).

The five RI sites identified during this process, and their areas of investigation for which BRAs were conducted, are listed below:

- Sites 2 and 12: the Main Garrison, the Sewage Treatment Plant, the Lower Meadow, the Directorate of Logistics (DOL) Automotive Yard, and the Cannibalization Yard
- Sites 16 and 17: the DOL Maintenance Yard, Pete's Pond, Pete's Pond Extension, and the 1400 Block Motor Pool
- Site 3: The Beach Trainfire Range
- Site 31: the Former Dump Site
- Site 39: the Inland Ranges.

A complete site history, a summary of the sampling and analysis performed, and conclusions about the potential chemical source areas for each of these sites were presented in Volume II. This volume presents the results of the BRAs performed on these sites. Each BRA evaluates possible adverse effects on human health from each discrete site area and also considers the potential for chemicals to migrate from each area to offsite locations. Volume IV presents the potential environmental (ecological) effects from exposure to these sites. Volume V evaluates potential remedial alternatives for each of the sites, based on the human health and ecological risk assessments.

1.1 Strategy of the Baseline Human Health Risk Assessment

Presented below is the strategy for risk assessment of NoFA, IA, and RI sites.

1.1.1 Assessment of NoFA and IA Sites

The SREs prepared for Fort Ord established whether unacceptable health risks or offsite migration of chemicals were associated with NoFA or IA sites. They indicated that no unacceptable health risks are associated with direct contact with site soils or onsite inhalation of vapors and dust from either NoFA or IA sites. At NoFA sites, no substantial offsite migration of chemicals will occur, even without further action. At IA sites, no substantial offsite migration of chemicals will occur after the planned interim actions.

If a receptor were exposed to chemicals at or from more than one NoFA or IA site, health risks are expected to be no greater than exposure to one site because all sites are geographically distinct (see Figure 1.1), and exposure to and health risks from chemicals at one site would decrease in proportion to exposure at additional sites.

1.1.2 Risk Assessment Framework for RI Sites

The risk assessment methods used for the BRAs at RI sites were based on EPA guidance. The methodology was presented to EPA Region IX, the California Department of Toxic Substances Control (DTSC), and the California Regional Water Quality Control Board, Central Coast Region (RWQCB) before preparing the BRAs. Any deviations from these methods are identified in the text sections corresponding to each RI site.

The methods used follow the basic framework for conducting risk assessments developed by the National Research Council (NRC) under the

guidance of the National Academy of Sciences (NAS) (NRC, 1983). This framework consists of four basic steps: (1) hazard identification, (2) exposure assessment, (3) toxicity assessment, and (4) risk characterization, which are described below.

- Hazard identification: reviewing and evaluating available site sampling data and identifying chemicals of potential concern (COPCs) in various site media

- Exposure assessment: evaluating potential exposure pathways to the COPCs and the potential human populations that could be exposed to them, either now or in the future

- Toxicity assessment: evaluating potential adverse health effects of exposure to the COPCs, based primarily on animal laboratory data. The results of these high-dose experiments are then extrapolated to low-dose environmental exposures

- Risk characterization: combining the results of the previous three steps to estimate the potential human risks from exposure to COPCs at the site under investigation. Both potential carcinogenic risks and noncarcinogenic adverse health effects are evaluated.

In addition to these four steps, BRAs involve evaluation of the uncertainties inherent in the risk assessment process. Reviewing the uncertainties helps in the interpretation of BRA results.

Diagrams summarizing conceptual site models for each of the five RI sites are presented as Tables 1.1 through 1.5. The diagrams provide an overview of how people might be exposed to chemicals at each of the RI sites. The diagrams summarize site characterization and chemical fate and transport information presented in Volume II, and the exposure assessments presented in Sections 3.0 through 7.0 of the baseline human health risk assessment (RI/FS Volume III).

The BRAs were performed in accordance with the U.S. Environmental Protection Agency's (EPA's) Risk Assessment Guidance for Superfund (EPA, 1989b, 1991d).

1.1.3 Concurrent Exposure

Possible exposure to chemicals at or from more than one RI site or operable unit at Fort Ord is not expected to contribute substantially to the health risks described in the BRAs for individual sites. The areas at RI sites at which chemicals have been detected in soil are geographically distinct (see Figure 1.1), so exposure to and health risks from chemicals at one site would decrease in proportion to increases in exposure at additional sites.

Possible exposure to vapors and airborne dust is expected to be very small compared to possible direct exposure to soil; offsite inhalation exposures are not expected to contribute substantially to overall exposure. Site 12 is the only site at which chemicals from one RI site have migrated offsite in groundwater to another RI site (Site 3). The chemicals in groundwater from Site 12, however, are not expected to contribute substantially to exposure at Site 3 because no exposure to groundwater is expected in that location (see Section 5.0). No other concurrent exposure to chemicals from more than one RI site was identified.

Two operable units, OU 1 and OU 2, also represent sources of chemicals that might contribute to overall health risks at the site. The risk assessment for OU 1 presented in Appendix E of the Draft Final OU 1 Remediation Confirmation Study (*HLA, 1994n*) indicates that no unacceptable health risks are associated with residual chemical concentrations. OU 1 is separated geographically from OU 2 and the five RI sites, and exposure to and risks from chemicals from OU 1 are not expected to coincide with exposure to chemicals from OU 2 or the RI sites.

Chemicals in groundwater that may be associated with OU 2 are present in the area of Sites 16 and 17, and those chemicals detected in groundwater are evaluated in this BRA. The BRA does not identify any other mechanisms by which exposure to chemicals from operable units and/or RI sites might occur concurrently.

1.2 Objectives and Scope

The objectives of this assessment are to evaluate the need to take action to remove chemicals from environmental media at the Fort Ord RI sites to prevent adverse human health effects and to develop chemical clean-up levels, if necessary. In addition to the Remedial Investigation work (Volume II), the BRAs for each RI site reflect the findings of two other reports: the Installation-Wide Multispecies Habitat Management Plan prepared by the Sacramento COE (1994), and the Base Reuse Plan prepared by the Fort Ord Reuse Group (FORG, 1994).

Each BRA addresses the potential effects of exposure to the chemical concentrations measured at each RI site. The assessment evaluates measured chemical concentrations and, in addition, evaluates the effects of predicted or modeled concentrations of some chemicals in some environmental media to fully characterize the potential impact of the chemicals found at each site.

1.3 Organization of the Assessment

Section 2.0 of this volume describes the methodology used to assess each of the RI sites. This methodology includes guidelines for evaluation of sample data, selection of COPCs, derivation of exposure point concentrations (EPCs), estimation of potential receptors and intake doses, selection of toxicity values, and risk characterization. Section 2.0 also summarizes the uncertainties of the BRA methods.

Sections 3.0 through 7.0 describe the separate BRAs performed for each of the five sites: Sites 2 and 12 in Section 3.0, Sites 16 and 17 in Section 4.0, Site 3 in Section 5.0, Site 31 in Section 6.0, and Site 39 in Section 7.0. Section 8.0 contains the uncertainty analysis, and Section 9.0 summarizes each BRA and draws conclusions for each site. Tables, plates, and figures follow the text for each section. The Fort Ord RI/FS master reference list, which includes the references cited in this volume, appears after Section 9.0. Appendices supporting the text follow the RI/FS master reference list.