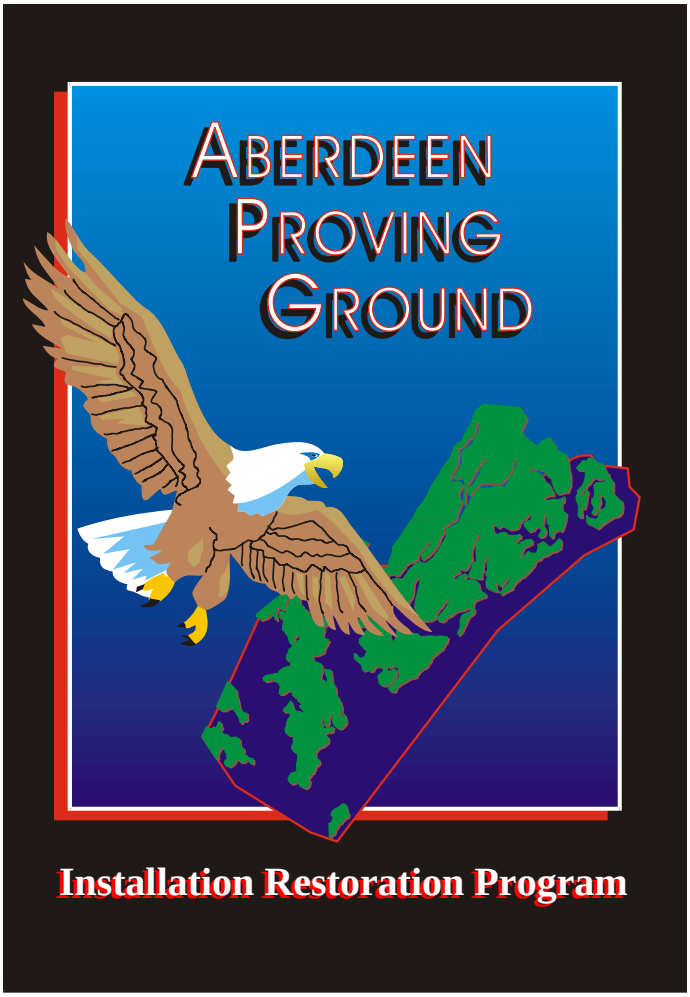

CANAL CREEK STUDY AREA

Record of Decision – Remedial Action at 10 Soil Sites in the Canal Creek Study Area

(Sites EACC1F-A, EACC1F-B, EACC1G-A,EACC1H-D, EACC1I-B, EACC3E, EACC3F, EACC3I, EACC3O, EACC3P)

Final, September 2008

U.S. Army Garrison
Aberdeen Proving Ground, Maryland

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RECORD OF DECISION

REMEDIAL ACTION AT
10 SOIL SITES
CANAL CREEK STUDY AREA

(Sites EACC1F-A, EACC1F-B, EACC1G-A,EACC1H-D, EACC1I-B, EACC3E, EACC3F, EACC3I, EACC3O, EACC3P)

ABERDEEN PROVING GROUND, MARYLAND

SUBMITTED BY:

ENVIRONMENTAL CONSERVATION AND RESTORATION DIVISION
U.S. ARMY GARRISON ABERDEEN PROVING GROUND
ABERDEEN PROVING GROUND, MARYLAND 21010

FINAL, SEPTEMBER, 2008

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ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

AEDB-R	Army Environmental Database – Restoration
APG	Aberdeen Proving Ground
ARAR	Applicable or Relevant and Appropriate Requirement
BTAG	Biological Technical Assistance Group
CCA	Canal Creek Aquifer
CCSA	Canal Creek Study Area
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CN	chloroacetophenone
COC	Contaminants of Concern
COPC	Contaminant of Potential Concern
CSM	Conceptual Site Model
DSHE	Directorate of Safety, Health and the Environment
DMMP	dimethylmethyl phosphonate
DSERTS	Defense Site Environmental Restoration Tracking System
EA	Edgewood Area
ERA	Ecological Risk Assessment
ER-L	Effects Range - Low
FFA	Federal Facilities Agreement
FM	titanium tetrachloride
FS	Feasibility Study
ft	feet
GIS	Geographical Information System
GP	General Physics Corporation
HEAST	Health Effects Assessment Summary Table
HHRA	Human Health Risk Assessment
HI	Hazard Index
HMF	Hazardous Materials Facility
HQ	Hazard Quotient
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
LUCs	Land Use Controls
MDE	Maryland Department of the Environment
msl	mean sea level
µg/kg	micrograms per kilogram

mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operations & Maintenance
PAH	polyaromatic hydrocarbon
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SWMU	Solid Waste Management Unit
SVOC	Semi-Volatile Organic Compound
TEL	Threshold Effects Level
TRV	Toxicity Reference Value
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency (now referred to as the U.S. Army Environmental Center)
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UXO	Unexploded ordnance
VOC	Volatile Organic Compound
Weston	Weston Solutions, Inc.
WWI	World War I
WWII	World War II
WP	White Phosphorus

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RECORD OF DECISION

REMEDIAL ACTION AT 10 SOIL SITES IN THE CANAL CREEK STUDY AREA

ABERDEEN PROVING GROUND, MARYLAND EDGEWOOD AREA NATIONAL PRIORITIES LIST (NPL) SITE

SEPTEMBER 2008

PART 1: DECLARATION

1 SITE NAME AND LOCATION

The 10 Soil Sites within the Canal Creek Study Area (CCSA) are located in the Edgewood Area (EA) of Aberdeen Proving Ground (APG), Maryland. Pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), this Record of Decision (ROD) selects a remedial action for these 10 sites. The Army Environmental Database – Restoration (AEDB-R) [formerly referred to as Defense Site Environmental Restoration Tracking System (DSERTS)] numbers for these sites are as follows:

EACC1F-A	Building E5604 Area
EACC1F-B	Building 80 Series Smoke Laboratories
EACC1G-A	Building E5185
EACC1H-D	Phosgene Plant Area
EACC1I-B	Building 113 WWI Gas Instruction Chamber
EACC3E	Building E3300/E3330 Laboratory Complex
EACC3F	Building E35XX Area
EACC3I	Building E3670 Assembly Plant
EACC3O	B-Field Range Area
EACC3P	Mosquito Test Grid Area

The location of these sites is shown on Figure 2 in the Decision Summary (Part 2) of this ROD.

The United States Environmental Protection Agency (USEPA) Superfund Site Identification number for APG-EA is MD 2210020036. This ROD will be listed as 10 Soil Sites in the CCSA in the USEPA's Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) database. The site owner and lead agency is the United States Army (Army), the USEPA is the lead regulatory agency, and the Maryland Department of the Environment (MDE) is the supporting regulatory agency.

Future RODs will be developed to address the remaining soil sites at CCSA, groundwater contamination in the Canal Creek Aquifer (CCA) in the West Canal Creek Area, and sediment and marshes associated with Canal Creek and Kings Creek. Groundwater contamination within the CCA in the East Canal Creek Area is currently being captured and treated at the Canal Creek Groundwater Treatment Plant, in accordance with the ROD signed in July 2000.

2 STATEMENT OF BASIS AND PURPOSE

This ROD presents the remedy selected by the Army and the USEPA Region III for the 10 Soil Sites in the CCSA. Land Use Controls (LUCs) have been chosen as the Selected Remedy for these sites. This remedy was chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Selected Remedy also satisfies Resource Conservation and Recovery Act (RCRA) corrective action requirements. The decision is based on the Administrative Record for this site.

The Army and USEPA, with support from MDE, developed remedial alternatives to achieve the performance objective of a completed response action. This site poses no potential unacceptable risks to human health under an industrial land-use scenario (i.e., foreseeable future use); however, there is potential for risk to hypothetical future residents, resulting in the need for LUCs. The results of the Ecological Risk Assessments (ERAs) suggest no unacceptable risk to ecological receptors at these sites.

To complete a streamlined response, USEPA and MDE support the Selected Remedy outlined in this ROD as necessary to adequately and cost-effectively protect human health and the environment.

3 ASSESSMENT OF THE SITE

The CCSA contains over 50 AEDB-R sites, including the 10 sites addressed by this ROD. Separate RODs have been implemented for sites in the CCSA as follows:

Site Name	AEDB-R Designation
Building 103 Dump	EACC1H-E
Building 503 Smoke Mixture Burning Sites	EACC1L-A
Beach Point Test Site Groundwater	EACC3N
East Canal Creek Aquifer	EACC4A
13 Select Sites in the Canal Creek Study Area	EACC1A-A, EACC1D, EACC2F, EACC1G-B, EACC2A, EACC2B, EACC2C, EACC2G, EACC2H-A, EACC2I-B, EACC3B, EACC3H
G-Street Salvage Yard	EACC1A-B

Remedial Investigation (RI) sampling at the 10 Soil Sites revealed slightly elevated concentrations of metals, pesticides, and polyaromatic hydrocarbons (PAH) [General Physics (GP), 2008]. The results of the RIs and risk assessments did not indicate the need for any further investigation since there were no unacceptable risks identified for human or ecological receptors under current or likely future land use scenarios. The RIs indicated, however, that further sampling for lead would be needed to fully assess the risk to future residents. Additionally, for all 10 sites, there is a potential for exposure to unexploded ordnance (UXO) and white phosphorus (WP). Therefore, LUCs are needed to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use.

The response actions selected in this ROD are necessary to protect the public health and the environment from actual or threatened releases of hazardous substances into the environment.

4 DESCRIPTION OF THE SELECTED REMEDY

The 10 Soil Sites are located in the CCSA.

The Selected Remedy for the 10 Soil Sites is LUCs. This remedy includes the following elements:

- Existing LUCs at APG would continue. These measures include engineering controls, boating access restrictions, and restrictions on subsurface access by site workers. Access restrictions are enforced by security guards.
- Modifications will be made to the Installation Master Plan and Geographical Information System (GIS) Overlay Maps in order to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use until risks presented by contaminant levels at the site allow for unlimited use and unrestricted exposure.

A Remedial Design (RD) will be submitted consistent with the RD schedule provisions of the Federal Facilities Agreement (FFA) to outline the LUC implementation. The Army shall be responsible for implementation, maintenance, periodic reporting, and enforcement of LUCs in accordance with the RD. As part of the Army's inspection and reporting responsibilities, periodic reviews will be undertaken and review reports will be submitted at a frequency determined by site-specific conditions (as specified in the USEPA-approved RD). The LUCs will include implementation through the APG Master Planning system with geographic information support.

Although the Army may transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall remain ultimately responsible for remedy integrity and shall: i) perform CERCLA 121(c) five-year reviews; ii) notify the appropriate regulators and/or local government representatives of any known LUC deficiencies or violations; iii) provide access to the property to conduct any necessary response; iv) retain the ability to change, modify or terminate LUCs and any related deed or lease provisions; and, v) ensure that the LUC objective is met to maintain remedy protectiveness.

As a condition of property transfer or lease, the Army may require the transferee or lessee in cooperation with other stakeholders to assume responsibility for various implementation actions. Third party LUC responsibility will be incorporated into pertinent contractual, property and remedial documentation, such as a purchase agreement, deed, lease, and RD addendum. To the extent permitted by law, a transfer deed shall require the LUCs imposed as part of a CERCLA remedy to run with the land and bind all property owners and users. If the Army intends to transfer ownership of any site, the Army may, if Federal and/or State law allows, upon transfer of fee title grant the State an environmental covenant or easement that

would allow the State to enforce LUC terms and conditions against the transferee(s), as well as subsequent property owner(s) or user(s) or their contractors, tenants, lessees or other parties. This covenant will be incorporated by reference in the transfer deed and will run with the land in accordance with State realty law. This state enforcement right would supplement, not replace, the Army's right and responsibility to enforce the LUCs.

The Selected Remedy for this site is protective of human and ecological receptors. The present worth cost of the Selected Remedy is $104,500.

5 STATUTORY DETERMINATIONS

This remedy meets the requirements of CERCLA Section 121 and, to the extent practicable, the NCP. The Selected Remedy for the 10 Soil Sites in the CCSA is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate, is cost effective, and utilizes permanent solutions to the maximum extent practicable.

The Selected Remedy does not employ treatment to reduce toxicity, mobility or volume of hazardous substances, pollutants, or contaminants. Therefore, the Selected Remedy does not satisfy the statutory preference for remedies that employ treatment as a principal element.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

6 DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this ROD. Additional information can be found in the Administrative Record file for the CCSA.

- Baseline risk calculation;
- Current and reasonably anticipated future land use assumptions and potential land use that will be available as a result of the Selected Remedy;
- Estimated capital, Operations & Maintenance (O&M), and total present worth costs, and the number of years over which the remedy cost estimates are projected;

- Key factor(s) that led to selecting the remedy (i.e., description of how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision);
- Groundwater (including vapor intrusion) is not included in this ROD but will be considered in a future ROD; and
- There are no principal threat wastes for these sites under the military/industrial land use scenario for these sites.

7 AUTHORIZING SIGNATURES

The appropriate approval authority for this action is the APG Installation Commander.

26 SEP 08

Jeffrey S. Weissman
Colonel, U.S. Army
Deputy Installation Commander

Date

9/29/08

James J. Burke
Director
Hazardous Site Cleanup Division
U.S. Environmental Protection Agency, Region III

Date

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PART 2: DECISION SUMMARY

1 SITE NAME, LOCATION, AND DESCRIPTION

The 10 Soil Sites within the CCSA are located in the Gunpowder Peninsula portion of APG, Maryland. The USEPA Superfund Site Identification Number for APG-EA is MD 2210020036. Pursuant to CERCLA, this ROD selects a remedial action for the 10 Soil Sites. The Army is the lead agency for site remediation; USEPA is the lead regulatory agency; and MDE is the support regulatory agency.

APG is a 72,500-acre Army installation located on the northwestern shore of the Chesapeake Bay in southern Harford County and eastern Baltimore County, Maryland (Figure 1). The Installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park, the Crane Point Power Plant, and residential areas; and to the north by the towns of Edgewood, Joppa, Magnolia, and Aberdeen. The Bush River divides the Installation into two main areas. The northeastern area is referred to as the Aberdeen Area, and the southwestern area is referred to as the Gunpowder Peninsula or the EA.

Established as the Ordnance Proving Ground in 1917, the Aberdeen Area of the installation became a formal military post, designated as APG, in 1919. Traditionally, APG's primary mission involved the testing and development of weapon systems, munitions, vehicles, and a wide variety of military support material. The EA (formerly Edgewood Arsenal) was appropriated by presidential proclamation in 1917 and has since been a center for research, development, testing, and manufacturing of military-related chemicals and chemical agents (U.S. Army Toxic and Hazardous Materials Agency [USATHAMA], 1983).

The CCSA encompasses over 700 acres, in the northern portion of the APG-EA, bordered by the Westwood Study Area to the west, Bush River and Lauderick Creek Study Areas to the east, and Other EAs to the south (Figure 1). The CCSA has been utilized since World War I (WWI) for the development, testing, and manufacturing of military-related chemicals and agents. Since the end of WWI, the chemical manufacturing activities were scaled down and many of the plants were abandoned or converted to pilot-scale chemical manufacturing facilities. Until the 1970s, most of the buildings in the CCSA discharged liquid wastes to the

West or East Branches of Canal Creek. The CCSA contains over 50 AEDB-R sites, including the following 10 sites addressed by this ROD (Figure 2):

- EACC1F-A Building E5604 Area
- EACC1F-B Building 80 Series Smoke Laboratories
- EACC1G-A Building E5185
- EACC1H-D Phosgene Plant Area
- EACC1I-B Building 113 WWI Gas Instruction Chamber
- EACC3E Building E3300/E3330 Laboratory Complex
- EACC3F Building E35XX Area
- EACC3I Building E3670 Assembly Plant
- EACC3O B-Field Range Area
- EACC3P Mosquito Test Grid Area

2 SITE HISTORY AND ENFORCEMENT ACTIVITIES

In September 1986, USEPA issued a RCRA Part B permit to APG. This permit required the assessment of Solid Waste Management Units (SWMUs) at APG due to their potential for release of contaminants to the environment. Studies performed within the guidelines of the RCRA permit identified the CCSA as one of the four areas that contained SWMUs. These studies included the Hydrogeologic Assessment (U.S. Geological Survey [USGS], 1989) and the RCRA Facility Assessment (U.S. Army Environmental Hygiene Agency [USAEHA], 1989).

As a result of findings from these studies, APG-EA was placed on the NPL in February 1990. The Department of the Army and USEPA Region III entered into a FFA on March 27, 1990 that subjected APG to RCRA corrective action and CERCLA remedial action requirements for the contaminated sites (USEPA Region III and U.S. Army, 1990). The APG Directorate of Safety, Health and the Environment (DSHE) implements the Installation Restoration Program (IRP) to fulfill the requirements of the FFA. The designations for sites under the purview of CERCLA and the IRP were later changed from SWMUs to DSERTs sites (which are now referred to as AEDB-R sites).

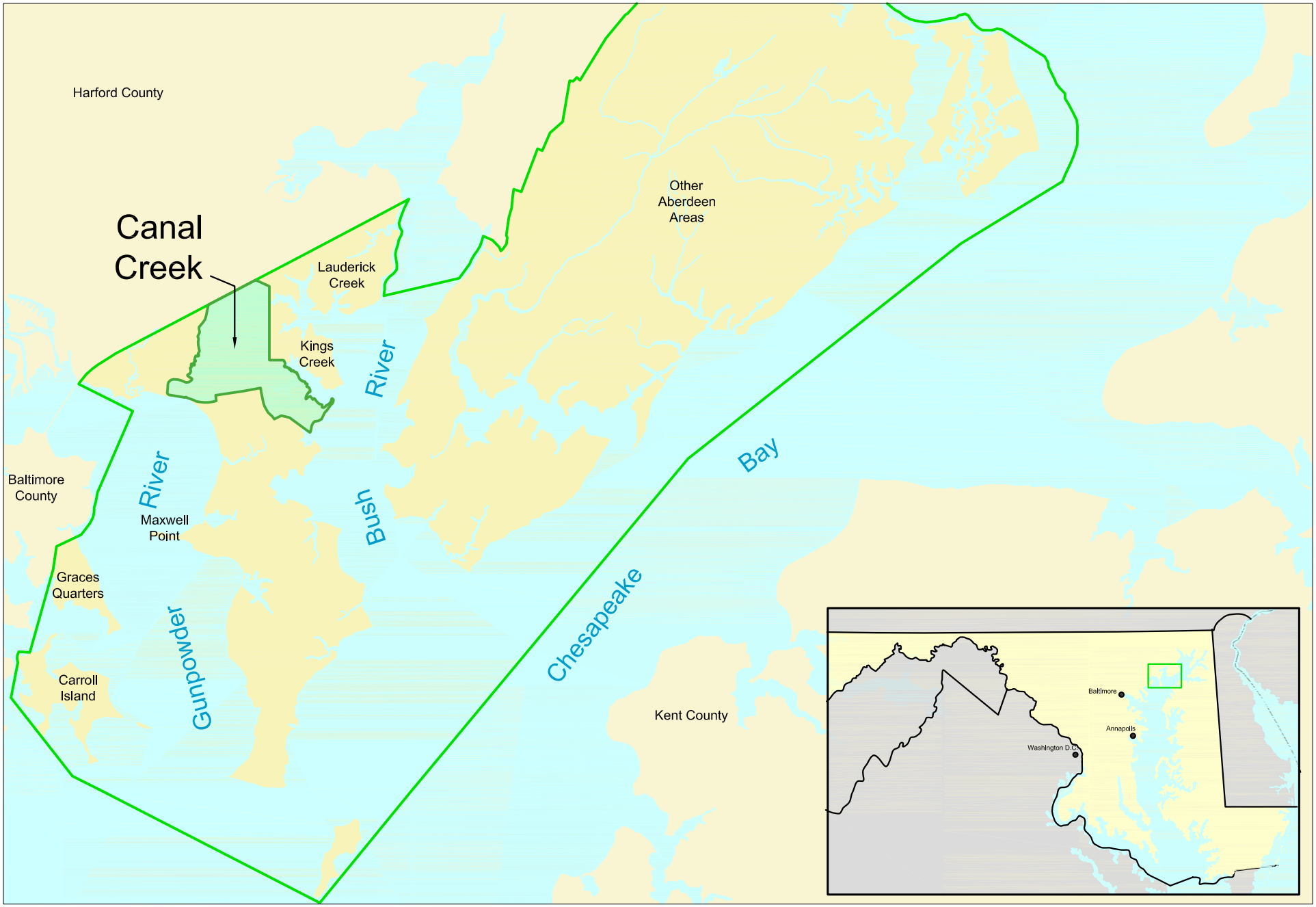

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Figure 1:
Overview of Aberdeen Proving Ground including Canal Creek Industrial Areas

Canal Creek Study Area
Surrounding Areas
Aberdeen Proving Grounds

Scale:
1" = 11,000'

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EACC - 1G-A
EACC - 1F-A
EACC - 1F-B
EACC - 1I-B
EACC - 1H-D
EACC - 3P
Kings Creek
EACC - 3E
EACC - 3F
EACC - 3I
EACC - 3O
Gunpowder River
Bush River

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Figure 2: Location of 10 Sites at Canal Creek Study Area

Kings Creek Industrial Area North
Main Industrial Area Southwest
Main Industrial Area Northwest
Kings Creek Industrial Area South
Wetlands
Canal Creek Study Area

Scale
1" = 1,000'

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RI activities at the 10 Soil Sites addressed by this ROD were initiated in 1993 and conducted in three major phases: Phase I (1993-1995), Phase II (at selected sites, 1996-2002), and Phase III (2004). Additional sampling was also conducted in 2003-2004 in support of the various ERAs and a separate Feasibility Study (FS) for the West Canal Creek Area. The following risk assessments and RI reports were used to support the Selected Remedies in this ROD:

- *Remedial Investigation Report for Thirty-Five Remaining Soils Sites, Volume I: Canal Creek Main Industrial Area – Northwest Region (GP, 2008a)*
- *Remedial Investigation Report for Thirty-Five Remaining Soil Sites, Volume II: Canal Creek Main Industrial Area – Southwest Region (GP, 2008b)*
- *Remedial Investigation Report for Thirty-Five Remaining Soil Sites, Volume IV: Canal Creek Main Industrial Area – Kings Creek Industrial Area (GP, 2008c)*
- *Baseline Human Health Risk Assessment for DSERTS Sites in the Canal Creek Study Area, Volume I: Northwest Industrial Area (EA, 2007a)*
- *Baseline Human Health Risk Assessment for DSERTS Sites in the Canal Creek Study Area, Volume II: Southwest Industrial Area (EA, 2007b)*
- *Baseline Human Health Risk Assessment for DSERTS Sites in the Canal Creek Study Area, Volume IV: Kings Creek Area (EA, 2007c)*
- *Data Evaluations and Risk Characterizations for DSERTS Sites in the Canal Creek Study Area, Volume I: Northwest Industrial Area (EA, 2006a)*
- *Data Evaluations and Risk Characterizations for DSERTS Sites in the Canal Creek Study Area, Volume II: Southwest Industrial Area (EA, 2006b)*
- *Data Evaluations and Risk Characterizations for DSERTS Sites in the Canal Creek Study Area, Volume IV: Kings Creek Area (EA, 2006c)*

Individual site histories and descriptions are provided in Section 5.

3 PUBLIC/COMMUNITY INVOLVEMENT

CERCLA Sections 113(k)(2)(B) and 117, Department of Defense, and Army policy require the involvement of the local community as early as possible in and throughout the IRP process. To accomplish this, APG is conducting monthly Restoration Advisory Board (RAB) meetings and periodic public meetings at each decision point in the CERCLA remedial process. The RAB membership is comprised of both Army and local community members. Information regarding the 10 Soil Sites was briefed to the RAB several times over the last few years.

The Proposed Plan was made available to the public on June 16, 2008. The Administrative Record, which contains the information used to select the remedy, may be found at the Aberdeen and Edgewood Branch of the Harford County Public Library and at the Miller Library at Washington College. The notice of the availability of these documents was published in The Aegis, Cecil Whig, Kent County News, The Avenue, and East County Times. A copy of the newspaper ad is provided in the Responsiveness Summary (Part 3) of this ROD. The public meeting was held on June 17, 2008, and the public comment period was held from June 16, 2008 to July 30, 2008. Responses to the public comments received during this period are included in the Responsiveness Summary (Part 3) of this ROD.

4 SCOPE AND ROLE OF RESPONSE ACTION

As mentioned previously, the CCSA contains over 50 AEDB-R sites. RODs have already been implemented for the following sites:

Site Name	Date	AEDB-R Designation
Building 103 Dump	February 1995	EACC1H-E
Building 503 Smoke Mixture Burning Sites	April 1995	EACC1L-A
Beach Point Test Site Groundwater	September 1997	EACC3N
East Canal Creek Aquifer	July 2000	EACC4A
13 Select Sites in the CCSA	September 2006	EACC1A-A, EACC1D, EACC2F, EACC1G-B, EACC2A, EACC2B, EACC2C, EACC2G, EACC2H-A, EACC2I-A, EACC2I-B, EACC3B, EACC3H
G-Street Salvage Yard	September 2007	EACC1A-B

Future RODs will address the remaining soils sites at CCSA, groundwater contamination within the CCA in the West Canal Creek Area (west of the groundwater divide) and sediment and marshes associated with Canal Creek and Kings Creek. This ROD addresses the final response action for the 10 Soil sites in the CCSA.

The RI addressing the 10 Soil Sites was finalized in June 2008. Sampling within these 10 sites revealed slightly elevated concentrations of PAHs, pesticides, and metals. The results of the RIs and risk assessments did not indicate the need for any further investigation since there were no unacceptable risks identified for human or ecological receptors under current or likely future land use scenarios. The RIs indicated, however, that further sampling for lead would be needed to fully assess the risk to future residents. Additionally, for all 10 sites, there is a potential for exposure to UXO and WP. As a result, without further investigation, LUCs preventing future residential land use (i.e., future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use) are needed for all 10 of these sites. Hazardous substances, pollutants, or contaminants will remain on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, APG-specific CERCLA 121(c) five-year reviews will be performed for the 10 Soil Sites.

The Selected Remedy for these sites will prevent residential exposure to hazardous substances in soil that may pose unacceptable risk. Groundwater (including vapor intrusion) is not included in this ROD but will be considered in a future ROD;

5 SITE CHARACTERISTICS

The CCSA was named after Canal Creek, which drains an area of over 3,000 acres. The East and West Branches of Canal Creek flow southward to the Gunpowder River. In the eastern portion of CCSA, surface water drains into Lauderick Creek and Kings Creek. Both of these creeks drain into Bush River (USGS, 1996). The general land cover for the CCSA includes grassy areas, wooded areas with low shrubs, wetlands, and buildings and pavement areas. Land surface is characterized by low, gently rolling terrain. Elevations range from approximately 40 ft above mean sea level (msl) at several locations near the northern APG-EA boundary, to about 10 ft above msl near the West Branch of Canal Creek.

Wetlands within the CCSA receive surface water runoff and drainage by overland flow, culverts, and stormwater sewer systems. Surface water runoff within the CCSA flows to both the East and West Branches of Canal Creek, which eventually discharge to the Gunpowder River.

The CCSA is located within the Atlantic Coastal Plan Physiographic Province. Underlying the area of investigation are predominantly fine-grained unconsolidated sediments, consisting of clay, silt, sand, and gravel deposited by streams, river, and seas, which form a wedge-shaped body that dips southeastward. Alluvial deposits occur adjacent to and within drainage ways and topographic lows.

The forest, field, and wetland habitats at the CCSA support a wide variety of wildlife and vegetation. Currently, there are no known occurrences of endangered flora or fauna species in the CCSA. Bald eagles, listed under Federal protection status as threatened, are known to forage in and around the CCSA. However, the closest known active bald eagle nesting areas are located in the Westwood Study Area and at the Reardon Inlet.

RI activities were initiated in 1993 and conducted in three major phases: Phase I (1993-1995), Phase II (at selected sites, 1996-2002), and Phase III (2004). Additional sampling also was conducted in 2003-2004 in support of the CCSA ERAs and the FS for the West Canal creek Area. Limited sampling was also conducted in 2008. Numerous constituents were detected across the CCSA in surface/subsurface soil, sediment, and surface water during these field efforts including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, herbicides, polychlorinated biphenyls (PCBs), metals, explosives, and radionuclides. Throughout the CCSA, there is a potential for exposure to UXO and WP. The results of the RI sampling efforts for each of the 10 sites along with brief site descriptions and histories are given below.

EACC1F-A, Building E5604 Area - Site EACC1F-A covers approximately 7.9 acres north of Fleming Road, east of Alley Road and south of 34th street. (Figure 3) Building E5604 was constructed during World War II (WWII) as a chemical munitions filling plant, and was used for mustard filling from the end of 1941 through mid-1943. In 1943, the plant was converted

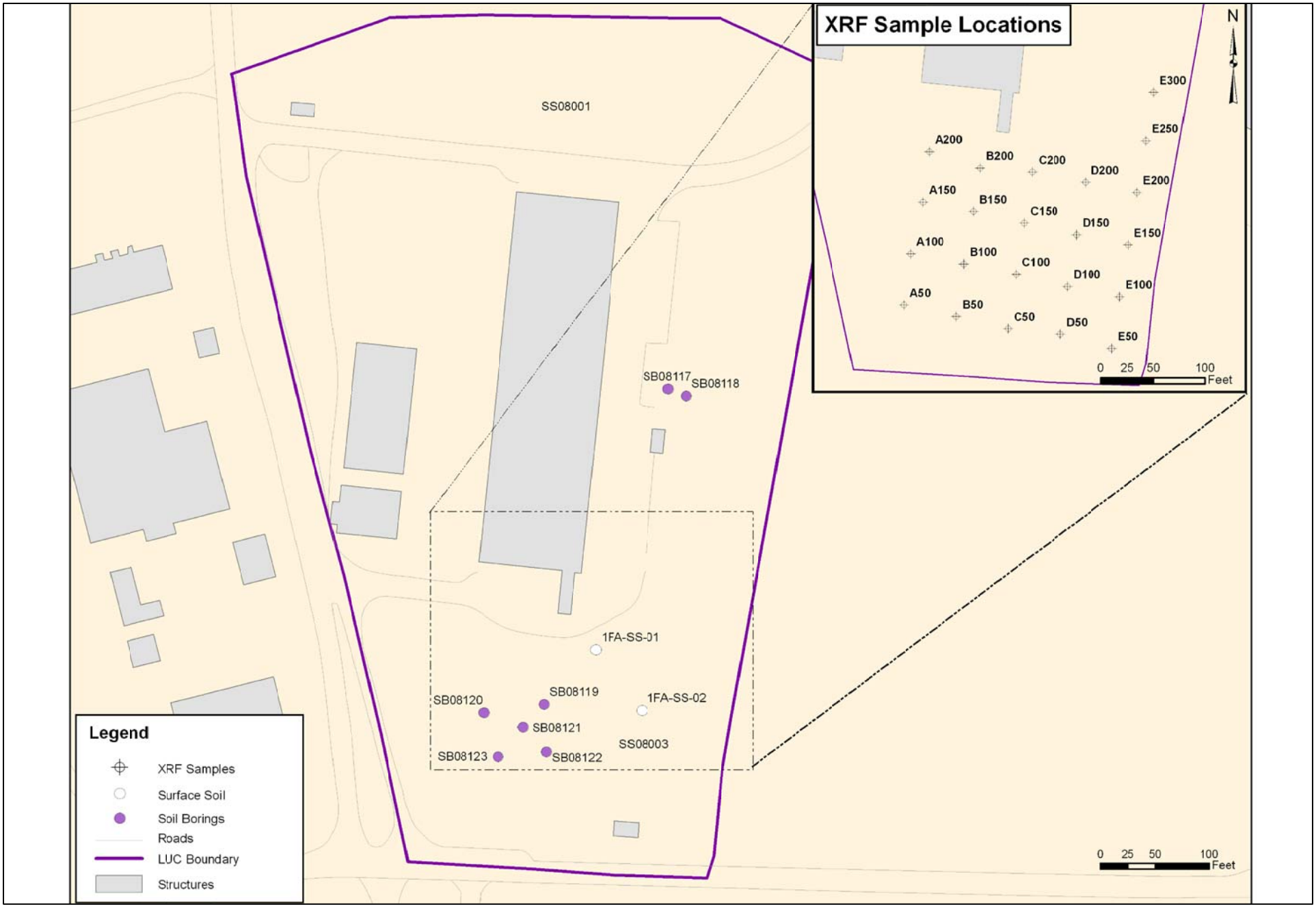

Figure 3:
EACC1F-A
Building E5604 Area

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to fill munitions with phosgene, sulfur trioxide, and chloroacetophenone (CN). After WWII, the plant was a standby phosgene filling plant and was used for thermite (a mixture of aluminum and an oxidizing agent) washout operations. During the Korean War, plasticized WP bomb bodies were degreased at Building E5604, and the building was used for the cleaning and storage of production equipment until the mid-1960s. In the mid-1960s, mask and filter manufacturing operations were conducted in Building E5604, and beginning in the early to mid-1970s, the building was used for the testing of physical protective equipment. Most testing used dioctyl phthalate and dimethylmethyl phosphonate (DMMP). Testing with DMMP ceased in the late 1980s. (USAEHA, 1989).

A localized area of surface and subsurface soil contamination exists in the southern portion of the site. The primary contaminants at this site are benzo[a]pyrene and arsenic. Benzo[a]pyrene (maximum concentration of 760 micrograms per kilogram (µg/kg) in surface soils) and arsenic (maximum concentration of 7.3 milligrams per kilogram (mg/kg) in surface soils and 9.2 mg/kg in subsurface soils) were the only two chemicals detected above industrial soil Risk Based Concentrations (RBCs) and background levels in surface and subsurface soils. No significant risk to ecological receptors was determined.

EACC1F-B, Former Building 80 Series Smoke Laboratory - Site EACC1F-B covers approximately 8.3 acres, north of Fleming Road and west of 32nd Street. (Figure 4) The Building 80 area consisted of five buildings constructed in 1918 – 1919 for use as smoke laboratories.

During the 1960s, four of the original buildings remained. One building was still used as a smoke laboratory, one building was used for the storage of flammable materials, and two buildings were used as general storehouses. Activities included pyrotechnic research and development, and sulfur trioxide and titanium tetrachloride (FM) smoke work. All five of the original buildings were connected to a chemical sewer that drained into the West Branch Canal Creek marsh. However, wastes from the smoke laboratories were commonly either burned or dumped in the area north of the laboratories (USAEHA, 1989). None of the smoke laboratories exist today. No recent removal actions have been documented for this site.

RI sampling for surface and subsurface soil and a geophysical survey were conducted. The primary contaminants at this site are arsenic, nitrobenzene, and lead. Arsenic (maximum concentration of 21.1 mg/kg in surface soil and 2.9 mg/kg in subsurface soil) was the only contaminant detected above industrial soil RBCs. Nitrobenzene was detected in surface soil in an area of stressed vegetation at a maximum concentration of 5.79 mg/kg. Lead was detected above the Biological Technical Assistance Group (BTAG) screening level and reference background in two samples, but both detections were below the EPA guidance level for industrial soil.

The ERA for site EACC1F-B concluded that there is a potential risk to herbivorous mammals, vermivorous mammals and vermivorous birds from nitrobenzene in surface soil. However, because this risk is based on a very limited habitat and higher quality habitat exists in the nearby vicinity, no significant population-wide effects are anticipated.

EACC1G-A, Building E5185 – Site EACC1G-A covers approximately 12.5 acres adjacent to and east of 34th Street and west of Hoadley Road. Magnolia and Fleming Roads run into "K" Street North and South respectively, which surround the building. (Figure 5) Building E5185 was used as a filling plant through WWII. The building was used for a variety of functions including equipment cleaning and degreasing, agent alarm development, metal plating, and wood treating through 1975. It has been used by the Ordnance School as a military vehicle maintenance training facility and is currently used for general purpose storage.

Sewer lines are associated with Building E5185. Wastewater drained into the same chemical sewer as Building E5188 (EACC1G-B, White Phosphorus Pits Filling Plant, which was addressed under the 13 Select Sites in the Canal Creek Study Area ROD [GP, 2006]). The sewer discharged 500 feet (ft) west of the building prior to connection to the sanitary sewer circa 1980. A concrete neutralization sump received wastewater from plating operations on the north side of E5185. Two 20,000-gallon tanks suspected beneath Building E5185 were found to be no longer present and sand within the vault was deemed environmentally safe (Weston Solutions, Inc [Weston], 2003).

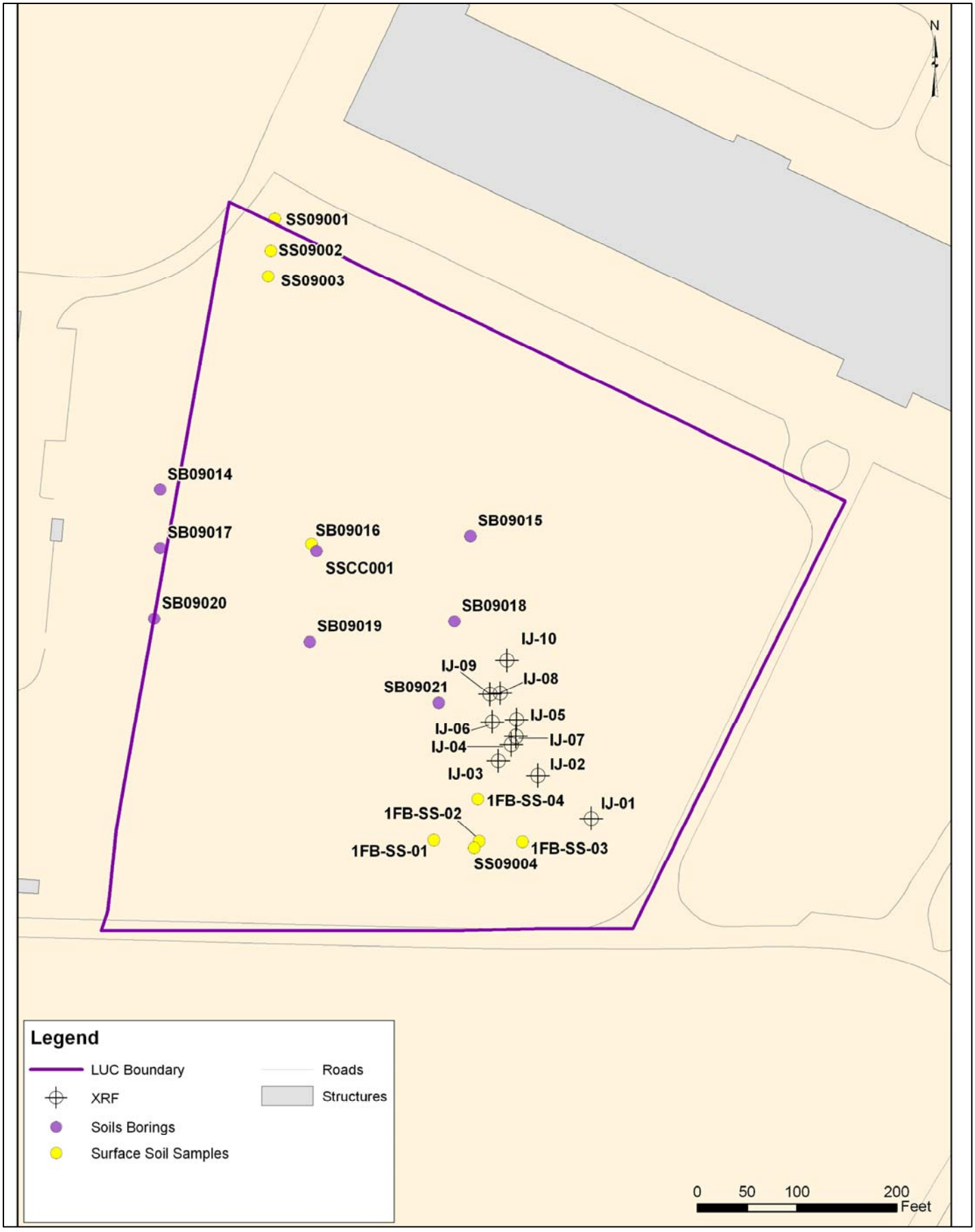

Figure 4:
EACC1F-B
Building 80 Series Smoke Laboratories

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Figure 5:
EACC1G-A
Building E5185 WWII Mustard Filling Plant

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Surface and subsurface soil samples were collected at this site. Arsenic (maximum concentration of 8.8 mg/kg in subsurface soil) was the only contaminant detected above its industrial soil RBC and reference background.

The ecological habitat at this site consists of only limited grass strips between Building E5185 and the surrounding pavement. Based on this, the ERA concluded that no further evaluation or action is required for protection of ecological receptors at this site.

EACC1H-D, Phosgene Plant Area – Site EACC1H-D covers approximately 15.9 acres, including the Building E53XX series buildings located between Hoadley Road and 35th Street. (Figure 6) The WWI Phosgene Plant was comprised of buildings on both sides of Hanlon Road. The WWII Phosgene Plant utilized the E53XX buildings on the north side of Hanlon Road. The WWII plant also was utilized for rocket and mortar shell filling. Since their use as phosgene plants, the buildings have been utilized for a variety of operations including chemical storage, metal parts machining, metals plating, and vehicle maintenance. Building E5354 was used for chemical storage and production of adamsite (an incapacitating agent with the military abbreviation of DM) candles, chemical agent identification sets, and training munitions (USAEHA, 1989).

Included in this area were caustic scrubbing systems used for both plants, a waste oil storage tank at Building E5360, and sumps located throughout the area connected to the sewer system. Buildings associated with the WWI plant were connected to the chemical sewer which ran southwest to the West Branch Canal Creek Marsh. The WWII plant facilities were connected to the sanitary sewer system. A 100-gallon steel shell flow-through sump was suspected under the concrete pad at the southeast corner of Building E5317; however, it was not found during the Hazardous Materials Facility (HMF) Removal Action (Weston, 2000). Most buildings were demolished in the 1960s; however, Buildings E5317, E5327, and E5365 still remain.

RI activities included soil gas, surface soil, and subsurface sampling. Arsenic and iron were the primary contaminants at this site. Arsenic (maximum concentration of 5.3 mg/kg) was detected above the industrial soil RBC in surface soils but was below the BTAG screening level and reference background concentration. Arsenic (maximum concentration of 7.3

mg/kg) was also detected above the industrial soil RBC in subsurface soil. Iron was detected in soil (maximum concentrations of 14,200 mg/kg in surface soil and 23,800 mg/kg in subsurface soil). There were no significant ecological risks for this site.

EACC1I-B, Building 113 WWI Gas Instruction Chamber - Site EACC1I-B is located approximately 100 yards east of Building 106/107 and consists of a former WWI Gas Instruction Chamber. The site covers approximately 2.7 acres. (Figure 7) The chamber was used for introducing Army personnel to the odors of various agents, as well as testing the effectiveness of gas masks and filters through the mid 1930s. The building was demolished in the early 1960s.

Wastes produced by gas chamber operations would have included the chemicals used in training, and possibly expended items such as grenades used to release gases for training purposes. The most commonly used training gas was CN.

RI activities included surface and subsurface soil sampling. The primary contaminants at this site were PAHs, arsenic, gross alpha, and gross beta. Elevated concentrations of PAHs, primarily benzo[a]pyrene, (maximum concentration of 61µg/kg in surface soil) and arsenic (maximum concentration of 53.4 mg/kg in surface soil) were detected above soil RBCs. Additionally, gross alpha and gross beta were detected in one sample exceeding the reference background. There were no significant ecological risks for this site.

EACC-3E Building E3300/E3330 Laboratory Complex - Site EACC3E covers approximately 19.4 acres along the east side of Ricketts Point Road and north of Beach Point Road. (Figure 8) It consists of the Building E3300/E3330 Laboratory Complex. Original facilities at this site were constructed in 1941 and 1942. The last of the structures was built in the mid-1960s. Building E3300 was built in 1965 and was referred to as the "supertoxic laboratory." Several of the WWII structures (storage buildings, magazines, small research laboratories) were demolished to make room for the construction of newer buildings or were converted to laboratories.

The complex was built for research and development work related to chemical warfare. Activities at the complex have involved the use of toxic chemical agents, agent detection chemicals, decontamination chemicals, explosives compounds, pyrotechnic mixes, and

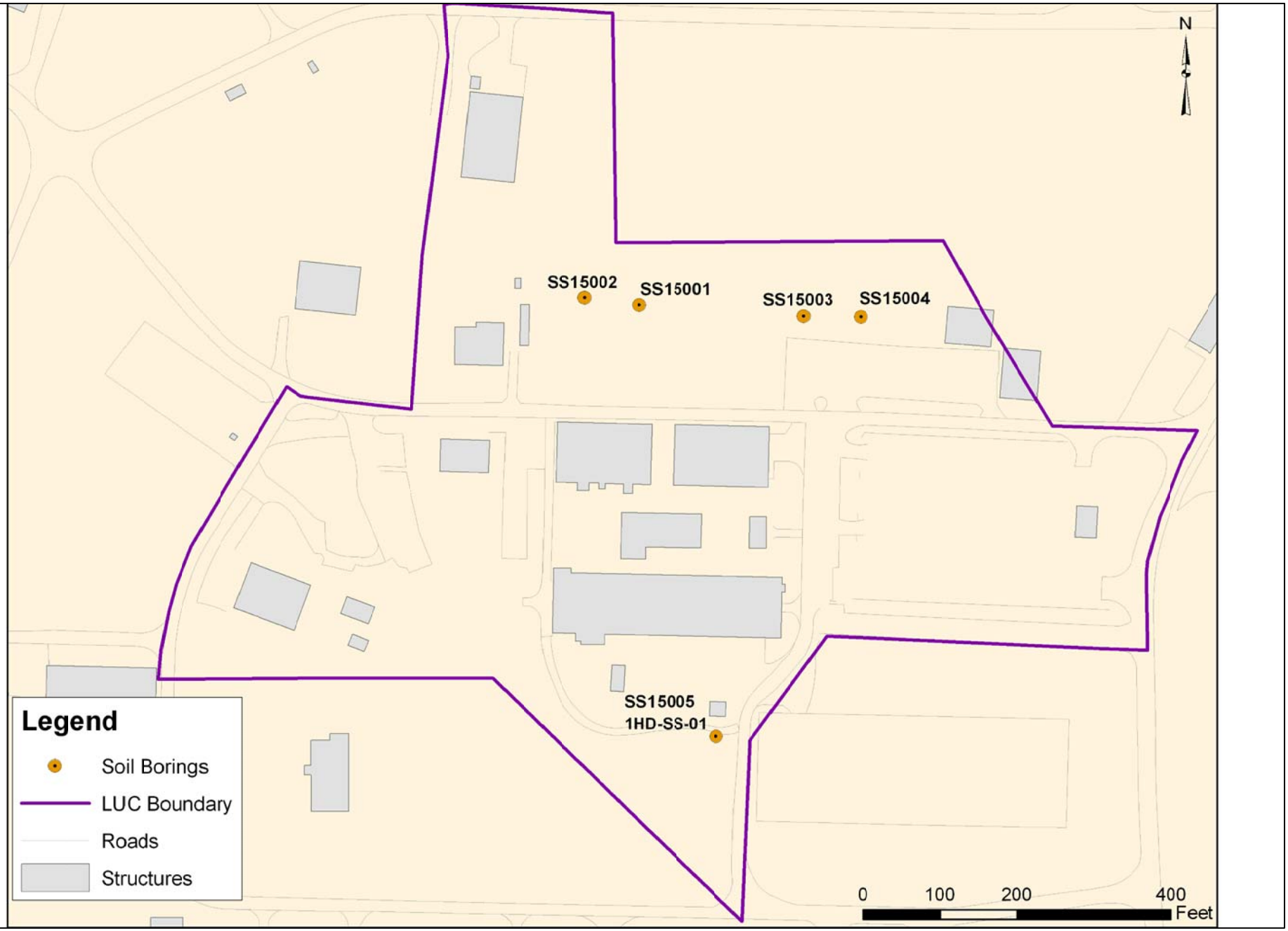

Figure 6:
EACC1H-D
Phosgene Plant Area

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Figure 7:
EACC1I-B
Building 113 WWI Gas Instruction Chamber

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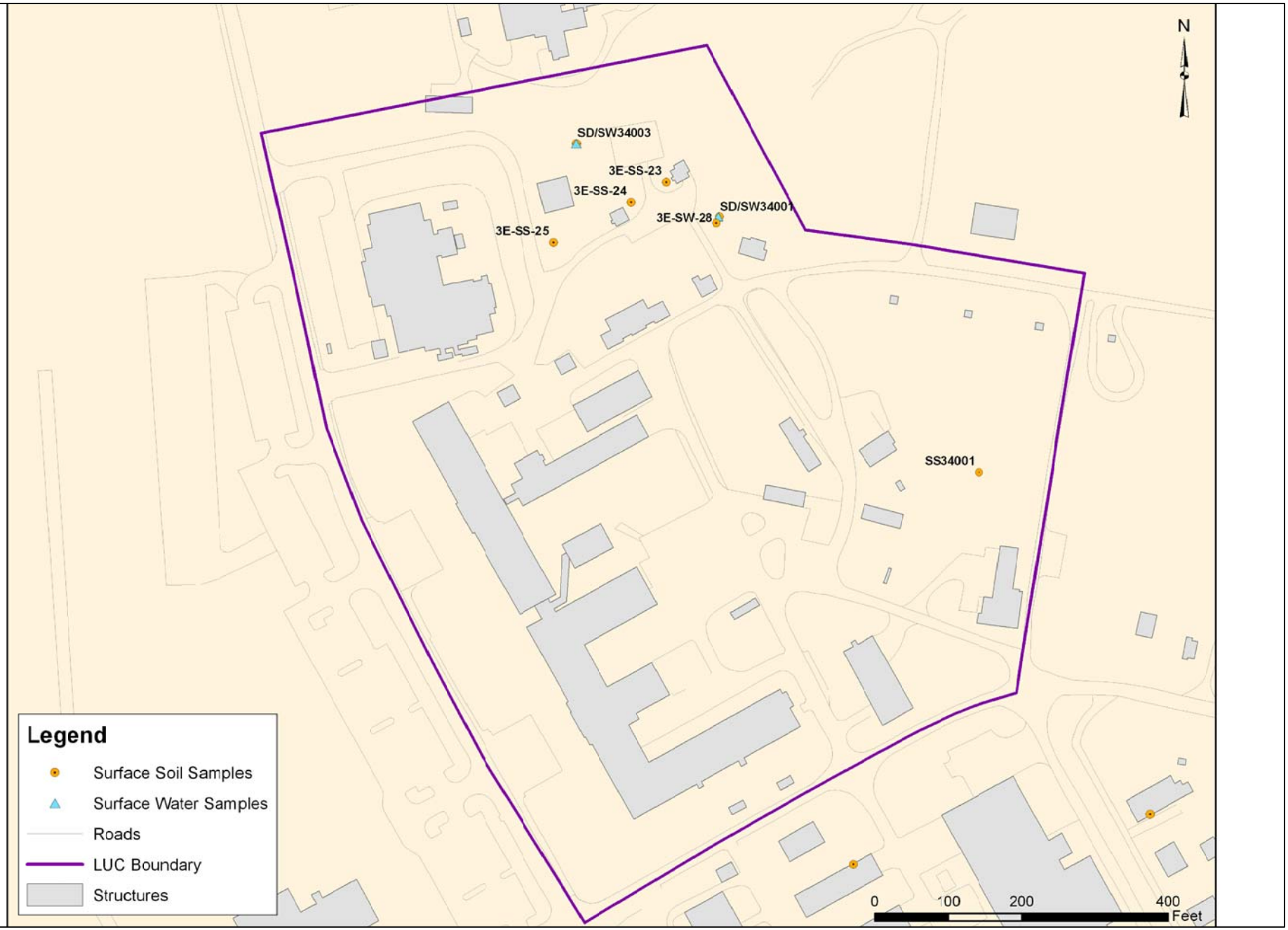

Figure 8:
EACC3E
Building E3300/E3330 Laboratory Complex

PLEXUS Scientific

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obscurant smokes. Support activities at the site related to laboratory research and development work include a machine shop, materials storage facilities, hazardous waste accumulation sites, a heating plant, and a wind tunnel. Of these, Building E3334 was used as a flammable materials storage facility and a storehouse for various types of chemicals. In 1975, this building was assigned to the Physical Chemistry Branch.

Buildings in this complex were originally serviced by a combination of sanitary sewers and chemical sewer/storm drains. Laboratory wastewater was discharged from the chemical sewer connected to the storm sewer leading into Kings Creek. Decontamination of chemical warfare agents was required prior to disposal in chemical sewers. Major modifications to the chemical sewer system were made in the 1980s to tie into the sanitary sewer. Additionally, a wastewater holding tank is located at Building E3348 with an associated steel inlet pipe. The tank and inlet pipe were removed in 2000 (Weston, 2000).

The ERA for site EACC3E concluded that there is a potential risk to terrestrial plants (from zinc) and vermivorous birds (from DDTr). However, because this risk is based on a very limited habitat and higher quality habitat exists in the nearby vicinity, no significant population-wide effects are anticipated.

During RI activities, surface soil, hydric soil, and subsurface soil samples were collected. Arsenic was the primary contaminant for this site. Arsenic (maximum concentration of 9 mg/kg in surface soil and 7.3 mg/kg in subsurface soil) was the only contaminant detected above industrial soil RBCs in surface and subsurface soil.

EACC3F, Building E35XX Area – Site EACC3F covers approximately 14.8 acres southeast of the intersection of Ricketts Point Road and Beach Point Road. (Figure 9) Many of the buildings at this site were constructed during the WWII era. Building E3516 was constructed as an experimental fabrication facility. Building E3528 was used for sandblasting, but no longer exists. Building E3500 was built in 1943 as a warehouse, a laboratory, and an environmental test chamber complex. Smoke work has been conducted in this facility in recent years. The northern portion of Building E3510 was constructed during 1953 and the southern portion was constructed in 1983. The building has been primarily used as a research laboratory related to physical protection. Recent work in Building E3510 has been

related to munitions development and detection of chemical agents. The Building E35XX Area contains a number of small laboratories and environmental test/surveillance chambers in which a variety of equipment and chemical materials have been tested, including chemical warfare agents.

A wide variety of wastes were produced by the facilities in the Building E35XX Area. With the exception of Building E3516 (Experimental Machine Shop), the facilities would have produced only small quantities of waste.

RI activities at this site included soil gas surveys, surface soil, and subsurface soil samples. Arsenic (maximum detection of 5.6 mg/kg in surface soil and 8.6 mg/kg in subsurface soil) was the only contaminant detected consistently above the industrial soil RBC in surface and subsurface soil. No significant ecological risks were determined at this site.

EACC3I, Building E3570 Assembly Plant – Site EACC3I covers approximately 7.7 acres along the south side of Beach Point Road, east of Building E3560 Test Chamber Complex. (Figure 10) The facility was constructed in 1953 as a munitions assembly plant. It has been used for production of fire bomb clusters and for vehicle decontamination testing. Building E3570 has also been used as a laboratory. Material storage areas at the site include a drum rack southeast of Building E3570, and a storage building immediately north of the drum rack, and hazardous waste satellite accumulation sites within the building. The drum rack has not been used since 1988. No recent removal actions have been documented for this site.

RI activities included surface and subsurface soil sampling. Arsenic (maximum concentration of 7.4 mg/kg in surface soil and 10.2 mg/kg in subsurface soil) was the only contaminant that was detected above the industrial soil RBC. No significant ecological risks were determined at this site.

EACC3O, B-Field Range Area – Site EACC3O covers approximately 54.2 acres along the south side of Beach Point Road, between the wastewater treatment plant and the Building E3580 Pyrotechnic Loading Facility, and extends approximately 1,000 ft south toward Bush River. (Figure 11) The site was used as an impact area for mortar and artillery testing from the A-Field firing point during the 1920s.

Figure 9:
EACC3F
Building E35XX Area

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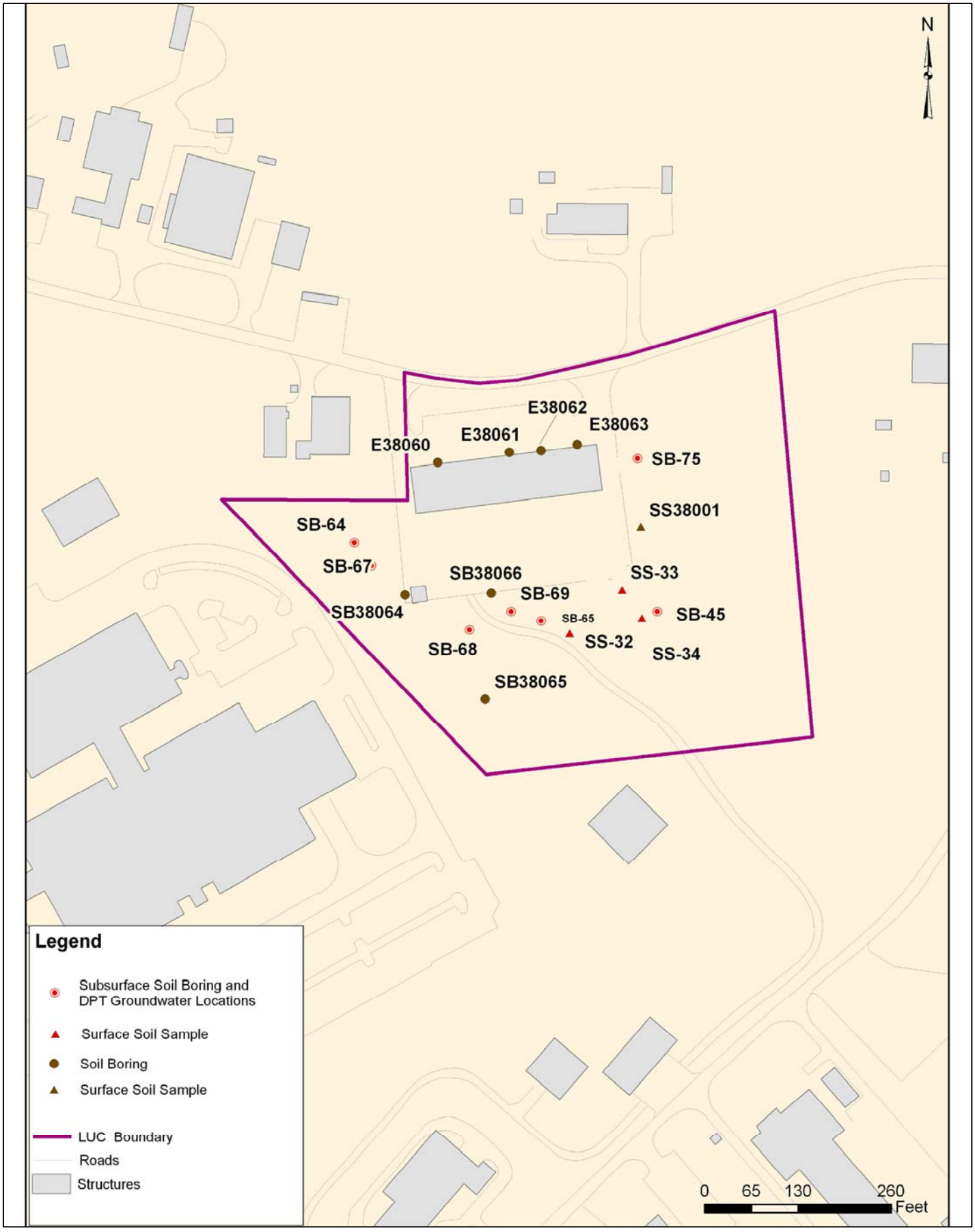

Figure 10:
EACC3I
Building E3570 Assembly Plant

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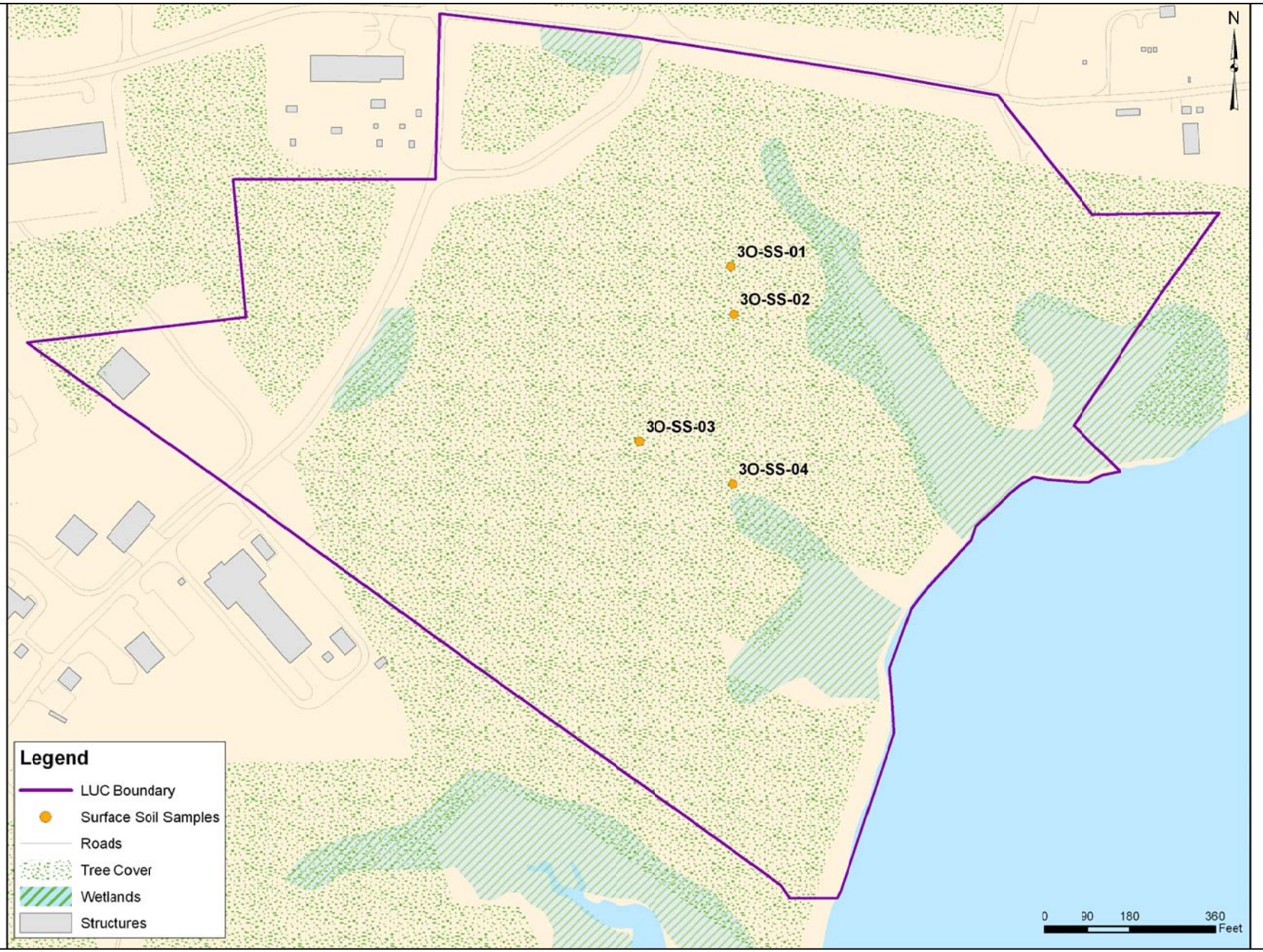

Figure 11:
EACC3O
B-Field Range Area

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RI activities included surface and subsurface soil sampling and geophysical surveys. Arsenic (maximum concentration of 3.8 in surface soil and 12.4 mg/kg in subsurface soil) was the only contaminant that consistently exceeded the industrial soil RBC. Although not found in concentrations exceeding RBCs, mercury was also deemed to be a potential human health concern. There were no significant ecological risks for this site.

EACC3P, Mosquito Test Grid Area – Site EACC3P covers approximately 8.8 acres east of Ricketts Point Road, between Chevron Road and Clearview Drive. The Mosquito Test Grid Area is south of Building E2100. (Figure 12) It consists of approximately 82 ponds that were used in the late 1960s for the development of pesticides for mosquito control.

RI activities included surface and subsurface soil sampling. Arsenic was the primary contaminant at this site. Arsenic (maximum concentration of 8.5 mg/kg in surface and 7.5 mg/kg in subsurface soil) was detected in surface and subsurface soil throughout the site, exceeding the industrial soil RBC. No significant ecological risks were determined at this site.

Section 5.1 provides discussion of primary sources and release mechanisms, and secondary sources and release mechanisms for the 10 Soil Sites.

5.1 Conceptual Site Model

Conceptual site models (CSMs) were developed during the risk assessment process for the 10 Soil Sites that identify the primary sources, primary contaminated media, migration pathways, exposure pathways, and potential human and ecological receptors. The CSMs are based on the data that are presented in the RI documentation. The CSMs, discussed in Section 2.0, are found in Attachment B of this document.

5.1.1 Primary Sources and Release Mechanisms

The primary sources that had been suspected and evaluated in the RIs for the CCSA included spillage and/or deposition for the historical above-ground sources, leakage from the underground sources, and leakage and infiltration from the former sumps and open sewer lines.

5.1.2 Secondary Sources and Release Mechanisms

Secondary sources include leaching to groundwater, dust generation and volatilization to air, erosion and runoff to surface water and sediment, and biotic uptake.

Groundwater underlying the sites in the CCA is not discussed in this document but is being addressed under AEDB-R sites EACC4A (East Canal Creek Area) and EACC4A-B (West Canal Creek Area).

6 CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

According to the APG Land Use Assessment (Michael Baker Corporation, 1998), current land use within the CCSA includes: research and development, supply/storage, open space, outdoor recreation, administration, airfield, and industrial. Buildings are used for warehousing, as offices, and for research and development activities. Several buildings within CCSA were also used historically for pilot-scale filling of chemical ordnance. With the exception of Weide Army Airfield (which may be subdivided into research and development, airfield, and open space), future land use within the CCSA is not expected to change substantially.

The closest residential housing for military personnel and their dependents is located on Clearview Drive, east of the Airfield. Off-post residential housing lies approximately 4,000 ft north of the site.

7 SUMMARY OF SITE RISKS

As a component of the RI process, risk assessments were performed for the CCSA sites associated with this ROD. The following summaries of the Human Health Risk Assessment (HHRA) and ERA were derived from the risk assessment documents (listed previously in Section 2.0).

7.1 Summary of Human Health Risk Assessment

7.1.1 Identification of Chemicals of Potential Concern

The risk assessment screening criteria identified constituents of potential concern (COPCs) for selection and quantitative evaluation in the HHRA, based on a review of the data and comparison to appropriate screening levels. Maximum concentrations of detected chemicals

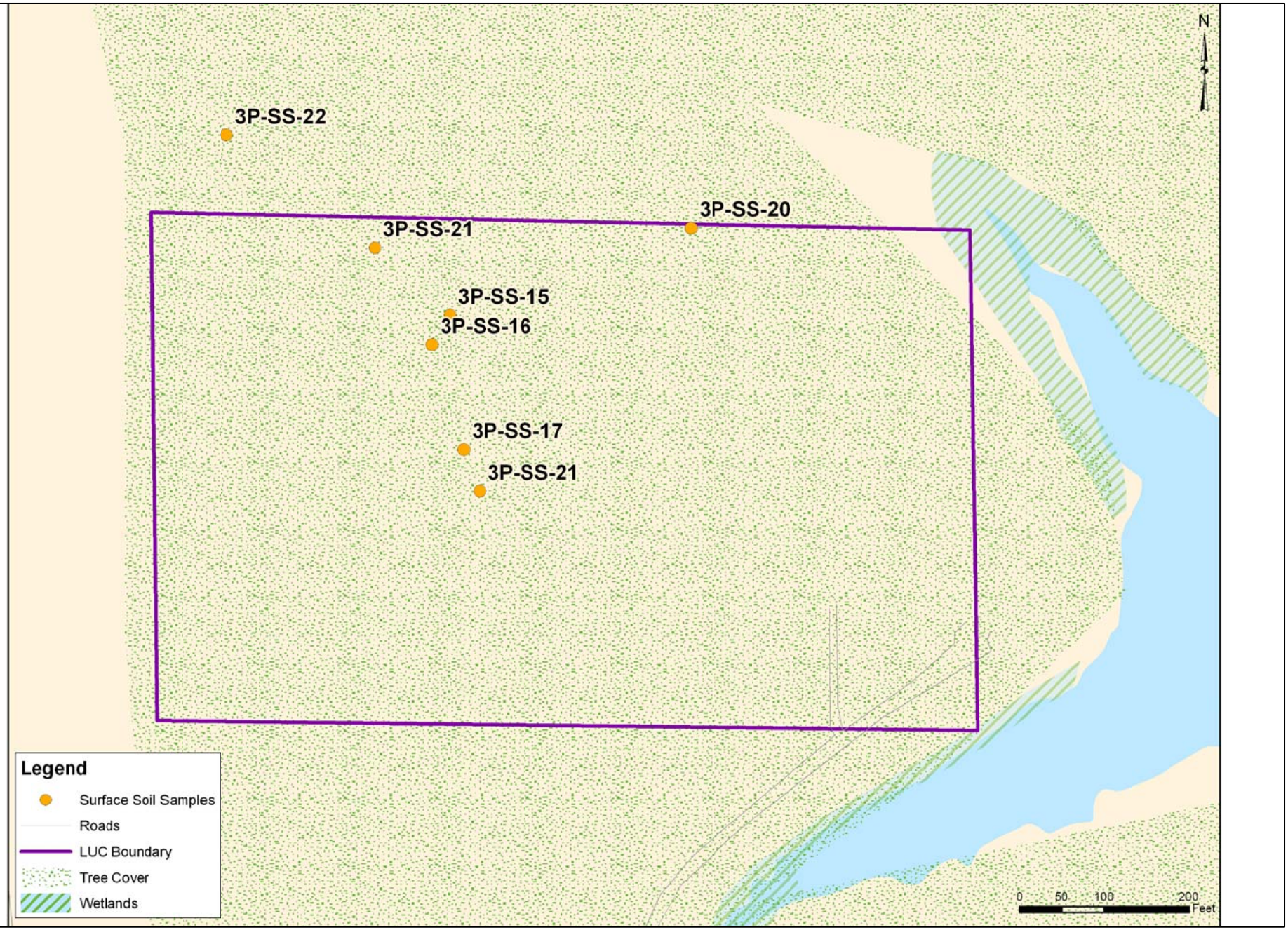

Figure 12:
EACC3P
Mosquito Test Grid Area

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in environmental media were compared to RBCs where available, in accordance with USEPA Region III guidance. The RBCs are back-calculated using conservative exposure parameters. Those back-calculated from carcinogenic toxicity criteria were used directly as screening criteria, while RBCs back-calculated from non-carcinogenic toxicity criteria were adjusted downward by a factor of 10 for use as screening criteria.

Sites EACC1F-A, EACC1F-B, and EACC1G-A were identified as part of the Northwest Region of CCSA (EA, 2007a). A total of 15 COPCs were identified in surface soil based on residential soil RBC risk-based screen: nitrobenzene, arsenic, chromium, iron, lead, manganese, mercury, vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, 4,4'-DDT, Aroclor 1248, and Aroclor 1254. Six COPCs were identified in surface soil based on the industrial soil RBC risk-based screen: arsenic, iron, lead, mercury, benzo(a)pyrene, and Aroclor 1248. 17 COPCs were identified for total soil in the Northwest Region based on the residential RBC risk-based screen: nitrobenzene, arsenic, chromium, iron, lead, manganese, mercury, thallium, vanadium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, 4,4'-DDT, Aroclor 1248, Aroclor 1254, and 1,1,2,2-tetrachloroethane. Seven COPCs in total soil are identified based on the industrial RBC risk-based screen: arsenic, iron, lead, mercury, vanadium, benzo(a)pyrene, and Aroclor 1248.

Sites EACC1G-A and EACC1H-D were evaluated as part of the Southwest Region of CCSA (EA, 2007b). In the Southwest Region, a total of 7 COPCs in surface soil were identified based on the residential soil RBC risk-based screen: antimony, arsenic, chromium, iron, manganese, vanadium, and benzo(a)pyrene. Two COPCs in surface soil were identified based on the industrial soil RBC risk-based screen: arsenic and iron. A total of seven COPCs were identified in total soil based on the residential soil RBC risk-based screen: antimony, arsenic, chromium, iron, manganese, vanadium, and benzo(a)pyrene. Two COPCs were identified in total soil based on the industrial soil RBC risk-based screen: arsenic and iron.

Sites EACC3E, EACC3F, EACC3I, EACC3O, and EACC3P were evaluated as part of the Kings Creek Region of CCSA (EA, 2007c). In the Kings Creek Region, a total of seven COPCs in surface soil were identified based on the residential soil RBC risk-based screen:

arsenic, chromium, iron, mercury, vanadium, 4,4-DDT, and Aroclor 1248. Three COPCs in surface soil were identified based on the industrial soil RBC risk-based screen: arsenic, mercury, and Aroclor 1248. Seven COPCs were identified in total soil based on the residential soil RBC risk-based screen: arsenic, chromium, iron, mercury, vanadium, 4,4-DDT, and Aroclor 1248. Three COPCs in total soil were identified based on the industrial soil RBC risk-based screen: arsenic, mercury, and Aroclor 1248.

7.1.2 Exposure Assessment

Current land use of the CCSA is primarily military/industrial. Potentially affected receptors under current/future land use conditions include site workers (i.e., industrial and construction), adolescent trespassers, and hypothetical future residents.

Potential exposure pathways were evaluated for both current and future land use conditions. The following exposure pathways were quantitatively evaluated under current/future land use conditions:

- Adolescent trespasser exposure from inhalation of fugitive dust from surface soil, dermal contact with surface soil, and incidental ingestion of surface soil.
- Maintenance worker exposure from inhalation of particulates from surface soil, dermal contact with surface soil, and incidental ingestion of surface soil.
- Commercial worker exposure through incidental ingestion of total soil, dermal contact with total soil, and inhalation of fugitive dust from total soil.

Under future land-use conditions, the CCSA will likely continue to be used for military/industrial purposes, although commercial or residential development in this area may occur. Under future land use conditions, the following potential exposure pathways were quantitatively evaluated, excluding future use of groundwater:

- Construction worker exposure through inhalation of fugitive dust from total soil, dermal contact with total soil, and incidental ingestion of total soil.
- Hypothetical adult and child resident exposure through inhalation of fugitive dust from total soil, dermal contact with total soil, and incidental ingestion of total soil.

Exposure point concentrations for the COPCs in each medium and timeframe were derived based on the 95 percent upper confidence limit on the arithmetic mean concentration or the maximum detected concentration, whichever was lower. In cases where fewer than five

samples were available, the maximum detected value was used as the exposure point concentration. Average daily doses, and other exposure parameters, are discussed in detail in the HHRA.

7.1.3 Toxicity Assessment

Chronic toxicity criteria and quantitative dose-response data were obtained from the Integrated Risk Information System (IRIS) (USEPA, 1996b), Health Effects Assessment Summary Tables (HEAST) (USEPA, 1997), and the National Center for Environmental Assessment for COPCs. Potential risks for some chemicals and essential human nutrients could not be quantitatively evaluated in the risk assessment because toxicity data are not available for these constituents. However, exclusion of these chemicals is not anticipated to result in significant underestimate of risk. Available data leads to the conclusion that these chemicals are moderately toxic, and relatively as toxic, or less toxic, than the other COPCs for which health effects criteria are available. Toxicity data in the HHRAs are presented by carcinogenic and non-carcinogenic data of each COPC for the oral, dermal, and inhalation exposure routes.

7.1.4 Risk Characterization

The human health risk characterizations combine the average daily doses calculated in the exposure section with the health effects criteria presented in the toxicity section in order to calculate potential human health risks. The estimated upper-bound excess lifetime cancer risks for these sites were compared to USEPA's acceptable risk levels of 1×10^{-6} to 1×10^{-4} for health protectiveness at CERCLA sites. Lifetime cancer risk levels of 1×10^{-6} and 1×10^{-4} represent the probability of one in one million and one in ten thousand, respectively, that an individual could contract cancer as a result of site-specific exposure.

Hazard quotients (HQs) are calculated for individual chemicals based on a ratio of the estimated site-specific exposure to a single chemical over a specified period to the estimated daily exposure level at which no adverse health effects are likely to occur (USEPA, 2005). The effects from simultaneous exposure to multiple chemicals are determined by summing the individual HQs within each exposure pathway (USEPA, 1989). This sum is referred to as

the Hazard Index (HI). In general, HIs that are greater than 1.0 are indicative of a potential for adverse health effects.

For the purposes of the HHRA, sites throughout CCSA were grouped geographically for assessment. Sites EACC1F-A, EACC1F-B and EACC1G-A were evaluated together as part of the Northwest Region HHRA (EA, 2007a). Sites EACC1H-D and EACC1I-B were evaluated independently and included as part of the Southwest Region HHRA (EA, 2007b). Sites EACC3E, EACC3F, EACC3I, EACC3O, and EACC3P were evaluated independently and included as part of the Kings Creek Region HHRA (EA, 2007c).

Estimated cancer risks for all of the industrial scenarios at these sites were within or below the USEPA's target risk range for health protectiveness of 1×10^{-6} to 1×10^{-4} (Tables 1 – 8). HIs were all below 1.0 for military/industrial land use. As a result, further evaluation under an industrial land-use scenario was not warranted.

Table 1
Human Health Risk Sites EACC1F-A, EACC1F-B, and EACC1G-A

Scenario	Receptor	Cancer Risk	HI
Current	Site Worker – Adult	1.0×10^{-5}	-
	Trespasser - Adolescent	1.2×10^{-6}	-
Future	Site Worker – Adult	1.7×10^{-6}	-
Hypothetical Future	Resident – Adult	2.7×10^{-5}	-
	Resident – Child	5.8×10^{-5}	2.4 (target organ HI<1.0)

Table 2
Human Health Risk Site EACC1H-D

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker - Adult	1.7×10^{-6}	-
Hypothetical Future	Resident – Adult	$4.2 \times 10\text{-}^{6}$	-
	Resident – Child	9.3×10^{-6}	2.5 (target organ HI < 1.0)

Table 3
Human Health Risk Site EACC1I-B

Scenario	Receptor	Cancer Risk	HI
Current/ Future	Trespasser – Adolescent	7.3×10^{-6}	-
	Site Worker – Adult	1.9×10^{-5}	-
Hypothetical Future	Resident – Adult	4.4×10^{-4}	0.36
	Resident - Child	4.4×10^{-4}	3.2

Table 4
Human Health Risk Site EACC3E

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker – Adult	5.12×10^{-7}	0.003
	Trespasser – Adolescent	2.6×10^{-7}	0.022
Hypothetical Future	Resident – Adult	5.39×10^{-6}	0.168
	Resident – Child	1.19×10^{-5}	1.53

Table 5
Human Health Risk Site EACC3F

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker – Adult	2.2×10^{-6}	-
	Trespasser – Adolescent	2.6×10^{-7}	0.022
Hypothetical Future	Resident – Adult	1.7×10^{-5}	-
	Resident – Child	1.7×10^{-5}	1.4 (HI < 1.0 for target organs)

Table 6
Human Health Risk Site EACC3I

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker – Adult	4.3×10^{-7}	.0027
Hypothetical Future	Resident – Adult	1.5×10^{-5}	0.13
	Resident – Child	1.5×10^{-5}	1.2

Table 7
Human Health Risk Site EACC3O

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker – Adult	7.1×10^{-6}	0.068
Hypothetical Future	Resident – Adult	4.5×10^{-5}	0.33
	Resident – Child	3.0×10^{-5}	3.0

Table 8
Human Health Risk Site EACC3P

Scenario	Receptor	Cancer Risk	HI
Current/Future	Site Worker – Adult	3.4×10^{-6}	0.0012
	Trespasser – Adolescent	1.0×10^{-6}	-
Hypothetical Future	Resident – Adult	4.7×10^{-5}	0.22
	Resident – Child	4.7×10^{-5}	2.0

Risks to hypothetical future residents associated with the 10 Soil Sites were also evaluated for planning purposes. Although cancer risks were within the USEPA's acceptable risk range, HIs for sites EACC1F-A, EACC1F-B, EACC1G-A, EACC1H-D, EACC1I-B, EACC3E, EACC3F, EACC3I, EACC3O and EACC3P exceeded 1.0 for the hypothetical future resident land use scenario.

7.1.5 Uncertainty

All risk assessments involve the use of assumptions, judgments, and incomplete data to varying degrees that contribute to the uncertainty of the final estimates of risk. Uncertainties result both from the use of assumptions or models in lieu of actual data and from the error inherent in the estimation of risk-related parameters, and may cause risk to be overestimated or underestimated. As a result, the results of these risk assessments should not be construed as presenting an absolute estimate of risk to persons potentially exposed to chemicals at the 10 sites discussed in this ROD.

The primary source of uncertainty for these sites is the lack of screening values for detected compounds aluminum, cobalt, and dibenzofuran. This is not anticipated to significantly impact the HHRA results.

7.2 Summary of Ecological Risk Assessment

7.2.1 Identification of Chemicals of Potential Concern

Chemicals were selected for evaluation in the ERA if they: i) were presumed to be present because of past activities at the CCSA sites; and ii) posed potential risks to ecological receptors. COPCs were selected if their maximum concentrations exceeded the screening level concentrations for ecological receptors provided by USEPA Region III's BTAG. Chemicals with maximum concentrations below the screening levels were eliminated from further consideration. All other chemicals were retained as COPCs, including those chemicals lacking screening levels.

7.2.2 Exposure Assessment

Potential exposure pathways and assessment endpoints for ecological receptors were identified based on: i) the likely presence of ecological resources; ii) the nature and extent of chemical contamination; ii) the source/mechanism of chemical release; iv) the medium (or media) of chemical transport; v) the point of potential contact by potential receptor groups; and, vi) the route of exposure at the contact point. Potentially complete exposure pathways and exposure groups were identified for evaluation in the ERAs based on consideration of the available habitat, and the type, extent, magnitude, and location of chemical contamination.

The following potential receptors were identified for surface soil, sediment, and surface water at the 10 Soil Sites:

- Terrestrial plants
- Soil invertebrates
- Herbivorous mammals
- Vermivorous mammals
- Vermivorous birds
- Predatory mammals
- Predatory birds

7.2.3 Ecological Effects Assessment

The majority of plant toxicity information available from scientific literature is for inorganic COPCs and has been based on the evaluation of potential adverse effects to agricultural crops from the presence of inorganic chemicals in surface soil.

Toxicity reference values (TRVs) reported by Efroymson et.al. (1997) were also used when available to assess the potential for chemicals to adversely affect terrestrial plants and earthworms. TRVs used for terrestrial wildlife were based on widely accepted sources such as Sample et al. (1996), the U.S. Army Center for Health Promotion and Preventive Medicine, and the Office of Solid Waste and Emergency Response to evaluate the potential for adverse effects to the receptors of concern. Avian TRVs were then derived applying total uncertainty factors from Sample et al. (1996) to daily doses reported in various references. Federal Ambient Water Quality Criteria developed by USEPA (1999) for the protection of aquatic life were used to assess potential impacts to aquatic species. Several sources of toxicity data were used to identify the potential for chemicals in sediment to cause adverse effects to benthic communities. They include threshold effects levels (TELs) derived by Smith et al. (1996) and MacDonald et al. (1996). In the absence of TEL values Effects Range-Low (ER-L) values were used. In the absence of ER-L values, lowest-effect-levels developed by the Ontario Ministry of the Environment and Energy (1993) were used. Other values used included sediment quality benchmark values by Jones et al. (1997), Ecotox threshold values from USEPA (1996a), and Washington State sediment quality standards from Jones et al. (1997).

7.2.4 Ecological Risk Characterization

No significant risk to ecological receptors was identified for the 10 Soil Sites with the exception of sites EACC1F-B and EACC3E. The ERA for site EACC1F-B concluded that there is a potential risk to herbivorous mammals, vermivorous mammals, and vermivorous birds from nitrobenzene in surface soil. The ERA for EACC3E concluded that the site poses potential risks to terrestrial plants (from zinc) and vermivorous birds (from DDTr). Although the initial seven steps of the ecological risk assessment process for these two sites concluded that the possibility exists for risk to ecological receptors, this conclusion was based on a very

limited habitat area. Higher quality habitat exists in the nearby vicinity. Therefore, no significant population-wide effects are expected at this site. Step 8 of the Risk Assessment process is Risk Management. During Step 8 for these sites, the risk management decision was made that no further evaluation is required for protection of ecological receptors at this site.

7.3 Risk Summary

7.3.1 Human Health

For the 10 Soil Sites, the carcinogenic risk ratios for commercial workers and construction workers were within the acceptable risk range. Non-carcinogenic risk ratios were less than 1.0. As a result, further evaluation (i.e., calculation of cancer risks and HIs) under an industrial land use scenario was not warranted. Risks to hypothetical future residents associated with the 10 sites were also evaluated for planning purposes. Although cancer risks were within the USEPA's acceptable risk range, all of the sites had non-carcinogenic HIs for hypothetical future child residents exceeding 1.0.

7.3.2 Ecological

An eight-step USEPA ERA process was completed for the 10 Soil Sites to determine if there was potential for ecological receptors to be adversely affected by the presence of contaminants. During the assessment, chemical concentrations were first compared to literature-based screening values. Site-specific chemical doses were then modeled for selected ecological receptors. No significant risk to ecological receptors was identified for the 10 Soil Sites with the exception of sites EACC1F-B and EACC3E. As described in Section 7.2.4, the ERA for site EACC1F-B concluded that there is a potential risk to herbivorous mammals, vermivorous mammals, and vermivorous birds from nitrobenzene in surface soil. The ERA for site EACC3E concluded that the site poses potential for risks to terrestrial plants (from zinc) and vermivorous birds (from DDTr). For both EACC1F-B and EACC3E, no significant population-wide effects are expected based on the relatively small area of contamination and the availability of higher quality habitat in the nearby vicinity.

8 REMEDIAL ACTION OBJECTIVE

Remedial Action Objectives (RAOs) are goals developed for the protection of human health and the environment. These objectives can be achieved by reducing exposure (e.g., capping an area or limiting access) as well as reducing the level of contamination. The RAO for the 10 Soil Sites is to prevent unacceptable exposure to contaminants in soil and to minimize risk presented by potential buried UXO and WP at the sites. The planned future use of the 10 Soil Sites is for military/industrial activities. The response action selected in this ROD is necessary to protect the public health and the environment from actual or threatened releases of hazardous substances into the environment.

9 DESCRIPTION OF ALTERNATIVES

Only two alternatives were considered in the Proposed Plan given the limited risk posed by each of the 10 sites, the well-defined future use of the sites, and the ability of the lead agency (the Army) to control access to the sites. For each site, No Action and LUCs have been evaluated.

9.1 Alternative 1: No Action

The NCP requires consideration of "No Action", as a baseline with which to compare other alternatives. Under this alternative, no active remedial measures would be taken to control risks to human or ecological receptors; treat or remove wastes; or reduce the toxicity, mobility, or volume of contaminated media. LUCs would not be implemented. The Army would conduct 5-year reviews because contamination would be left in-place for those sites exhibiting risk under a residential scenario above levels that allow for unlimited use and unrestricted exposure.

Cost Summary

Capital Cost	$0
5-year Review	$15,000
Present Worth Costs (30 years)	$46,000

Estimated Construction Timeframe: *No construction*

Estimated Time to Achieve RAOs: *Will not achieve RAOs*

9.2 Alternative 2: Institutional Controls[1]

The LUC alternative would be used to limit exposure to those areas where contaminant levels would not allow for unrestricted use. These controls include legal mechanisms and notices to restrict access and prohibit unauthorized excavation or construction at the site, and to prohibit residential land uses.

Existing LUCs in the CCSA will continue. These measures include engineering controls, boating access restrictions, and restrictions on subsurface access by site workers. Access restrictions are enforced by security guards. Modifications will be made to the Installation Master Plan and GIS Overlay Maps in order to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use. UXO screening procedures currently in place at APG will remain in effect.

CERCLA 121(c) Five-Year Reviews will be conducted to assess the long-term effectiveness of the LUCs.

Cost Summary

Capital Cost	$12,000
Annual Operation and Maintenance (O&M) Costs	$ 2,500
CERCLA 5-Year Review	$15,000
Present Worth Costs (30 years)	$104,500

Estimated Construction Timeframe: *No construction*

Estimated Time to Achieve RAOs: *6 months*

10 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The following is a comparative analysis of the alternatives considered for remediating the 10 Soil Sites. The alternatives are evaluated against the NCP threshold and primary balancing criteria. The analysis identifies trade-offs between alternatives.

[1] Army policy considers the implementation of LUCs to be a non-action, but the NCP considers it to be an action.

10.1 Overall Protection of Human Health and the Environment

CERCLA, as amended, requires that remedial actions be evaluated for protectiveness of human health and the environment. LUCs are sufficient to prevent exposure of the hypothetical future resident to contaminants identified at the 10 sites. Implementation of the No Action alternative would not prevent potential unacceptable exposure to site contaminants. Thus, the No Action alternative will not be considered further.

10.2 Compliance with Applicable or Relevant and Appropriate Requirements

CERCLA, as amended, requires that remedial actions at NPL sites meet the requirements of other federal and state environmental laws and regulations that are applicable to the site or that address situations sufficiently similar to those at the site to be considered relevant and appropriate. These other laws and regulations, termed Applicable or Relevant and Appropriate Requirements (ARARs), include:

- Chemical-specific (requirements related to site contaminants)
- Location-specific (requirements related to site location)
- Action-specific (requirements related to the specific remedial actions being considered)

There are no chemical-, location-, or action-specific ARARs associated with implementation of LUCs at the 10 Soil Sites in this ROD.

10.3 Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion considers the magnitude of the residual risk that would remain after the alternative has been implemented. It also considers whether the alternative is adequate and reliable in the long term. LUCs would be effective in preventing exposure to site contaminants. Implementation of the proposed LUCs will be effective in preventing the risk inherent in residential exposure to site contaminants by not permitting residential land use, and will be reasonably permanent (i.e., routinely verified to be functional over the course of time). LUCs would not be considered to be as permanent as removal or treatment of the contaminants.

10.4 Reduction of Mobility, Toxicity or Volume Through Treatment

This criterion evaluates how effectively treatment is being employed in the remedial alternative to reduce the toxicity, mobility, and volume of contaminants at the site.

Reduction of toxicity, mobility, or volume through treatment is not applicable because treatment is not involved.

10.5 Short-Term Effectiveness

Short-term effectiveness takes into account protection of remedial workers, members of the community, and the environment during implementation of the remedial action and the time required to achieve RAOs.

The LUC alternative can be readily implemented in 6 months, at which time the RAOs will be achieved, and no risks are presented to the public through its implementation.

10.6 Implementability

Three factors are considered for implementability: whether the alternative is practical in a technical sense; whether it is practical in an administrative sense; and whether the required services and materials are available.

The LUC alternative is readily implementable.

10.7 Cost

The costs considered in this analysis include total capital cost, annual O&M costs, and present worth. The net present worth cost is the amount of money in current dollars necessary to cover the total cost of remediation (i.e., for sites with long-term activities, the present worth assumes a five percent interest rate over a 30-year period).

Alternative	**Present Worth Cost**
2	$ 104,500

10.8 State Acceptance

State representatives have reviewed the remedial alternatives and provided preliminary comments that were addressed in the RI Report and Proposed Plan. Based on a thorough review of the remedial alternatives and public comments, MDE concurs with the Selected Remedy.

10.9 Community Acceptance

In general, the community supports the Selected Remedy for the 10 Soil Sites. Responses to written comments received from the community are presented in Part 3 of this document.

11 PRINCIPAL THREAT WASTES

The COCs present at the 10 Soil Sites addressed by this ROD are considered non-principal threat wastes (i.e., source materials that present only a low risk in current and likely future land use scenarios).

12 SELECTED REMEDY

12.1 Description of the Selected Remedy

The Selected Remedy for the 10 Soil Sites is Alternative 2 – LUCs. The estimated total present worth cost of the remedy is $104,500.

The Selected Remedy includes the following elements:

- LUCs. Under this Selected Remedy, LUCs will be implemented to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use. LUCs will be maintained until the concentration of hazardous substances in the soil are reduced to levels that allow for unlimited use and unrestricted exposure. If this site is subsequently remediated to allow for unlimited use and unrestricted exposure, LUCs will no longer be required. Boundaries for LUC implementation are delineated on Figures 3 through 12.
- CERCLA 121(c) five-year reviews. Five-year reviews will be conducted to assess the long-term effectiveness of the LUCs.

The selected remedy is protective of human and ecological receptors.

12.2 LUC Remedial Design

LUCs will be implemented for the 10 Soil Sites. CERCLA 121(c) five-year reviews will also be conducted for this site (in conjunction with the periodic APG-EA NPL site review) to assess the long-term effectiveness of the remedies (including the LUCs).

The Army shall be responsible for implementation, maintenance, periodic reporting, and enforcement of LUCs. The Army will specify the details of the LUCs to be implemented in a LUC RD document. The Design document will be submitted to USEPA and MDE in accordance with the provisions outlined in the FFA. As part of the Army's inspection and reporting responsibilities, periodic reviews of the restrictions and objectives outlined above will be undertaken and review reports will be submitted at a frequency determined by site-specific conditions (as specified in the USEPA-approved RD). The LUCs will include implementation through the APG Master Planning system with geographic information system support.

Although the Army may transfer these responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall remain ultimately responsible for remedy integrity and shall: i) perform CERCLA 121(c) five-year reviews; ii) notify the appropriate regulators and/or local government representatives of any known LUC deficiencies or violations; iii) provide access to the property to conduct any necessary response; iv) retain the ability to change, modify or terminate LUCs and any related deed or lease provisions; and, v) ensure that the LUC objective is met to maintain remedy protectiveness.

As a condition of property transfer or lease, the Army may require the transferee or lessee in cooperation with other stakeholders to assume responsibility for various implementation actions. Third party LUC responsibility will be incorporated into pertinent contractual, property and remedial documentation, such as a purchase agreement, deed, lease, and RD addendum. To the extent permitted by law, a transfer deed shall require the LUCs imposed as part of a CERCLA remedy to run with the land and bind all property owners and users. If the Army intends to transfer ownership of any site, the Army may, if Federal and/or State law allows, upon transfer of fee title grant the State an environmental covenant or easement that

would allow the State to enforce LUC terms and conditions against the transferee(s), as well as subsequent property owner(s) or user(s) or their contractors, tenants, lessees or other parties. This covenant will be incorporated by reference in the transfer deed and will run with the land in accordance with State realty law. This state enforcement right would supplement, not replace, the Army's right and responsibility to enforce the LUCs.

12.3 Summary of the Rationale for the Selected Remedy

The Selected Remedy (LUCs) for the 10 Soil Sites is protective of human health through the prevention of future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use. Although there may be limited risk to ecological receptors from sediment, elevated lead concentrations are isolated and the locations do not represent a significant risk to receptors. This remedy is dependent on LUCs to provide long-term effectiveness and permanence. It would not result in reduction of toxicity, mobility, or volume of contaminants through treatment. Hazardous substances, pollutants, or contaminants will remain on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, this area will be included in the CERCLA 121(c) five-year review for the APG-EA NPL site.

12.4 Summary of Estimated Remedy Costs

The information in the cost estimate summary is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the LUC design. This is an engineering cost estimate that is expected to be within -30 to +50 percent of the actual project cost (USEPA, 1999 and USEPA, 2000).

The estimated cost for the Selected Remedy includes total capital cost, annual O&M costs, 5-year review costs and present worth over a 30-year period.

The estimated cost for the 10 Soil Sites is $104,500.

12.5 Expected Outcomes of Selected Remedy

LUCs will be implemented at the 10 Soil Sites to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use.

12.6 Performance Standards for the Selected Remedy

The following performance standard has been developed for the selected remedy:

- Establish a restriction in the Installation Master Plan prohibiting development and use of the property for future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use.

13 STATUTORY DETERMINATIONS

13.1 Protection of Human Health and the Environment

To complete a streamlined response, USEPA and MDE support the Selected Remedy for the 10 Soil Sites as necessary to adequately and cost-effectively protect human health and the environment through the prevention of future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use on these sites. Constituents in surface media do not pose unacceptable risk to ecological receptors at the site. Through implementation of LUCs, residential land use will be prevented. RAOs will be achieved upon implementation of LUCs.

13.2 Compliance with Applicable or Relevant and Appropriate Requirements

There are no chemical-, action-, or location-specific ARARs for the Selected Remedy.

13.3 Cost-Effectiveness

The Selected Remedy is considered to be cost-effective because costs are proportional to overall effectiveness.

13.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The Selected Remedy utilizes permanent solutions to protect future residents from exposure to contaminants through implementation and continued enforcement of LUCs which are permanent to the extent that they are maintained. LUCs would not be considered to be as

permanent as removal or treatment of contaminants. The Army will enforce the LUCs described in Section 4 of this document. In the unlikely event of land transfer, deed restrictions will be imposed.

13.5 Preference for Treatment as a Principal Element

The Selected Remedy does not utilize technologies to reduce the toxicity, mobility, and volume of the contaminated soil because of high costs and lack of performance advantages. The Selected Remedy does not satisfy the statutory preference for treatment as a principal element.

13.6 Five-Year Review Requirement

Hazardous substances, pollutants, or contaminants will remain on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, CERCLA 121(c) five-year reviews will be performed for the 10 Soil Sites.

14 DOCUMENTATION OF SIGNIFICANT CHANGES

There are no significant changes from the Proposed Plan.

PART 3: RESPONSIVENESS SUMMARY

The final component of the ROD is the Responsiveness Summary. The purpose of the Responsiveness Summary is to provide a summary of the public's comments, concerns, and questions about the 10 Soil Sites, and the Army's responses to these concerns.

APG held a public meeting on June 17, 2008 to formally present the Proposed Plan and remedial actions and to answer questions and receive comments. During the public comment period, APG also received written comments. All comments and concerns summarized below have been considered by the Army and USEPA in selecting the remedy for this ROD.

The Responsiveness Summary is divided into the following sections:

1. Overview.
2. Background on community involvement.
3. Summary of comments received during the public comment period and APG’s responses.

1 OVERVIEW

At the time of the public comment period, the Army had published the preferred alternative for the 10 Soil Sites in the CCSA. LUCs were proposed as the preferred alternative for all 10 sites to prevent future military family housing, elementary and secondary schools, child care facilities, playgrounds, and non-military residential land use. To complete a streamlined response, USEPA and MDE support the Selected Remedy outlined in this ROD as necessary to adequately and cost-effectively protect human health and the environment. The community also agrees with the Selected Remedy.

2 BACKGROUND ON COMMUNITY INVOLVEMENT

APG has maintained an active public involvement and information program for the IRP since the early 1990s. APG's specific community relations activities for the CCSA included:

- Information regarding the 10 Sites was briefed to the RAB several times over the last few years.
- The public comment period on the Proposed Plan ran from June 16, 2008 to July 30, 2008. Copies of the Proposed Plan were made available to the public through APG's administrative record locations at the Edgewood and Aberdeen branches of the Harford County Library and the Miller Library at Washington College in Kent County.
- APG prepared a release announcing the availability of the Proposed Plan, the dates of the public comment period, and the date and time of the public meeting. APG placed newspaper advertisements announcing the public comment period and meeting in The Aegis, The Avenue, The Cecil Whig, The East County Times, and The Kent County News. A copy of the newspaper advertisement announcing the public comment period and the public meeting is provided on Figure 13.
- APG prepared and published a fact sheet on the Proposed Plan including information on the public meeting. APG mailed copies of this fact sheet to more than 2,600 citizens and elected officials on its IRP mailing list. The fact sheet included a form, which citizens could use to send APG their comments.
- On June 17, 2008, APG held a public meeting at the Edgewood Senior Center in Edgewood, Maryland. Representatives of the Army, USEPA, and MDE were present at the meeting. APG representatives presented information on the 10 Soil Sites and on the proposed remedial action. A summary of the meeting is available in Attachment B of this ROD.

3 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Comments raised during the public comment period are summarized below. As part of its fact sheet on the Proposed Plan, APG included a questionnaire that residents could return with their comments. APG received 4 completed forms. The alternatives preferred by individuals returning comment forms were:

__0____ - Alternative 1 – No Action

__4____ - Alternative 2 – LUCs

The Army selected Alternative 2, with concurrence from the USEPA. MDE also agreed with the selected remedy. Alternative 2 was also selected by all of the responding community members.

Written comments included on the forms are summarized below:

Comment 1:

I feel the risk assessments do not warrant further investigation and that sampling for lead is needed to fully assess the risk to future residents. Also, the LUCs are needed to prevent future residential use of these sites.

Alternative number (2) should be implemented to prevent site activities that would result in unacceptable exposure. Restrict access to prohibit unauthorized excavation or construction on all sites.

Response 1:

Implementation of LUCs at the 10 Soil Sites will effectively prevent unacceptable exposures and will prohibit unauthorized excavation or construction.

Figure 13: Newspaper Ad

U.S. ARMY INVITES PUBLIC COMMENT ON PROPOSED PLAN FOR 10 SOIL SITES, CANAL CREEK STUDY AREA

The U.S. Army at Aberdeen Proving Ground (APG) invites the public to comment on its Proposed Plan for the 10 Soil Sites, Canal Creek Study Area.

FACT SHEET

APG has prepared a fact sheet on the Proposed Plan which includes a comment form that can be returned to APG.

If you are not on APG's mailing list, you can request a copy of the fact sheet by calling APG's 24-hour Environmental Information Line at (410) 272-8842 or (800) APG-9998.

WEB SITE

You can request a copy of the Proposed Plan and provide comments through the APG Web Site at www.apg.army.mil.

PUBLIC MEETING

APG invites the public to attend a meeting on:

DATE: Tuesday, June 17, 2008

TIME: 6:30 p.m. – informal poster/ information session

7:15 p.m. – presentation

PLACE: Edgewood Senior Center
1000 Gateway Rd., Edgewood, MD 21040

The meeting location is wheelchair accessible, and an interpreter for the hearing impaired is available with 72-hours advance notice (call 800-APG-9998).

WRITTEN COMMENTS

The 45-day public comment period on the proposed action extends from June 16 to July 30, 2008. Written comments, postmarked by July 30, 2008, should be sent to:

Mr. Ken Stachiw
Directorate of Safety, Health & Environment
ATTN: IMNE-APG-SHE-R
Building E5771 Magnolia Road
Aberdeen Proving Ground, MD 21010; or

Ms. Yazmine Yap-Deffler
U.S. Environmental Protection Agency
Region III, 1650 Arch Street
Philadelphia, PA 19103-2029; or

Ms. Heather Njo
Maryland Department of the Environment
Federal Facilities Division
Hazardous Waste Program
1800 Washington Boulevard, Suite 645
Baltimore, MD 21230-1719

PROPOSED ACTION

APG is proposing to take action at 10 Soil Sites within the Canal Creek Study Area. The Preferred Alternative is Land Use Controls (LUCs) including prohibition of future residential use, and modifications to the Installation Master Plan and GIS Overlay Maps.

ALTERNATIVES EVALUATED FOR THE 10 SOIL SITES

Alternative 1, No Action: The law requires APG evaluate taking no action to establish a baseline for comparison with other alternatives. Reviews would be conducted every five years.

Cost: $46,000

Alternative 2, LUCs: APG would implement LUCs to prevent future residential land use. Five year reviews would be completed and a LUC Implementation Plan would be required.

Cost: $104,503

Based on an analysis of the alternatives, APG prefers Alternative 2, LUCs.

The preferred alternative may be modified or new alternatives may be developed based on public input. The final alternative selected will be documented in a Record of Decision that summarizes the decision-making process. APG will summarize and respond to comments received during the comment period as part of the Record of Decision. Copies of the Remedial Investigations and the Proposed Plan are available for review at the APG information repositories. The repositories are located at the Edgewood (410-612-1600) and Aberdeen (410-273-5608) branches of Harford County Library and Miller Library at Washington College in Kent County (410-778-7292).

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Comment 2:

Can't read the numbers on buildings on Figure 2 – need clearer map.

Are the chemicals and waste "left in place" checked periodically to ensure that they are not leaking from the containers they are stored in?

Response 2:

We apologize for the lack of clarity with regard to the referenced figure. An effort has been made to improve the quality of figures for this ROD.

Materials "left in place" at the 10 Soil Sites refer to contaminants that exist above regulatory criteria in the soil itself rather than being stored in containers. The status of the site will be fully assessed every five years as part of the CERCLA Five-Year Review process to ensure that the chosen remedy remains protective of human health and the environment.

Comment 3:

This land sounds like it needs strict controls to be sure future generations don't use it for residences, etc.

Response 3:

Implementation of LUCs at the 10 Soil Sites will effectively prevent unacceptable exposures by prohibiting residential land use.

Comment 4:

The description on previous pages is too complicated for me to understand. I am just glad that you are doing something. I vote for #2.

Response 4:

We apologize for the complexity of the document and will make an effort in future documents to make them more easily readable.

PART 4: REFERENCES

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___ 2006c. *Data Evaluations and Risk Characterizations for DSERTS Sites in the Canal Creek Study Area, Volume IV: Kings Creek Industrial Area, Draft.* APG-MD.

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ATTACHMENT A
PUBLIC MEETING MINUTES

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SUMMARY OF PUBLIC MEETING
HELD ON 17 JUN 2008

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SUMMARY
10 SOIL SITES IN THE CANAL CREEK STUDY AREA
PROPOSED PLAN PUBLIC MEETING
17 June 2008, 6:30 PM
Edgewood Senior Center, 1000 Gateway Road
Edgewood, Maryland

Attendees:
Community Members: None Present
Weston: Nick Palczuk
Maryland Department of the Environment (MDE): Heather Njo, Butch Dye
Restoration Advisory Board (RAB) Members: Ruth Ann Young, Christine Grochowski
US Army Aberdeen Proving Ground (APG) Directorate of Safety, Health and the Environment (DSHE) Environmental Conservation and Restoration Division (ECRD): John Wrobel, Karen Jobes
USAPG Public Affairs Office (PAO): George Mercer
US Army Environmental Command (AEC): Douglas Scarborough
US Environmental Protection Agency (USEPA) Region III: Yazmine Yap-Deffler
Plexus Scientific: Jeff Sgambato, Chris Boes, Sarah Forman
Myers Engineering: Lisa Myers

** Prior to the start of the meeting, an informal information poster session was held to provide an opportunity for community members to ask questions about the sites included in the Canal Creek Study Area (CCSA) 10 Soil Sites Proposed Plan. No significant questions or concerns were expressed by the meeting attendees during the poster session.*

1.0 Welcome & Introductions

Mr. George Mercer (APG PAO) welcomed all attendees to the Proposed Plan (PP) for CCSA 10 Soil Sites Public Meeting. Mr. Mercer introduced Ms. Yazmine Yap-Deffler (USEPA), Mr. Harold Dye (MDE), Ms. Heather Njo (MDE), Ms. Ruth Ann Young (RAB Member), Ms. Christine Grochowski (RAB Member), Mr. Douglas Scarborough (AEC), and Mr. John Wrobel (APG DSHE ECRD Project Officer). Mr. Mercer emphasized that public participation is extremely important to the success of the Installation Restoration Program (IRP). Mr. Mercer encouraged attendees to raise any concerns or questions during the meeting. Mr. Mercer added that attendees also have the option of submitting written comments at a later date. Mr. Mercer introduced John Wrobel as a project manager for Aberdeen Proving Ground.

Mr. John Wrobel thanked all attendees, and explained that he is employed as a project manager at Aberdeen Proving Ground. Mr. Wrobel stated that he manages the CCSA, including the 10 Soil Sites that will be addressed during the meeting. Mr. Wrobel encouraged attendees to ask questions at any point during the meeting.

Mr. Wrobel stated that the purpose of this public meeting was to present and discuss the 10 Soil Sites Proposed Plan. This included background for each site, chemicals of concern, risks, and preferred remedial action. The 10 Soil Sites are currently in the CERCLA remedial process. The process began with site investigations in the mid-1970s to mid-1980s. Due to the Hazard Ranking Score, APG, Edgewood Area (EA) was placed on the National Priority List as a high

priority site for investigation and cleanup. Therefore, Remedial Investigation/Feasibility Studies ensued and the nature and extent of contamination was investigated, based on APG's history.

For each of the 10 Soil Sites, the feasibility of cleanup and the risks of leaving the contamination in place, versus removal, were evaluated. The objective of this presentation is to discuss the Proposed Plan, including the preferred remedial alternative. Comments on the Proposed Plan will be incorporated into the Record of Decision (ROD), which is agreed upon by the USEPA, MDE, and APG. Eventually, all sites at APG will be delisted. For the 10 Soil Sites, APG is currently in the remedy selection phase of the CERCLA remedial process.

Mr. Wrobel stated that the Edgewood Area has been used since 1917 for testing and development of chemical agents. Waste handling and disposal activities were unregulated until a later date.

The CCSA is comprised of approximately 700 acres and is divided into four quadrants for management purposes. Remedial Investigation sampling activities throughout the CCSA occurred from the mid 1990s to the early 2000s. Monthly RAB meetings were held to obtain input during this process.

2.0 10 Soil Sites

Mr. Wrobel displayed a map showing the 10 Soil Sites that were evaluated in the Proposed Plan. Mr. Wrobel mentioned that the Army uses designations for each site for tracking purposes (such as EACC1F-A).

Building E5604 Area

Mr. Wrobel displayed a map depicting the Building E5604 Area with sample locations. Mr. Wrobel stated that signs of stressed vegetation and any records of where the waste was handled or disposed were used to bias sampling at each site. The RAB was advised of the sample locations, which were agreed upon by the USEPA and MDE. This particular site was constructed during WWII for chemical munitions filling and mask and filter manufacturing. The site encompasses eight acres. The primary contaminants are arsenic and benzo(a)pyrene.

Mr. Wrobel stated that three things determine if a remedial action is warranted and they are: chemicals, concentration, and impact to a receptor (human or ecological). The Ecological Risk Assessment consisted of seven steps and was reviewed by the USEPA, MDE, and the Biological Technical Assistance Group (BTAG). The Human Health Risk Assessment evaluates carcinogenic and non-carcinogenic effects. The current and likely future use of the EA of APG will remain as military/industrial use. The carcinogenic and non-carcinogenic effects were evaluated under a military/industrial scenario. No carcinogenic or non-carcinogenic risks were determined under this scenario. However, under a residential scenario, some unacceptable non-carcinogenic risks were determined for the hypothetical future resident child. The risk assessment process was the same for all 10 Soil Sites.

Former Building 80 Smoke Laboratories

Mr. Wrobel displayed a map depicting the Former Building 80 Smoke Laboratories with sample locations. The buildings were previously demolished. Primary contaminants are arsenic and nitrobenzene. There is a nitrobenzene risk to some ecological receptors (birds and small

mammals) using the conservative scenario assumed in the Ecological Risk Assessment. The risk assessment model assumes the same concentration across the site, based on the single highest detection. However, the actual localized contamination won't impact the overall population. It was determined in Step 8, the Risk Management step, that there is no need for action to protect ecological receptors. Carcinogenic and non-carcinogenic risks were within the USEPA's acceptable range for the military/industrial land use scenario

Building E5185 WWII Mustard Plant

Mr. Wrobel displayed a map depicting the Building E5185 WWII Mustard Plant with sample locations. This site was used as a filling plant through WWII. It is approximately 12 acres in size and consists of a building and a parking lot. The primary contaminants are arsenic and benzo(a)pyrene. There are no unacceptable risks based on either the Human Health Risk Assessment (for military/industrial use) or the Ecological Risk Assessment.

Phosgene Plant Area

Mr. Wrobel displayed a map depicting the Phosgene Plant area with sample locations. Phosgene was a chemical warfare agent that was produced on-site. The primary contaminants are arsenic and iron. The site is approximately 15 acres in size. There are no unacceptable risks based on the Human Health Risk Assessment (for military/industrial use) or the Ecological Risk Assessment.

Building 113 WWI Gas Instruction Chamber

Mr. Wrobel displayed a map depicting the Building 113 WWI Gas Instruction Chamber with sample locations. The site was demolished in the early 1960s. The primary contaminants are PAHs, arsenic, and gross alpha and beta. There was a residential child and adult risk for skin only (target organ), due to arsenic. Results of the Human Health Risk Assessment indicated that there were no unacceptable risks under the military/industrial land use scenario. No unacceptable risks were determined based on the Ecological Risk Assessment.

Building 3300 Laboratory Complex

Mr. Wrobel displayed a map depicting the Building 3300 Laboratory Complex with sample locations. It was built as a "super toxics" laboratory for research and development of chemical warfare during WWII. Primary contaminants are arsenic and DDTr (4,4'-DDT and its primary degradation products 4,4'-DDD and 4,4'-DDE). The area consists of a parking lot with grassy areas. There are no unacceptable risks based on the Ecological Risk Assessment or the Human Health Risk Assessment under the military/industrial land use scenario.

Building 35XX Area

Mr. Wrobel displayed a map depicting the Building 35XX Area with sample locations. The site consists of numerous small laboratories. The primary contaminant is arsenic. There are no unacceptable risks based on the Ecological Risk Assessment or the Human Health Risk Assessment under the military/industrial land use scenario.

Building E3570 Assembly Plant

Mr. Wrobel displayed a map depicting the Building E3570 Assembly Plant with sample locations. It was constructed in the 1950s and was used for rocket/munitions testing and

assembly. The primary contaminant is arsenic. There are no unacceptable risks based on the Ecological Risk Assessment or the Human Health Risk Assessment under the military/industrial land use scenario.

B-Field Range

Mr. Wrobel displayed a map depicting the B-Field Range with sample locations. It was used as an impact area for mortar and artillery from A-Field during the 1920s and used to store nerve agents in the 1940s. The primary contaminant is arsenic. The site is approximately 54.2 acres in size. There are no unacceptable risks based on the Ecological Risk Assessment or the Human Health Risk Assessment under the military/industrial land use scenario.

Mosquito Test Grid Area

Mr. Wrobel displayed a map depicting the Mosquito Test Grid Area with sample locations. It was discovered during site reconnaissance of the area (not in the original RCRA assessment) and consists of 82 bermed, plastic-lined ponds. The ponds were used for the development of insecticides to control mosquitoes. The primary contaminants are arsenic and mercury. There were no unacceptable risks based on the Ecological Risk Assessment. Under a hypothetical future resident scenario, there was an unacceptable risk to the central nervous system target organ (primarily due to mercury) for both the child and adult cases. There are no unacceptable carcinogenic or non-carcinogenic risks to human health under a military/industrial land use scenario.

Summary of Remedial Alternatives

Mr. Wrobel discussed the two remedial alternatives for the 10 Soil Sites [No Action and Land Use Controls (LUCs)]. The land use must remain military/industrial to limit exposure to contaminants. It is required by CERCLA that No Action be considered as a baseline for use as a comparison with all alternatives. LUCs limit exposure to areas, prohibit development as residential, and involve excavation restrictions. All excavation activities must be approved through APG. For the LUCs alternative, restrictions would be entered into the Installation's Geographical Information System (GIS). The 30 year cost of the No Action alternative is $46,000, which includes a five-year review. Excavation permits have to be approved, especially those in that area(s) of LUCs.

Mr. Wrobel discussed that the alternatives must be evaluated in terms of the nine evaluation criteria, which are protection of human health and the environment; compliance with applicable regulations; long-term effectiveness; short-term effectiveness; implementability; cost; reduction of toxicity, mobility, or volume; and state and community acceptance. For the ROD, the Army will be held accountable and five-year reviews will be required. LUCs is the preferred alternative for all 10 Soil Sites. This alternative will prevent residential use/exposure to contaminants, will be protective of human health, and ecological risks will be acceptable. The 30 year cost of the LUCs alternative is $104,000. GIS will be maintained over 30 years for the LUCs sites.

3.0 General Questions and Discussion

Mr. Wrobel stated that public comments on the proposed plan will be incorporated into the ROD. The comment period extends until July 30, 2008.

Ms. Young provided comment in support of the preferred alternative (LUCs at the 10 Soil Sites over 30 years). She also inquired whether APG record keeping was previously tied into the Harford County GIS system. Mr. Wrobel stated that the Army would check into whether APG is tied into the Harford County GIS.

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ATTACHMENT B
CONCEPTUAL SITE MODELS

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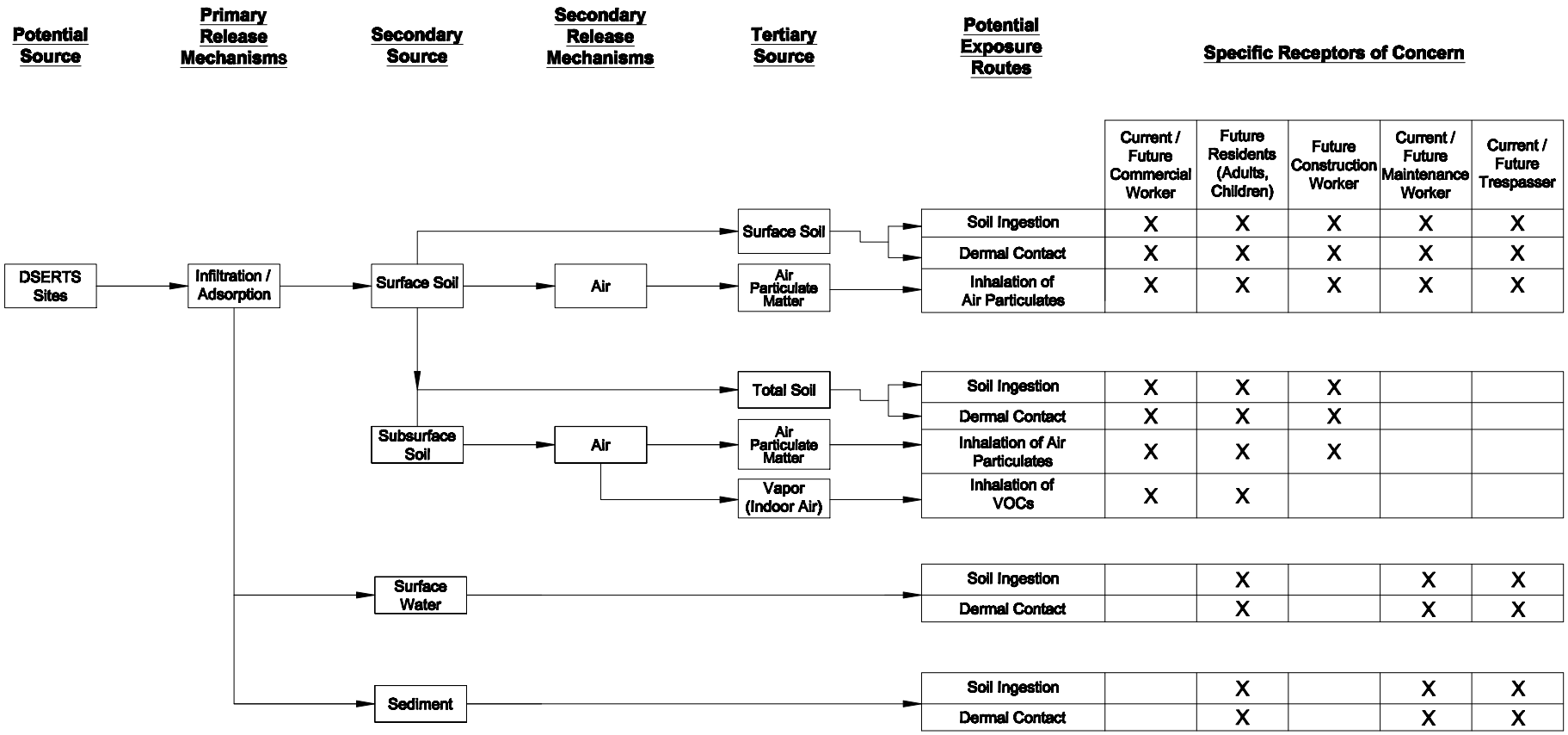

Potential Source	Primary Release Mechanisms	Secondary Source	Secondary Release Mechanisms	Tertiary Source	Potential Exposure Routes	Current / Future Commercial Worker	Future Residents (Adults, Children)	Future Construction Worker	Current / Future Maintenance Worker	Current / Future Trespasser
DSERTS Sites	Infiltration / Adsorption	Surface Soil		Surface Soil	Soil Ingestion	X	X	X	X	X
					Dermal Contact	X	X	X	X	X
			Air	Air Particulate Matter	Inhalation of Air Particulates	X	X	X	X	X
		Subsurface Soil		Total Soil	Soil Ingestion	X	X	X		
					Dermal Contact	X	X	X		
			Air	Air Particulate Matter	Inhalation of Air Particulates	X	X	X		
				Vapor (Indoor Air)	Inhalation of VOCs	X	X			
		Surface Water			Soil Ingestion		X		X	X
					Dermal Contact		X		X	X
		Sediment			Soil Ingestion		X		X	X
					Dermal Contact		X		X	X

Human Health Conceptual Site Model: Canal Creek Study Area - Main Industrial Area - Northwest

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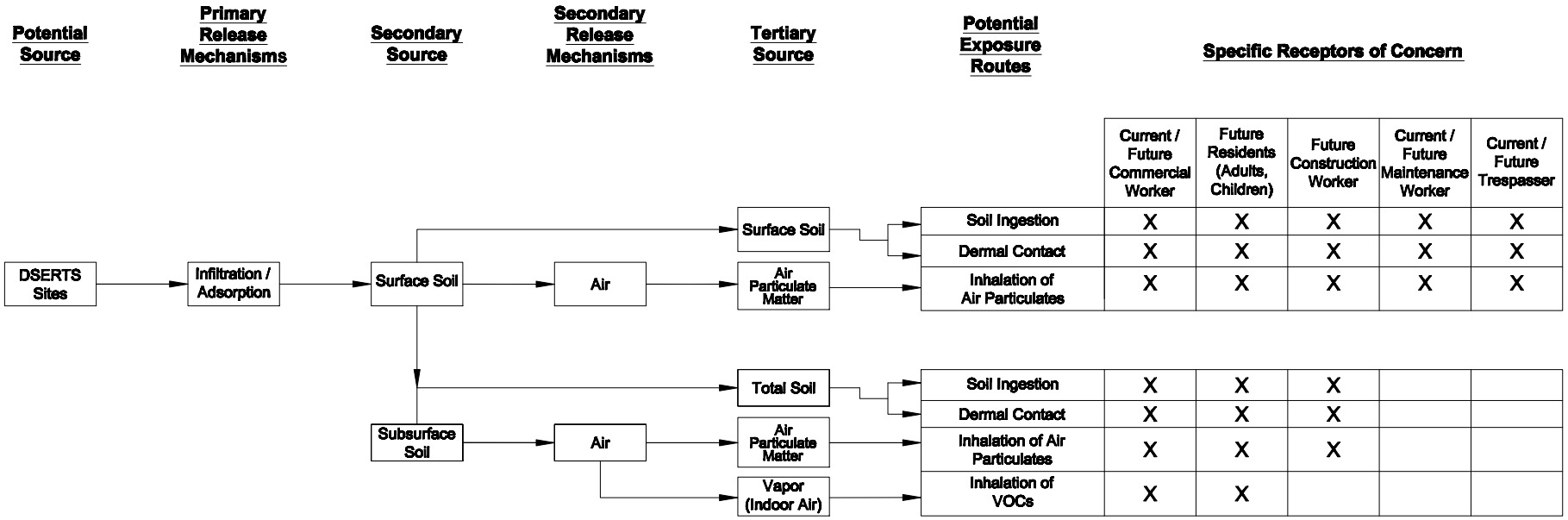

Human Health Conceptual Site Model: Canal Creek Study Area - Main Industrial Area - Southwest

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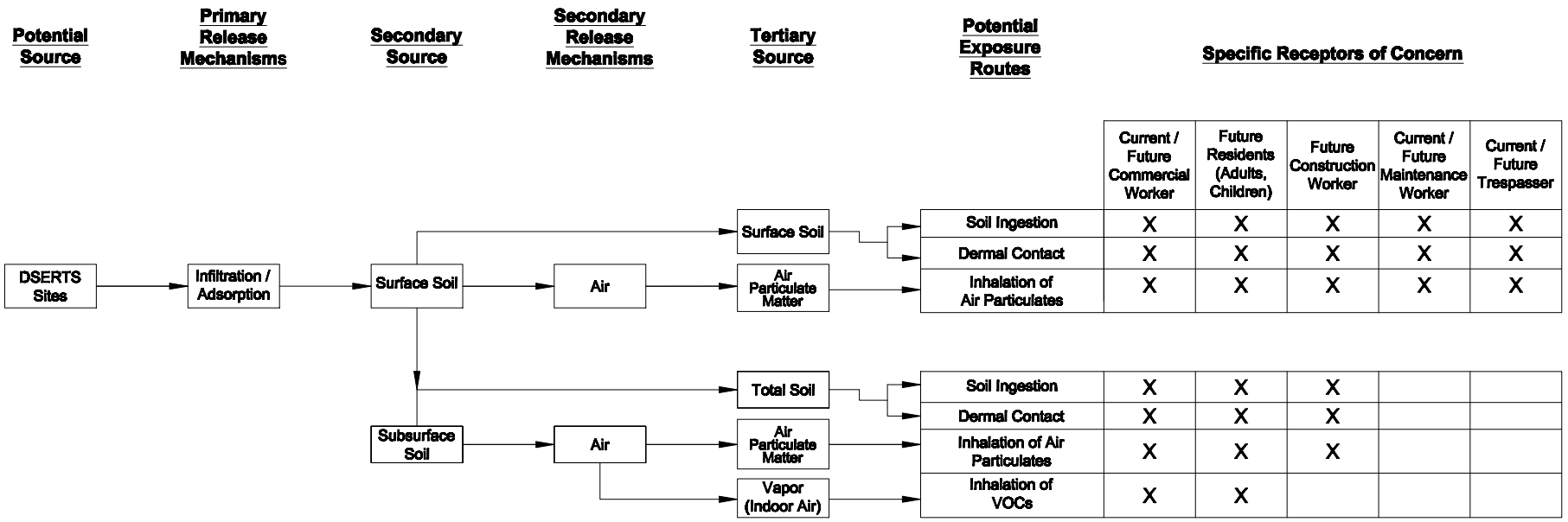

Potential Exposure Routes	Current / Future Commercial Worker	Future Residents (Adults, Children)	Future Construction Worker	Current / Future Maintenance Worker	Current / Future Trespasser
Soil Ingestion	X	X	X	X	X
Dermal Contact	X	X	X	X	X
Inhalation of Air Particulates	X	X	X	X	X
Soil Ingestion	X	X	X		
Dermal Contact	X	X	X		
Inhalation of Air Particulates	X	X	X		
Inhalation of VOCs	X	X			

Human Health Conceptual Site Model: Canal Creek Study Area - Kings Creek Industrial Area